Presentation of the Invention

Embodiments of the invention seek to provide a drinking device which allows the user to have an improved taste experience.

The drinking device according to an aspect of the invention for the retronasal perception of an aroma substance comprises a storage container for drinking liquid, a head part, which can be fastened on the storage container and has a mouth end; an exchangeable aroma container, through which air can flow and which can be fastened on the head part, and a drinking straw, which is fixed in the head part, a transport channel for drinking liquid, said transport channel extending from the storage container towards the mouth end of the head part; and an air channel for transporting aromatized air, said air channel extending from the aroma container towards the mouth end in the head part, characterized in that the exchangeable aroma container can be moved, in relation to the head part, in an axial direction from a sealing position to a non-sealing position.

The essential aspect of the drinking device according to embodiments of the invention consists in that the aroma substance is perceived retronasally. During drinking, the aroma substance reaches the mouth of the user together with the drinking liquid and subsequently rises retronasally via the pharynx to the olfactory mucosa (*regio olfactoria*), where it is detected by the receptors situated there and is perceived by the user. The device according to embodiments of the invention is equally suited for cold or warm drinking liquids.

Advantage is taken of the fact that there is a close correlation between the sense of smell and the sense of taste. The user therefore gains the impression that they are tasting the aroma, even though they are in fact only smelling it retronasally.

The human sense of taste is essentially determined by the retronasal sense of smell. The receptors of the tongue can only distinguish between sweet, sour, bitter, salty and umami, whereas the differentiated sense of taste arises in that the gaseous phase of foodstuffs and liquids in the pharynx ascends via the retronasal route and reaches the olfactory mucosa. The sensors located there trigger neurological stimuli which cause a taste impression in the brain. Thus, a person to whose pharynx an aroma is delivered during drinking gains the impression that the beverage is aromatized, since the retronasal smelling process creates the sensation in the brain that the beverage is the source of the aroma, even though the user is ingesting a pure and unadulterated, i.e. non-aromatized, liquid such as water. If the

smell is perceived by breathing in through the nose, known as the orthonasal perception of an aroma substance, this impression does not arise to the same extent since the sensation is linked to the breathing rate and thus the user gains the correct impression that they are only smelling the aroma substance, but not tasting it as is the case with retronasal perception.

The storage container, which is preferably designed to be refillable, can contain pure water or carbonated water, while the aroma substance is delivered to the air situated in the transport channel and the drinking liquid immediately before ingestion by the user or is transported separately to the pharynx of the user.

Alternatively, however, the drinking liquid can also have an inherent taste. The existing inherent taste of the drinking liquid is either intensified by the aroma substance from the aroma container or is supplemented by one or more additional flavor components. If the storage container contains apple juice, for instance, apple aroma can be added to intensify the taste experience, or an orange aroma for instance can be added in order to create a blend of flavors. In this manner alcoholic beverages such as beer, for instance, can also be provided with additional aroma substances, whereby the particular preferences of a user can be catered for by using a corresponding aroma container in the drinking device according to embodiments of the invention. In addition, flavors which are not common in the food sector can also be used in the drinking device disclosed here, such as “sandalwood”, “spring meadow” or “unicorn” known from air fresheners. The aroma used can be synthetic or natural. It is possible to use aromas which have been isolated or enriched from a synthetic or natural source and natural substances such as fresh or processed products made, for example, of lemon peel, dandelion leaves, licorice or other aromatic substances.

Providing the aroma container on the head part of the drinking device has the additional advantage that the user can immediately recognize the “flavor”. Thus, for instance, the aroma container could be labeled according to the chosen aroma or also be colored entirely and, for instance, have a yellow color for a lemon aroma or a green color for a green apple aroma.

In this regard, the drinking straw can be fastened on the head part in such a way that one end of the drinking straw is arranged a few centimeters, preferably between 2 cm and 5 cm, in front of the mouth end of the head part, and the aromatized air guided through the air channel enters the drinking liquid at the end of the drinking straw or in the immediate proximity of the end of the drinking straw. At the mouth end of the head part, the drinking

liquid mixed with aromatized air is ingested by the user.

In the oral cavity of the user, the aromatized air escapes from the surrounding drinking liquid in the form of air bubbles and rises retronasally via the pharynx to the olfactory mucosa. A further advantage of separately delivering the aromatized air and the drinking liquid until directly in front of the mouthpiece consists in that at most a negligible mass transfer between the air and the drinking liquid can take place.

The technical challenge of all solutions described above consists in coordinating the geometries of the transport channel for drinking liquid and of the air channel with each other such that, depending on the drinking position and in the case of special drinking liquids and also depending on the viscosity of the drinking liquid, the aromatized air and the drinking liquid are sucked in at the desired proportion to one another.

According to a preferred embodiment, the exchangeable aroma container can be moved, in relation to the head part, in an axial direction from a sealing position to a non-sealing position. By means of a simple axial movement of the aroma container, said container can thus be moved from a sealing position to an operating position in which air can flow through the aroma container.

According to a preferred embodiment of the invention, the head part is arranged at an angle in relation to the storage container, preferably inclined at an angle between 20° and 30° in relation to the storage container, and particularly preferably inclined at an angle of approximately 25° in relation to the longitudinal axis of the storage container.

This measure has the advantage that the drinking device according to embodiments of the invention has improved ergonomics and, moreover, it is intuitively clear to a user how to hold the drinking device. Due to the provision of a bend in the axial extension of the drinking device, the drinking device is tilted significantly less while drinking, thereby reducing the risk of accidentally spilling the drinking liquid. Moreover, the provision of a bend facilitates the filling process of the storage container by the user, in particular at water sources with a small distance between the faucet and the sink.

The angular arrangement of the head part in relation to the storage container can in particular also be combined with the further preferred feature, according to which the drinking straw has a sectional curvature in the longitudinal direction.

If the position of the storage container while drinking is defined and if the drinking straw moreover has an at least sectional curvature, the end of the drinking straw opposite to the mouth end can be positioned in such a way that it is possible to consume almost the entire content of the storage container.

A preferred embodiment of the drinking device is the provision of a lid which is either put or screwed on and thereby seals the drinking device. A rotating lid is well suited to sealing the drinking device tightly even when an increased pressure is building up in the interior of the storage container, as can occur if the drinking liquid is a carbonated beverage. Such a lid can tightly seal both the transport channel for drinking liquid and the air channel for aromatized air, but in the same manner also another air line for delivering air into the interior of the storage container for the purpose of equalizing pressure. A further advantage of a rotating lid is that it protects the mouthpiece from contamination and is thus an element that is familiar to every user, and the suitability of which for tightly sealing the drinking device is relied upon.

Preferably, the lid has a receiving means for attaching a carrying strap. The receiving means can be designed as a tongue-and-groove system, for example. In this way, different carrying straps can be comfortably fastened on the lid, and the drinking device can be individualized according to the user's wishes e.g. by the choice of color of the carrying strap. It can also be individualized by a different shape of the strap.

According to a preferred embodiment of the invention, the head part has an air chamber in connection with the air channel. Said air chamber is a safety buffer for buffering overpressure or negative pressure during and after drinking, and thus it can be avoided that drinking liquid can flow into the aroma container. This solves in particular the problem that the fluctuations in the pressure and flow conditions in the transport channel for drinking liquid and in the air channel, which occur at the drinking device at the end of the drinking process, lead to drinking liquid getting into the air channel and/or the aroma container. This ingress of liquid into the aroma container can, for instance, lead to unwanted dilution of the fragrance-emitting substance or the occurrence of hygiene problems. The interruption of the air channel by an air chamber can be configured by providing a recess in the head part of the drinking device where the transport channel for drinking liquid and the air channel come into contact.

Another aspect of the invention provides an aroma container for a drinking device as described for the retronasal perception of an aroma substance. The aroma container comprises an annular

aroma chamber comprising a carrier substance that contains a fluid with an aromatizing substance, wherein the aroma chamber is enclosed by a wall which comprises an interior circumferential surface, an exterior circumferential surface as well as a top side and a lower side, wherein the interior circumferential surface is shaped in such a way that the aroma container can only be put in a single rotational direction onto a component shaped complementarily to the interior circumferential surface and can be shifted in an axial direction essentially perpendicular to the top side in relation to the component, at least one first opening for air to flow in, and at least one second opening for air to flow out.

The aroma container according to embodiments of the invention, which can be fastened on the head part of the drinking device, surrounds – with its interior circumferential surface – the head part of the drinking device. Since the interior circumferential surface is shaped in such a way that the aroma container can only be put in a single rotational direction onto a component shaped complementarily to the interior circumferential surface, in this specific case onto the head part shaped complementarily to the interior circumferential surface, a flow-in opening in the head part can be aligned with the aroma container in such a way that the user, when drinking through the drinking straw, also sucks in aromatized air having flown through the aroma container. Since the aroma container can be shifted axially in a direction essentially perpendicular to the top side and the lower side, the aroma container can be moved between a locked position and an operating condition. In the locked position, there is no flow connection between the second opening of the aroma container and the air channel of the drinking straw. In the operating condition, on the other hand, the user can suck in air through the drinking straw, which is in flow connection with the second opening of the aroma container so that ambient air is sucked into the first opening of the aroma container, flows through the aroma chamber with the aromatizing substance, leaves the aroma container through the second opening as aromatized air, and flows into the air channel of the drinking straw.

According to a preferred embodiment of the invention, the at least one first opening for air to flow in is arranged in the lower side of the wall. The first opening or the first openings for air to flow in are arranged essentially on the exterior side of an essentially annular aroma container, for example, whereas the second opening or second openings for air to flow out are arranged essentially on the interior side of the aroma container. The provision of a plurality of second openings results in the advantage that the aroma container cannot only be positioned in a single alignment in relation to the head part of the drinking device, but a plurality of positions are possible in which one of the second openings are in flow connection with the air channel or air channels of the head part. Thus, handling is facilitated

for the user, and other shapes of the aroma container are possible since a defined, relative positioning is no longer necessary.

Said positioning of the first opening in connection with the possibility of axially shifting the aroma container makes it possible to move the aroma container in the axial direction to a locked position, in which not only no flow connection exists between the second opening and the air channel of the drinking straw, but additionally the first opening can be brought in contact with a suitable part of the head part, whereby the first opening is also sealed in the locked position.

Thus, for instance, an aroma container with any desired prismatic geometry could be pressed in an axial direction in order to bring the aroma container into a non-sealing position. The aroma container can engage in this position, i.e. remain in this position automatically, or drinking with the delivery of an aroma is only possible if the aroma container is pulled out. In this manner, a user could additionally choose between drinking liquid with and without aromatized air.

The use of an essentially elastic material such as silicone or other elastomers for the production of the head part or parts of the head part of the drinking device can, for instance, make it easier to seal the system.

Preferably, the opening for air to flow out is arranged in the interior circumferential surface. In this manner, a flow connection can be easily established between the aroma container and the head part which abuts at the interior circumferential surface of the aroma container.

According to a preferred embodiment of the invention, the removable aroma container can be inserted into the drinking device according to embodiments of the invention by means of a simple motion sequence. This can be achieved by the interior circumferential surface having a characteristic shape that is immediately recognized by the user in order to attach the aroma container in its correct position at the head part of the drinking device.

Particularly preferred, however, is the embodiment according to which the aroma container of the drinking device doubles as a locking device, by means of which the air channel as well as the first opening and the second opening of the aroma container can be locked tightly. In this regard, the aroma container according to a preferred embodiment of the invention is designed such that it can be moved from the sealing position to the non-sealing position by

means of a translational motion. Consequently, the user just has to bring the aroma container into an operating position, causing the sealing device to be actuated without the user noticing. In this manner, the number of construction elements can be kept low, thereby enabling *inter alia* a more hygienic design and also a cost saving in the production and assembly of the drinking device. Moreover, almost every user knows the function of a sports valve so that the user intuitively pulls out the aroma container as a shiftable component for drinking and, after drinking, presses it back into its original position or screws on the lid, by means of which the aroma container can be moved back into its locked position.

The drinking device according to embodiments of the invention can be designed in a wide variety of ways. It can be a mobile drinking bottle which is configured as a Thermos flask with either one or two walls.

Another preferred embodiment of the invention lies in that the transport channel for the drinking liquid and/or the air channel have a specific shape. It is, for instance, possible that the transport channel for the drinking liquid is widened or narrowed at one, two or more places, so that the diameter of the transport channel is greater or smaller there than at the other places. Narrowing or widening can be designed in the drinking straw of the drinking device. This enables a different mouthfeel of the user when drinking from the drinking device.

A further preferred modification of the geometry of the channels in the drinking device comprises different surfaces on the inside of the channel or obstacles which change the flow conditions in the transport channel for drinking liquid or in the air channel.

The air channel of the drinking device can also have a specific shape. Previous solutions use a consistently uniformly shaped channel. The air channel must thus have a small diameter, which means that problems occur when producing the head part of the drinking device. Furthermore, a narrow channel makes it more difficult to clean the drinking device. However, it is also possible for the air channel to be narrower only at a short stretch. This both simplifies production and makes cleaning easier.

A further preferred embodiment of the drinking device according to the invention provides for the aroma unit of the drinking device according to embodiments of the invention to have to be activated before use. The aroma can initially be encapsulated microscopically or macroscopically. Activation can, for instance, occur through a change in temperature or a mechanical

process. A preferred embodiment provides for a filter through which air can flow, in which an essentially round aroma unit is positioned whose interior contains a fluid comprising an aromatizing substance. The shell of the aroma unit preferably consists of a material such as gelatine or agarose, so that in the inactive state a tight shell keeps the fluid with the aromatized substance in a non-volatile state. The fluid is released into the surrounding filter by the activation, such as the destruction of the shell under pressure. Such solutions are proposed for use in cigarettes, for instance in US 20040261807 A1. According to embodiments of the invention, in a preferred embodiment this technology is to be used in the drinking device according to embodiments of the invention. This can result in a number of advantages. For instance, it allows the aroma substances to be protected from oxidative processes, and generally packaging material can be saved and plastic seals avoided.

Common to all preferred embodiments and combinations of technical features set out above and below is that a mediated air flow through the air channel during normal drinking from the drinking device according to embodiments of the invention expediently lies between about 250 and 550 ml/min. This air flow is achieved, for example, when using an air channel with a diameter of approximately 0.5 to 2.5 mm or with a non-circular cross-section having a cross-sectional area of the air channel between 0.2 mm^2 and 4.9 mm^2. The air flow can also be adjusted in another manner, such as by means of an essentially short narrowing of the air channel, by means of a valve which can also be configured as a check valve in order to prevent the ingress of liquid into the air channel and/or the aroma container, or by means of a membrane. An essentially permeable membrane can, for instance, be attached at the point where the air channel enters the transport channel for drinking liquid. A further advantage of the use of a membrane at this point is also that the fluctuations described above in the pressure and flow conditions when the drinking process ends do not lead to drinking liquid entering the air channel and/or the aroma container or its volume being reduced at this or any other moment.

Brief Description of the Drawings

The invention is described below, merely by way of example, on the basis of the enclosed schematic figures, in which

Fig. 1 schematically shows the functional principle of a drinking device according to the invention for the retronasal perception of an aroma substance;

Fig. 2 shows a side view of a drinking device according to the invention with screwed-on