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(54) Drinking container and method for a pulsed delivery of a tastant

(57) The invention provides drinking container (1) comprising a first compartment (10) arranged to comprise a first liquid (11), a second compartment (20) arranged to comprise a second liquid (21), and a straw (100), comprising a straw wall (150), a user opening (105), a first inlet (101) arranged to allow the first liquid (11) enter the straw (100), a second inlet (102) arranged to allow the second liquid (21) enter the straw (100), and a rotatable device (200) arranged within the straw (100), the rotatable device (200) comprising a device opening (222). The straw (100) is arranged to allow the first liquid (11) flow in a direction from the first inlet (101) to the user opening (105) with a flow, and the rotatable device (200) is arranged to rotate by the flow, thereby rotating the device opening (222) along the second inlet (102). Further, the rotatable device (200) is arranged to provide a pulsed delivery of the second liquid (21) to the straw (100) as a result of the rotation. Such drinking container (1) can be used for a pulsed delivery of a tastant to a consumer for reducing tastant content.

Fig 1a

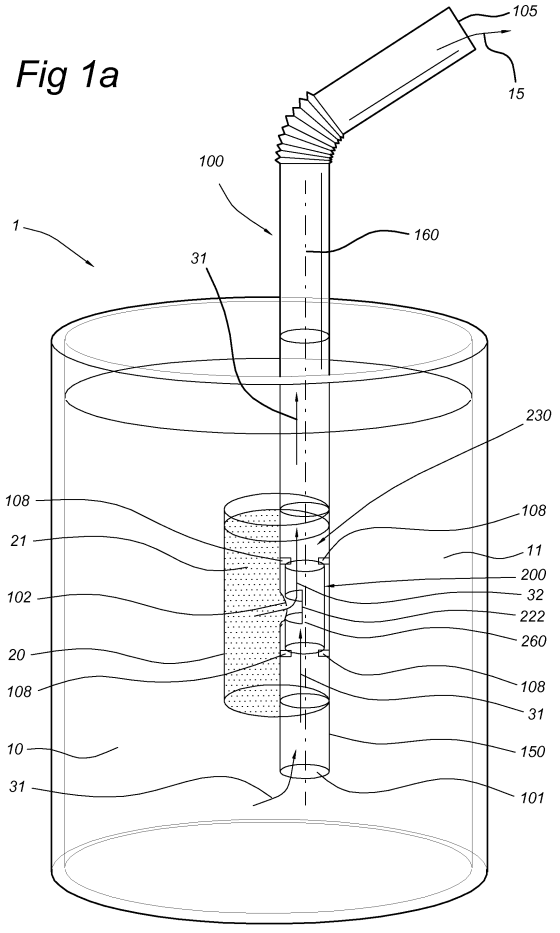

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Fig 1b

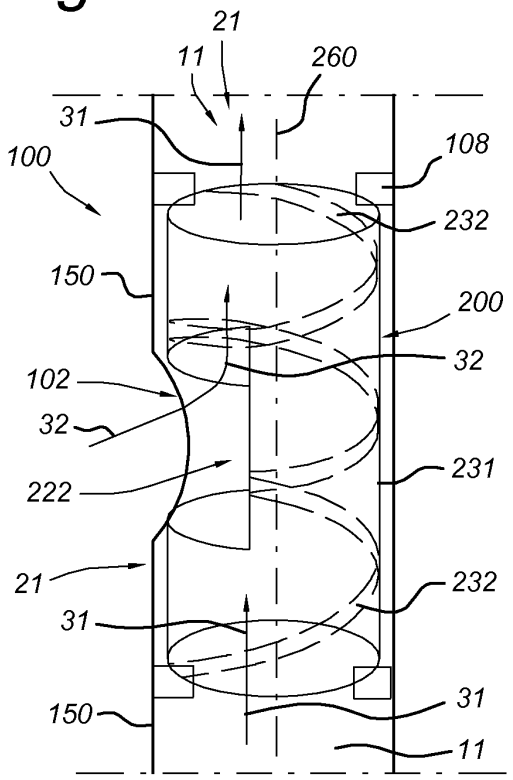
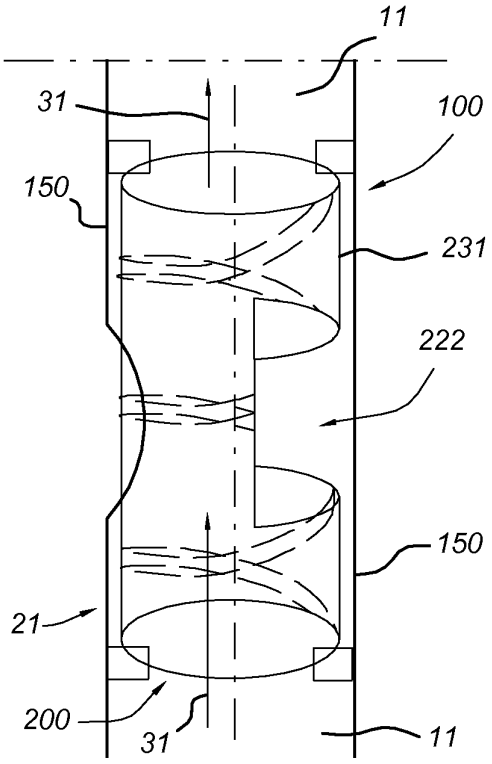

21
11
260
31
100
108
232
150
200
32
102
32
231
222
21
232
31
31
150
11

Fig 1c


11
31
100
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231
222
150
21
200
31
11

Description

Field of the invention

[0001] The invention relates to a drinking container, a straw for such drinking container, a method for the pulsed delivery of a tastant (and/or another compound). The invention further relates to the use of a pulsed delivery of a tastant (and/or another compound) to enhance tastant perception and/or other sensory perceptions.

Background of the invention

[0002] Pulsed delivery of pharmaceuticals is known in the art. WO2000/069420 for instance describes that the use of microencapsulation to protect sensitive bioactive agents from degradation is known. Typically, a bioactive agent is encapsulated within any of a number of protective wall materials, usually polymeric in nature.

[0003] The agent to be encapsulated can be coated with a single wall of polymeric material or can be homogeneously dispersed within a polymeric matrix. The amount of agent inside the microcapsule can be varied as desired, ranging from either a small amount to as high as 95% or more of the microcapsule composition. The diameter of the microcapsule can also be varied as desired, ranging from less than one micrometer to as large as three millimeters or more.

[0004] EP199362, US4900556 and US4921757 describe a system for delayed and pulsed release of biologically active substances. The active substance is entrapped in encapsulated liposomes which are stimulated by external factors or by including a phospholipase within the liposomes, at distinct intervals of time to produce a pulsed release of the entrapped substance. Vitamin C (ascorbic acid) is an example of a bioactive agent, which its presence in the body is needed at substantial high concentrations but at the same time is not entirely absorbed when administered in a single dose.

[0005] EP1161878 for instance indicates that a flavour burst, resulting from the fact that the flavour is not homogeneously distributed in a dough or bread product, are liked by consumers.

[0006] US2002142075 describes an assemblage for simultaneously ingesting more than one liquid beverage, having a plurality of individual conduits, a plurality of beverage receptacles, and a joining mechanism for joining said receptacles into a unified structure. The conduits, receptacles, and joining mechanism are of complementarily size and configuration such, that when the device is assembled, the conduits can reach from the furthest interior of its respective receptacle, through an outlet in said receptacle, and comfortably into a user's mouth.

[0007] Meiselman and Halpern, Physiology and Behaviour 11 (1973), 713-716, describe enhancement of taste intensity through pulsatile stimulation.

Summary of the invention

[0008] It was found that a pulsed delivery of a tastant increases tastant perception by a consumer. Hence, it seems interesting to provide a food product which allows a pulsed tastant delivery, on the one hand to provide consumers with an increased tastant perception, and/or on the other hand to provide food products with reduced tastant contents, such as with a reduced salt or sugar content. Further, there is a desire to provide a pulsed delivery of a flavour.

[0009] Therefore, there is a desire to provide a food product which allows a pulsed addressing of one or more of olfactory, gustative and somato (OGS) organs, such as taste buds or olfactory organs. In this way, for instance olfactory receptors or tastant receptors may be addressed (in a pulsed way).It is especially a desire to provide a drinking container with a straw, that can be used to provide a liquid food product, with which olfactory-sensory, gustative-sensory and somato-sensory (OGS) stimuli can be provided in a pulsed way. Further, it is especially a desire to provide a drinking container with a straw, that can be used to provide a liquid food product, wherein the consumer, when consuming the liquid food product, receives a pulsed tastant delivery of (for instance) the tastant in the liquid.

[0010] Further, there may be a desire to provide other compounds, such as a colourant, in a pulsed way. The compound to be delivered, such as one or more of the stimulus, colourant, drug or pharmaceutical, in a pulsed way, is also indicated as "active food ingredient".

[0011] Hence, it is an aspect of the invention to provide a drinking container (or beverage container), an alternative straw for a drinking container which preferably allow pulsed delivery of a liquid, such as a liquid comprising a tastant, or a liquid comprising a drug or a pharmaceutical, etc.. It is further an aspect of the invention to provide a method for the pulsed delivery of a tastant (and/or another compound, such as one or more selected from the group consisting of a drug, a pharmaceutical and a colourant) to a liquid food product when a consumer is consuming the liquid food product from such drinking container, especially when consuming through a straw.

[0012] Herein, the invention is especially further elucidated with respect to a tastant (or a liquid comprising a tastant). However, in embodiments, instead of a tastant, also another compound may be included, such as a drug or a pharmaceutical, a colourant, etc. Also a combination of one or more of such compounds may be delivered pulsewise. Hence, where applicable, the term tastant may be replaced by "compound" or "active food ingredient". In general, the invention is directed to embodiments wherein a pulsed delivery of an active food ingredient may be provided, wherein the active food ingredient may especially be selected from the group consisting of an olfactory-sensory stimulus, a gustative-sensory stimulus, a somato-sensory stimulus, a drug, a pharmaceutical, and a colourant, especially selected from the group

of OGS-sensory stimuli. As will be clear to a person skilled in the art, also a combination of active food ingredients may be applied.

[0013] The stimuli may be chosen to influence one or more perceptions selected from the group consisting of bitter, salty, sour, sweet, umami, kokumi, fatty, dry, metallic, prickling, hot, cool, numb, and temperature, more preferably one or more tastants selected from the group consisting of bitter, sweet, sour, salty and umami tastants. One or more of the stimuli may be chosen to increase such perception but may also be chosen to decrease such perception, for instance when the first liquid comprises a stimulus with an undesired perception or undesired perception intensity.

[0014] According to a first aspect, the invention provides a drinking container designed to contain a liquid food product and designed to provide a pulsed release of a tastant (and/or another compound; as mentioned herein) when consuming the liquid food product from the drinking container. Especially, the drinking container is designed to provide a pulsed release of the tastant (and/or another compound) to the liquid food product (flowing in the direction of the consumer) upon consumption of the liquid food product by the consumer. Even more especially, the drinking container is designed to provide a pulsed release of the tastant (and/or another compound) in a pulse frequency of at maximum about 0.5 Hz when the consumer is consuming the product. Especially, the drinking container is designed to provide such pulse frequency for a predetermined type of consumers, such as children or adults of a specific age, and/or children or adults in a specific condition (such as when being ill or when having a specific illness or handicap). The pulse frequency is especially in the range of at maximum about 0.1 Hz.

[0015] Hence, in a specific embodiment, a drinking container is provided designed to provide a pulsed release of a tastant (and/or another compound) to the liquid food product (flowing in the direction of the consumer) upon consuming the liquid food product, wherein the liquid food product is especially designed for a predetermined target group, wherein the drinking container is further designed to provide a pulsed release of the tastant (and/or another compound) in a pulse frequency of at maximum about 0.5 Hz, upon consumption of the liquid food product by a member of the target group. A preferred pulse frequency, especially for tastants, is in the range of about 0.05-0.5 Hz, such as about 0.1-0.5 Hz.

[0016] Herein, the term "consuming" especially relates to sucking the liquid food product from the container through the straw through the user opening by a user.

[0017] In yet a further aspect, the invention provides a drinking container comprising

a. a first compartment arranged to comprise a first liquid;

b. a second compartment arranged to comprise a second liquid;

c. a straw, comprising a straw wall, a user opening, a first inlet arranged to allow the first liquid enter the straw, a second inlet arranged to allow the second liquid enter the straw, and a rotatable device arranged within the straw, the rotatable device comprising a device opening,

wherein the straw is arranged to allow the first liquid flow in a direction from the first inlet to the user opening with a flow, and wherein the rotatable device is arranged to rotate by the flow, thereby rotating the device opening along the second inlet, and

wherein the rotatable device is arranged to provide a pulsed delivery of the second liquid to the straw as a result of the rotation.

[0018] Such drinking container may be used to provide a pulsed delivery of the second liquid to the consumer(s mouth), due to the pulsed delivery (during consumption) of the second liquid to the straw, whereby the pulsed delivery to the consumer of the second liquid is provided while the consumer is consuming the liquid food product. The consumer sucks the first liquid through the straw, and thereby receives a pulsed delivery of the second liquid. Thereby, the consumer is consuming the liquid food product. As a result of the pulsed delivery of the second liquid to the straw, when the consumer is generating the flow of the first liquid to the consumers mouth, the consumer may also receive a pulsed delivery in the consumers mouth of the second liquid.

[0019] Such drinking container is preferably a container (for containing a liquid food product) designed to provide a pulsed release of a tastant (for instance contained in the second liquid in a high concentration) (or another active food ingredient) when consuming the liquid food product as defined above. Thus, the drinking container, comprising the straw, is especially arranged to provide a pulsed release of a compound, such as a tastant, to the liquid food product when the liquid food product is consumed. The second liquid especially comprises such compound, like a compound selected from the group consisting of a tastant, a colorant, a drug, a pharmaceutical, a flavour, etc.. The term "a compound" may also include a plurality of compounds, such as a tastant and a drug, or a combination of pharmaceuticals, etc..

[0020] Here, the term "liquid food product" especially refers to the first liquid or more especially to the combination of the first and the second liquid. The liquid food product as consumed by the consumer especially is a composite product, composed of the first liquid and the second liquid. The phrase "container containing a liquid food product" is therefore especially to be understood in the sense that the container contains the first and the second liquid, which form the liquid food product when the consumer consumes the liquids in the drinking container, especially by sucking the straw. In general, the composition of the liquid food product will be dominated by the first liquid.

[0021] The pulsed delivery of the tastant or other stim-

ulus may allow reducing stimulus content in the food product and/or enhancing of stimulus perception by the consumer (relative to the same food product wherein the olfactory-sensory, gustative-sensory and/or somato-sensory (OGS) stimuli would homogeneously be distributed and/or continuously be released). Further, the pulsed delivery of the tastant or other stimulus may also be applied to mask or reduce perception of undesired stimuli of the liquid, especially the first liquid, such as the taste or flavour of a bitter component. Hence, the invention can also be applied to mask the presence of stimuli which are perceived (in the content used in the liquid food product) as less present, such as for instance of a vitamin.

[0022] Therefore, the invention also provides the use of a pulsed delivery of a compound (including more than one of such compounds) selected from the group of OGS-sensory stimuli to a consumer for reducing the content of such compound(s). The invention also provides the use of a pulsed delivery of a compound (including more than one of such compounds) selected from the group of OGS-sensory stimuli to a consumer for enhancing olfactory, gustative and/or somato perception. A combination of enhancing perception while also reducing the stimulus content may also be obtained in embodiments of the invention.

[0023] Especially, the invention also provides the use of a pulsed delivery of a tastant to a consumer for reducing tastant content. The invention also provides the use of a pulsed delivery of a tastant to a consumer for enhancing tastant perception. A combination of enhancing tastant perception while also reducing tastant content may also be obtained in embodiments of the invention.

[0024] In a specific embodiment, the second liquid comprises a tastant with a second tastant content, wherein the first liquid optionally comprises the same tastant with a first tastant content, and wherein the first tastant content is zero, or, when the first tastant content is larger than zero, the ratio of the second tastant content to the first tastant content is ≥ 1.2, preferably ≥ 1.5, even more preferably ≥ 2, yet even more preferably ≥ 5, yet even more preferably ≥ 10. In a specific embodiment, the tastant content in the first liquid is 0. The tastant content can be indicated in concentration or in vol.% or in wt.% (weight percentage). In the present invention, the content of tastants may in general be indicated in wt.%. Likewise, this may apply to embodiments

wherein the second liquid, and optionally the first liquid, comprise in addition to the tastant or alternatively to the tastant one or more of the other herein mentioned active food ingredients.

[0025] Note that where more than one tastant is used, each tastant may individually be assessed. For instance, when salt and sugar are used as tastants, one of these tastants may be contained in the first and the second liquid respectively, as defined above, and the other may or may not be contained in the first and the second liquid respectively, as defined above. For instance, both liquids may contain salt with substantially the same content, but the tastant sugar may be present in a higher content in the second liquid than in the first liquid. Likewise, this may apply to embodiments wherein the second liquid, and optionally the first liquid, comprise in addition to the tastant or alternatively to the tastant one or more of the other herein mentioned active food ingredients.

[0026] Further, optionally different tastants or other compounds may also be delivered via separate routes. For instance, the drinking container may also be arranged to provide one or more other liquids, other than the second liquid, in a pulsed way to the straw. Therefore, the term "second compartment" may include a plurality of second compartments. Likewise, the terms "second inlet" and "device opening" may include a plurality of second inlets and device openings, respectively. Optionally, the straw may also comprise a plurality or rotatable devices and second inlets, respectively.

[0027] Herein, the term "tastant" especially refers to one or more tastants selected from the group consisting of bitter, sweet, sour, salty and umami tastants, more especially one or more tastants selected from the group consisting of sugars, sweeteners, salts, taste potentiators and acidulants. As will be clear to the person skilled in the art, the phrase "one or more tastants selected from the group consisting of..." may include combinations of two or more tastants, including combinations of different tastants within the same tastant category, such as a mixture of salts, but may also refer to a single tastant, such as a specific salt like NaCl or KCl, or a single sugar, such as sucrose or fructose.

[0028] As mentioned above, in an embodiment, the tastant comprises one or more tastants selected from the group consisting of bitter, sweet, sour, salty and umami tastants, more especially selected from the group consisting of sugars, sweeteners, salts, taste potentiators and acidulants. A tastant may be defined as any substance, e.g. salt, capable of eliciting gustatory excitation, i.e. stimulating the sense of taste. A tastant preferably has no noticeable smell. The term "tastant" is known to the person skilled in the art. The tastant in the invention may especially comprises one or more tastants selected from the group consisting of bitter, sweet, sour, salty and umami tastants, more especially selected from the group consisting of sugars, sweeteners, salts (including mixes of salts), taste potentiators and acidulants.

[0029] The sweet tastant may especially comprise a sugar and/or a sweetener. The umami tastant especially comprises a taste potentiator. The salty tastant especially comprises a salt. The sour tastant especially comprises an acidulant.

[0030] In an embodiment, the sweet tastant may be selected from the group consisting of one or more sugars including but not limited to sucrose, glucose, fructose, one or more monosaccharides, one or more disaccharides, syrups, one or more molasses and one or more fruit sugars, one or more sweeteners including but not limited to acesulfame potassium, alitame, aspartame, cyclamate, glycyrrhizin, neotame, perillartine, saccharin

and sucralose.

[0031] The salty tastant may in an embodiment include one or more salts including but not limited to sodium chloride, potassium chloride, one or more other alkali metal-halogen salts, one or more other earth alkali metal-halogen salts, one or more other alkali metal-phosphate salts, one or more other earth alkali metal-phosphate salts. The salty tastant may especially comprise NaCl and/or KCl, especially NaCl (especially kitchen salt).

[0032] The taste potentiator may for instance comprise one or more compounds or compositions selected from the group consisting of yeast extracts, glutamic acid (such as mono sodium glutamate (MSG)), salts of inosinic acid, guanylic acid, adenylic acid, uridylic acid cytidylic acid. Taste potentiators are for instance also listed in WO06/127935.

[0033] The sour tastant comprises in an embodiment one or more acidulants (food acids such as acetic acid, citric acid, lactic acid, phosphoric acid, hydrochloric acid, tartaric acid, maleic acid, and propionic acid), etc. Fumaric acid is preferably not used as tastant.

[0034] The bitter tastant may be defined herein as a compound or molecular complex that induces, in a subject, the perception of a bitter taste. In particular, a bitter tastant is one which results in the activation of gustducin and/or transducin. Examples of bitter tastants include but are not limited to denatonium benzoate ("denatonium"; also "DEN"), quinine hydrochloride ("quinine"; also "QUI"), strychnine hydrochloride ("strychnine"; also "STR"), nicotine hemisulfate ("nicotine"; also "NIC"), atropine hydrochloride ("atropine"; also "ATR"), sparteine, naringin, caffeic acid ("caffeine"; also "CAF"), quinacrine, and epicatechin.

[0035] In a specific embodiment, the first liquid comprises a drinking yoghurt optionally comprising a first tastant, such as a sour and/or a sweet tastant, with a first tastant content, and the second liquid may also comprise a drinking yoghurt, but with a high tastant content, such as a high sour and/or a sweet tastant content. In another specific embodiment, the first liquid comprises a drinking yoghurt optionally comprising a first tastant, such as a sour and/or a sweet tastant, with a first tastant content, and the second liquid may comprise a concentrated tastant solution with a high tastant content, such as a high sour and/or a sweet tastant content. In an embodiment, the first tastant content is zero, or, when the first tastant content is larger than zero, the ratio of the second tastant content (in the second liquid) to the first tastant content (in the first liquid) is ≥ 1.2 or higher (see also above). As mentioned above, if more than one tastant is applied, the higher tastant content in the second liquid may related to one or more of these tastants, but does not necessarily apply to each tastant. Further, it is stressed that this higher tastant content may apply to one single tastant, i.e. when for instance more than one sweet or more than one salty tastant is applied, the higher tastant content in the second liquid may relate to only one of these tastants, but in an embodiment also to more of these tastants. Likewise, this may apply to embodiments wherein the second liquid, and optionally the first liquid, comprise in addition to the tastant or alternatively to the tastant one or more of the other herein mentioned active food ingredients.

[0036] In yet another embodiment, the first liquid comprises a soft drink optionally comprising a sour and/or a sweet tastant and the second liquid may comprise an aqueous liquid comprising a sour and/or a sweet tastant. Especially, at least one tastant is present in the second liquid in a relatively higher content than in the first liquid, such as wherein the ratio of the second tastant content to the first tastant content is ≥ 1.2 or higher (see also above). Likewise, this may apply to embodiments wherein the second liquid, and optionally the first liquid, comprise in addition to the tastant or alternatively to the tastant one or more of the other herein mentioned active food ingredients.

[0037] In general, the container (and straw therefore, see also below), may also be used to mix liquids. For instance, drinks for children, such as fun drinks, may be provided. Colour effects may be obtained, but also tastant and/or mouthfeel effects may be provided, since the second liquid is delivered in a pulsed way. Hence, both tastant and/or organoleptic aspects (and/or other OGS aspects) of the drink delivered to the consumer may be varied in a pulsed way with the container of the invention. But, as mentioned above, the drinking container of the invention may also be used to administer a drug or a pharmaceutical to the liquid food product, especially during consumption thereof (and thus to a consumer when the consumer is consuming the liquid food product).

[0038] Further, the container of the invention may in an embodiment be used to hold water and a water miscible liquid (such as a syrup), which, when mixed, provide a drink. In general, in such embodiment, the first liquid will be water, and the second liquid will be the water miscible liquid.

[0039] Hence, by mixing the second liquid to the first liquid (in a pulsed way), a compound may be added to the liquid food product when the consumer is consuming the liquid food product, wherein this compound is administered in a pulsed way. The compound may be one or more compounds selected from the group consisting of active food ingredients such as tastants, colourants, drugs, pharmaceuticals, etc.

[0040] The first liquid, may for instance be a soft drink, but could also be milk, a drinking yoghurt, a fruit juice, an alcohol beverage, a flavoured milk (like for instance chocolate milk or vanilla milk), a soy milk, a diet beverage, a lemonade, an ice coffee, an ice tea, but also water (see above) etc..The combination of the first and the second liquid provide the liquid food product (or beverage), i.e. liquid food product that is consumed by the consumer when sucking the straw over time.

[0041] The second and first liquids may have viscosities that may be substantially the same, but have in a

preferred embodiment a viscosity ratio of larger than about 1. Hence, in a specific embodiment, the ratio of the viscosity of the second liquid to the viscosity of the first liquid is at least about 0.9, more preferably at least about 1.5, even more preferably at least about 2, yet even more preferably at in the range of about 1-100, such as about 1.5-100, like 2-50, such as about 2-20, like about 2-10.

[0042] In specific embodiments, also indicated as "one rotator" embodiments, the rotatable device comprises a hollow cylinder having a rotation axis and a cylinder mantle, wherein the rotation axis coincides with a longitudinal axis of the straw,

wherein the cylinder mantle comprises the device opening, and wherein the cylinder further comprises a rotation means arranged to rotate the rotatable device as a result of the flow. The rotation means may function as a kind of screw or propeller etc., by which the cylinder is propelled when the user sucks the liquid food product through the straw. As will be clear to a person skilled in the art, the term "coincide" may also relate to "substantially coincide".

[0043] In yet another embodiment, the rotatable device comprises a hollow cylinder having a rotation axis, a cylinder mantle and a rotatable device bottom plate (i.e. a cylinder bottom plate), wherein the rotation axis coincides with a longitudinal axis of the straw, wherein the cylinder mantle comprises a cylinder mantle inlet, arranged to allow the first liquid enter the straw via the first inlet and the cylinder mantle inlet,

wherein the rotatable device bottom plate comprises the device opening, and wherein the cylinder further comprises a rotation means arranged to rotate the rotatable device as a result of the flow.

[0044] In yet another embodiment, the rotatable device comprises a rotation means arranged to rotate the rotatable device as a result of the flow, and a rotatable device bottom plate, arranged to rotate about a rotation axis, wherein the rotatable device bottom plate comprises the device opening, and wherein the rotation axis coincides with the longitudinal axis of the straw.

[0045] In further embodiments, also indicated as "two rotators" embodiments, the straw comprises a cog wheels housing part comprising the rotatable device, wherein the rotatable device comprises two cog wheels comprising cogs, arranged to allow transmission of rotational force to one another, wherein the cog wheels are arranged to create a channel between the straw wall and at least one of the cog wheels allowing the first liquid flow with flow, wherein the cogs are arranged to rotate the rotatable device as a result of the flow, wherein the cog wheels housing part comprises the second inlet, and wherein the at least one of the cog wheels comprises the device opening, and

wherein preferably the at least one cog wheel and the cog wheels housing part are arranged to allow to rotate the device opening along the second inlet as a result of the rotation of the at least one cog wheel due to the flow. A pulsed flow of the second liquid may be obtained with such straw.

[0046] Preferably, the rotation means are arranged to be at least partly driven by the flow of the first liquid downstream of the second inlet (and of the device opening). The terms "downstream" and "upstream" especially relate to positions within the straw. A first position closer to the user opening than a second position, while the second position is (thus) closer to the first inlet than the first position, is indicated as downstream. Thus, assuming a flow, relative to the flow the first position is closer to the consumer and is thus downstream of the second position, which is further away from the consumer. Likewise, the second position is upstream of the first position.

[0047] Especially, the drinking container is arranged to provide the pulsed delivery of the second liquid product as defined above.

[0048] It may be desirable to provide a movable straw, for instance in view of transport or in view of protection, but also for instance in view of keeping the liquids contained in the compartments when the straw is in a first position (for instance before consumption of the food product), and allow the liquids to be mixed during consumption. Therefore, in a specific embodiment, the straw and the rotatable device are arrangeable in a drinking position, wherein the rotatable device is arranged within the straw at least partly in front of the second inlet and wherein the straw and the rotatable device are arrangeable in non-drinking position, wherein the first inlet and the second inlet are blocked by one or more of the straw wall, the rotatable device or a barrier. As will be clear to a person skilled in the art, the term "blocked" may also relate to "substantially blocked". Herein the term "moveable straw" especially relates to a straw that is a slidable or telescopic straw, wherein preferably in a first state the straw is more enclosed by the drinking container than in a second state. In an embodiment, the straw is in a first state enclosed by the container. Thus, the straw may be especially moveable while staying at least partly arranged within the straw. Further, the straw may especially be moveable in a direction parallel to the longitudinal axis of the straw.

[0049] The invention also provides the straw per se, such as a straw comprising a straw wall, a user opening, a first inlet arranged to allow the first liquid enter the straw, a second inlet arranged to allow the second liquid enter the straw, and a rotatable device arranged within the straw, wherein the rotatable device comprises a device opening,

wherein the straw is arranged to allow the first liquid flow in a direction from the first inlet to the user opening with a flow, and wherein the rotatable device is arranged to rotate by the flow, thereby rotating the device opening along the second inlet, and

wherein the rotatable device is arranged to provide a pulsed delivery of the second liquid to the straw as a result of the rotation.

[0050] In a further aspect, the invention also provides

a method for the pulsed delivery of a second liquid comprising a tastant, and/or another compound, to a consumer consuming a first liquid via a straw from a drinking container, wherein the drinking container comprises

a. a first compartment arranged to comprise the first liquid optionally comprising the tastant with a first tastant content;
b. a second compartment arranged to comprise a second liquid comprising the same tastant with a second tastant content, wherein the first tastant content is zero, or, when the first tastant content is larger than zero, the ratio of the second tastant content to the first tastant content is ≥ 1.2, preferably ≥ 1.5, even more preferably ≥ 2;
c. the straw, comprising a straw wall, a user opening, a first inlet arranged to allow the first liquid to enter the straw, a second inlet arranged to allow the second liquid to enter the straw, and a rotatable device arranged within the straw, the rotatable device comprising a device opening,

wherein the consumer, when consuming the first liquid, creates a flow of the first liquid in a direction from the first inlet to the user opening, thereby rotating the rotatable device, and thereby rotating the device opening along the second inlet, and
wherein the rotatable device provides the pulsed delivery of the second liquid to the straw as a result of the rotation.

[0051] In general, the invention provides a method for the pulsed delivery of a second liquid comprising a active food ingredient (such as a tastant), and/or another compound, to a consumer consuming a first liquid via a straw from a drinking container, wherein the drinking container comprises

a. a first compartment arranged to comprise the first liquid optionally comprising the active food ingredient with a first active food ingredient content;
b. a second compartment arranged to comprise a second liquid comprising the same active food ingredient with a second active food ingredient content, wherein the first active food ingredient content is zero, or, when the first active food ingredient content is larger than zero, the ratio of the second active food ingredient content to the first active food ingredient content is ≥ 1.2, preferably ≥ 1.5, even more preferably ≥ 2;
c. the straw, comprising a straw wall, a user opening, a first inlet arranged to allow the first liquid to enter the straw, a second inlet arranged to allow the second liquid to enter the straw, and a rotatable device arranged within the straw, the rotatable device comprising a device opening,

wherein the consumer, when consuming the first liquid, creates a flow of the first liquid in a direction from the first inlet to the user opening, thereby rotating the rotatable device, and thereby rotating the device opening along the second inlet, and
wherein the rotatable device provides the pulsed delivery of the second liquid to the straw as a result of the rotation.

[0052] In this way, the consumer will, when consuming the liquid food product, receive the first liquid and in a pulsed way the second liquid (thereby thus consuming the liquid food product).

[0053] In a specific embodiment of the method for the pulsed delivery of a second liquid comprising a tastant, and/or another compound, such method does not include a medical method.

[0054] The container may be a tin, such as a multi-compartment tin, a bag, like a multi-compartment bag, a thermos (jug), such as a multi-compartment thermos (jug), a beaker, such as a multi-compartment beaker, etc.. The herein described drinking containers are in general two-compartment drinking containers, but the invention is not limited to two compartment drinking containers. In case a plurality of second liquids is to be provided in a pulsed way, the drinking container may comprise more than two compartments, for instance a plurality of second compartments, each arranged for containing one of the plurality of second liquids, respectively.

Brief description of the drawings

[0055] Embodiments of the invention will now be described, by way of example only, with reference to the accompanying schematic drawings in which corresponding reference symbols indicate corresponding parts, and in which:

Figure 1a-1c schematically depict an embodiment of a drinking container; Figures 1b and 1c schematically depict in more detail an embodiment of the rotatable device 200;
Figures 2-2b schematically depict an embodiment of the drinking container, wherein the straw is arranged or arrangeable in a non-drinking position (for instance the for time frame after production, but before use) and in a drinking position;
Figures 3a-b schematically depict a number of embodiments of the drinking container and rotatable device for use therein;
Figures 4a-4c and 4d-4e schematically depict further embodiments and variants of the drinking container and straw; and
Figure 5a-5c schematically depict further embodiments of the straw with rotatable device.
Figures 1a-1c, 3a-3b, relate to embodiments that can also indicated as "one rotator" embodiments; Figures 4a-4c and 5a-5c relate to embodiments that can also be indicated as " two rotator" embodiments. Figures 2a-2b schematically depict to an embodiment of a movable straw, which may relate to one rotator or two-rotator embodiments.

Description of preferred embodiments

[0056] Figure **1a** schematically depicts an embodiment of a drinking container 1. The drinking container 1 comprises a first compartment 10 arranged to comprise a first liquid 11, a second compartment 20 arranged to comprise a second liquid 21 and a straw 100. Especially, the drinking container 1 (also indicated as container 1) is arranged to provide the pulsed delivery of the second liquid 21 as defined above. Hence, such drinking container 1 can be used for a pulsed delivery of a tastant to a consumer for reducing tastant content (see also above).

[0057] The straw 100 comprises a straw wall 150 and a user opening 105. The user opening 105 is arranged to be used by a user for sucking the liquids out of the container 1. The liquid consumed by the user or consumer is indicated with reference 15. This liquid 15, also indicated as liquid food product, is (over time) a combination of the first liquid 11 and the second liquid 21. Since the second liquid 21 is introduced in a pulsed way, the liquid food 15 consumed by the consumer may temporarily in a first time frame substantially consist of the first liquid 11 and temporarily in a second time frame substantially consist of the first and the second liquids 11,21. Due to the rotation of the rotatable device 200 (see below) these time frames are alternating; i.e. the second liquid 21 is dosed pulsewise. The consumer thereby consumes the liquid food product 15.

[0058] The straw 100 further comprises a first inlet 101 arranged to allow the first liquid 11 enter the straw 100, a second inlet 102 arranged to allow the second liquid 21 enter the straw 100, and a rotatable device 200 arranged within the straw 100. The rotatable device 200 rotates as function of the flow induced by the consumer sucking the liquid food product 15 from the container 1. The rotatable device 200 may comprise one or more rotation means selected from the group consisting of a fin (including a plurality of fins), a screw (including a plurality of screws), a rotor (including a plurality of rotors), a vane (including a plurality of vanes) etc., which are arranged to induce rotation of the rotatable device 200 when the first liquid 11 flows through or along the rotatable device 200 within the straw 100. The rotatable device 200 comprises a device opening 222, which is especially arranged to allow the second liquid 21 enter the straw 200. The straw 100 is (thus) arranged to allow the first liquid 11 flow in a direction from the first inlet 101 of the straw 100 to the user opening 105 of the straw 100, with a flow, which is indicated with reference 31.

[0059] As said above, the rotatable device 200 is arranged to rotate by the flow 31, thereby rotating the device opening 222 along the second inlet 102 of the straw 100, and the rotatable device 200 is arranged to provide a pulsed delivery of the second liquid 21 to the straw 100 as a result of the rotation of the rotatable device 200. In this way, downstream of device opening 222, flow 31 and flow 32 mix, into the flow of the liquid food product 15.

[0060] For preventing the rotatable device 200 from substantial longitudinal movements within the straw 100, the straw 100 may comprise one or more rotatable device positioners 108. The rotatable device positioner(s) 108 are especially arranged (within the straw 100) to prevent (large) movement(s) of the rotatable device 200 in the length direction of the straw. Preferably, the rotatable device positioner(s) 108 are arranged in such a way, that rotation of the rotatable device 200 is not substantially hindered.

[0061] The straw 100 has a longitudinal axis 160. In general, a straw 100 has a cylindrical shape. In such embodiments, the longitudinal axis 160 substantially coincides with the rotation axis of the straw 100.

[0062] Figures **1b** and **1c** schematically depict in more detail an embodiment of the rotatable device 200 in the straw 100 as depicted in figure 1a. The rotatable device 200 is shown in 2 states. In figure 1b, a first state is shown, wherein the rotatable device opening 222 is at least partly facing the second inlet 102 of the straw 100. In this state, the second liquid 21 can enter the straw 100, as indicated with flow 32. In this embodiment, the straw wall 150 comprises this second inlet 102. In figure 1c, the rotatable device 200 has rotated further, and the rotatable device opening 222 is at least substantially not facing the second inlet 102 of the straw 100. In this state, the second liquid 21 cannot enter the straw 100. When rotating further, as a result of the flow 31, the first state will again be obtained, etc. This is explained in more detail below.

[0063] The rotatable device 200 here has a cylindrical shape, and is indicated as hollow cylinder 230 (further also indicated as cylinder 230). The cylinder 230 is arranged to allow the first liquid 11 flow through the cylinder from one cylinder end to the other cylinder end. This flow is indicated with reference 31.

[0064] The cylinder 230 has a cylinder mantle 231. The rotatable device 200, here especially the cylinder mantel 231 comprises rotation means. By way of example, a screw thread 232 is drawn. Due to the suction by the consumer, the first liquid 11 flows through the cylinder and due to the presence of the rotation means, the hollow cylinder 230 will rotate due to the flow 31. Hence, from a first state the cylinder 230 will rotate to another state (and may finally come again in the first state (again and again) during consumption of the liquid food product), such as a second state, wherein the rotatable device opening 222 is substantially not facing the second inlet 102 of the straw 100. In this state, the second liquid 21 will substantially not be able to flow from the second compartment 20 via straw second opening 102 into straw 100, since the second straw opening 102 is substantially blocked. This is the "closed state". The pulse frequency may depend amongst others upon the opening sizes of the second opening 102 and the rotatable device opening 222.

[0065] In this (and other) embodiment(s), the rotation means, here screw thread 232, are arranged to be at least partly driven by the flow 31 of the first liquid 11

downstream of the second inlet 102 (and of the device opening 222). This is shown in figures 1a and 1b, wherein the rotational device 200 may not only be driven by flow 31 in the "lower" part of the hollow cylinder 230, i.e. upstream of device opening 222, but also by flow 31 downstream of second inlet 102 (and device opening 222).

[0066] In summary, in specific embodiments, the rotatable device 200 comprises said hollow cylinder 230, which has preferably a rotation axis 260 and said cylinder mantle 231. The rotation axis 260 may substantially coincide with the longitudinal axis 160 of the straw 100; the cylinder mantle 231 comprises the device opening 222, and the cylinder further comprises rotation means 232, such as a helical structure, arranged to rotate the rotatable device 200 as a result of the flow 31. The rotation axis 260 is preferably the cylinder axis.

[0067] It may be desirable to provide a movable straw 100, for instance in view of transport or in view of protection, but also for instance in view of keeping the liquids 11 and 21 contained in the compartments 10,20 when the straw 100 is in a drinking position (for instance before consumption of the liquid food product), and allow the liquids to be mixed during consumption. Referring to figures **2a** and **2b,** a non-limiting embodiment is depicted wherein the straw 100 and the rotatable device 200 are arrangeable in a drinking position, wherein the rotatable device 200 is arranged within the straw 100 at least partly in front of the second inlet 102 and wherein the straw 100 and the rotatable device 200 are arrangeable in non-drinking position, wherein the first inlet 101 and the second inlet 102 are substantially blocked by one or more of the straw wall 105, the rotatable device 200 or a barrier 30.

[0068] Figures 2a and 2b may not only apply to the herein (above) described (one rotator) embodiments, but may also apply to other embodiments, such as the below described (two rotator) embodiments.

[0069] In the embodiments schematically depicted in figures 2a and 2b, 2 barriers 30 are provided, which block the first inlet 101 and the second inlet 102 in a certain position, i.e. the non-drinking position. An advantage thereof is that in the non-drinking position, such as during transport or in shop or at the wholesaler, etc., those openings are blocked, whereby substantial mixing of the liquids 11,21 is (substantially) prevented.

[0070] In figures 2a and 2b, the barriers 30 are by way of non-limiting example provided as barrier between the first compartment 10 and second compartment 20, and as container bottom plate, respectively. However, also other options are possible.

[0071] In figure 2a, the non-drinking state is schematically depicted. Figure 2b schematically depicts the drinking state. Here, the first inlet 101 and the second inlet 102 are substantially not blocked by the barriers 30, and the first liquid 11 and (in a pulsed way) the second liquid 21 may enter the straw 100.

[0072] Such embodiments, wherein the drinking container 1 provides a drinking position and non-drinking position, may also be useful for drinking containers for kids, who take for instance drinks to school, sport, etc. However, other target groups may be people in a specific condition, such as disabled or sick people, aged people, sporters, etc.

[0073] In yet another embodiment, as schematically depicted in figure **3a,** the rotatable device 200 comprises a hollow cylinder 230 having rotation axis 260, cylinder mantle 231 and rotatable device 200 bottom plate 233. The rotation axis 260 substantially coincides with the longitudinal axis 160 of the straw 100. The cylinder mantle 231 comprises a cylinder mantle inlet 237, arranged to allow the first liquid 11 enter the straw 100 via the first opening 102 and the cylinder mantle inlet 237. Note that in this embodiment, the first liquid 11 does not enter the straw 100 via an inlet arranged at a straw end, but enters the straw 100 through the straw wall 150. For this reason, by way of example, the first inlet 101 and the cylinder mantel inlet 237 are drawn as relatively large openings. The first inlet 101 and the cylinder mantel inlet 237 may especially be arranged to provide a good flow into and through the straw 100 during consumption of the liquid food product 15. Here, wherein the rotatable device 200 bottom plate comprises the device opening 222 and the cylinder 230 further comprises the rotation means 232, such as fins or a helical structure, etc., arranged to rotate the rotatable device 200 as a result of the flow 31.

[0074] In the embodiment schematically depicted in figure 3a, a stage is depicted wherein second opening 102 and device opening 222 of rotational device 200 do not overlap, i.e. at this stage there may substantially be no flow from the second liquid 21 into the straw 100. When the rotatable device 200 rotates further, the openings may (temporarily) overlap. By the rotation of the rotational device 200, a pulsed delivery of second liquid 21 into straw 100 may be provided. In this (and other) embodiment(s), the rotation means, here screw thread 232, are arranged to be at least partly driven by the flow 31 of the first liquid 11 downstream of the second inlet 102 (and of the device opening 222).

[0075] In yet another embodiment, schematically depicted in figure **3b,** the rotatable device 200 comprises a rotation means 232 (thus especially in the absence of the hollow cylinder), such as a screw thread or a screw propeller, arranged to rotate the rotatable device 200 as a result of the flow 31, and rotatable device 200 bottom plate 233, arranged to rotate about rotation axis 260, wherein the rotatable device 200 bottom plate 233 comprises the device opening 222. Again, the rotation axis 260 coincides with the longitudinal axis 160 of the straw 100. As described above, the device opening 222 rotates, during consuming the liquid food product 15 through the user opening 105, along the second inlet 102. The rotatable device 200 is also in this embodiment arranged to provide a pulsed delivery of the second liquid 21 to the straw 100 as a result of the rotation of the rotatable device 200.

[0076] In yet further embodiments, also indicated as

"two rotators" embodiments, the straw 100 comprises a cog wheels housing part 170 comprising the rotatable device 200. An embodiment and variants are schematically depicted in figures **4a-4c.** The rotatable device 200 comprises two cog wheels 240 comprising cogs 241, which arranged to allow transmission of rotational force to one another. The cog wheels 240, in the cog wheels housing part 170 are arranged to create a channel 243 between the straw wall 150 and at least one of the cog wheels 240 allowing the first liquid 11 flow with flow 31. The cog wheel housing part 170 may be substantially flat, having substantially the thickness of the cog wheels 240. Since the cogs 241 of the cog wheels 240 mesh with each other (indicated with meshing position 242), substantially no liquid may pass between the wheels 240. However, between the straw wall 150 and the cogs 241 of a cog wheel 240 (i.e. through channel 243 (also indicated as motor channel, since this channel hosts flow 31 that drives the cog wheel(s) 241)), liquid may flow in the direction of the user opening 105 when a user consumes the liquid food product 115. Further, the cogs 241 are arranged to rotate the rotatable device 200 as a result of the flow 31, and the cog wheels housing part 170 comprises the second inlet 102. The at least one cog wheel 240 and the cog wheels housing part 170 are arranged to allow to rotate the device opening 222 along the second inlet 102 as a result of the rotation of the at least one cog wheel 240 due to the flow 31. Thereby, flow 32 is periodically induced.

[0077] In this embodiment, the cog wheel housing part 170 has an upstream opening 171, here for allowing the first liquid 11 enter the straw 100, and a downstream opening 172, here arranged to allow flows 31,32 of the first liquid 11 and second 21 (pulsed), respectively, in the direction of user opening 105.

[0078] Figures 4b and 4c schematically depict stages of an embodiment of at least one of the cog wheels 240, wherein one or more of the cogs 241, but preferably not all, have a deepening in the cog, thereby providing a kind of slit in a cog or one or more (adjacent) cogs. Thereby, device opening 222 is provided. Due to rotation of the (at least one) cog wheel 240 having this device opening 222, the device opening 222 rotates along the second opening 102 in the straw wall 150, more precisely, the cog wheel housing part 170. In this way, in a pulsed way, the second liquid 21 may enter through opening 102, through device opening 222 in the straw 100, and flow 32 is provided. In time, the device opening 222 moves further, and at a later stage, the second opening 102 is substantially blocked by the cogs 241 not having comprising such deepening. Then, less or substantially no second liquid will pass through opening 102.

[0079] Figures 4b and 4c schematically depict a front view of one of the cog wheels 240 of the rotatable device 200. Note that in the schematic embodiment of figure 4a, it is suggested that only one of the cog wheels 240 comprises the device opening 222. However, the cog wheel housing part 170 may also comprise two (or more) second inlets 102, and one cog wheel 240 may comprise more than one device openings 222 and/or both cog wheels 240 may comprise one or more device openings 222.

[0080] Figures **4d** and **4e** schematically depict non-limiting variants of the two-cog wheel embodiment. Figure 4d schematically depicts a detail of a variant of the embodiment schematically depicted in figures 4a-4c. Due to the slit in the cogs 241, device opening 222 is provided. The cogs 241 comprising the device opening 222 are by way of example depicted with dashed lines. Preferably, the dimensions of the device opening 222 in this embodiment are selected to allow suction of the second liquid 21. Figure 4d indicates with references 171 and 172 the cog house openings respectively,
wherein the former is the upstream opening and the latter is the downstream opening. The downstream opening 172 is, relative to the direction of flow to the user, closer to the straw opening 105 than the upstream opening 171.

[0081] The device opening 222, here in this embodiment a channel, indicated with reference 244 (also indicated as pulse channel), is provided. The device opening 222, or more precisely channel 244 is arranged in such a way that at least once during a full rotation of the cog wheel, (motor) channel 243 between the upstream cog house opening 171 and the downstream opening 172 is enlarged (by channel 244). In this way, flow 31 flows substantially continuously through channel 243 and temporarily, this motor channel 243 is increased when one opening of the pulse channel is in liquid contact with opening 102 and another opening of the pulse channel is in liquid contact with the downstream cog house opening 172.

[0082] Figure 4e schematically depicts a variant wherein the device opening 222, here (pulse) channel 244, is integrated in the body of cog wheel 240, either as body channel or as slit at a side of the cog wheel 240.

[0083] Figure **5a** schematically depicts a further embodiment of the straw 100 comprising cog wheels housing part 170 comprising the rotatable device 200, wherein the rotatable device 200 comprises at least 2 cog wheels 240, here four cog wheels 240 (indicated with references 240a, 240b, 240c, 240d (first, second, third and fourth cog wheels, respectively) comprising cogs 241, arranged to allow transmission of rotational force to one another, wherein the cog wheels 240 are arranged to create a channel 243 between the straw wall 150 and at least one of the cog wheels 240 allowing the first liquid 11 flow with flow 31, wherein the cogs 241 are arranged to rotate the rotatable device 200 as a result of the flow 31, wherein the cog wheels housing part 170 comprises the second inlet 102, wherein the at least one of the cog wheels 240 comprises the device opening 222, and wherein the at least one cog wheel 240 and the cog wheels housing part 170 are arranged to allow to rotate the device opening 222 along the second inlet 102 as a result of the rotation of the at least one cog wheel 240 due to the flow 31.

[0084] In this specific embodiment, the cog wheels

comprise two subset of cogwheels. Cog wheels 240a and 240b are arranged as motor or rotator, and rotate as function of the flow 31. These cog wheels 240a and 240b are arranged to rotate the second subset, which comprises cog wheels 240c and 240d, which are arranged as pump. The first subset is arranged to provide a rotational force to the second set in a pulsed way. This may especially be obtained by providing the second cog wheel (in the line of cog wheels 240), i.e. cog wheel 240b with one or more non-cog regions, indicated with reference 246, and arranging the second cog wheel 240b and the third cog wheel 240c in such a way, that when cog wheels 240a and 240b rotate as function of the flow 31, the third cog wheel 240c is rotated in a pulsed way. By way of example, second cog wheel 240b comprises three non-cog regions 246.

[0085] Preferably, the first and the second cog wheels 240a and 240b mesh at meshing position 242 substantially tight, such that substantially no liquid flows between the cog wheels 240a and 240b. Likewise this preferably applies for the third and the fourth cog wheels 240c and 240d, i.e. cog wheels 240c and 240d mesh at meshing position 242" substantially tight, such that substantially no liquid flows between the cog wheels 240c and 240d. The meshing position between cog wheels 240b and 240c is indicated with reference 242'.

[0086] Liquid 21 may flow with flow 32 via the spaces between the cogs 241 of cog wheels 240c and 240d. In this way, device opening 222 in this embodiment is a kind of interrupted channel 244. Alternatively and/or additionally, cog wheels 240c and/or 240d may have the same features as described for the cog wheels 240 in figures 4d and 4e (i.e. a channel in some of the cogs 241 and/or a channel 244 in the wheel(s).

[0087] Important is the second cog wheel 240b, which provides the rotational force to the subset of cog wheels 240c and 240d. Figures **5b** and **5c** schematically depict two non-limiting embodiments. In figure 5b, the second cog wheel 240b has a double arrangement of cogs. One set of cogs 241 is arranged to rotate with first cog wheel 240a and one set of cogs 241 is arranged to rotate with third cog wheel 240c. The latter set comprises at least one non-cog region 246. In figure 5c, an embodiment is schematically depicted wherein the second cog wheel is a "normal" cog wheel, comprising the non-cog region(s) 246. In the latter embodiment, the non-cog region(s) are arranged to allow a substantially continuous rotation of the second cog wheel 240b when the first cog wheel 240a rotates substantially continuous; i.e. the first and second cog wheels 240a,240b are arranged to rotate substantially continuous as a result of the flow 31. In other words, despite the non-cog region(s) 246 the first and the second cog wheels 240a and 240b are arranged to substantially mesh, whatever rotational position, whereas the second and the third cog wheels 240b and 240c, as function of the non-cog regions 246 do and do not substantially mesh in a pulsed way.

[0088] The invention also provides the straw per se, such as straw 100 as described above (see also figures 1a-4c and 5a-c). This straw 100 comprises the straw wall 150, user opening 105, first inlet 101 arranged to allow a liquid, such as first liquid 11 enter the straw 100, second inlet 102 arranged to allow another liquid, such as the second liquid 21 enter the straw 100, and rotatable device 200 arranged within the straw 100, the rotatable device 200 comprising device opening 222, wherein the straw 100 is arranged to allow the first liquid 11 flow in a direction from the first inlet 101 to the user opening 105 with flow 31, and wherein the rotatable device 200 is arranged to rotate by the flow 31, thereby rotating the device opening 222 along the second inlet 102, and wherein the rotatable device 200 is arranged to provide a pulsed delivery of the second liquid 21 to the straw 100 as a result of the rotation.

[0089] The first liquid 11, may for instance be a soft drink, but could also be milk, a drinking yoghurt, but also water (see above) etc..The combination of the first and the second liquids 11,21 provide the food product, i.e. liquid food product 15 that is consumed by the consumer when sucking the straw 100 over time.

[0090] In yet another embodiment, the first liquid 11 comprises liquid, such as commercially available liquids, and the second liquid 21 comprises a liquid drug or pharmaceutical, such as a liquid comprising a drug or pharmaceutical, for instance obtainable by solvation or by emulsifying or by suspending the drug or pharmaceutical in a liquid. In this way, the drinking container 1 and the method of the invention can especially be used to administer a drug or pharmaceutical, for instance to kids, while substantially allowing the user sensing the first liquid 11 and (optionally) thereby reducing sensing (too much) the drug or pharmaceutical.

[0091] In yet another embodiment, the first liquid 11 comprises liquid comprising a drug or pharmaceutical, for instance obtainable by solvation or by emulsifying or by suspending the drug or pharmaceutical in a liquid, and the second liquid 21 comprises a liquid comprising a tastant (especially a tastant (with a tastant content) that will be liked by the consumer). In this way, the drinking container 1 and the method of the invention can especially be used to administer a drug or pharmaceutical, for instance to kids, while substantially allowing the user sensing the second liquid 21 with the tastant and thereby reducing sensing (too much) the drug or pharmaceutical comprised by the first liquid 11.

[0092] Therefore, the invention is also related to an embodiment of drinking container 1,

wherein one or more of the first and the second compartments 10,20, preferably only the first compartment 10, comprises liquid comprises one or more of a drug and pharmaceutical, and wherein the second compartment 20 comprises liquid comprising one or more OGS stimuli, wherein the one or more OGS stimuli are especially selected to reduce OGS perception of the liquid comprising the drug and/or pharmaceutical. Also in such embodiment, the stimulus perception (of a drug and/or pharma-

ceutical) that may be undesired by a user, may be masked by the stimulus in the first liquid.

[0093] The drinking container 1 can in an embodiment be used in a medical method.

[0094] In a specific embodiment, the second liquid 21 comprises a tastant with a second tastant content, wherein the first liquid 11 optionally comprises the tastant with a first tastant content, and wherein the first tastant content is zero, or, when the first tastant content is larger than zero, the ratio of the second tastant content to the first tastant content is ≥ 1.2, preferably ≥ 1.5, even more preferably ≥ 2, yet even more preferably ≥5, yet even more preferably ≥ 10. In a specific embodiment, the tastant content in the first liquid is 0.

[0095] In yet another embodiment, the second liquid 21 comprises a colourant, in order to provide a colour effect. Especially in this embodiment, at least part of the straw 100 is preferably transmissive or translucent.

[0096] As will be clear to the person skilled in the art, although the invention has especially been described with respect to the first and the second liquid, more than two liquids may be administered to the straw and consumed by the consumer. To this end, the container 1 may comprise more than one second compartment 20, and the straw 100 may comprise more than 1 second inlet 102, respectively.

[0097] Further, the container 1 and/or the straw 100 may comprise means to compensate for reduction of the amount(s) of the first and/or second liquids 11,21 in the first and/or second compartments 10,20, respectively, during consumption of the liquid food product 15 through the straw 100. For example, a one way valve may be applied, or any other means, which may especially be arranged to release air into the first and/or second compartments 10,20, respectively, during consumption, to compensate under pressure. This may especially advantageous in embodiments wherein the walls (and optionally also the barriers) at least partly comprise rigid materials. The wall (and optionally also the barriers) may also comprise flexible material.

[0098] The term "substantially" herein, such as in "substantially coincide" or in "substantially consists", will be understood by the person skilled in the art. The term "substantially" may also include embodiments with "entirely", "completely", "all", etc. Hence, in embodiments the adjective substantially may also be removed. Where applicable, the term "substantially" may also relate to 90% or higher, such as 95% or higher, especially 99% or higher, even more especially 99.5% or higher, including 100%. The term "comprise" includes also embodiments wherein the term "comprises" means "consists of".

[0099] Furthermore, the terms first, second, third and the like in the description and in the claims, are used for distinguishing between similar elements and not necessarily for describing a sequential or chronological order. It is to be understood that the terms so used are interchangeable under appropriate circumstances and that the embodiments of the invention described herein are capable of operation in other sequences than described or illustrated herein.

[0100] The drinking container and straw herein are amongst others described during use (consumption). As will be clear to the person skilled in the art, the invention is not limited to methods of operation or use or consumption, etc.. Further, the drinking container and the straw are herein depicted to contain the first and/or the second liquid etc. However, the invention and claims are directed to a drinking container and straw per se, with or without the liquids.

[0101] It should be noted that the above-mentioned embodiments illustrate rather than limit the invention, and that those skilled in the art will be able to design many alternative embodiments without departing from the scope of the appended claims. In the claims, any reference signs placed between parentheses shall not be construed as limiting the claim. Use of the verb "to comprise" and its conjugations does not exclude the presence of elements or steps other than those stated in a claim. The article "a" or "an" preceding an element does not exclude the presence of a plurality of such elements. In the device claim enumerating several means, several of these means may be embodied by one and the same item of hardware. The mere fact that certain measures are recited in mutually different dependent claims does not indicate that a combination of these measures cannot be used to advantage.

Claims

1. A drinking container (1) comprising

a. a first compartment (10) arranged to comprise a first liquid (11);
b. a second compartment (20) arranged to comprise a second liquid (21);
c. a straw (100), comprising a straw wall (150), a user opening (105), a first inlet (101) arranged to allow the first liquid (11) enter the straw (100), a second inlet (102) arranged to allow the second liquid (21) enter the straw (100), and a rotatable device (200) arranged within the straw (100), the rotatable device (200) comprising a device opening (222),

wherein the straw (100) is arranged to allow the first liquid (11) flow in a direction from the first inlet (101) to the user opening (105) with a flow (31), and wherein the rotatable device (200) is arranged to rotate by the flow (31), thereby rotating the device opening (222) along the second inlet (102), and wherein the rotatable device (200) is arranged to provide a pulsed delivery of the second liquid (21) to the straw (100) as a result of the rotation.

2. The drinking container (1) according to claim 1,

wherein the second liquid (21) comprises a tastant with a second tastant content, wherein the first liquid (11) optionally comprises the same tastant with a first tastant content, and wherein the first tastant content is zero, or, when the first tastant content is larger than zero, the ratio of the second tastant content to the first tastant content is ≥ 1.2, preferably ≥ 1.5, even more preferably ≥ 2.

3. The drinking container (1) according to claim 2, wherein the tastant comprises one or more tastants selected from the group consisting of bitter, sweet, sour, salty and umami tastants, more especially selected from the group consisting of sugars, sweeteners, salts, taste potentiators and acidulants.

4. The drinking container (1) according to claim any one of claims 2-3, wherein the first liquid (11) comprises a drinking yoghurt.

5. The drinking container (1) according to any one of claims 2-3, wherein the first liquid (11) comprises a soft drink.

6. The drinking container (1) according to any one of claims 1-5, wherein the rotatable device (200) comprises a hollow cylinder (230) having a rotation axis (260) and a cylinder mantle (231), wherein the rotation axis (260) coincides with a longitudinal axis (160) of the straw (100), wherein the cylinder mantle (231) comprises the device opening (222), and wherein the cylinder further comprises a rotation means (232) arranged to rotate the rotatable device (200) as a result of the flow (31).

7. The drinking container (1) according to any one of claims 1-5, wherein the rotatable device (200) comprises a hollow cylinder (230) having a rotation axis (260), a cylinder mantle (231) and a rotatable device 200 bottom plate (233), wherein the rotation axis (260) coincides with a longitudinal axis (160) of the straw (100),
wherein the cylinder mantle (231) comprises a cylinder mantle inlet (237), arranged to allow the first liquid (11) enter the straw (100) via the first inlet (101) and the cylinder mantle inlet (237), wherein the rotatable device 200 bottom plate (233) comprises the device opening (222), and wherein the cylinder (230) further comprises a rotation means (232) arranged to rotate the rotatable device (200) as a result of the flow (31).

8. The drinking container (1) according to any one of claims 1-5, wherein the rotatable device (200) comprises a rotation means (232) arranged to rotate the rotatable device (200) as a result of the flow (31), and a rotatable device 200 bottom plate (233), arranged to rotate about a rotation axis (260), wherein the rotatable device bottom plate (233) comprises the device opening (222), and wherein the rotation axis (260) coincides with the longitudinal axis (160) of the straw (100).

9. The drinking container (1) according to any one of claims 1-5, wherein the straw (100) comprises a cog wheels housing part (170) comprising the rotatable device (200), wherein the rotatable device (200) comprises two cog wheels (240) comprising cogs (241), arranged to allow transmission of rotational force to one another, wherein the cog wheels (240) are arranged to create a channel (243) between the straw wall (150) and at least one of the cog wheels (240) allowing the first liquid (11) flow with flow (31), wherein the cogs (241) are arranged to rotate the rotatable device (200) as a result of the flow (31), wherein the cog wheels housing part (170) comprises the second inlet (102), and wherein the at least one of the cog wheels (240) comprises the device opening (222), and wherein the at least one cog wheel (240) and the cog wheels housing part (170) are arranged to allow to rotate the device opening (222) along the second inlet (102) as a result of the rotation of the at least one cog wheel (240) due to the flow (31).

10. The drinking container (1) according to any one of the preceding claims, wherein the straw (100) and the rotatable device (200) are arrangeable in a drinking position, wherein the rotatable device (200) is arranged within the straw (100) at least partly in front of the second inlet (102) and wherein the straw (100) and the rotatable device (200) are arrangeable in non-drinking position, wherein the first inlet (101) and the second inlet (102) are blocked by one or more of the straw wall (105), the rotatable device (200) or a barrier (30).

11. The drinking container (1) according to any one of claims 6-8, wherein the rotation means (232) comprises a means selected from the group consisting of a helical structure, a fin, a vane, etc.

12. A straw (100)), comprising a straw wall (150), a user opening (105), a first inlet (101) arranged to allow the first liquid (11) enter the straw (100), a second inlet (102) arranged to allow the second liquid (21) enter the straw (100), and a rotatable device (200) arranged within the straw (100), the rotatable device (200) comprising a device opening (222), wherein the straw (100) is arranged to allow the first liquid (11) flow in a direction from the first inlet (101) to the user opening (105) with a flow (31), and wherein the rotatable device (200) is arranged to rotate by the flow (31), thereby rotating the device opening (222) along the second inlet (102), and
wherein the rotatable device (200) is arranged to pro-

vide a pulsed delivery of the second liquid (21) to the straw (100) as a result of the rotation.

13. A method for the pulsed delivery of a second liquid comprising a tastant to a consumer consuming a first liquid (11) via a straw (100) from a drinking container (1), wherein the drinking container (1) comprises

a. a first compartment (10) arranged to comprise the first liquid (11) optionally comprising the tastant with a first tastant content;
b. a second compartment (20) arranged to comprise a second liquid (21) comprising the same tastant with a second tastant content, wherein the first tastant content is zero, or, when the first tastant content is larger than zero, the ratio of the second tastant content to the first tastant content is ≥ 1.2, preferably ≥ 1.5, even more preferably ≥ 2;
c. the straw (100), comprising a straw wall (150), a user opening (105), a first inlet (101) arranged to allow the first liquid (11) enter the straw (100), a second inlet (102) arranged to allow the second liquid (21) enter the straw (100), and a rotatable device (200) arranged within the straw (100), the rotatable device (200) comprising a device opening (222),

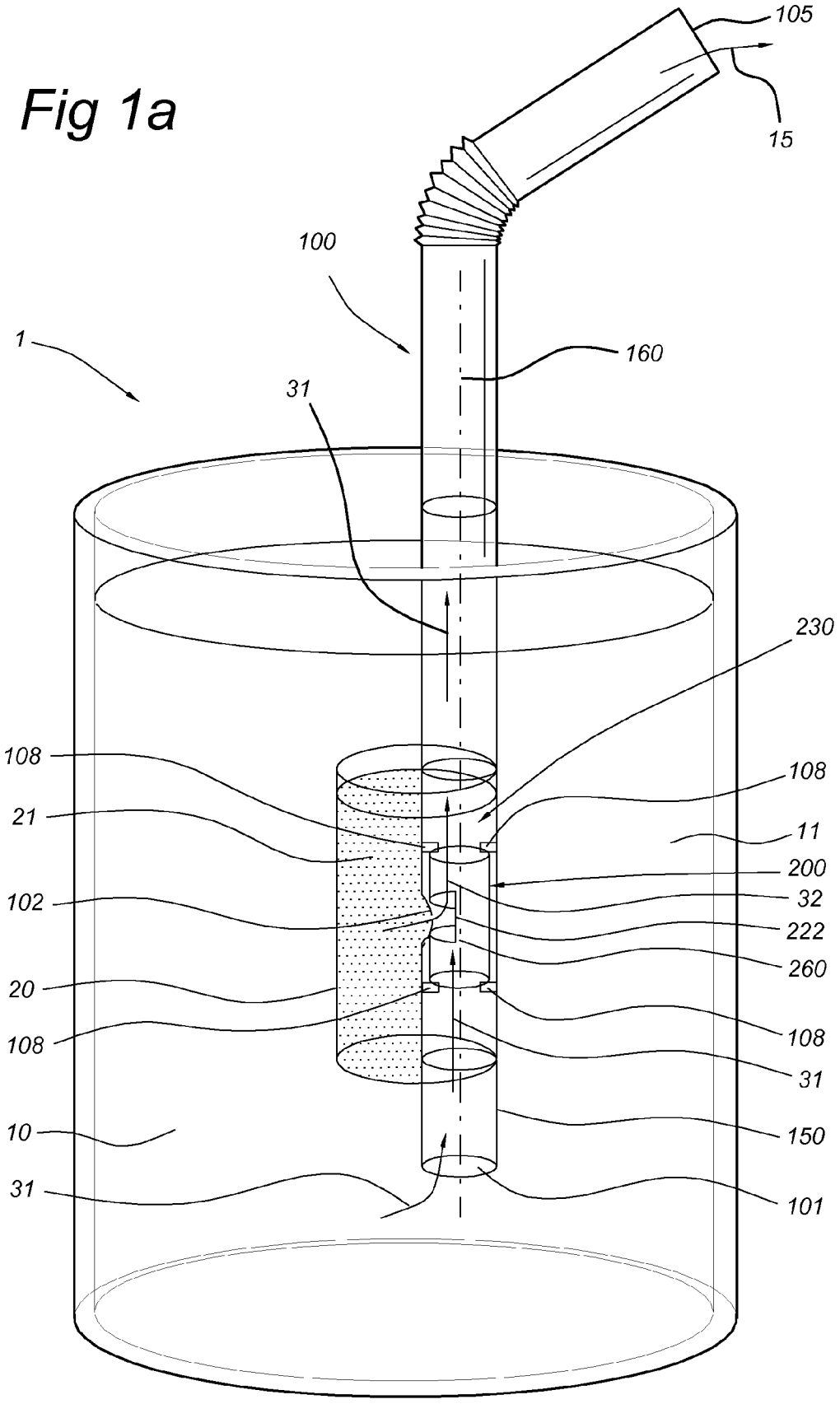
wherein the consumer, when consuming the first liquid (11), creates a flow (31) of the first liquid in a direction from the first inlet (101) to the user opening (105), thereby rotating the rotatable device (200), and thereby rotating the device opening (222) along the second inlet (102), and wherein the rotatable device (200) provides the pulsed delivery of the second liquid (21) to the straw (100) as a result of the rotation.

14. Use of a pulsed delivery of a tastant to a consumer for reducing tastant content.

15. Use according to claim 14 of a pulsed delivery of a tastant to a consumer of a first liquid (11) from a drinking container (1) according to any one of claims 1-11 for reducing tastant content

16. Use of a pulsed delivery of a tastant to a consumer of a first liquid (11) from a drinking container (1) according to any one of claims 1-11 to enhance tastant perception.

Fig 1a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15
100
1
160
31
230
108
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11
200
102
32
222
260
20
108
108
31
10
150
31
101

Fig 1b

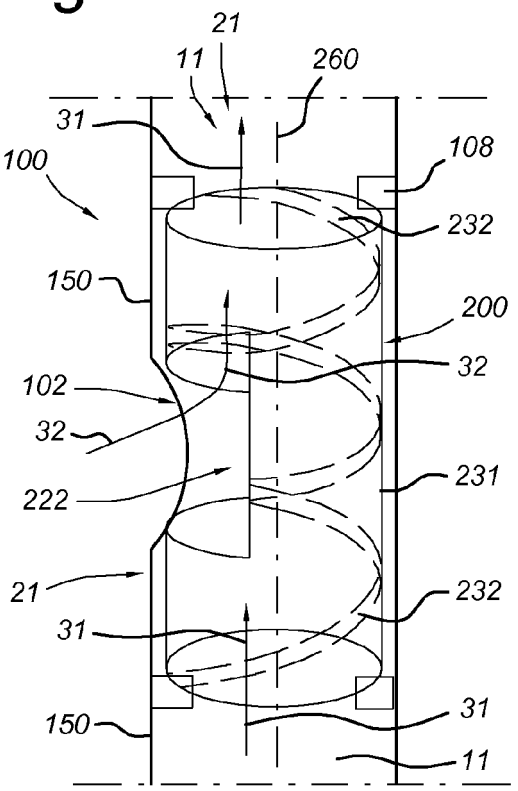


Fig 1c

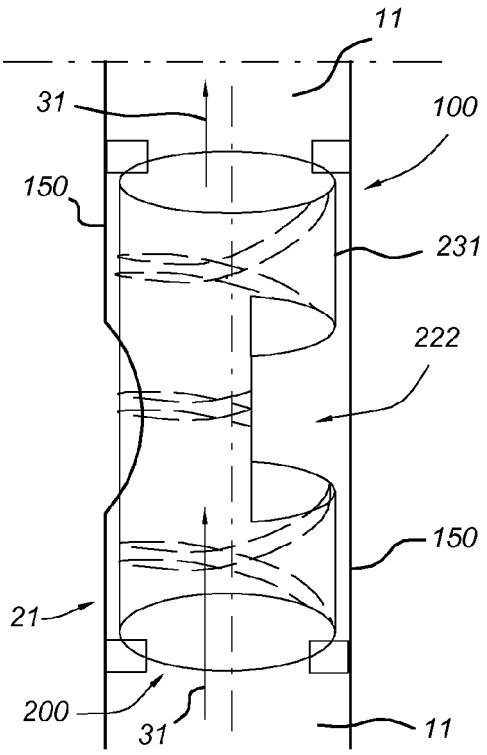


Fig 2a

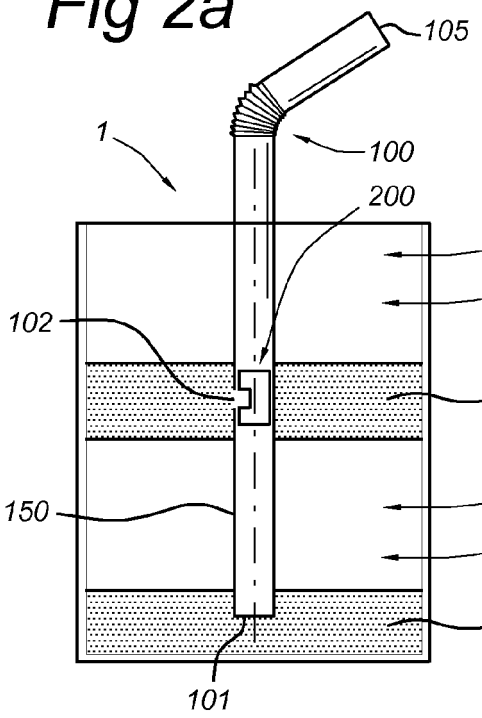
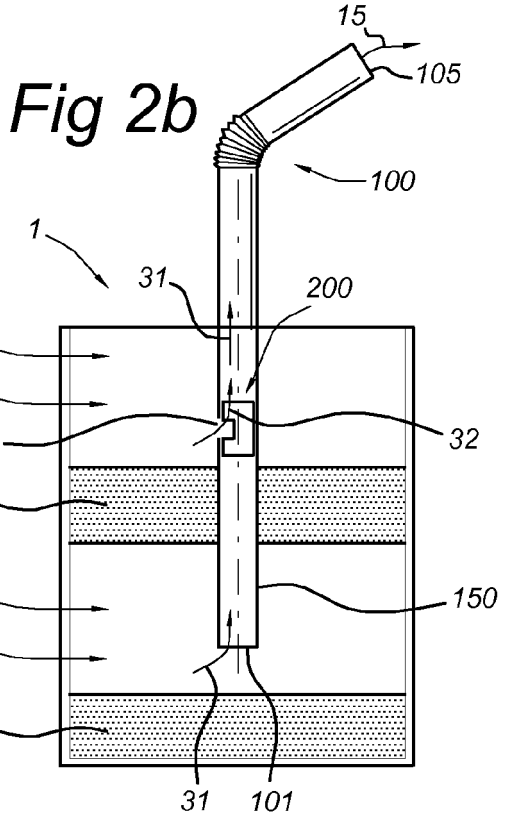


Fig 2b



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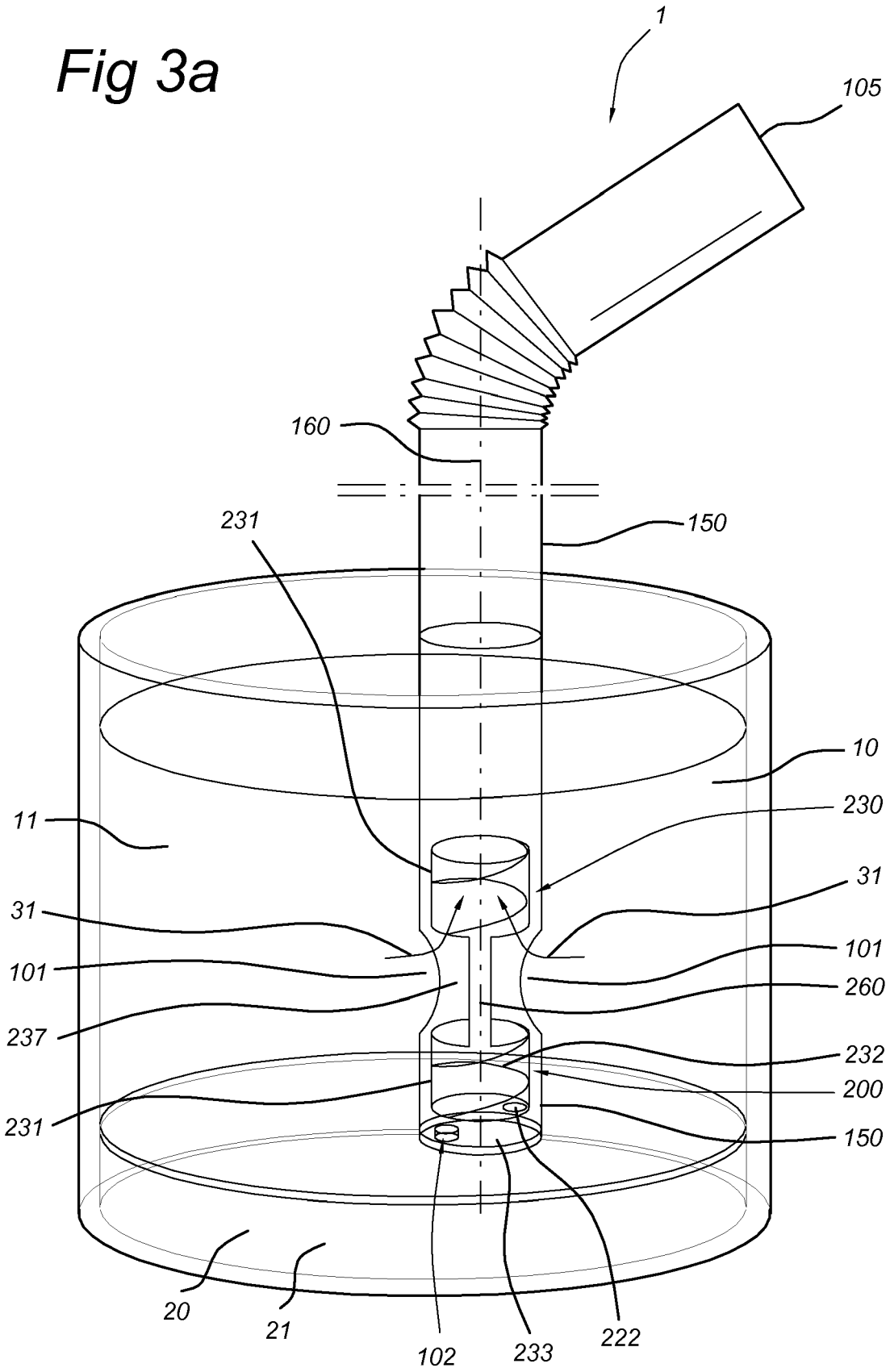
1
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160
231
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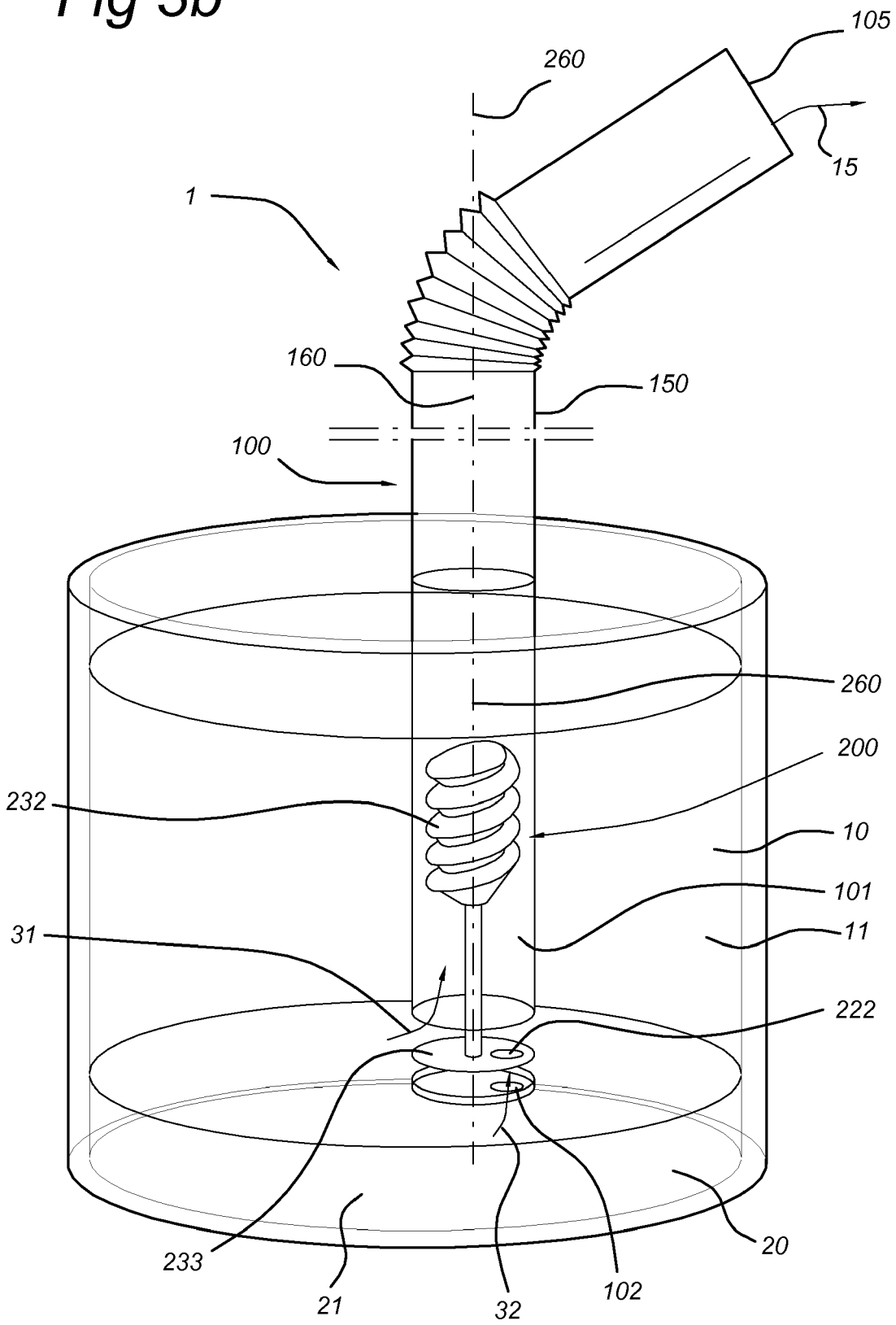
102
233
222

Fig 3b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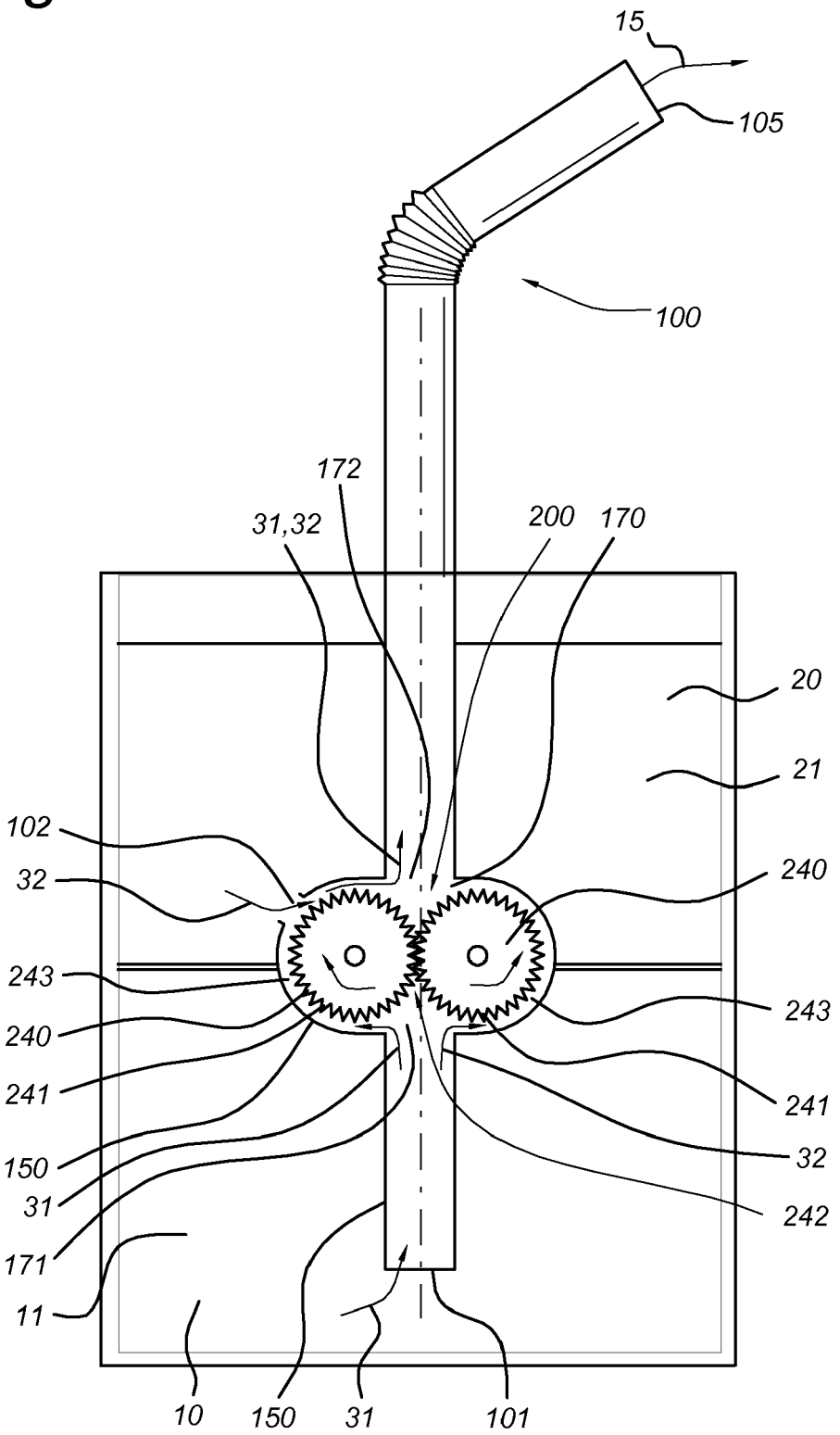
102
20

Fig 4a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32
242
10
150
31
101

Fig 4b

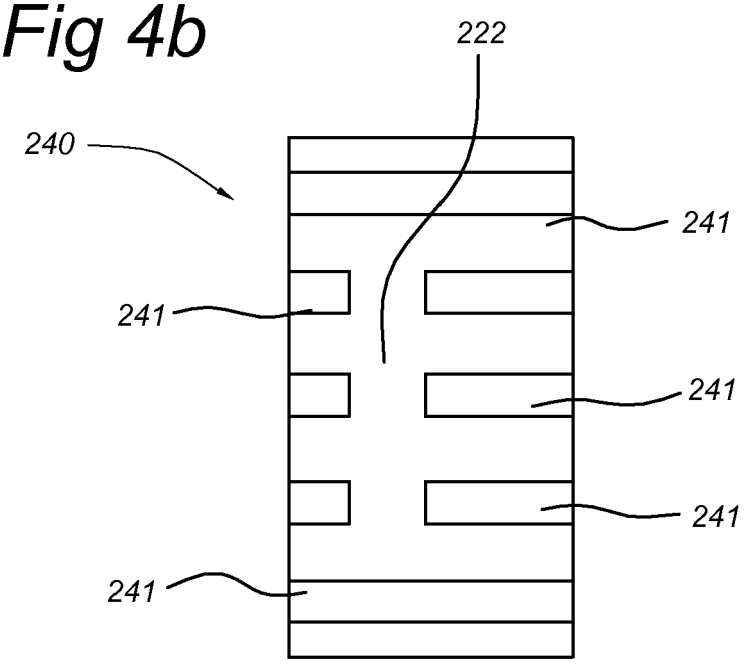


Fig 4c

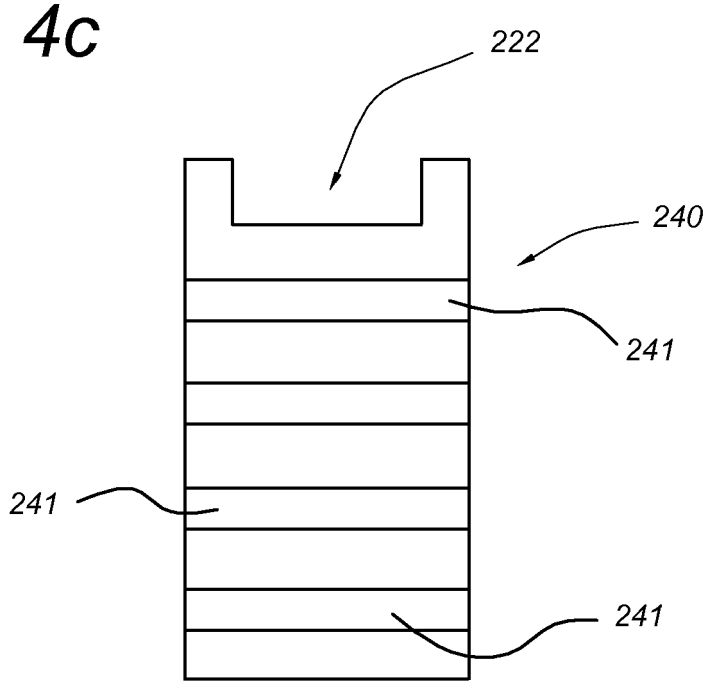
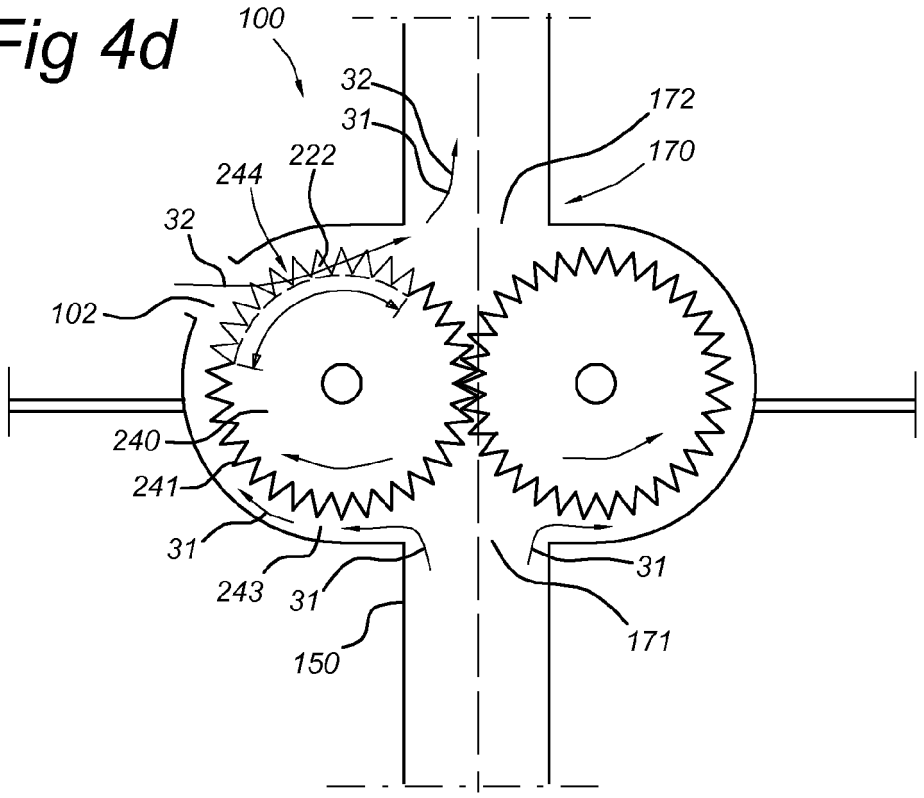


Fig 4d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222
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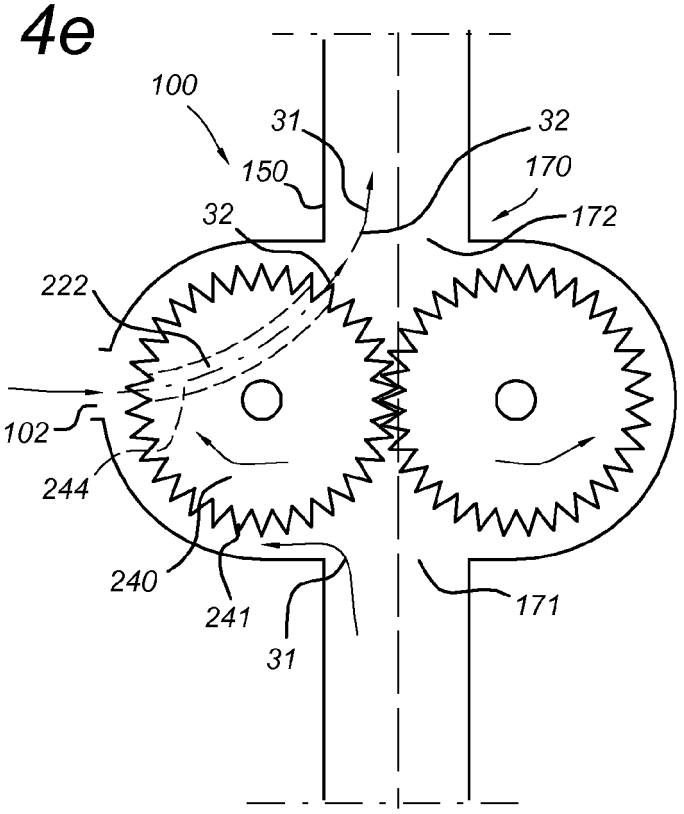
102
240
241
31
243
31
150
31
171

Fig 4e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222
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240
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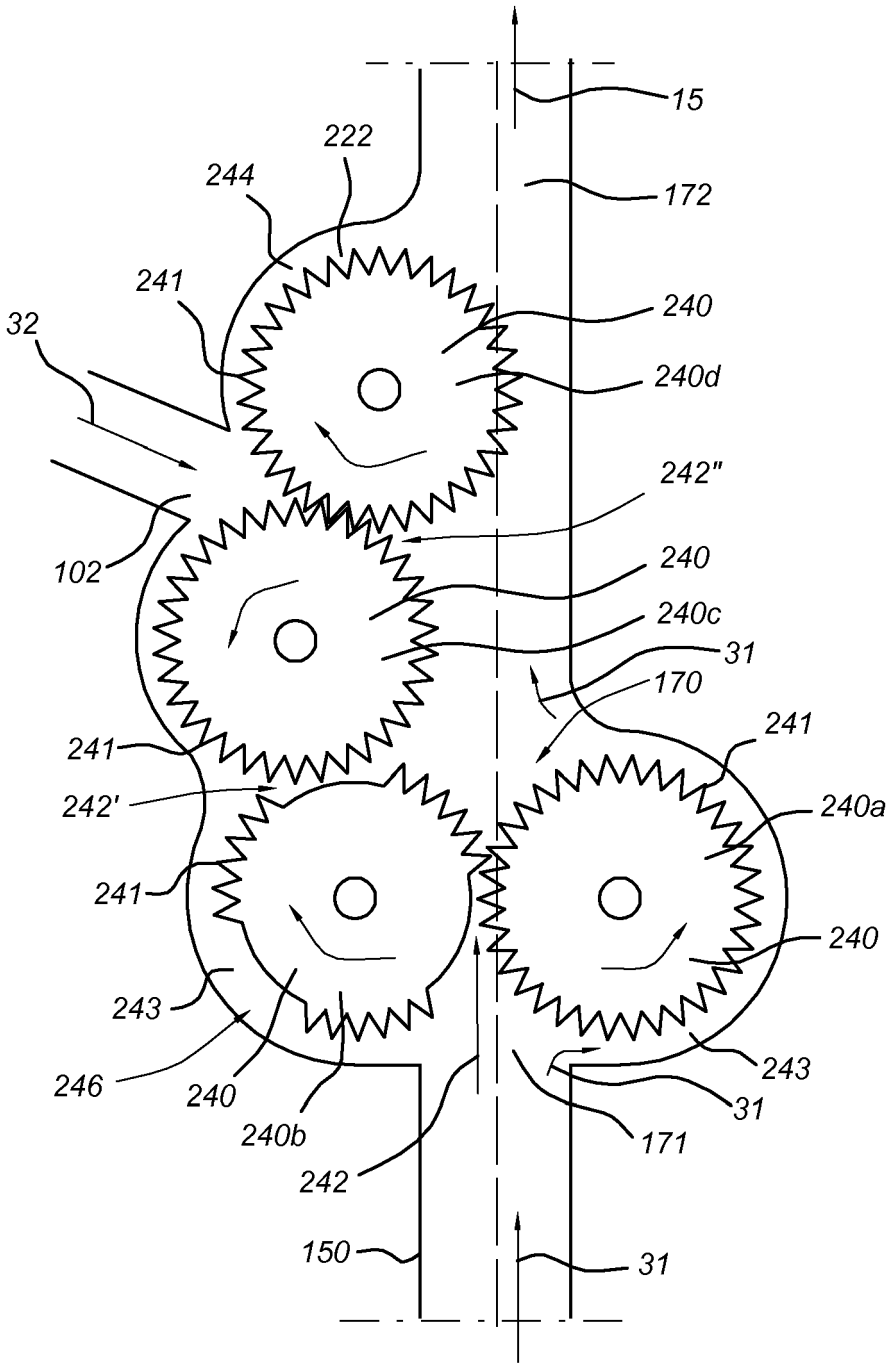
31
171

Fig 5a


15
222
244
172
241
240
32
240d
242"
102
240
240c
31
170
241
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242'
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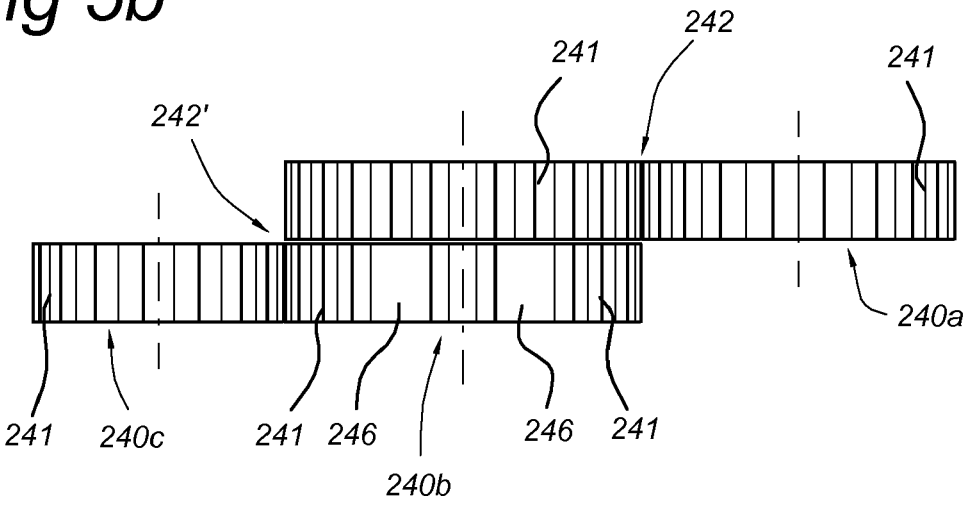
240
243
243
246
240
31
240b
171
242
150
31

Fig 5b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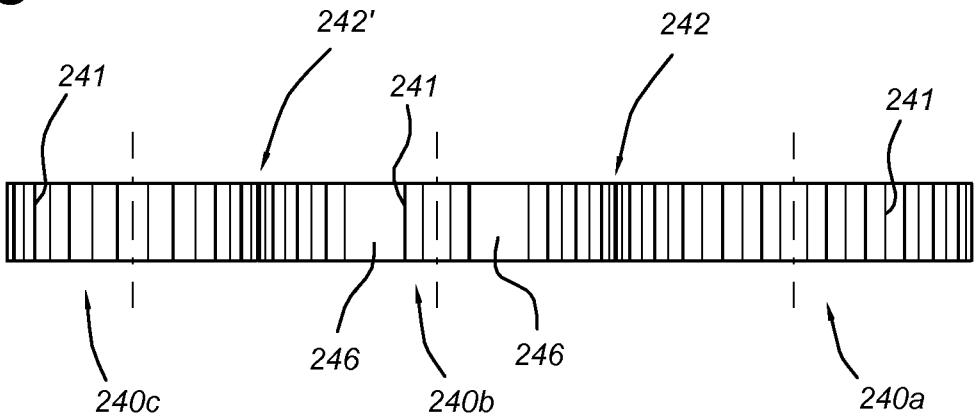
240b

Fig 5c


242'
242
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240c
240b
240a

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EUROPEAN SEARCH REPORT

Application Number
EP 09 15 2373

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A	WO 03/035537 A (BAILEY RANDALL B [US]; TREK BICYCLE CORP [US]) 1 May 2003 (2003-05-01)		

TECHNICAL FIELDS SEARCHED (IPC)

A47G
A61J
B65D
A45F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	21 August 2009	Vistisen, Lars

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