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(54) **A LIQUID DISPENSER AND A LIQUID DISPENSING SYSTEM**

(57) A liquid dispenser for dispensing liquid according to a beverage recipe, has a memory (201), a communication module (202), at least two containers (101, 102, 103) for containing different liquid types, valves (101b, 102b, 103b) for controlling the flow of the liquid in the containers (101, 102, 103), a recipe creation unit

(203) and a valve control unit (204). The recipe creation unit (203) creates a user-based beverage recipe in accordance with the user information received by the communication module and the valve control unit (204) controls the valves in accordance with the user-based beverage recipe.

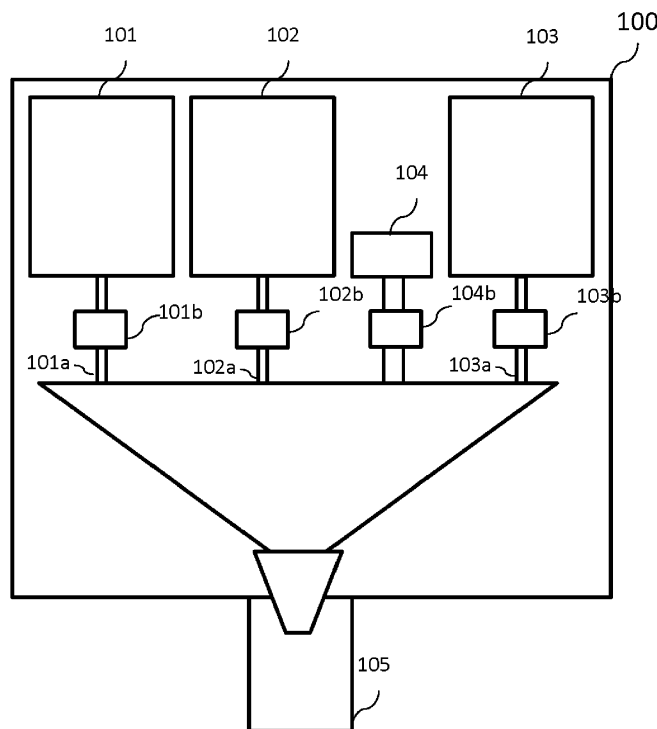


Fig. 1

Description

Technical Field

[0001] The present invention disclosure relates to a liquid dispenser and a liquid dispensing system.

Background

[0002] Liquid dispensers are widely used especially for dispensing certain hot beverages such as coffee, tea or hot chocolate and cold beverages such as water, carbonated beverages and such. Automating the dispensing procedure allows the liquid dispenser to prepare the beverages in a standardized ways, i.e. there are certain options how the liquid is dispensed and the liquid dispenser provides the beverage only according to certain pre-determinations with limitations. This provides a comfort to the consumer by ensuring that the requested beverage is provided at substantially the same quality and taste.

[0003] Liquid dispensers and liquid dispensing systems also provides comfort to the beverage supplier by reducing the amount of the work to provide the supply of the beverages. They generally comprise big containers to receive the liquid for many servings and dispense the liquid for a predetermined amount. Alternatively the consumer activates and deactivates the dispensing process by opening and closing a valve manually. This ensures that the user receives the desired amount of the liquid.

[0004] There are also certain liquid dispensers which are able to store and dispense different liquid types. Such liquid types may be different liquids such coffee, milk and water, or same liquid with different characteristics, namely hot water, cold water and lukewarm water. Accordingly it is possible to use only one liquid dispenser in order to provide different liquid types to the consumer. The consumer has the ability to select among the different liquid types through an interface and the liquid dispenser provides the user the selected liquid type.

[0005] It is also possible to perform the payment procedure through some of the liquid dispensers. Such liquid dispensers has either a money receiving unit in order to receive the required money for the beverage to be dispensed in coins or notes, or a credit card slot for receiving the credit card and issuing a necessary order to the bank for the transaction of the required money. Accordingly the payment procedure is also executed with an automated process and therefore reducing the amount of the work to provide maintenance for the liquid dispenser.

Summary

[0006] According to a first aspect of the present disclosure, a liquid dispenser for dispensing liquid according to a beverage recipe comprising; a memory for storing the beverage recipe; a communication module for receiving user information from a receptacle; at least two containers for containing different liquid types, wherein each

of the at least two containers is coupled to at least a nozzle and at least a valve wherein each of the valves are configured to allow the flow of the liquid from the respective containers through the respective nozzles at an open position of the valve, and to prohibit the flow of the liquid from the respective containers through the respective nozzles at a closed position of the valve; a recipe creation unit for creating a user-based beverage recipe in accordance with the beverage recipe and the user information received by the communication module, and for storing the user-based beverage recipe in the memory; and a valve control unit for controlling the position of the valves, wherein the valve control unit is arranged for opening and closing the valves in accordance with the user-based beverage recipe is provided.

[0007] In an example, the liquid dispenser comprises an additive dispenser unit for dispensing predetermined amount of a solid additive, wherein the additive dispenser unit comprises a valve for dispensing the solid additive into the receptacle and the valve for dispensing the solid additive is coupled to the valve control unit and the valve control unit brings the valve of the additive dispenser unit to the open position in accordance with the user information received by the communication module.

[0008] In an example, the liquid dispenser comprises a holder for receiving the receptacle, and a sensor unit for detecting the correct placement of the receptacle to the holder, and the valve control unit is arranged to bring the valves to the open position only if the sensor unit detects the correct placement of the receptacle to the holder.

[0009] In an example, the valve control unit is arranged to lock at least one of the valves in response to the user information received by the communication module, such that the locked valve stays at the closed position for a predetermined amount of time.

[0010] In an example, the valve control unit is arranged to lock at least one of the valves in response to the user information received by the communication module, such that the locked valve stays at the closed position until a new user information which is different from the user information is received by the communication module.

[0011] In an example, the valve control unit is arranged to lock at least one of the valves in response to the user information received by the communication module, such that the locked valve stays at the closed position as long as the sensor unit is arranged to detect the correct placement of the receptacle to the holder while the communication module receiving the user information.

[0012] In an example, the user information comprises a user identifier and the liquid dispenser is arranged to store the amount of the liquid which is dispensed for the user identifier in a predetermined amount of time.

[0013] In an example, the user information comprises a user identifier and the liquid dispenser is arranged to store the amount of the additive which is dispensed for the user identifier in a predetermined amount of time.

[0014] In an example, the liquid dispenser comprises

a volume determination unit for determining the available volume of the receptacle received by the holder.

[0015] In an example, the volume determination unit is arranged to determine the available volume of the receptacle received by the holder by receiving the user information comprising the volume information representing the volume of the receptacle.

[0016] In an example, wherein the liquid dispenser comprises an image acquisition unit for acquiring the image of the receptacle received by the holder and an image processing unit and the volume determination unit is arranged to determine the available volume of the receptacle from the image of the receptacle received by the holder.

[0017] In an example, the beverage recipe comprises information representing the volume percentage of each of the liquid type per serving, the volume determination unit is arranged to calculate the available volume of the receptacle, and the valve control unit is arranged to change the state of the valves in accordance with the beverage recipe and the determined available volume of the receptacle.

[0018] In an example, the additive dispenser unit comprises a plurality of compartments and a valve for each of the compartments, wherein each of the valves are coupled to the valve control unit.

[0019] In an example, the valve control unit is arranged to close the valves of each of the nozzles when the volume of the liquid dispensed by the nozzles are less than the difference of the determined volume of the receptacle received by the holder and a predetermined amount.

[0020] According to a second aspect of the present disclosure, a liquid dispensing system comprising a liquid dispenser according to the liquid dispensers above, wherein the receptacle comprises a receptacle communication unit for communicating with the liquid dispenser and a memory for storing the user information is disclosed.

Brief Description of the Drawings

[0021] To assist understanding of the present disclosure and to show how embodiments may be put into effect, reference is made by way of example to the accompanying drawings in which:

Figure 1 shows schematically an example of a liquid dispenser for dispensing liquid according a beverage recipe in accordance with an embodiment of this disclosure.

Figure 2 shows schematically a simplified block diagram of an example of a liquid dispenser in accordance with an embodiment of this disclosure.

Detailed Description

[0022] There are many liquid dispensers and liquid dis-

pensing systems available in the market, which are able to dispense the liquid directly from a source, such as a tap connected to a liquid source such as pipes, or liquid dispensers which are able to dispense the liquid from the containers such as tanks. The containers may be attachable to a container receiver slot, such as a collar, which are located outside the casing of the liquid dispenser in order to ensure that the container can be changed without using too much effort. An example for such container would be bottled water dispensers, which the user places a 5-gallon water bottle upside down on the top of the water dispenser. The gravity and vacuum pressure applied to the water in the bottle ensures the flow of the water towards the earth, while a valve being at a closed position ensures that nozzle which the water may be dispensed is blocked. The valve may be brought to an open position which may be activated by certain means such as a button, a spigot or a knob, in order to dispense the water when it is desired. When the valve is brought to the open position, air is allowed into the bottle and the water is dispensed into a receptacle, such as a glass or a bottle.

[0023] A valve may be any device for halting or controlling the flow of a liquid, or any other material through a passage, a pipe, an inlet etc., such as a nozzle, or a hinged lid or a movable part that closes or modifies the passage of the content in a device. Such passage may be provided in a binary manner, such as the passage being fully open or fully closed. Alternatively such passage may have different levels providing a certain amount of the material is passed at a certain time. The levels of such passage can be increased or decreased by changing the size of the opening which the material passes through the valve.

[0024] There are also liquid dispensers which receive containers for storing the liquid inside its casing. Such liquid dispensers may have a container inside the casing, and the containers can be filled. Alternatively a liquid dispenser may comprise a container slot which can receive a container to be inserted into the container slot. The presence of the container slot allows that the containers can be changed in a quicker manner. There are also liquid dispensers which has more than one container in order to provide different liquid types according to the preference of the user. An example may be a liquid dispenser which is able to dispense tea or coffee according to the request of the user. Such liquid dispensers may have separate valves for each of the containers, and only the valve for the requested liquid is brought to the open position for allowing the selected liquid to be dispensed into the receptacle.

[0025] The flow of the liquid may be supplied with the help of gravity and vacuum pressure as mentioned above. However it may not be possible to provide such arrangement depending on the gravity because of the space limitations, or more flow rate may be desired which cannot be obtained with the gravity and vacuum pressure. For such liquid dispensers, pumps may be used to

move the requested liquid from its container through the nozzle and into the receptacle. In such liquid dispensers, pumps are also used as valves as they control the flow of the liquid from the containers into the receptacle.

[0026] It is also possible for the liquid dispensers to include a heating system or a refrigerating system for changing the temperature of the liquid to be dispensed as desired and allowing dispensing more liquid types, such as hot water, cold water, lukewarm water, using only one container for the liquid. In an example the system applies heat or cold to the path of the liquid which may include the nozzle, as the liquid flows from the container into the receptacle. As the liquid flows, it gains heat or cold and the temperature of the liquid is changed through the path. Different pipe shapes may be used, such as spiral shaped pipes, in order to ensure that the liquid is provided a liquid path which is long enough to provide the required heat or cold to the liquid during its flow.

[0027] In an example for dispensing liquids at different temperatures from a common container, there may be small compartments within the liquid dispenser which are allocated for the purpose of heating or cooling a limited amount of the liquid and keeping the temperature of the liquid in those small compartments at a predetermined temperature by applying the cold or the heat to those small compartments. In an example these small compartments are also coupled to the system in a manner that when the user requests hot water, the liquid dispenser brings the valve of the selected small compartment to the open position, so that the heated water in the selected small compartment is dispensed to the receptacle.

[0028] An example of a liquid dispenser 100 is provided in Figure 1. The liquid dispenser 100 comprises at least two containers 101, 102 and 103, and an additive dispenser unit 104. In an example at least two containers 101, 102, 103 are suitable for dispensing different liquid types. In an example different liquid types may be two different liquids having different chemical compounds, such as water and soda. In another example different liquid types may be a liquid with different characteristics, such as hot water and cold water. At least one nozzle 101a, 102a, 103a and a valve 101b, 102b, 103b are provided for each of the containers 101, 102, 103 respectively. Each of the containers 101, 102, 103 is coupled to at least a nozzle 101a, 102a, 103a and a valve 101b, 102b, 103b. The each of the valves 101b, 102b, 103b are configured to allow the flow of the liquid from the respective containers 101, 102, 103 through the respective nozzles 101a, 102a, 103a, by bringing the respective valves 101b, 102b, 103b to an open position for allowing the flow of the liquid through the respective nozzles 101a, 102a, 103a. The respective valves 101b, 102b, 103b are also configured to prohibit the flow of the liquid from the respective containers 101, 102, 103 through the respective nozzles 101a, 102a, 103a, by bringing the respective valves 101b, 102b, 103b to a closed position for prohibiting the flow of the liquid through the respective nozzles

101a, 102a, 103a.

[0029] The term "respective" herein is used to refer to the component, or feature, or aspect which relates or belongs to separately or individually a plurality of components, features or aspects. Just for the purpose of providing an example, there may be a first container which is coupled to a first nozzle and a first valve and a second container which is coupled to a second nozzle and a second valve. The definition with respect to the respective valves to the containers or to the respective containers means that the first valve for the first container and the second valve for the second container are defined.

[0030] In an example, the liquid dispenser 100 comprises an additive dispenser unit 104 for dispensing a predetermined amount of a solid additive. In an example, the solid additive may be a pharmaceutical component for treating a health condition, such as insulin or anti-depressants. Or alternatively, the solid additive may be a composition to enhance the taste, such as ethyl maltol or MSG. In another alternative, the solid additive may be a composition to sweeten the taste of the beverages in the container, such as sugar or aspartame. The additive dispenser unit 104 comprises a valve 104b for dispensing the solid additive into the receptacle, by bringing the valve 104b to an open position for allowing the solid additive to be dispensed into the receptacle.

[0031] Figure 2 shows schematically an example of a liquid dispenser comprising a memory 201, a communication module 202, a recipe creation unit 203, a valve control unit 204, a sensor unit 205 and a volume determination unit 206. They may be coupled to each other in a sense that each of them may communicate with other blocks. They may also be coupled to other components of the liquid dispenser as well. Skilled person may identify that a processor may be used to realize at least a part of at least one of these blocks. In an example the block diagram shown in Figure 2, is compatible with the liquid dispenser 100.

[0032] The valves 101b, 102b, 103b, which each of them are coupled to the respective containers 101, 102, 103, are controlled by a valve control unit 204 for controlling the position of the valves 101b, 102b, 103b independent from each other. The valve control unit 204 is arranged for opening and closing the valves 101b, 102b, 103b. In an example the valve control unit 204 supplies an electric signal to the valves 101b, 102b, 103b and the each of the valves 101b, 102b, 103b changes the position of the respective valves 101b, 102b, 103b according to the electric signal supplied by the valve control unit 204. In another example the valve control unit 204 provides a mechanical output to the valves 101b, 102b, 103b and the valves 101b, 102b, 103b are opened or closed with the mechanical output. Such mechanical output may be provided as a release of a spring or a movement of a part of the valves 101b, 102b, 103b.

[0033] The valve 104b, which is coupled to the additive dispenser unit 104, may be controlled by the valve control unit 204. In an example the valve control unit 204 is also

arranged for opening and closing the valve 104b. In an example the valve control unit 204 supplies an electric signal to the valve 104b, and the valve 104b changes the position according to the electric signal supplied by the valve control unit 204. In another example the valve control unit 204 provides a mechanical output to the valve 104b and the valve 104b is opened or closed with the mechanical output. Such mechanical output may be provided as a release of a spring or a movement of a part of the valve 104b.

[0034] In an example the electric signal supplied by the valve control unit 204 to any of the valves 101b, 102b, 103b, 104b is a switch signal, wherein the switch signal changes the position of the respective valves 101b, 102b, 103b, 104b independent from the prior position of the respective valves 101b, 102b, 103b, 104b before the respective valves 101b, 102b, 103b, 104b receiving the signal. Hence the same switch signal can be used to change the position of the respective valves 101b, 102b, 103b, 104b, from open position to close position, or from close position to open position. In an example, the electric signal is coded such that it specifies a position for the respective valves 101b, 102b, 103b, 104b which the electric signal is sent to. In an example the electric signal is coded by including the information of the identifier for which valve 101b, 102b, 103b, 104b the position information is being directed to, and the electric signal is then broadcasted to all of the valves 101b, 102b, 103b, 104b by the valve control unit 204.

[0035] The liquid dispenser 100 may also comprise a memory 201 for storing at least one beverage recipe. In an example the beverage recipe may contain specific volume percentage of different liquid types. In a simple example, the beverage recipe contains information that approximately 20% of the first liquid type in a first container 101, e.g. water at 95°C, and approximately 80% of the second liquid type in a second container 102, e.g. water at 4°C should be mixed, thereby providing lukewarm water. In an example, the beverage recipe comprises the ratio of the different liquid types which are provided by the absolute volume or weight. In another example, the beverage recipe may comprise time information for the valves to be opened for a specific time in order to make the beverage.

[0036] The beverage recipe may be stored during the production of the liquid dispenser 100 by the manufacturer. In an example, the liquid dispenser 100 may have a user interface, through which the user may enter information which may be used in order to use or build the beverage recipe. In an example, the information which the user enters comprises information about the liquid types, such as the first container 101 contains water, or alternatively a first liquid type, and the second container 102 contains tea, or alternatively a second liquid type. Accordingly the user defines the liquid within the containers 101, 102, 103 through the user interface in order to introduce the liquid to the beverage recipe, so that when the beverage recipe is executed, the valve control unit

204 knows which container contains which liquid. The defining process may be through selection among a pre-determined list in the memory 201 of the liquid dispenser 100 for each of the containers 101, 102, 103 which contains a liquid.

[0037] The liquid dispenser 100 also comprises a communication module 202 for receiving user information from a receptacle. In an example, the communication module 202 may be a module for receiving and transmitting signals which are compliant to a specific communication standard. In an example, the communication module 202 comprises a Near Field Communication module which allows using NFC communication with a receptacle. Any other communication method may also be used which would allow the liquid dispenser 100 to receive a user information from a receptacle, which may include but may not be limited to a communication of an 802.11 method, such as 802.11b, 802.11g, 802.11 n etc., or RFID or Bluetooth. In an example, the beverage recipe may also be received by the communication module 202 and stored in the memory 201 of the liquid dispenser 100.

[0038] In an example, the user information received by the communication module 202 is transmitted by the receptacle which has a compliant communication module with the communication module 202 of the liquid dispenser 100. In an example the user information comprises the identification of the user, so that the liquid dispenser 100 can identify the user information stored in the receptacle. Such identification of the user may be stored to the receptacle using the communication module 202 through the user interface of the liquid dispenser 100. In an example, the user information comprises properties of the receptacle, such as the volume of the receptacle or the information provided by the sensors within the receptacle, such as a temperature sensor.

[0039] The temperature information may be provided from the temperature sensor which measures the temperature of the beverage in the receptacle as user information. In an example, the receptacle comprises a volume sensor for measuring the volume of the liquid in the receptacle, and volume information is provided as user information from the receptacle to the liquid dispenser 100. In another example, the user information comprises certain selection or preference of the user, such as the preference for the user with respect to coffee is black, or preference for the user with respect to water is lukewarm water.

[0040] The liquid dispenser 100 may also comprise a recipe creation unit 203 for creating a user-based beverage recipe in accordance with the beverage recipe stored in the memory 201 and the user information received by the communication module 202. The created user-based beverage recipe is stored in the memory 201. In an example, the user-based beverage recipe is created by the recipe creation unit 203 by amending the amount of the liquid types provided in the beverage recipe according to the user information. In another example, the user-based beverage recipe is created by amending

the liquid types, for example, changing a liquid type in the beverage recipe to another liquid type. In an example, another liquid type may be selected according to a correspondence table carrying the information of possible liquids to be dispensed instead of the liquid type in the beverage recipe.

[0041] In the example of the user-based beverage recipe is created by the recipe creation unit 203 by amending the amount of the liquids provided in the beverage recipe according to the user information, the communication module 202 receives the volume information from the receptacle, which indicates the volume of the receptacle. The recipe creation unit 203 may calculate the total amount of the liquid in the beverage recipe stored in the memory 201, simply by adding each of the components in the beverage recipe.

[0042] The recipe creation unit 203 may determine an adjustment factor according to the total amount of the liquid in the beverage recipe stored in the memory 201 and the volume information received by the communication module 202. In an example, the adjustment factor may be calculated by dividing the volume information received by the communication module 202 to the total amount of the liquid in the beverage recipe stored in the memory 201.

[0043] In an example, the recipe creation unit 203 may create the user-based beverage recipe by multiplying each of the amount of the liquids in the beverage recipe with the adjustment factor, in order to ensure that the required amount of the liquids are supplied from the containers 101, 102, 103 according to the volume information received by the communication module 202. Hence the beverage provided by the beverage recipe can be provided in any volume.

[0044] In an example, the beverage recipe may have the information that a certain type of liquid is required for the beverage and such type of liquid may be restricted for certain users. The recipe creation unit 203 checks the user information received by the communication module 202 and determines if the receptacle, which the user information is received from, is authorized for the liquids to be provided for preparing the beverage of the beverage recipe. In an example, the beverage recipe may comprise the information that the beverage has a certain amount of liquor. But, because the user information identifies the user as a minor i.e. not authorized for the liquor, the user-based beverage recipe is created by the recipe creation unit 203 in such way that the user-based beverage recipe does not have any liquor.

[0045] In an example, when the user receptacle, which the user information is received from, is not authorized for a liquid in a container, the user-based beverage recipe is created in such way that the amount of the unauthorized liquid to be dispensed in the beverage recipe is changed with another liquid which the user is authorized according to the user information received by the communication module 202. The information with respect to the another liquid may be obtained from a correspond-

ence table. The correspondence table may be stored in the memory 201 of the liquid dispenser 100. The correspondence table may identify which liquid types may correspond to some of the liquid types in the beverage recipe.

[0046] In an example, the correspondence table indicates possible liquids which may be used instead of a first liquid type. The first liquid type may be a liquid type which can be a liquid type that a user may be unauthorized to have, for example a liquor, a sugary drink, a caffeinated drink, a liquid with certain therapeutic effects, a liquid which may be allergenic, or such. The correspondence table indicates which other liquids may be used as substitute liquid instead of the first liquid type, for example, water or mineral water may be used as the substitute liquid instead of the liquor.

[0047] According to one of the examples with the correspondence table, the correspondence table also indicates information for providing the correct amount of the substitute liquid, instead of the amount of the first liquid type in the beverage recipe. In an example such information for providing the correct amount of the substitute liquid may be a multiplier specific to the pair of the first liquid type and the substitute liquid type and the amount of first liquid type in the beverage recipe is amended in the user-based beverage recipe by multiplying with the multiplier. Such multiplier may be the adjustment factor. In another example, such information for providing the correct amount of the substitute liquid may be the density of the substitute liquid.

[0048] In an example, the user information received by the communication module 202 from the receptacle comprises the correspondence table. The correspondence table be prepared previously, for example through the user interface of the liquid dispenser 100, and it may be stored in the memory 201 of the receptacle according to the selections of the user. The user may set the liquids which he/she likes to have instead of a liquid. In an example, the user may select mineral water as replacement to a liquor type. Such information is stored in the correspondence table in the receptacle, so any capable liquid dispenser 100 may receive the correspondence table from its communication module 202 as the user information.

[0049] In the examples using the correspondence table, the recipe creation is arranged to create a user-based beverage recipe in accordance with the beverage recipe stored in the memory 201 and the user information received by the communication module 202, with the correspondence table. The user-based beverage recipe is created by processing the beverage recipe stored in the memory 201 and amending some of the liquids in the beverage recipe stored in the memory 201 and changing them according to the correspondence table.

[0050] In an example the liquid dispenser 100 has liquid information stored in the memory 201 including information about properties of the liquids stored in the containers 101, 102, 103. In an example, the liquid informa-

tion for each of the containers 101, 102, 103 may include any one of the temperature of the liquid, the user identification or group identification for identifying who are authorized or who are not authorized for the respective liquid, certain conditions for the authorization, such as an age limit required for the liquid, the density of the liquid, an identifier for the liquid, or a corresponding identifier for the liquid identifier to correspond with the beverage recipe for identifying the liquid, or remaining volume of the liquid.

[0051] In an example the determination if the user is authorized for a liquid in a container is performed by processing the user information received by the communication module 202 and comparing the user information with the liquid information. In an example, an age limit for the liquid in the container is stored in the memory 201 as the liquid information, and the user information received by the communication module 202 which includes the age information stored in the receptacle is compared with the liquid information and it is determined if the user is authorized for the liquid. In another example, a user identifier is received by the communication module 202 as user information and the liquid dispenser 100 checks if the user identifier received by the communication module 202 is stored in the memory 201 of the liquid dispenser 100 as a user for determining whether the user is authorized for the liquid in the selected container.

[0052] The valve control unit 204 processes the user-based beverage recipe in the memory 201 in order to open and close the respective valves 101b, 102b, 103b, 104b for providing the respective liquids in the respective containers 101, 102, 103 as instructed by the user-based beverage recipe. The valve control unit 204 controls the position of the respective valves 101b, 102b, 103b for allowing the flow of the liquid from the respective containers 101, 102, 103 at the open position of the respective valves 101b, 102b, 103b, 104b, and for prohibiting the flow of the liquid from the respective container at the closed position of the respective valves 101b, 102b, 103b, 104b.

[0053] In an example, some of the valves 101b, 102b, 103b, 104b of the liquid dispenser 100 may be arranged to be locked, i.e. the valve 101b, 102b, 103b, 104b of the liquid dispenser 100 is held at the closed position and it is ensured that the locked valve 101b, 102b, 103b, 104b is not brought to an open position unless the user is authorized, even though the beverage recipe or the user-based beverage recipe instructs the valve control unit 204 to dispense the liquid which the user is not authorized. In an example the valves 101b, 102b, 103b, 104b have a lock mode, which restricts the valves 101b, 102b, 103b, 104b to change position, independent of the signals received from the valve control unit 204 to open the valves 101b, 102b, 103b, 104b according to the beverage recipe. In another example, the valve control unit 204 detects that one of the valves 101b, 102b, 103b, 104b is locked and it does not transmit the signal to bring the valve 101b, 102b, 103b, 104b to the open position in case

of such detection.

[0054] In an example the valve control unit 204 sends a valve 101b, 102b, 103b, 104b lock signal to the valve 101b, 102b, 103b, 104b to be locked. When the valve 101b, 102b, 103b, 104b is locked, the valve 101b, 102b, 103b, 104b is not brought to open position, even when the user instructs the beverage dispenser to dispense the liquid of the beverage recipe. In an example, the status of the valve 101b, 102b, 103b, 104b being locked is kept until a new user information which is different from the user information is received by the communication module 202. When such new user information is received, the liquid dispenser 100 determines if the valve 101b, 102b, 103b, 104b can be unlocked, such as if the user is authorized to have the liquid of the previously locked container according to the new user information.

[0055] In an example, the valve 101b, 102b, 103b, 104b for dispensing the solid additive is coupled to the valve control unit 204 and the valve control unit 204 brings the valve 101b, 102b, 103b, 104b of the additive dispenser unit 104 to the open position in accordance with the user information received by the communication module 202. The valve 101b, 102b, 103b, 104b of the additive dispenser unit 104 is biased to the closed position in order to increase the security. In an example, the valve 101b, 102b, 103b, 104b of the additive dispenser unit 104 can be brought to the open position by the valve control unit 204 only by using the user information received by the communication module 202. Accordingly the valve 101b, 102b, 103b, 104b of the additive dispenser unit 104 is not affected by the information of the beverage recipe, and it only processes the user information. There may be beverage recipes which are added for new beverages and the device can be updated without any concern about that such updates affecting the additive dispenser unit 104.

[0056] In an example, the liquid dispenser 100 comprises a holder 105 for receiving a receptacle. The receptacle is placed to the holder 105 in order to ensure that the liquid is dispensed into the receptacle when the receptacle is placed properly, as provided by the shape of the holder 105, such as the bottom of the lid is parallel to the ground, or predetermined ideal conditions are met. A sensor unit 205 may be provided with the liquid dispenser 100 for detecting the correct placement of the receptacle to the holder 105. In an example the sensor unit 205 is a camera or a photo sensor which identifies if the receptacle is held in a predetermined position.

[0057] In an example when the liquid dispenser 100 has a sensor for detecting the correct placement of the receptacle to the holder 105, the liquid dispenser 100 may be arranged to bring the valves 101b, 102b, 103b, 104b to the open position, only if the sensor detects the correct placement of the receptacle to the holder 105. If the liquid dispenser 100 does not detect the correct placement of the receptacle to the holder 105, the valves 101b, 102b, 103b, 104b are not brought to the open position. In an example the user may be notified through the user

interface that the receptacle must be placed properly for the liquid to be dispensed. In an example the valves 101b, 102b, 103b, 104b may be locked to keep the valves 101b, 102b, 103b, 104b at the closed position.

[0058] In an example when the valves 101b, 102b, 103b, 104b are locked and the valves 101b, 102b, 103b, 104b stay at the closed position, the sensor unit 205 may continuously or periodically detect if the receptacle is placed properly. In another alternative, the sensor unit 205 for detecting the correct placement of the receptacle to the holder 105 is activated when the user information is received. When there is no user information detected or received by the communication module 202, the sensor unit 205 is brought to the sleep mode. Accordingly when one of the valves 101b, 102b, 103b, 104b is locked, the locked valve 101b, 102b, 103b, 104b stays at the closed position, as long as the sensor unit 205 is arranged to detect the correct placement of the receptacle to the holder 105 while the communication module 202 receiving the user information.

[0059] The amount of the liquid which is dispensed by the liquid dispenser 100 may be stored in the memory 201 of the liquid dispenser 100. In an example the amount of the liquid which is dispensed by the liquid dispenser 100 is stored during each dispense in relation with the user information, which includes the user identifier, such that the track of the dispensed liquid and its amount is kept for the user identifier. In an example the amount of the liquid that is dispensed while receiving the user information is stored for a predetermined amount of time. In an example the amount may be kept for 24 hour cycles by resetting the amount at the beginning of each cycle, or alternatively the amount is kept only for the last 24 hour and any records before the 24-hour window period is deleted.

[0060] In an example, the amount of the additive is tracked per user in a fashion similar to the amount of the liquid as explained above. In an example the user information received from the receptacle comprises the user identifier, and the amount of each of the additives provided for the user information is stored in a memory 201 as the dispensed amount information for the user identifier. In an example the dispensed amount information may be kept for 24 hour cycles by resetting the amount at the beginning of each cycle, or alternatively the dispensed amount information is kept only for the last 24 hour and any records before the 24-hour window period going back from the latest dispense is deleted.

[0061] In an example the stored dispensed amount information is transmitted to the receptacle via the communication module 202 and the receptacle stores the dispensed amount information, so that such information may be used in another liquid dispenser. In an example the user information received by the liquid dispenser 100 from the receptacle comprises the amount of the liquid and/or the amount of the additive that was dispensed for the receptacle in a predetermined amount of time. In that case, the liquid dispenser 100 receives the dispensed

amount information from the receptacle, adds the amount of the liquid and/or the amount of the additive that the liquid dispenser dispensed to the received dispensed amount information and transmits the updated dispensed amount information to the receptacle.

[0062] In an example the liquid dispenser 100 has information stored in a memory 201 which comprises a quota information which comprises the amount of the liquid and/or the additive permitted for a user identifier in a predetermined amount of time. When the liquid dispenser 100 is instructed to dispense to a receptacle, the liquid dispenser 100 receives the user information comprising the user identifier and checks the stored dispensed amount information exceeds the quota information. When the dispensed amount information exceeds the quota information, the liquid dispenser 100 locks the valve 101b, 102b, 103b, 104b which contains the additive or the liquid that exceeds the quota information.

[0063] The liquid dispenser 100 may comprise a volume determination unit 206 for determining the available volume of the receptacle received by the holder 105. In an example the volume determination unit 206 determines the volume of the receptacle received by the holder 105 by receiving the volume information which is stored in the receptacle.

[0064] In an example, the liquid dispenser 100 may comprise an image acquisition unit, such as a camera or a photo sensitive element, or a plurality of such, for acquiring the image of the receptacle received by the holder 105. In an example the image acquisition unit may be located to acquire the image of the receptacle, such that the inner side of the receptacle, which holds the liquid when the liquid is dispensed, is detected above the inner side of the receptacle. In an alternative, acquiring the image of the receptacle from its sides may also be used, especially when the receptacle is transparent or translucent.

[0065] In an example, the liquid dispenser 100 may also comprise an image processing unit for processing the acquired image in order to determine the available volume of the receptacle from the acquired image of the receptacle received by the holder 105. In an example, the image acquisition unit acquires the image of the receptacle received by the holder 105 and estimates the dimensions of the receptacle using well known image processing algorithms. The estimated dimensions are used in order to calculate the volume of the receptacle. The level of the liquid may also be detected using image processing algorithms and the volume of the liquid may be calculated. Finally the available volume of the receptacle is calculated by subtracting the volume of the liquid from the volume of the receptacle.

[0066] In an example, the receptacle may comprise a sensor for detecting the volume of the liquid in the receptacle. The sensor may directly or indirectly detect the volume. In the example of indirect detection, the receptacle may sense the weight of the liquid and determine the volume of the liquid according to the density of the

liquid. The density information may be pre-stored in the receptacle, or provided through the communication module 202 by the liquid dispenser 100.

[0067] In an example, the liquid dispenser 100 processes the beverage recipe and identifies the volume ratio of each of the liquids in the beverage recipe. The identification of the volume ratio of the liquids in the beverage recipe may be obtained directly from the beverage recipe, in case the beverage recipe already is stored by containing the volume per liquid information in percentages. Alternatively the information in the beverage recipe is processed in order to obtain the volume ratio of each of the liquid in the beverage recipe, namely the normalized volume of each of the liquids for the beverage recipe. For example, for a beverage recipe stating that 80 ml. cold water and 20 ml. hot water must be dispensed, the volume percentages would be %80 cold water and %20 hot water, therefore the normalized volumes result to 0.8 volume cold water and 0.2 volume hot water.

[0068] In an example, the liquid dispenser 100 calculates the available volume of the receptacle, wherein the available volume of the receptacle is the volume of the receptacle which is empty. In an example, if the volume of the receptacle is 200ml, and the receptacle is already filled with a liquid of 40ml, the available volume of the receptacle is 160ml. Any known image processing techniques may be used in order to provide determination for the volume of the liquid and the available volume of the receptacle.

[0069] In an example, after the image processing unit determines the available volume of the receptacle, the liquid dispenser 100 processes the beverage recipe and calculates the amount of the liquid to be dispensed from the respective containers 101, 102, 103 according to the identified volume ratio of the liquids in the beverage recipe. Therefore the amount of each of the liquids to be dispensed is calculated using the beverage recipe in the memory 201 and the determined available volume of the receptacle. The total amount to be dispensed for the selected beverage recipe will be limited to the available volume of the receptacle which is calculated by the liquid dispenser 100.

[0070] In an example the calculation of the amount of each of the liquids to be dispensed for a beverage recipe is performed by the processor by multiplying the determined available volume of the receptacle with the volume ratio of the liquids in the beverage recipe. In an example a temporary beverage recipe is created by processing the information in the beverage recipe in order to obtain the volume ratio of each of the liquid in the beverage recipe.

[0071] During such processing, the sum volume is calculated by adding the volume information of each of the liquids in the beverage recipe and dividing the volume information of each of the liquids in the beverage recipe with the sum volume. An alternative calculation for the volume ratio may also be performed with the weight information within the beverage recipe using the density

information of each of the liquids. Alternatively it can be also performed by simply using the weight information in the beverage recipe as the volume information, in case the density of the liquids can be accepted to be close to each other.

[0072] In an example, the valve control unit 204 is arranged to lock at least one of the valves 101b, 102b, 103b, 104b in response to the user information received by the communication module 202.

[0073] It will be understood that the processor referred to herein may in practice be provided by a single chip or integrated circuit or plural chips or integrated circuits, optionally provided as a chipset, an application-specific integrated circuit (ASIC), field-programmable gate array (FPGA), digital signal processor (DSP), graphics processing units (GPUs), etc. The chip or chips may comprise circuitry (as well as possibly firmware) for embodying at least one or more of a data processor or processors, a digital signal processor or processors, baseband circuitry and radio frequency circuitry, which are configurable so as to operate in accordance with the exemplary embodiments. In this regard, the exemplary embodiments may be implemented at least in part by computer software stored in (non-transitory) memory and executable by the processor, or by hardware, or by a combination of tangibly stored software and hardware (and tangibly stored firmware).

[0074] Reference is made herein to memory. This may be provided by a semiconductor memory, or single chip or integrated circuit or plural chips or integrated circuits, optionally provided as a chipset, or single device or by plural devices. Suitable devices include for example a RAM, DRAM, SRAM a hard disk and non-volatile semiconductor memory (e.g. a solid-state drive or SSD).

Claims

1. A liquid dispenser for dispensing liquid according to a beverage recipe comprising;
a memory for storing the beverage recipe;
a communication module for receiving user information from a receptacle;
at least two containers for containing different liquid types, wherein each of the at least two containers is coupled to at least a nozzle and at least a valve wherein each of the valves are configured to allow the flow of the liquid from the respective containers through the respective nozzles at an open position of the valve, and to prohibit the flow of the liquid from the respective containers through the respective nozzles at a closed position of the valve;
a recipe creation unit for creating a user-based beverage recipe in accordance with the beverage recipe and the user information received by the communication module, and for storing the user-based beverage recipe in the memory;
a valve control unit for controlling the position of the,

wherein the valve control unit is arranged for opening and closing the valves in accordance with the user-based beverage recipe.

2. A liquid dispenser according to claim 1, wherein the liquid dispenser comprises an additive dispenser unit for dispensing predetermined amount of a solid additive, wherein the additive dispenser unit comprises a valve for dispensing the solid additive into the receptacle and the valve for dispensing the solid additive is coupled to the valve control unit and the valve control unit brings the valve of the additive dispenser unit to the open position in accordance with the user information received by the communication module.
3. A liquid dispenser according to claim 1 or claim 2, wherein the liquid dispenser comprises a holder for receiving the receptacle, and a sensor unit for detecting the correct placement of the receptacle to the holder, and the valve control unit is arranged to bring the valves to the open position only if the sensor unit detects the correct placement of the receptacle to the holder.
4. A liquid dispenser according to any of the claims 1 to 3, wherein the valve control unit is arranged to lock at least one of the valves in response to the user information received by the communication module, such that the locked valve stays at the closed position for a predetermined amount of time.
5. A liquid dispenser according to any of the claims 1 to 3, wherein the valve control unit is arranged to lock at least one of the valves in response to the user information received by the communication module, such that the locked valve stays at the closed position until a new user information which is different from the user information is received by the communication module.
6. A liquid dispenser according to claim 3, wherein the valve control unit is arranged to lock at least one of the valves in response to the user information received by the communication module, such that the locked valve stays at the closed position as long as the sensor unit is arranged to detect the correct placement of the receptacle to the holder while the communication module receiving the user information.
7. A liquid dispenser according to any one of the claims 1 to claim 6, wherein the user information comprises a user identifier and the liquid dispenser is arranged to store the amount of the liquid which is dispensed for the user identifier in a predetermined amount of time.
8. A liquid dispenser according to any one of the claims 2 to claim 6, wherein the user information comprises a user identifier and the liquid dispenser is arranged to store the amount of the additive which is dispensed for the user identifier in a predetermined amount of time.
9. A liquid dispenser according to any one of the claims 3 to 8, wherein the liquid dispenser comprises a volume determination unit for determining the available volume of the receptacle received by the holder.
10. A liquid dispenser according to any one of the claims 3 to 8, wherein the volume determination unit is arranged to determine the available volume of the receptacle received by the holder by receiving the user information comprising the volume information representing the volume of the receptacle.
11. A liquid dispenser according to any one of the claims 3 to 11, wherein the liquid dispenser comprises an image acquisition unit for acquiring the image of the receptacle received by the holder and an image processing unit and the volume determination unit is arranged to determine the available volume of the receptacle from the image of the receptacle received by the holder.
12. A liquid dispenser according to any one of the claims 9 to claim 11, wherein the beverage recipe comprises information representing the volume percentage of each of the liquid type per serving, the volume determination unit is arranged to calculate the available volume of the receptacle, and the valve control unit is arranged to change the state of the valves in accordance with the beverage recipe and the determined available volume of the receptacle.
13. A liquid dispenser according to any one of the claims 2 to claim 12, wherein the additive dispenser unit comprises a plurality of compartments and a valve for each of the compartments, wherein each of the valves are coupled to the valve control unit.
14. A liquid dispenser according to any one of the claims 3 to claim 13, wherein the valve control unit is arranged to close the valves of each of the nozzles when the volume of the liquid dispensed by the nozzles are less than the difference of the determined volume of the receptacle received by the holder and a predetermined amount.
15. A liquid dispensing system comprising a liquid dispenser accordingly to any one of the claim 1 to claim 14 and a receptacle, wherein the receptacle comprises a receptacle communication unit for communicating with the liquid dispenser and a memory for storing the user information.

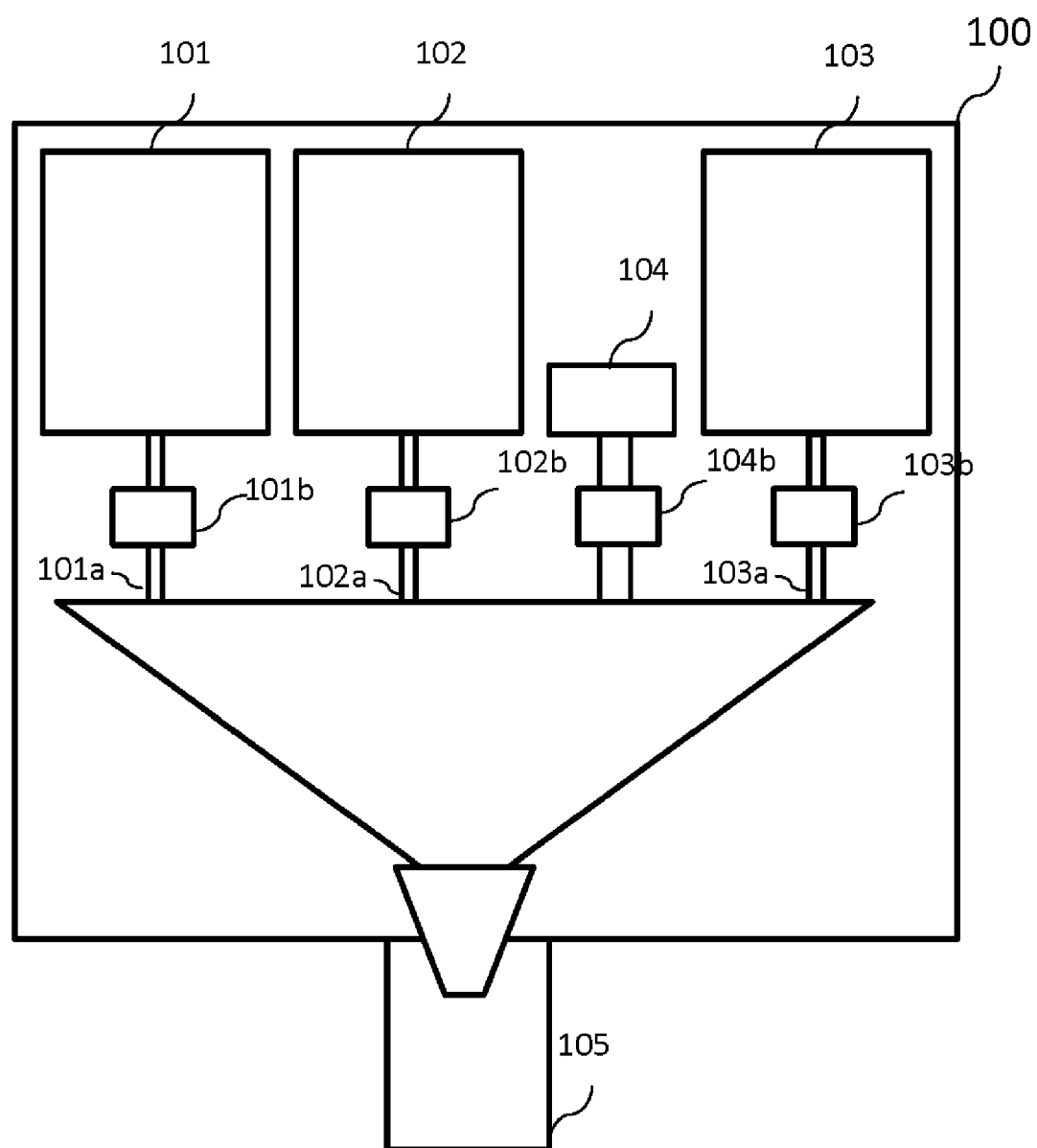


Fig. 1

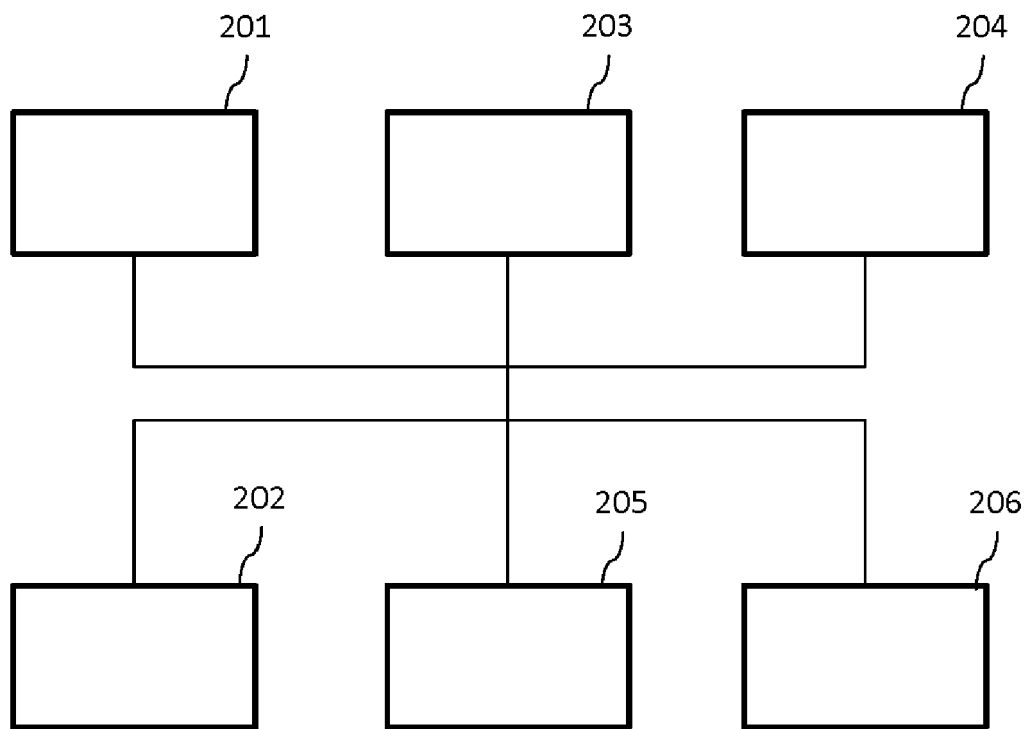


Fig. 2



EUROPEAN SEARCH REPORT

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 2009/032946 A1 (COCA COLA CO [US]) 12 March 2009 (2009-03-12) * paragraphs [0033], [0038], [0041], [0043], [0108], [0114], [0138]; figures *	1-3,7-9, 13-15	INV. B67D1/00 B67D1/08 B67D1/12
X	US 2017/088410 A1 (WING MICHAEL [US] ET AL) 30 March 2017 (2017-03-30) * paragraphs [0078], [0080], [0173], [0186]; figures *	1,15	
A	WO 2020/047612 A1 (KELLEY LAWSON P [AU]) 12 March 2020 (2020-03-12) * paragraph [0073]; figures *	1,2	
A	US 2019/352161 A1 (KNIGHT CLAYTON [US] ET AL) 21 November 2019 (2019-11-21) * paragraphs [0018], [0030]; figures *	1,3	
A	US 2011/017776 A1 (METROPULOS WILLIAM [US] ET AL) 27 January 2011 (2011-01-27) * paragraphs [0115], [0116]; figures *	1,15	TECHNICAL FIELDS SEARCHED (IPC)
A	US 2018/072555 A1 (FORTUNATO NANCY [US] ET AL) 15 March 2018 (2018-03-15) * paragraphs [0004], [0039], [0040]; figures *	1,15	B67D G06Q
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 7 December 2020	Examiner Müller, Claus
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 20 18 2133

5

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

07-12-2020

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30

35

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2009032946 A1	12-03-2009	AU 2008296274 A1	12-03-2009
		BR PI0816442 A2	16-05-2017
		CN 101828206 A	08-09-2010
		CN 104392548 A	04-03-2015
		EP 2212864 A1	04-08-2010
		JP 5596544 B2	24-09-2014
		JP 5906287 B2	20-04-2016
		JP 2010537916 A	09-12-2010
		JP 2014237491 A	18-12-2014
		RU 2010111244 A	20-10-2011
		RU 2013111694 A	27-09-2014
		US 2009065570 A1	12-03-2009
		US 2013079926 A1	28-03-2013
		US 2014142749 A1	22-05-2014
US 2017088410 A1	30-03-2017	WO 2009032946 A1	12-03-2009
		ZA 201001755 B	24-11-2010
		CA 3000484 A1	06-04-2017
		CN 108289481 A	17-07-2018
		EP 3355715 A2	08-08-2018
		GB 2562368 A	14-11-2018
		US 2017088410 A1	30-03-2017
		US 2018251358 A1	06-09-2018
		US 2018251359 A1	06-09-2018
		US 2018251360 A1	06-09-2018
		US 2018251361 A1	06-09-2018
		WO 2017059027 A2	06-04-2017
		NONE	
WO 2020047612 A1	12-03-2020		
US 2019352161 A1	21-11-2019	US 2019352161 A1	21-11-2019
		WO 2019222144 A1	21-11-2019
US 2011017776 A1	27-01-2011	CN 102245496 A	16-11-2011
		GB 2483129 A	29-02-2012
		JP 5878467 B2	08-03-2016
		JP 2013500209 A	07-01-2013
		US 2011017776 A1	27-01-2011
		US 2014069953 A1	13-03-2014
		US 2018029860 A1	01-02-2018
		WO 2011011690 A1	27-01-2011
US 2018072555 A1	15-03-2018	US 2018072555 A1	15-03-2018
		WO 2018049040 A1	15-03-2018

EPO FORM P0459

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