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(71) Applicant: **Aqualex**
8540 Deerlijk (BE)

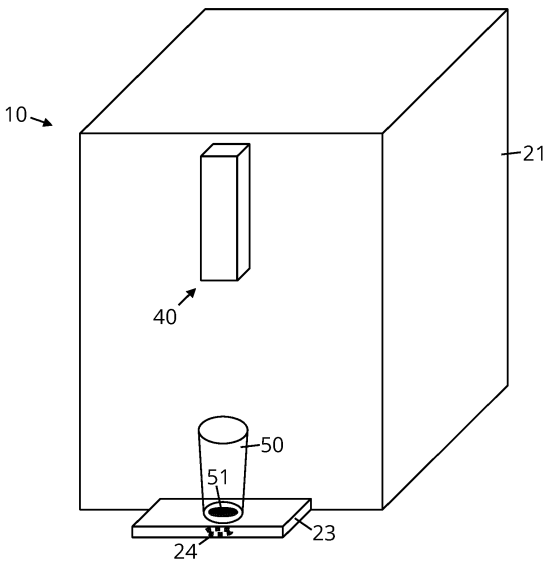
(72) Inventor: **PEELMAN, Karel**
8720 Dentergem (BE)

(74) Representative: **Winger**
Mouterij 16 bus 101
3190 Boortmeerbeek (BE)

(54) DRINKING WATER DISPENSER

(57) Drinking water dispenser (21, 22) for automatically filling a drinking water container (50) with a preselected volume of a preselected drinking water type, the drinking water container (50) having a bottom and a machine-readable marker (51) enclosed in the bottom. The drinking water dispenser (21, 22) comprises: (i) a nozzle (40) for dispensing the drinking water type, (ii) a sensing unit (24) and (iii) a processor (80). The sensing unit (24) is configured to determine whether the drinking water container (50) is properly positioned below the nozzle (40) by sensing whether the machine-readable marker (51) is present within a predetermined zone. The sensing unit (24) is further configured to read information from the machine-readable marker (51). The processor (80) is configured to-if the drinking water container (50) is positioned below the nozzle (40)-process the information read from the machine-readable marker (51) to obtain the preselected drinking water type and the preselected volume for the drinking water container (50), and to automatically dispense the preselected volume of the preselected drinking water type from the nozzle (40) into the drinking water container (50).

FIG 1



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Description

Technical field of the invention

[0001] The present invention relates to the field of drinking water dispensers. In particular, the present invention relates to drinking water dispersers that are capable of automatically filling drinking water containers.

Background of the invention

[0002] Beverage dispensers which are capable of preparing and dispensing a selected beverage into a beverage container are known in the art. A particular type thereof are drinking water dispensers, which are specifically adapted to prepare and dispense e.g. still water, sparkling (i.e., carbonated) water, enchanced water and/or hot water. For preparing the different drinking water types, the drinking water dispensers may for example obtain still water from a common water source. These drinking water dispensers may use tap water as a source for the still water, and may thereby provide an economically and ecologically friendly way to provide a range of drinking waters to a user. Alternatively, the common water source may be provided in the form of water bottles. The drinking water dispenser may add CO_2 (e.g., by a carbonator) to the still water so as to obtain sparkling water, and then dispense the sparkling water in the drinking water container. Furthermore, the still water from the common water source may be heated or cooled. In some instances, a drinking water dispenser may also comprise a range of syrups/powders, and a flavoured drinking water may be prepared by mixing the water with a syrup/powder for providing the flavour to the still or sparkling water.

[0003] Such beverage/drinking water dispensers are often used by many users, and, therefore, may unintentionally become a source of infectious diseases. Indeed, any user may, by physically contacting surfaces of the beverage dispenser (e.g., by touching a touch screen for determining the type of beverage that is to be dispensed), leave germs on the contacted surfaces. These germs may, subsequently, pass onto a next user that uses the beverage dispenser. This problem is particularly relevant during a (large) epidemic, such as the ongoing corona pandemic, but is also present in times of e.g. the seasonal flu. Regularly disinfecting the beverage dispenser (e.g., after every use) is often unpractical and may be detrimental to the ease-of-use typically associated with such dispensers.

[0004] In the state of the art, some beverage dispensers may comprise a sensing unit for reading a machine-readable marker (such as an RFID-tag, a QR-code, or a bar code) on a beverage container. From said marker, the beverage dispenser may obtain various information associated with the beverage container and/or its owner, such as a pre-purchased volume of beverage, the beverage volume previously delivered, a billing account to be charged, etc.

[0005] However, although such beverage dispensers allow certain functionality to be automated to a degree, they do typically still require physical interaction between the user and the beverage dispenser. Also, the machine-readable marker is therein typically located (e.g. attached or printed) on an outer surface of the beverage container, making it prone to being damaged and/or dislodged. This in turn limits the durability of the beverage container as a whole.

[0006] Another common problem with beverage/drinking water dispensers as available up to now is that of their use in settings such as restaurants, bars or cafeterias where they are used by the personnel to (pre-)fill containers for consumption by the customers (e.g., water bottles provided at the table during a meal). In this case, while the use of durable and refillable (e.g., glass) containers in combination with ,e.g., the drinking water dispenser can be economical and ecologically-friendly, there is still the issue that the personnel must be put to the task (often several times a day) of filling these containers. While filing e.g. several tens of these containers is not a particularly complicated task, it is one which may easily be experienced as boring/numbing while nevertheless requiring virtually constant active attention by the person performing it. For example, they may need to actively monitor the right moment to stop filling one container, replace it, start dispensing again, etc. Although beverage dispensers with a (selectable) dosage setting are known, the beverage containers of different sizes may need to be filled and thus the person undertaking this task still needs to check the size of the container at hand and then select the right volume. Accordingly, while their attention is directed to operating the dispenser, the personnel is not available to do other tasks, meaning that there is a non-negligible additional cost factor involved for the business. The latter can be a reason refrain from employing such a (drinking water) dispenser and to use (non-ecological) pre-bottled alternatives instead.

[0007] There is thus still a need in the art for drinking water dispensers which address at least some of problems outlined above.

Summary of the invention

[0008] It is an object of the present invention to provide good drinking water dispensers for automatically filling a drinking water container with a preselected volume of a preselected drinking water type. It is further object of the present invention to provide good systems and methods associated therewith. This objective is accomplished by apparatuses and methods according to the present invention.

[0009] It is an advantage of embodiments of the present invention that initiating filling of the drinking water container with the drinking water type may require nothing more than positioning the drinking water container underneath the nozzle of the drinking water dispenser

for dispensing the drinking water type, making the drinking water dispenser very user-friendly. It is a further advantage of embodiments of the present invention that, as the volume of the preselected drinking water type that is dispensed into the drinking water container is preselected, the user may not have to waste time on selecting a volume, or waiting until the drinking water container is filled to actively terminate said dispensing. It is therefore still a further advantage of embodiments of the present invention that drinking water containers may be filled in a time-efficient way, i.e., the rate of filling drinking water containers may be high. It is yet a further advantage of embodiments of the present invention that the drinking water dispenser may not require users to touch the drinking water dispenser for filling of the drinking water container, thereby mitigating any risk of transferring diseases between different users of the drinking water dispenser.

[0010] The above in turn may make the present invention particularly suitable for restaurants, bars, cafeterias and the like. Indeed, in contrast to current drinking water dispensers, personnel in such establishment need only place a container under the nozzle and can then simply go on with their work while the container will be automatically filled with the preselected drinking water (which can be pre-programmed in well in advance; e.g. for the entire lifetime of the container). All that remains then is to occasionally replace the filled container with an empty one-which may be done quickly and easily, even in passing-, without requiring any further input or attention from personnel and all the while obviating spilling or uneven filling.

[0011] It is an advantage of embodiments of the present invention that the machine-readable marker, being located enclosed in the bottom of the drinking water container, may be physically isolated such that no fluid or the like may come into contact with the machine-readable marker and moreover it is protected being from being removed, torn off or physically damaged. It is therefore an advantage of embodiments of the present invention that the machine-readable marker, and thus the drinking water container may have a long life-time; even under extensive use.

[0012] In a first aspect, the present invention relates to a drinking water dispenser for automatically filling a drinking water container with a preselected volume of a preselected drinking water type, the drinking water container having a bottom and a machine-readable marker enclosed in the bottom. The drinking water dispenser comprises: (i) a nozzle for dispensing the drinking water type, (ii) a sensing unit and (iii) a processor. The sensing unit is configured to determine whether the drinking water container is properly positioned below the nozzle by sensing whether the machine-readable marker is present within a predetermined zone. The sensing unit is further configured to read information from the machine-readable marker. The processor is configured to-if the drinking water container is positioned below the nozzle-process the information read from the machine-readable marker to obtain the preselected drinking water type and the preselected volume for the drinking water container, and to automatically dispense the preselected volume of the preselected drinking water type from the nozzle into the drinking water container.

[0013] In a second aspect, the present invention relates to a system comprising: (i) a drinking water dispenser according to embodiments of the first aspect of the present invention, and (ii) a drinking water container having a bottom and a machine-readable marker enclosed in the bottom.

[0014] In a third aspect, the present invention relates to a method for automatically filling a drinking water container with a preselected volume of a preselected drinking water type, the drinking water container having a bottom and a machine-readable marker enclosed in the bottom, the method comprising: (a) positioning the drinking water container below the nozzle; (b) sensing that the drinking water container is properly positioned below the nozzle by sensing that the machine-readable marker is present within a predetermined zone; (c) reading information from the machine-readable marker; (d) processing the information read from the machine-readable marker to obtain the preselected drinking water type and the preselected volume for the drinking water container; and (e) automatically dispensing the preselected volume of the preselected drinking water type into the drinking water container.

[0015] Particular and preferred aspects of the invention are set out in the accompanying independent and dependent claims. Features from the dependent claims may be combined with features of the independent claims and with features of other dependent claims as appropriate and not merely as explicitly set out in the claims.

[0016] Although there has been constant improvement, change and evolution of devices in this field, the present concepts are believed to represent substantial new and novel improvements, including departures from prior practices, resulting in the provision of more efficient, stable and reliable devices of this nature.

[0017] The above and other characteristics, features and advantages of the present invention will become apparent from the following detailed description, taken in conjunction with the accompanying drawings, which illustrate, by way of example, the principles of the invention. This description is given for the sake of example only, without limiting the scope of the invention. The reference figures quoted below refer to the attached drawings.

Brief description of the drawings

[0018]

FIG 1 is a schematic representation of a perspective view of a system comprising a drinking water dispenser and a drinking water container in accordance with embodiments of the present invention, based on a drink machine.

FIG 2 is a connection diagram for a system in accordance with embodiments of the present invention.

FIG 3 is a schematic representation of a perspective view of a system comprising a drinking water dispenser and a drinking water container in accordance with embodiments of the present invention, based on a tap.

[0019] In the different figures, the same reference signs refer to the same or analogous elements.

Description of illustrative embodiments

[0020] The present invention will be described with respect to particular embodiments and with reference to certain drawings but the invention is not limited thereto but only by the claims. The drawings described are only schematic and are non-limiting. In the drawings, the size of some of the elements may be exaggerated and not drawn on scale for illustrative purposes. The dimensions and the relative dimensions do not correspond to actual reductions to practice of the invention.

[0021] Furthermore, the terms first, second, third and the like in the description, are used for distinguishing between similar elements and not necessarily for describing a sequence, either temporally, spatially, in ranking or in any other manner. 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.

[0022] Moreover, the terms top, bottom and the like in the description and the claims are used for descriptive purposes and not necessarily for describing relative positions. It is to be understood that the terms so used are interchangeable with their antonyms under appropriate circumstances and that the embodiments of the invention described herein are capable of operation in other orientations than described or illustrated herein.

[0023] It is to be noticed that the term "comprising", used in the claims, should not be interpreted as being restricted to the means listed thereafter; it does not exclude other elements or steps. It is thus to be interpreted as specifying the presence of the stated features, integers, steps or components as referred to, but does not preclude the presence or addition of one or more other features, integers, steps or components, or groups thereof. The term "comprising" therefore covers the situation where only the stated features are present and the situation where these features and one or more other features are present. Thus, the scope of the expression "a device comprising means A and B" should not be interpreted as being limited to devices consisting only of components A and B. It means that with respect to the present invention, the only relevant components of the device are A and B.

[0024] Similarly, it is to be noticed that the term "coupled" should not be interpreted as being restricted to direct connections only. The terms "coupled" and "connected", along with their derivatives, may be used. It should be understood that these terms are not intended as synonyms for each other. Thus, the scope of the expression "a device A coupled to a device B" should not be limited to devices or systems wherein an output of device A is directly connected to an input of device B. It means that there exists a path between an output of A and an input of B which may be a path including other devices or means. "Coupled" may mean that two or more elements are either in direct physical or electrical contact, or that two or more elements are not in direct contact with each other but yet still co-operate or interact with each other.

[0025] Reference throughout this specification to "one embodiment" or "an embodiment" means that a particular feature, structure or characteristic described in connection with the embodiment is included in at least one embodiment of the present invention. Thus, appearances of the phrases "in one embodiment" or "in an embodiment" in various places throughout this specification are not necessarily all referring to the same embodiment, but may. Furthermore, the particular features, structures or characteristics may be combined in any suitable manner, as would be apparent to one of ordinary skill in the art from this disclosure, in one or more embodiments.

[0026] Similarly, it should be appreciated that in the description of exemplary embodiments of the invention, various features of the invention are sometimes grouped together in a single embodiment, figure, or description thereof for the purpose of streamlining the disclosure and aiding in the understanding of one or more of the various inventive aspects. This method of disclosure, however, is not to be interpreted as reflecting an intention that the claimed invention requires more features than are expressly recited in each claim. Rather, as the following claims reflect, inventive aspects lie in less than all features of a single foregoing disclosed embodiment. Thus, the claims following the detailed description are hereby expressly incorporated into this detailed description, with each claim standing on its own as a separate embodiment of this invention.

[0027] Furthermore, while some embodiments described herein include some but not other features included in other embodiments, combinations of features of different embodiments are meant to be within the scope of the invention, and form different embodiments, as would be understood by those in the art. For example, in the following claims, any of the claimed embodiments can be used in any combination.

[0028] Furthermore, some of the embodiments are described herein as a method or combination of elements of a method that can be implemented by a processor of a computer system or by other means of carrying out the function. Thus, a processor with the necessary instructions for carrying out such a method or element of a method forms a means for carrying out the method or element of a method. Furthermore, an element described herein

of an apparatus embodiment is an example of a means for carrying out the function performed by the element for the purpose of carrying out the invention.

[0029] In the description provided herein, numerous specific details are set forth. However, it is understood that embodiments of the invention may be practised without these specific details. In other instances, well-known methods, structures and techniques have not been shown in detail in order not to obscure an understanding of this description.

[0030] The following terms are provided solely to aid in the understanding of the invention.

[0031] As used herein, and unless otherwise specified, a distinction is made between different types of drinking water. These may be defined relative to the 'starting water' and the 'starting water temperature'. Herein, the starting water is the drinking water that is introduced into the drinking water dispenser, and may be processed by it. Typically, the starting water is tap water or bottled water. This starting water has a 'starting water temperature', which is the temperature of said starting water at the time it is introduced into the drinking water dispenser. If the starting water temperature is unknown, a temperature of 20 °C may be assumed. Chilled, unchilled and hot water are then respectively drinking water with a temperature lower than, equal to and considerably higher-e.g., at least 25°C higher-than the starting water temperature. Sparking Carbonated (i.e., sparkling) water is-as is well known-drinking water (e.g., starting water) in which carbon dioxide has been dissolved under pressure so as to obtain "sparkling" drinking water. Flat water is drinking water (e.g., starting water) that is not carbonated (i.e., "not sparkling"). Typically, still water may be provided chilled, uncooled, or hot, while the carbonated water is typically provided either chilled or uncooled (but not hot). Therefore, 'hot water' is typically understood to mean hot still water. Furthermore, filtered water is referred to when the starting water in the system has been subjected to a filter treatment within the drinking water dispenser (that is, in addition to any filter treatment that was performed on the starting water before it was introduced into the drinking water dispenser).

[0032] In a first aspect, the present invention relates to a drinking water dispenser for automatically filling a drinking water container with a preselected volume of a preselected drinking water type, the drinking water container having a bottom and a machine-readable marker enclosed in the bottom. The drinking water dispenser comprises: (i) a nozzle for dispensing the drinking water type, (ii) a sensing unit and (iii) a processor. The sensing unit is configured to determine whether the drinking water container is properly positioned below the nozzle by sensing whether the machine-readable marker is present within a predetermined zone. The sensing unit is further configured to read information from the machine-readable marker. The processor is configured to-if the drinking water container is positioned below the nozzle-process the information read from the machine-readable marker to obtain the preselected drinking water type and the preselected volume for the drinking water container, and to automatically dispense the preselected volume of the preselected drinking water type from the nozzle into the drinking water container.

[0033] The drinking water dispenser in accordance with embodiment of the present invention may be suitable for providing any type of drinking water. Notwithstanding, the drinking water dispenser may preferably be a drinking water dispenser (optionally including'enhanced water'). It is to be noted in this respect that various different drinking water dispenser markets can be distinguished, with little (commercial) overlap between them and each their own challenges, making them effectively belong to different fields. Indeed, there are the soft drink dispensers (e.g. dispensing products from the Coca-Cola Company, to name but one example) commonly found e.g. in larger fast-food or buffet restaurants. Also well-known are various (including high-end) coffee dispensers. In this regard, drinking water dispensers are distinct from these (and particularly from the former), with their own vendors and clientele. In addition to more high-end home user, these drinking water dispensers are typically mainly targeted to restaurants/ bars/cafeterias/etc. and businesses/offices which want to offer their workers and customers/clients with healthy and environmentally-friendly drinking waters in an economical way. If they do want to provide soft drinks, these establishment typically do not resort to soft drink machines, but instead opt for the higher quality of bottled soft drinks. While it may be a valued addition to a drinking water dispenser to have the option for additional flavours and/or other ingredients, it should be appreciated that this does not necessarily yield a soft drink and thus does not turn the drinking water dispenser into a soft drink machine. Indeed, so-called 'enhanced water' (also marketed inter alia as 'flavoured water' , 'infused water', 'vitaminized water', etc.) is nowadays a product in its own right, and which is proposed as a healthy alternative to soft drinks.

[0034] As the machine-readable marker is enclosed in the bottom of the drinking water container, a predetermined zone can be defined such that when the sensing unit senses that the machine-readable marker is present in said (predetermined) zone, it can be inferred that the drinking water container is properly positioned below the nozzle. To this end, the drinking water container may typically have an opening at the top, and the machine-readable marker in the bottom may preferably be vertically aligned with the opening (i.e., centred with respect to the opening) when the drinking water container is positioned 'upright' (i.e., as it would be positioned on a flat horizontal surface). This centring ensures that the location of the machine-readable marker can be reliably used to infer the alignment of the opening with respect to the nozzle (based the drinking water container's orientation). By contrast, if the machine-readable marker would be in or on the side of the drinking water container, then the opening may still be in any of a range of locations de-

pending on how the drinking water container is facing (i.e., how it is rotated), so that the alignment of the opening to the nozzle remains completely unknown.

[0035] Since a user while generally naturally and intuitively introduce the drinking water container under the nozzle in a predictable fashion-with the opening facing the nozzle and oriented in anticipation of placing it down on the base (cf. infra)-the predetermined zone may be selected such that the machine-readable marker is sensed within it already before the drinking water container is fully placed down (thereby speeding up the activation of the drinking water dispensing). However, if the most accurate determination of the drinking water container's (or more particularly, its opening's) positioning below the nozzle is desired, the predetermined zone can be selected to be near the base such that the drinking water container should be substantially positioned on the base before the machine-readable marker can be in the predetermined zone.

[0036] In embodiments, the drinking water dispenser may thus further comprise a base for positioning thereon the drinking water container. The base may comprise a substantially planar top surface on which the drinking water container may be positioned. Said top surface may comprise an indication (e.g., a circular marker or a ridge) for where the drinking water container may be placed on- or positioned above-the base so as to be properly positioned below the nozzle. In preferred embodiments, the top surface of the base may be substantially horizontal. Although this is not strictly necessary (e.g., the base may also be (slightly) angled), it facilitates determining the alignment of the opening from the location of the machine-readable medium and improves the predictability under which the user will introduce the drinking water container under the nozzle.

[0037] In embodiments, the sensing unit may be integrated in the base. In this case, the predetermined zone may be simply defined by a maximum distance to the sensing unit (i.e., it may be defined by a maximum distance between the machine-readable marker and the sensing unit), so that the predetermined zone forms a dome above the base in which the machine-readable maker can be sensed to determine that the drinking water container is properly positioned. The invention is however not limited thereto, and instead, the sensing unit may be located above the base, e.g., laterally displaced from the predetermined zone. Sensing whether the machine-readable marker is present within a predetermined zone may consist of detecting the machine-readable marker directly using the sensor used for reading the machine-readable marker (i.e. comprised in or substantially equal to the sensing unit). For example, it may be sensed whether a marker is in focus (e.g. whether it is within a minimal focus distance) in case of using an optical reader; or the sensing may be based on a signal strength (e.g. Received Signal Strength Indicator or RRSI) or a on response time after an inquiry (e.g. Time Difference of Arrival or TDoA) for an electronic marker. Alternatively, sensing whether the machine-readable marker is present within a predetermined zone may comprise a further detection sensor (e.g. complementary to and/or in combination with the sensor for reading the machine-readable marker). For example, the sensing unit may further comprise an optical sensor (also if the machine-readable marker is an electronic marker) or a weight sensor for sensing the machine-readable marker.

[0038] In general, the size, shape and location of the dome depends on several parameters, such as how close to the base it is desired to bring the drinking water container before it may be determined as being properly positioned, the orientation (angle) of the base, the size of the opening the drinking water container may be expected to have, etc. Notwithstanding, the predetermined zone may for example have a width (i.e., a dimension parallel to the top surface of the base) of from 0.5 cm to 10 cm, preferably from 1 cm to 7.5 cm, yet more preferably from 2 cm to 5 cm. Likewise, it may have a height (i.e., a dimension parallel to the normal direction of the top surface) of from 0.1 cm to 20 cm, preferably of from 0.3 cm to 10 cm, more preferably from 0.5 to 5 cm, yet more preferably from 1 cm to 2.5 cm.

[0039] In embodiments, the drinking water dispenser may be adapted to produce two or more of the drinking water types starting from a common water source; preferably at least two or more drinking water types. Said common water source may be understood to be a "starting water" from which the drinking water types are to be prepared. Said common water source may, for example, be a tap water source, which is an economically and ecologically friendly water source. However, other sources-such as replaceable (large) water bottles-could likewise be used as the common water source.

[0040] In embodiments, the drinking water dispenser may further comprise a filtering system for filtering water, and/or a chiller for chilling water, and/or a heater for heating water, and/or a carbonator for carbonating water. It is an advantage of these embodiments that the filtering system and/or the chiller and/or the heater and/or the carbonator may be used to prepare the different drinking water types from the common water source.

[0041] Filtering the starting water from the common water source may remove any impurities, which may influence the quality (e.g., pH), smell, and taste of the water. In embodiments, the filtering system may be configured for reducing the hardness of the starting water from the common water source.

[0042] In preferred embodiments, the preselected drinking water type may be drinking water; which may include enhanced water. In preferred embodiments, the preselected drinking water type (e.g., the drinking water type) may be selected from still water and sparkling water; preferably from still water, sparkling water and hot water; yet more preferably from still water, sparkling water, hot water and one or more types of enhanced water. These may be filtered or unfiltered. For example, the preselected drinking water type may be selected from

unfiltered chilled water, unfiltered hot water, chilled filtered still water, chilled filtered sparkling water, hot filtered water and-optionally-one or more types of enhanced water.

[0043] In embodiments, the hot water may have a temperature of from 50°C to 100°C, preferably from 60°C to 99°C, more preferably from 75°C to 98°C. Said hot water may be prepared by heating water from the common water source using the heater. Preferably, before heating the water from the common water source, the water is first filtered, at least so as to reduce the hardness of the water (e.g., so as to reduce the carbonate content of the water, and reduce the precipitation of lime in the drinking water dispenser). It is an advantage of these embodiments that said hot water may be suitable for preparing tea, coffee (e.g., instant coffee or filter coffee), soup, and/or chocolate milk. Notwithstanding, the dispensation of hot water does pose a certain safety risk-e.g. if the drinking water dispenser would inadvertently start dispensing hot water while the opening of the drinking water container is (still) misaligned with the nozzle, the user may easily into contact with the hot water and risk serious burns-and may therefore be subject to additional limitations. For example, it may be chosen that no automatic dispensation of hot water may occur. Or it may be chosen that the predetermined zone for hot water is smaller-e.g. requiring (effectively through the selection of the smaller predetermined zone or by using an additional sensor) that the drinking water container is placed on the base and not hovering over the base (cf. supra)-, thereby reducing the possibility for misalignment. Alternatively or additionally, it may be chosen that hot water is an option for selection only for some types of drinking water containers (e.g. only for 'open' containers-such as a cup-having a comparatively large and easily accessible opening compared to their bottom; while not for e.g. 'bottle-shaped' containers having a comparatively small opening and are therefore more prone to misalignment).

[0044] The still or sparkling water may be chilled or unchilled. Chilled water may have a temperature of from 0°C to 15°C, preferably from 2°C to 12°C. Said chilled water may be prepared by chilling the common water source using the chiller.

[0045] In some embodiments, the drinking water dispenser may further comprise a flavour distributing system. Said flavour distributing system may, e.g., comprise a plurality of syrups (e.g., infusion-, soft drink-, iced-tea- and/or tea-flavoured syrups) and/or powders (e.g., coffee powder, such as instant coffee powder, or a powder for making a sports drink). Each syrup and/or powder may be contained in a respective bottle or cup. The syrups and/or powders may typically comprise differently flavoured syrups and/or powders. The flavour distributing system may thus be for distributing a flavour selected from a plurality of different flavours. The syrup distributing system may be configured for providing a predetermined amount (which may depend on the flavour in question) of a syrup and/or powder to a water type, so as to obtain a drinking water type with the selected flavour. The drinking water type with added flavour may be chilled or unchilled, but is preferably chilled. The drinking water type with added flavour may be sparkling or still. It is an advantage of these embodiments that a wide range of drinking water types having a range of different flavours may be obtained by mixing water with a syrup and/or powder. In preferred embodiments, the drinking water type with added flavour may be an 'enhanced water'. Enhanced water is a drinking water with added ingredients, such as (natural or artificial) flavours, vitamins and/or minerals. Enhanced water is generally recognized as being distinct from soft drinks, which typically contain a large amount of sweetener(s). Accordingly, enhanced waters are often proposed/marketed as a low-calorie, healthy alternative to soft drinks (including diet soft drinks). If any, the flavour added to enhanced water is typically rather subtle, in further contrast to soft drinks, coffee and/or tea.

[0046] In embodiments, the base may be adapted for collecting spilled drinking water (i.e., drinking water dispensed by the drinking water dispenser through the nozzle, but not collected by the drinking water container). The base may for example comprise a container having a lid comprising an aperture (e.g., having a lid comprising a grid) for collecting the spilled drinking water therethrough. The spilled drinking water container may comprise an outlet for draining of the collected spilled drinking water. In embodiments, the sensing unit may be located within or below the spilled drinking water container. Preferably, the sensing unit may be located in a hermetically sealed cavity within or below the spilled drinking water container. As such, the drinking water collected in the container for collecting said spilled drinking water-and/or potentially overflowing said container-may advantageously not reach and damage the sensing unit. The sensing unit may typically be communicatively coupled to the processor, which is preferably located away from the spilled drinking water container.

[0047] In embodiments, the machine-readable marker may be an electronic marker or a non-electronic marker. The non-electronic marker may, for example, be a QR code or a barcode, such as a one dimensional or a two dimensional barcode. Such non-electronic marker may, for example, be read by a sensing unit comprising an optical detector. In embodiments, the electronic marker may be an RFID (radio-frequency identification)-tag or an NFC (near field communication)-tag. The electronic marker may be passive (i.e., drawing power from the reader's field) or active (i.e., being itself powered by a power supply). An electronic marker may, for example, be read by a sensing unit adapted for reading RFID-tags or NFC-tags. Such a sensing unit may e.g. comprise a radio-frequency transmitter.

[0048] The drinking water dispenser may typically advantageously be such that the information from the machine-readable marker can be read sufficiently accurately. For example, when the sensing unit is located within or below the spilled drinking water container, the drinking

water dispenser may be adapted to allow reading the machine-readable marker through the spilled drinking water and-if relevant-through the spilled drinking water container. To that end, a common measure may be to select as materials in the drinking water dispenser between the machine-readable marker and the machine-readable marker materials which are (sufficiently) transparent to the signal from the machine-readable marker to the sensing unit (i.e. electronically transparent in the case of an electronic signal, optically transparent in the case of an optical signal, etc.). Moreover, the sensing unit and machine-readable marker may for instance advantageously be selected such that the readout is (largely) unaffected by what may be expected to be in the line-of-sight between the sensing unit and the machine-readable marker. This may typically be achieved using electronic markers such as RFID- or NFC-tags. Alternatively, for a machine-readable marker the readout of which may be affected by what may be expected to be in the line-of-sight between the sensing unit and the machine-readable marker (as may occur when using e.g. an optical marker), the drinking water dispenser may be adapted to account for and/or compensate for this. For example, the processor could be configured to correct a signal read out by the sensing unit in function of the amount (e.g., as determined by an additional sensor in or near the container, or by the sensing unit itself) of spilled drinking water in the spilled drinking water container.

[0049] In embodiments, the drinking water dispenser may further comprise a valve for each drinking water type and the processor may be configured for automatically dispensing the preselected volume of the preselected drinking water type comprises the processor controlling the valves. Preferably, each valve may be fluidically connected to the same nozzle. Using a common nozzle advantageously simplifies determining whether the drinking water container is properly positioned below said nozzle, compared to using several nozzles with respect to all of which the positioning of the drinking water container have need to be monitored.

[0050] In embodiments, the information read from the machine-readable marker may be an identifier, which may be associated with the drinking water container. In embodiments, the processor may be communicatively coupled to a database. Said database may comprise information on the preselected drinking water type and the preselected volume associated with said information (e.g., with the identifier). For example, the sensing unit may read the information, and the processor may-based on said information-determine from the database the preselected drinking water type and the preselected volume for the drinking water container. It is an advantage of these embodiments that the information on the preselected drinking water type and the preselected volume may be adapted by adapting the database. Said database may be adapted directly by a user or manager of the drinking water dispenser; e.g., via an app or other interface. This moreover can advantageously allow the user or manager to set/adjust the preselected drinking water type and/or preselected volume of a plurality of containers in bulk; which can be particularly beneficial in a restaurant/bar/cafeteria/etc.-setting as described before. In alternative embodiments, the information may contain the preselected drinking water type and the preselected volume. It is an advantage of these embodiments that no database may be required, as the information on the preselected drinking water type and the preselected volume are stored on the machine-readable marker. As the preselected volume and the preselected drinking water type is obtained from the information read from the machine-readable marker, no display and no further interaction between a user/manager and the drinking water dispenser may be required, so that a good efficiency and a good hygiene may be achieved. To this end, the information in the machine-readable marker may be fixed, or a reprogrammable machine-readable marker (e.g., as typically the case for an NFC-tag) may be used. The latter may for example be directly reprogrammable using a smartphone (which nowadays e.g. typically have the necessary NFC-technology therefore already built-in) or similar personal device, offering the advantage of the information in the machine-readable marker to remain adaptable while nevertheless obviating the need for different users to interact with a common interface.

[0051] Furthermore, the information read from the machine-readable marker may be used to make a payment for the dispensed drinking water. Said payment may be by a direct payment system linked to a banking account associated with the information read from the machine-readable marker. In embodiments, the processor may be communicatively coupled to a payment system. Alternatively, the processor may obtain information on an amount of credit associated with the information read from the machine-readable marker (e.g., from a user account associated said marker), such as a prepaid amount of drinking water that may be dispensed. Whenever a payment was successfully executed, or when there is still credit associated with the information read from the machine-readable marker, the processor may automatically dispense the preselected volume of the preselected drinking water type. Subsequently, when the drinking water type was dispensed based on a credit associated with the information read from the machine-readable marker, the processor may reduce said credit associated with the information.

[0052] In preferred embodiments, the drinking water dispenser as such may not comprise an input module (i.e. a module for interacting with, controlling and/or changing settings of the drinking water dispenser by a user or operator). In some of these embodiments, the drinking water dispenser may be communicatively connected with an input module which is separate therefrom. In some embodiments, a smartphone, smartwearable, a computer or another remote device may be used as the input module (e.g. via an app). In preferred embodiments, the drinking water dispenser may be operable in a touch-

less manner (i.e. without needing the user to physically contact the drinking water dispenser).

[0053] In embodiments, a plurality of drinking water dispensers may be communicatively connected to each other. For example, the plurality of drinking water dispensers may be communicatively connected to a central information system that may comprise the database comprising information on the preselected drinking water type and the preselected volume associated with said information. It is an advantage of these embodiments that the same drinking water container may be used at each of the plurality of drinking water dispensers; e.g., different venues of the same restaurant/bar/cafeteria/etc. or even across venues of different brands.

[0054] In general, the drinking water dispenser may have any suitable design. For example, it could be a drinking water machine (see e.g. Example 1) or a tap (see e.g. Example 2). In embodiments, the base may be an integral part of drinking water dispenser or may be built into another surface (e.g., built into a countertop).

[0055] In embodiments, any feature of any embodiment of the first aspect may independently be as correspondingly described for any embodiment of any of the other aspects.

[0056] In a second aspect, the present invention relates to a system comprising: (i) a drinking water dispenser according to embodiments of the first aspect of the present invention, and (ii) a drinking water container having a bottom and a machine-readable marker enclosed in the bottom.

[0057] The drinking water container may be any type of container suitable for containing drinking waters, such as a mug, a glass, a cup, or a bottle. The drinking water container may be made of, for example, glass, porcelain, wood, carton or paper. In embodiments, the machine-readable marker may be moulded into the drinking water container. For example, the drinking water container may be formed of glass, wherein the machine-readable marker is moulded in the glass. However, instead of being moulded into the drinking water container, the drinking water container may comprise a cavity in the bottom, e.g., defined by a double bottom, in which the machine-readable marker may be located. The machine-readable marker is preferably formed of a material that is substantially non-absorbing for (i.e., transparent to) the frequency of the field used for reading the machine-readably marker. Glass may be particularly advantageous because of its transparency over a broad frequency range, although also other materials, such as porcelain or paper, may have sufficient transparency, e.g., at least for part of the radiofrequency range used for the electronic marker. It is an advantage of these embodiments that the machine-readable marker may be hermetically sealed from the environment, which may result in a long life-time for the machine-readable marker.

[0058] In embodiments, any feature of any embodiment of the second aspect may independently be as correspondingly described for any embodiment of any of the other aspects.

[0059] In a third aspect, the present invention relates to a method for automatically filling a drinking water container with a preselected volume of a preselected drinking water type, the drinking water container having a bottom and a machine-readable marker enclosed in the bottom, the method comprising: (a) positioning the drinking water container below the nozzle; (b) sensing that the drinking water container is properly positioned below the nozzle by sensing that the machine-readable marker is present within a predetermined zone; (c) reading information from the machine-readable marker; (d) processing the information read from the machine-readable marker to obtain the preselected drinking water type and the preselected volume for the drinking water container; and (e) automatically dispensing the preselected volume of the preselected drinking water type into the drinking water container.

[0060] In embodiments, the method may be performed in a drinking water dispenser in accordance with embodiments of the first aspect of the present invention, or in a system in accordance with embodiments of the second aspect of the present invention. In embodiments, steps b and c may be performed by the sensing unit. In embodiments, steps d and e may be performed by the processor.

[0061] In embodiments, the method may further comprise a step a'-before step a-of: writing the preselected drinking water type and the preselected volume to the machine-readable marker; or linking the preselected drinking water type and the preselected volume to an identifier. In embodiments, step d may comprise resolving the preselected drinking water type and the preselected volume directly from the information read from the machine-readable marker. It is an advantage of these embodiments that the information on the preselected drinking water type and the preselected volume are stored in the machine-readable marker encapsulated in the drinking water container, so that no external database may be required. In embodiments, step d may comprise resolving an identifier from the machine-readable marker, and looking up the preselected drinking water type and the preselected volume linked to the identifier. For example, the drinking water type and the preselected volume linked to the identifier may be looked up in a database communicatively coupled to the processor. It is an advantage of these embodiments that the preselected drinking water type and the preselected volume may be changed straightforwardly by changing the preselected drinking water type and the preselected volume in the database (cf. supra).

[0062] Cf. supra, the drinking water container with the machine-readable marker enclosed in the bottom may be inferred to be properly positioned below a nozzle when the machine-readable marker is present within the predetermined zone. In embodiments, step e may accordingly comprise interrupting the dispensing if the drinking water container is sensed to no longer be positioned on

the base. In other words, step e may comprise interrupting the dispensing if the machine-readable marker is no longer present within the predetermined zone. When the machine-readable marker is no longer present within the predetermined zone, the drinking water container may be assumed to be no longer properly positioned below the nozzle, so that the drinking water type dispensed from the nozzle may not enter the drinking water container.

[0063] In embodiments, automatically dispensing the preselected volume of the preselected drinking water type, i.e., step e, may comprise: halting the dispensing based on a signal from a volumetric counter, or dispensing the preselected drinking water type for an amount of time in function of a predetermined pressure of the drinking water type. The preselected volume can thus advantageously automatically be dispensed without needing active attention from the user. Provided the preselected volume is setup/selected properly (i.e., the preselected volume is lower than the volume of the drinking water container), this also entails that said dispensing will advantageously always be terminated before the drinking water container overflows.

[0064] In embodiments, any feature of any embodiment of the third aspect may independently be as correspondingly described for any embodiment of any of the other aspects.

[0065] The invention will now be described by a detailed description of several embodiments of the invention. It is clear that other embodiments of the invention can be configured according to the knowledge of the person skilled in the art without departing from the true technical teaching of the invention, the invention being limited only by the terms of the appended claims.

Example 1: Drinking water dispenser integrated in a drink machine

[0066] We now refer to FIG 1, which is an example of a system (10) in accordance with embodiments of the present invention. The system (10) comprises a drinking water dispenser (21) and a drinking water container (50). In this example, the drinking water dispenser (21) is in the shape of a drink machine. The drinking water dispenser (21) is adapted for providing drinking waters of different types-e.g., chilled sparkling water, chilled still water, unchilled still water, and hot water-through a nozzle (40) into the drinking water container (50) positioned below the nozzle (40) on a base (23) of the drinking water dispenser (21). The drinking water container (50) comprises a machine-readable marker (51), such as an RFID-tag or an NFC-tag, enclosed in a bottom of the drinking water container (50). The drinking water container (50) may, for example, be formed of glass, although the invention is not limited thereto. The machine-readable marker (51) may be moulded in the glass, so that any drinking water spilled or any drinking water located on the base (23) may not damage the machine-readable marker (51) and the marker (51) may not be removed, torn off or physically damaged. As another example, the drinking water container (50) could be formed of paper and have a double bottom forming a cavity, and the machine-readable marker (51) may be located in the cavity.

[0067] As depicted in FIG 1, the base (23) comprises a sensing unit (24), which may determine whether the machine-readable marker (51) is present within a predetermined zone. If the sensing unit (24) determines that the machine-readable marker (51) is indeed present in said predetermined zone, the drinking water container (50) can be inferred to be properly positioned below the nozzle (40). The sensing unit (24) can then moreover read information from the machine-readable marker (51).

[0068] Simultaneous reference is made to FIG 1 and FIG 2. When the drinking water container (50) is properly positioned below the nozzle (40), a processor (80), comprised in the drinking water dispenser (21), may determine, from the information read by the sensing unit (24), a predetermined drinking water type and a predetermined drinking water volume. The information may, itself, comprise the predetermined drinking water type and the predetermined drinking water volume, i.e., the predetermined drinking water type and the predetermined drinking water volume may be directly resolvable from the information by the processor (80). Alternatively, said information may comprise an identifier, and the processor (80) may look up the preselected drinking water type and the preselected volume linked to the identifier in a database (81). Still alternatively, the processor (80) may look up the preselected drinking water type and the preselected volume linked to the identifier in, for example, a lookup table or a user profile linked to the identifier. The database (81), lookup table, or user profile may be obtained from a memory slot present in the drinking water dispenser (21), but may also be obtained externally, e.g., via a communication network or the internet from an external central server (e.g., via a network cable or via wireless communication).

[0069] The drinking water dispenser (21) further comprises provisions (not depicted) for obtaining the different drinking water types from a common water source, provided by a common water supply (90). The common water supply (90) may, for example, be connected to water bottles or to a water tap, and provide a starting water. A provision may, for example, supply CO_2 to the starting water from the common water source so as to obtain sparkling water, or provide heating or chilling to the starting water. That is, the provision may be a chiller for chilling water; and/or a heater for heating water; and/or a carbonator for carbonating water. Using these different provisions-alone or in combination-different types of drinking water may be made and directed to an (electromagnetic) valve set (91) comprises valves (92) that may be controlled by the processor (80). When the processor (80) automatically dispenses the preselected volume of the preselected drinking water type, the processor (80) controls a valve (92) corresponding to the preselected drinking water type, thereby dispensing it at the nozzle (40).

As such, after having obtained the preselected volume and the preselected drinking water type, the processor (80) may dispense the preselected volume of the preselected drinking water type from the nozzle (40) into the drinking water container (50). Typically, the preselected volume is such that it can be contained completely in the drinking water container (50), so that overflow is unlikely to occur. As such, the (active) attention of the user is not required by the drinking water dispenser (21) while dispensing.

[0070] Reference is made back solely to FIG 1. Different from drink machines from the state of the art, no input module may be required on the drinking water dispenser (21). The user may simply position the drinking water container (50) properly below the nozzle/on the base and the predetermined volume of the predetermined drinking water type is dispensed in the drinking water container (50), without any further action. However, a input module may be included for providing further control, e.g., for terminating dispensing of the drinking water type in the event of an emergency, or for providing an extra hurdle for children, which may be particularly preferred when hot water is to be dispensed. Also, in some embodiments, a input module may be included for the user to provide the preselected volume and/or the predetermined drinking water type, and link the preselected volume and/or the predetermined drinking water type to the machine-readable marker (51) or to the identifier obtainable from the information on the machine-readable marker (51). For example, the thus provided preselected volume and/or predetermined drinking water type may be written to the machine-readable marker (51) or, e.g., to an external database, where it is linked to the identifier.

Example 2: Drinking water dispenser integrated in a drink water tap

[0071] Another example of a system (10) in accordance with embodiments of the present invention is schematically shown in FIG 3. This system (10) mainly differs from that of Example 1 in that the nozzle (40) of the drinking water dispenser (22) is, in FIG 3, shaped in the form of a drink water tap. Generally, however, the way in which the system (10) of the present example functions is the same as that of Example 1. Indeed, also the drinking water dispenser (22) of the present invention comprises a sensing unit (24) in a base (29) for sensing a machine-readable marker (51) enclosed in a bottom of a drinking water container (50).

[0072] In this example, the base (29) comprises a container (26) for collecting spilled drinking water. The base has a lid that is formed of a grid (25), which allows spilled water to enter the container (26) and may allow the sensing unit (24), embedded in the base (29), more in particular, in a hermetically sealed cavity (28) inside the container (26), to detect the machine-readably marker (51) through said grid (25). This base may, for example, be embedded into the countertop (not depicted).

[0073] The sensing unit (24) is adapted for detecting whether the drinking water container (50) is properly positioned below a nozzle (40) by detecting whether sensing whether the machine-readable marker (51) is present within a predetermined zone. The sensing unit (24) also reads information from the machine-readable marker (51). The sensing unit (24) is communicatively coupled to a processor (80) for transferring said information to the processor (80). The processor (80), similar as in Example 1, process the information read from the machine-readable marker (51) to obtain the preselected drinking water type and the preselected volume for the drinking water container (50). The processor (80) automatically dispenses the preselected volume of the preselected drinking water type from the nozzle (40) into the drinking water container (50).

[0074] It is to be understood that although preferred embodiments, specific constructions, configurations and materials have been discussed herein in order to illustrate the present invention. It will be apparent to those skilled in the art that various changes or modifications in form and detail may be made without departing from the scope of the invention as defined in the appended claims.

Claims

1. A drinking water dispenser (21, 22) for automatically filling a drinking water container (50) with a preselected volume of a preselected drinking water type, the drinking water container (50) having a bottom and a machine-readable marker (51) enclosed in the bottom, the drinking water dispenser (21, 22) comprising:

i. a nozzle (40) for dispensing the drinking water type;
ii. a sensing unit (24) configured to

- determine whether the drinking water container (50) is properly positioned below the nozzle (40) by sensing whether the machine-readable marker (51) is present within a predetermined zone, and
- read information from the machine-readable marker (51); and

iii. a processor (80) configured to-if the drinking water container (50) is positioned below the nozzle (40)-

- process the information read from the machine-readable marker (51) to obtain the preselected drinking water type and the preselected volume for the drinking water container (50), and
- automatically dispense the preselected volume of the preselected drinking water

type from the nozzle (40) into the drinking water container (50).

2. The drinking water dispenser (21, 22) according to claim 1, wherein the preselected drinking water type is selected from still water and sparkling water; preferably from still water, sparkling water and hot water.

3. The drinking water dispenser (21, 22) according to any of the previous claims, wherein the drinking water dispenser (21, 22) is adapted to produce two or more of the drinking water types starting from a common water source.

4. The drinking water dispenser (21, 22) according to claim 3, further comprising:

- a filtering system for filtering water; and/or
- a chiller for chilling water; and/or
- a heater for heating water; and/or
- a carbonator for carbonating water.

5. The drinking water dispenser (21, 22) according to any of the previous claims, wherein the drinking water dispenser further comprises a base (23, 29) for positioning thereon the drinking water container (50) and wherein the sensing unit (24) is integrated in the base (23, 29).

6. The drinking water dispenser (21, 22) according to any of the previous claims, further comprising a valve (92) for each drinking water type and wherein the processor (80) being configured for automatically dispensing the preselected volume of the preselected drinking water type comprises the processor (80) controlling the valves (92).

7. A system (10) comprising:

i. a drinking water dispenser (21, 22) according to any of the previous claims, and
ii. a drinking water container (50) having

- a bottom and
- a machine-readable marker (51) enclosed in the bottom.

8. The system (10) according to claim 7, wherein the machine-readable marker (51) is an electronic marker or a non-electronic marker.

9. The system (10) according to claim 8, wherein the electronic marker is an RFID-tag or an NFC-tag.

10. The system (10) according to any of claims 8 to 10, wherein the machine-readable marker (51) is moulded into the drinking water container (50).

11. A method for automatically filling a drinking water container (50) with a preselected volume of a preselected drinking water type, the drinking water container (50) having a bottom and a machine-readable marker (51) enclosed in the bottom, the method comprising:

a. positioning the drinking water container (50) below the nozzle (40);
b. determining that the drinking water container (50) is properly positioned below the nozzle (40) by sensing that the machine-readable marker (51) is present within a predetermined zone;
c. reading information from the machine-readable marker (51);
d. processing the information read from the machine-readable marker (51) to obtain the preselected drinking water type and the preselected volume for the drinking water container (50); and
e. automatically dispensing the preselected volume of the preselected drinking water type into the drinking water container (50).

12. The method according to claim 11, wherein step d comprises:

- resolving the preselected drinking water type and the preselected volume directly from the information read from the machine-readable marker (51); or
- resolving an identifier from the machine-readable marker (51), and looking up the preselected drinking water type and the preselected volume linked to the identifier.

13. The method according to any of claims 11 to 12, further comprising a step a'-before step a-of:

- writing the preselected drinking water type and the preselected volume to the machine-readable marker (51); or
- linking the preselected drinking water type and the preselected volume to an identifier.

14. The method according to any of claims 11 to 13, wherein step e comprises interrupting the dispensing if the drinking water container (50) is sensed to no longer be positioned below the nozzle (23).

15. The method according to any of claims 11 to 14, wherein automatically dispensing the preselected volume of the preselected drinking water type comprises:

- halting the dispensing based on a signal from a volumetric counter, or
- dispensing the preselected drinking water type for an amount of time in function of a predeter-

mined pressure of the drinking water type.

FIG 1

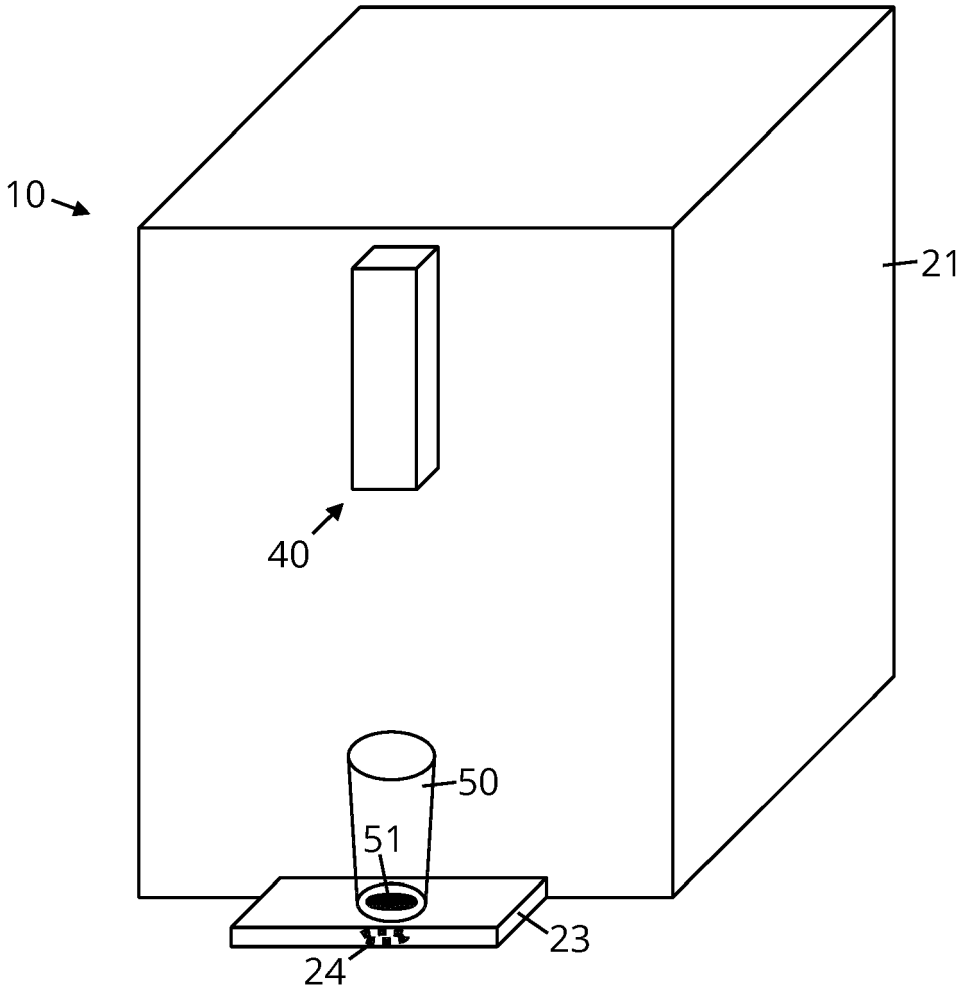


FIG 2

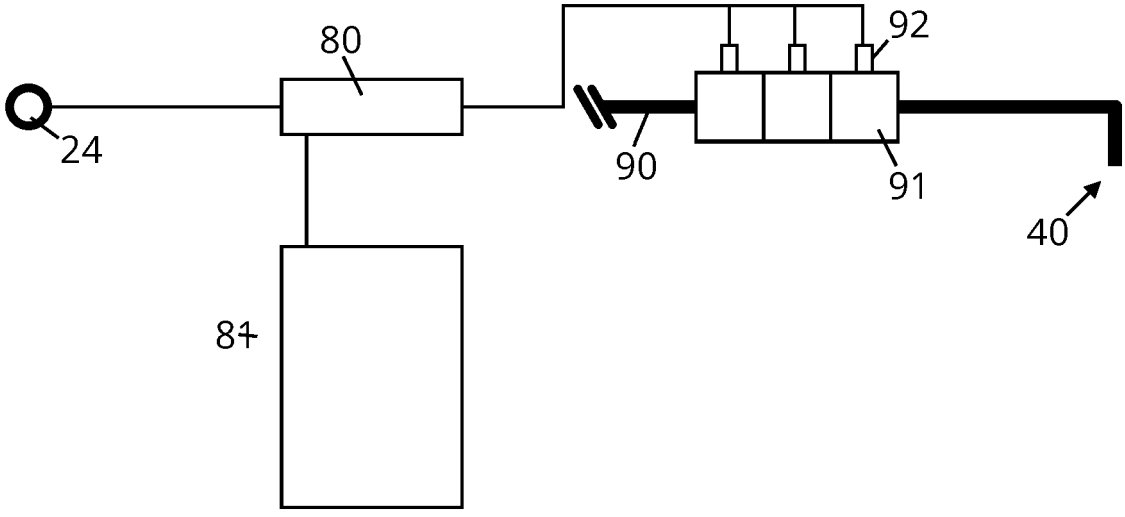
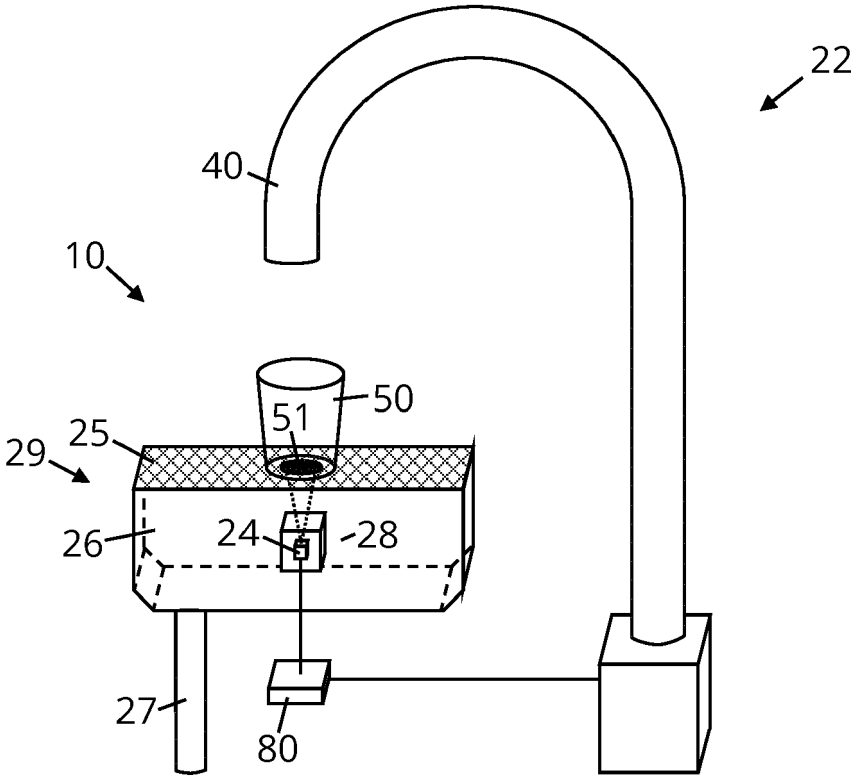


FIG 3



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EUROPEAN SEARCH REPORT

Application Number
EP 23 18 2854

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	KR 2017 0033184 A (KYOWON CORP [KR]) 24 March 2017 (2017-03-24) * paragraphs [0037], [0038] * * paragraph [0045] - paragraph [0057] *	1-15	INV. B67D1/08 B67D1/12 ADD. B67D1/00
Y	JP 3 575361 B2 (DENSO CORP) 13 October 2004 (2004-10-13) * paragraph [0018] * * paragraph [0033] - paragraph [0040] *	1-15	
Y	US 2019/300357 A1 (CRAWFORD ROBERT [US] ET AL) 3 October 2019 (2019-10-03) * paragraphs [0079], [0083] *	2-4	
Y	US 10 664 132 B2 (PEPSICO INC [US]) 26 May 2020 (2020-05-26) * column 8, line 14 - line 61 *	5	
Y	US 2020/247662 A1 (WADE JEREMY [US] ET AL) 6 August 2020 (2020-08-06) * paragraphs [0044], [0056] * * paragraph [0066] - paragraph [0068] *	7	TECHNICAL FIELDS SEARCHED (IPC) B67D
Y	US 2020/182524 A1 (SCALF ERIC [US]) 11 June 2020 (2020-06-11) * paragraph [0056] *	14	
Y	US 2022/135391 A1 (MULLENAUX THOMAS [US]) 5 May 2022 (2022-05-05) * paragraph [0058] *	15	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	27 October 2023	Desittere, Michiel

CATEGORY OF CITED DOCUMENTS

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 23 18 2854

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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27-10-2023

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
KR 20170033184 A	24-03-2017	NONE	
JP 3575361 B2	13-10-2004	JP 3575361 B2	13-10-2004
		JP 2001184557 A	06-07-2001
US 2019300357 A1	03-10-2019	AU 2019249109 A1	24-09-2020
		CA 3093575 A1	27-03-2019
		CN 111936943 A	13-11-2020
		EP 3776104 A1	17-02-2021
		JP 2021519730 A	12-08-2021
		RU 2020134678 A	04-05-2022
		US 2019300357 A1	03-10-2019
		US 2022112070 A1	14-04-2022
		WO 2019195050 A1	10-10-2019
US 10664132 B2	26-05-2020	AU 2016249115 A1	12-10-2017
		BR 112017021973 A2	10-07-2018
		CA 2980465 A1	20-10-2016
		CN 107428521 A	01-12-2017
		EP 3283431 A1	21-02-2018
		HK 1244477 A1	10-08-2018
		JP 2018513063 A	24-05-2018
		JP 2022020071 A	31-01-2022
		RU 2017134916 A	17-05-2019
		TW 201702856 A	16-01-2017
		US 2016306510 A1	20-10-2016
		US 2020210031 A1	02-07-2020
		WO 2016168665 A1	20-10-2016
US 2020247662 A1	06-08-2020	NONE	
US 2020182524 A1	11-06-2020	CN 113167526 A	23-07-2021
		EP 3874213 A1	08-09-2021
		US 2020182524 A1	11-06-2020
		US 2021231357 A1	29-07-2021
		WO 2020119093 A1	18-06-2020
US 2022135391 A1	05-05-2022	NONE	

EPO FORM P0459

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