

(19)



(11)

EP 4 826 314 A2

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
21.10.2026 Bulletin 2026/43

(51) International Patent Classification (IPC):
F25C 5/185 ^(2018.01) **F25C 5/20** ^(2018.01)

(21) Application number: **26171821.7**

(52) Cooperative Patent Classification (CPC):
F25C 5/185; F25C 5/22; F25C 2305/024;
F25C 2400/12; F25D 2317/0417; F25D 2323/122

(22) Date of filing: **13.04.2026**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL
NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA
Designated Validation States:
GE KH LA MA MD TN

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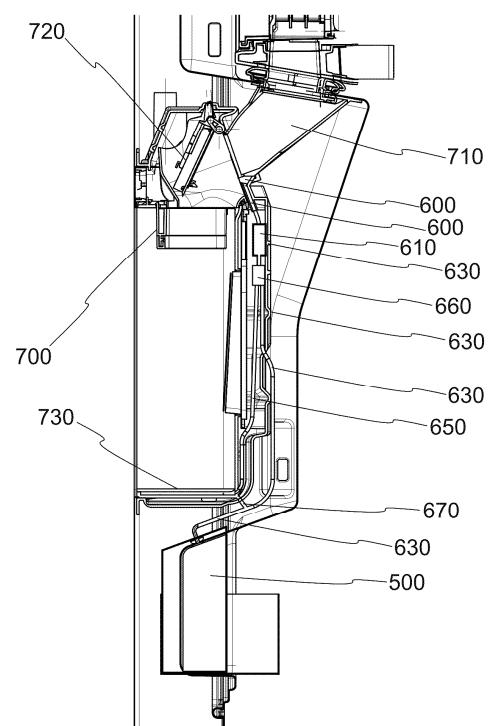
(30) Priority: **14.04.2025 TR 2025004425**

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(54) **A COOLING DEVICE COMPRISING AN ICE-MAKING UNIT**

(57) The present invention relates to a cooling device (100) comprising a device body (200); a device door (300); an ice-making unit (400) disposed in the device body (200) and having an ice storage container (410); an ice dispenser (700) disposed in the device door (300) for dispensing ice from the ice storage container (410); and an ice delivery duct (710) for enabling the ice in the ice storage container (410) to be delivered to the ice dispenser (700), a water discharge duct (600) connected to the ice delivery duct (710) in order to deliver the water, which passes from the ice storage container (410) to the ice delivery duct (710), to a wastewater tank (500).

Figure 5



EP 4 826 314 A2

Description

[0001] The present invention relates to a cooling device, in particular to a cooling device comprising an ice-making unit, which supports the formation of fresh ice in the ice-making unit and enables the discharge of wastewater generated in the ice-making unit.

[0002] Cooling devices comprising ice-making units are widely used, particularly in the food sector and in domestic environments, in order to meet ice needs of users. The ice made in the ice-making units is generally stored in an ice storage container and kept ready for service to users. The aforementioned waiting period varies depending on the needs of users or the environmental conditions. This variable waiting period leads to a series of problems and, accordingly, to a negative user experience. The first problem occurs when users do not request ice for an extended period of time. Ice that remains in the ice storage container for a long time stretches over time under the effect of cold air and adheres to each other. In some cases where adhesion and stretching are limited, the ice-making unit may still dispense ice; however, when the shape of the dispensed ice is distorted, the user experience is reduced. Moreover, particularly in cases where the ice pieces are firmly adhered to each other, the ice-making unit cannot dispense ice. In such cases, the adhered ice in the ice storage container must be removed by the user. The ice removal process leads to a loss of time for users and causes hygiene issues. Furthermore, since the door of the cooling device remains open during the cleaning process, the temperature of the relevant compartments of the cooling device increases rapidly, thereby increasing the risk of spoilage of the food stored in the cooling device. Another problem arises in cases of prolonged power outages, due to the melting of the ice in the ice storage container. When the mains power is restored, the melted ice water collected in the ice storage container freezes again in the form of a solid ice mass. In this case, similar to the previous problem, the ice-making unit cannot dispense the aforementioned ice mass. Accordingly, the ice mass in the ice storage container must again be removed by the user. Another problem is that temperature fluctuations within the cooling device during cleaning and ice that remains unused for long periods may cause odor problems in the ice storage container. Ice that remains unused for long periods or residual ice that is not removed may lead to bacterial growth and the formation of unpleasant odors over time. This situation poses a hygiene risk and reduces user satisfaction.

[0003] In order to enable users to use the ice-making units more efficiently and hygienically, there is a need in the art for a cooling device comprising an ice-making unit wherein the above-mentioned technical problems can be prevented.

[0004] In the state of the art Korean Patent Document No. KR20230053111A, an ice-making machine is

disclosed, comprising a control box; an ice tray positioned on one side of the control box and having an ice-making groove wherein ice-making water is collected; an ice removal motor disposed in the control box and configured to dispense the ice made in the ice-making groove; an ice removal mechanism that has protrusions on the periphery thereof, rotates with the operation of the ice removal motor and, when rotated, removes the ice in the ice-making groove; a support portion connected to the control box from at least one side and extending toward one side of the ice tray; and at least one sterilization unit located on the support portion.

[0005] The aim of the present invention is the realization of a cooling device wherein water in the ice storage container can be discharged.

[0006] Another aim of the present invention is the realization of a cooling device that can melt ice that has remained in the ice storage container for a long time so as to discharge the same, and continuously provide freshly stored ice for service to the user.

[0007] Yet another aim of the present invention is the realization of a cooling device wherein the ice-making unit, and in particular the ice storage container, can be disinfected using disinfecting light radiation, thereby preventing unpleasant odors and continuously providing hygienic, freshly stored ice.

[0008] Yet another aim of the present invention is the realization of a cooling device in which ice that has remained in the ice-making unit for a long time is melted and automatically discharged, thereby increasing user satisfaction and ensuring high energy efficiency.

[0009] The cooling device of the present invention comprises a device body; a device door; an ice-making unit disposed in the device body and having an ice storage container; an ice dispenser disposed in the device door for dispensing ice from the ice storage container; and an ice delivery duct for enabling the ice in the ice storage container to be delivered to the ice dispenser.

[0010] The cooling device of the present invention further comprises a water discharge duct connected to the ice delivery duct in order to deliver the water, which passes from the ice storage container to the ice delivery duct, to a wastewater tank.

[0011] In the embodiments of the present invention, the ice made in the ice-making unit is stored in the ice storage container. In the embodiments of the present invention, the physical connection between the ice storage container and the ice dispenser disposed in the device door is provided by means of the ice delivery duct. When, for any reason, the ice in the ice storage container begins to melt, the resulting water flows toward the ice delivery duct. The water entering the ice delivery duct is delivered to the wastewater tank by means of the water discharge duct connected to the ice delivery duct, thereby enabling the water in the ice

storage container to be discharged.

[0012] By means of this embodiment of the present invention, in cases where the ice in the ice storage container melts due to prolonged interruption of mains power, the resulting water is delivered to the wastewater tank by means of the water discharge duct and discharged without requiring user intervention.

[0013] In an embodiment of the present invention, the cooling device comprises the ice delivery duct and the wastewater tank disposed in the device door. By means of this embodiment of the present invention, more space is provided in the device body for the ice-making unit. Thus, a cooling device can be realized, comprising the ice-making unit that can make more ice per unit time and an ice storage container that can store a greater amount of ice. The placement of the wastewater tank in the device door facilitates the user access to the wastewater tank and the emptying of the wastewater tank.

[0014] In an embodiment of the present invention, the cooling device comprises a flap provided in the ice delivery duct and configured to open and close the ice delivery duct to regulate the passage of ice through the ice delivery duct; and the water discharge duct connected to a portion of the ice delivery duct where the flap is positioned when in a closed position. In this embodiment of the present invention, the flap functions as a duct cover that can open and close the ice delivery duct. When no ice is dispensed from the ice dispenser, the flap is in the closed position. When ice is required to be dispensed from the ice dispenser, the flap moves to an open position, thereby allowing ice pieces to pass from the ice delivery duct to the ice dispenser. When closed, in other words when closing the ice delivery duct, the flap prevents the water in the ice delivery duct from being delivered to the ice dispenser. When a large amount of water is delivered from the ice storage container to the ice delivery duct, the water tends to accumulate in the portion where the flap is positioned when in the closed position. The connection of the water discharge duct to said portion ensures that all of the water in the ice delivery duct is transferred to the water discharge duct.

[0015] In an embodiment of the present invention, the cooling device comprises a water guiding port arranged in the ice storage container and configured to direct the water in the ice storage container toward the ice delivery duct. By means of the water guiding port, the water in the ice storage container is directed to the ice delivery duct without splashing. Thus, the water flowing from the ice storage container to the ice delivery duct is enabled to be transferred along a proper path to the water discharge duct connected to the ice delivery duct without breaking the adhesion force. Preventing said splashing prevents the formation of water droplets on the inner walls of the ice delivery duct that may cause bacterial growth and odor. Moreover, a quieter water transfer from the ice storage container to the

ice delivery duct is achieved.

[0016] In an embodiment of the present invention, the cooling device comprises the ice storage container having a container base that is inclined toward the end facing the ice delivery duct so as to advance the water toward the ice delivery duct. By means of this embodiment of the present invention, all of the water in the ice storage container is enabled to move toward the ice delivery duct. Thus, newly made ice pieces to be stored in the ice storage container are prevented from becoming wet and adhering to each other.

[0017] In an embodiment of the present invention, the cooling device comprises a control unit configured to initiate a defrosting operation in the ice-making unit in order to melt the ice in the ice storage container when ice made by the ice-making unit is not dispensed from the ice dispenser for a selected waiting period. By means of this embodiment of the present invention, the ice that remains in the ice storage container without being dispensed during the selected waiting period is melted. During said selected waiting period, the ice remaining in the ice storage container may become stale. Even if staleness is not an issue, after the selected waiting period the ice pieces may stretch and take on a form that is undesirable for the user. In some cases, due to such stretching, the ice pieces may adhere to each other and form large ice masses. Such large ice masses may not be dispensable by the ice dispenser. In such cases, the ice in the ice storage container must be removed. In this embodiment, the ice melted to take the water form passes from the ice storage container to the ice delivery duct. The water is transferred from the ice delivery duct to the wastewater tank by means of the water discharge duct. Thus, stale, deformed and/or solidified ice in the ice storage container is removed without requiring any mechanical intervention by the user. Thereafter, the ice-making unit becomes ready for making fresh ice.

[0018] In an embodiment of the present invention, the cooling device comprises at least one ice-making cartridge provided in the ice-making unit; at least one heater for heating the ice-making cartridge; ice transfer arms for transferring the ice in the ice-making cartridge to the ice storage container; and a control unit configured to transfer the ice in the ice-making cartridge to the ice storage container by means of the ice transfer arms when the ice in the ice-making cartridge is not transferred to the ice storage container for a selected waiting period, and to initiate a defrosting operation in the ice-making unit in order to melt the ice in the ice storage container. When the ice pieces in the ice-making cartridge are not transferred to the ice storage container for the selected waiting period, the ice pieces may become stale and/or deform into a form that is undesirable for the user. In this case, the ice in the ice-making cartridge must be removed. In this embodiment, for this purpose, the ice in the ice-making cartridge is first transferred to the ice storage container by

means of the ice transfer arms. Thereafter, the defrosting operation is initiated. The ice melted to take the water form passes from the ice storage container to the ice delivery duct. The water is transferred from the ice delivery duct to the wastewater tank by means of the water discharge duct. Thus, stale, deformed ice in the ice storage container is removed without requiring any mechanical intervention by the user. Thereafter, the ice-making cartridge becomes ready for making fresh ice.

[0019] In an embodiment of the present invention, the cooling device comprises a control unit configured to heat the ice-making cartridge by means of the heater for a selected heating period in order to evaporate the water in the ice-making cartridge. This embodiment of the present invention is particularly advantageous in cases of prolonged mains power outages. In the event of such a mains power outage, the ice pieces in the ice-making cartridge melt and take the form of water. Making ice again from such stale water would result in stale ice being served to the user. Therefore, the water in the ice-making cartridge must be discharged. It is not possible to discharge the water in the ice-making cartridge by means of the ice transfer arms. Therefore, in order to discharge the water in the ice-making cartridge, it would be necessary to first convert the water in the ice-making cartridge into ice, transfer the ice to the ice storage container by means of the ice transfer arms, and then initiate a defrosting operation. These steps result in additional time and energy loss. In order to prevent such losses, the ice-making cartridge is heated by means of the heater for the selected heating period, thereby enabling the water in the ice-making cartridge to be discharged by evaporation. Thereafter, the ice-making cartridge becomes ready for making fresh ice.

[0020] In an embodiment of the present invention, the cooling device comprises a water collection chamber disposed in the water discharge duct; a first discharge duct for transferring water at a first level of the water collection chamber; a second discharge duct for transferring water at a second level above the first level of the water collection chamber to the wastewater tank; a water level sensor configured to detect whether water is present at the second level in the water collection chamber; a valve configured to connect the first discharge duct to the second discharge duct when no water is detected at the second level of the water collection chamber, and to connect the water in the first discharge duct to a third discharge duct opening to a dispenser wastewater tray when water is detected at the second level of the water collection chamber; and a connecting duct connecting the dispenser wastewater tray to the wastewater tank. By means of this embodiment of the present invention, an alternative duct configuration is provided for cases where the water discharge duct may become clogged or where the discharge capacity may be insufficient. In this embodiment of the present invention, instead of using the water dis-

charge duct having a single large cross-section, two different ducts, namely the first discharge duct and the second discharge duct, can be selectively used by means of the valve. Thus, in the event that one duct becomes clogged, water discharge can be performed through the other duct. In addition, the use of ducts having smaller cross-sections provides flexibility in the design of the cooling device. For example, in embodiments where the water discharge duct is arranged in the device door, the device door can be made thinner, a larger volume can be provided in the device door for accommodating the ice dispenser, or a thicker insulation material can be used in the device door.

[0021] In an embodiment of the present invention, the cooling device comprises at least one light source provided in the ice-making unit and configured to emit disinfecting light radiation. By means of the light source emitting disinfecting light radiation, the ice made in the ice-making unit is enabled to maintain its freshness for a longer period.

[0022] In an embodiment of the present invention, the cooling device comprises the light source that is an LED configured to emit light radiation at least one wavelength in the ultraviolet spectrum range and/or mainly at a wavelength of 405 nm. The light source emitting light radiation in the ultraviolet spectrum range provides a low-cost solution. The light source emitting light radiation at a wavelength of 405 nm is completely harmless both to human health and to the polymer materials in the cooling device.

[0023] In an embodiment of the present invention, the cooling device comprises a light-transmitting window surrounding the light source so as to protect the same against external mechanical effects. By means of this embodiment of the present invention, the light source is protected from mechanical effects, and the service life of the light source is extended.

[0024] In an embodiment of the present invention, the cooling device comprises at least one reflective member provided in the ice-making unit and configured to reflect the light radiation emitted by the light source. By means of this embodiment of the present invention, disinfecting light radiation can be directed to regions that are difficult to reach, while also providing cost and energy efficiency advantages by using a relatively small number of light sources.

[0025] In an embodiment of the present invention, the cooling device comprises the control unit configured to operate the light source when ice made by the ice-making unit is not dispensed from the ice dispenser for a selected waiting period. In this embodiment, disinfecting the water in the ice storage container before being discharged ensures that hygiene in the water discharge duct is maintained over long periods, and prevents odor formation.

[0026] In an embodiment of the present invention, the cooling device comprises a volatile organic compound sensor provided in the ice-making unit; and the

control unit configured to operate the light source when a volatile organic compound value above a selected measurement value is measured in the ice-making unit by means of the volatile organic compound sensor. By means of this embodiment of the present invention, the light source is operated dynamically. Thus, long-term freshness of the ice pieces stored in the ice storage container and/or present in the ice-making cartridge, and/or long-term hygiene in the water discharge duct, are ensured in an energy-efficient manner.

[0027] The cooling device realized in order to attain the aims of the present invention is illustrated in the attached figures, where:

Figure 1 - is the isometric view of the cooling device in an exemplary embodiment of the present invention.

Figure 2 - is the side cross-sectional view of the cooling device in an exemplary embodiment of the present invention.

Figure 3 - is the side cross-sectional view of the ice-making unit provided in the cooling device in an exemplary embodiment of the present invention.

Figure 4 - is the side cross-sectional view of the connection between the ice-making unit and the ice delivery duct in an exemplary embodiment of the present invention.

Figure 5 - is the side cross-sectional view of the cooling device having the water discharge duct comprising the first discharge duct and the second discharge duct in an exemplary embodiment of the present invention.

Figure 6 - is the cross-sectional view of the water discharge duct wherein the first discharge duct is connected to the second discharge duct in an exemplary embodiment of the present invention.

Figure 7 - is the cross-sectional view of the water discharge duct wherein the first discharge duct is connected to the third discharge duct in an exemplary embodiment of the present invention.

Figure 8 - is the front cross-sectional view of the ice-making unit in an exemplary embodiment of the present invention.

[0028] The elements illustrated in the figures are numbered as follows:

100. Cooling device

200. Device body

300. Device door

400. Ice-making unit

410. Ice storage container

411. Water guiding port

412. Container base

420. Ice-making cartridge

430. Heater

440. Ice transfer arm

500. Wastewater tank

600. Water discharge duct

610. Water collection chamber

620. First discharge duct

630. Second discharge duct

640. Water level sensor

650. Third discharge duct

660. Valve

670. Connecting duct

700. Ice dispenser

710. Ice delivery duct

720. Flap

730. Dispenser wastewater tray

800. Light source

810. Reflective member

820. Window

900. Volatile organic compound sensor

[0029] The cooling device (100) of the present invention comprises a device body (200); a device door (300); an ice-making unit (400) disposed in the device body (200) and having an ice storage container (410); an ice dispenser (700) disposed in the device door (300) for dispensing ice from the ice storage container (410); and an ice delivery duct (710) for enabling the ice in the ice storage container (410) to be delivered to the ice dispenser (700). The cooling device (100) of the present invention further comprises a water discharge duct (600) connected to the ice delivery duct (710) in order to deliver the water, which passes from the ice storage container (410) to the ice delivery duct (710), to a wastewater tank (500).

[0030] By means of the embodiments of the present invention, the melted ice water in the ice storage container (410) is enabled to be delivered to the wastewater tank (500) via the water discharge duct (600) and discharged without requiring user intervention. The melting of the ice in the ice storage container (410) may occur in an uncontrolled, automatic, or manually controlled manner. The melting of the ice in the ice storage container (410) occurs in an uncontrolled manner particularly as a result of prolonged interruption of the mains power. The water formed as a result of the melting of the ice stored in the ice storage

container (410) flows into the ice delivery duct (710). In the embodiments of the present invention, the water flowing into the ice delivery duct (710) is delivered to the wastewater tank (500) via the water discharge duct (600) connected to the ice delivery duct (710) and discharged. Thus, the water is not delivered to the ice dispenser (700), and water leakage from the ice dispenser (700) is prevented. By means of this embodiment, the water flowing into the ice delivery duct (710) is discharged outside the user's field of view, thereby increasing user satisfaction.

[0031] In an embodiment of the present invention, the cooling device (100) comprises the ice delivery duct (710) and the wastewater tank (500) disposed in the device door (300).

[0032] In an embodiment of the present invention, the cooling device (100) comprises a flap (720) provided in the ice delivery duct (710) and configured to open and close the ice delivery duct (710) to regulate the passage of ice through the ice delivery duct (710); and the water discharge duct (600) connected to a portion of the ice delivery duct (710) where the flap (720) is positioned when in a closed position. The flap (720) can close at least a portion, preferably the entire cross-section, of the ice delivery duct (710). At least a portion of the ice delivery duct (710) has a tubular structure and is preferably substantially cylindrical. Accordingly, the flap (720) may be in the form of a disc. When in the closed position, the flap (720) preferably completely closes the cross-section of the ice delivery duct (710) and does not allow ice to pass from the ice delivery duct (710) to the ice dispenser (700). When in the open position, the flap (720) at least partially opens the cross-section of the ice delivery duct (710) and allows ice to pass from the ice delivery duct (710) to the ice dispenser (700). The water discharge duct (600) is connected to the portion where the flap (720) is positioned within the cross-section of the ice delivery duct (710) when the flap (720) is in the closed position (see Figure 5, where the flap (720) is in the open position). Thus, when in the closed position, the flap (720) directs the water in the ice delivery duct (710) toward the water discharge duct (600).

[0033] In an embodiment of the present invention, the cooling device (100) comprises a water guiding port (411) arranged in the ice storage container (410) and configured to direct the water in the ice storage container (410) toward the ice delivery duct (710). The water guiding port (411) may be in the form of a duct, or may be in the form of a port having an inclined discharge end that enables the water from the ice storage container (410) to be poured into the ice delivery duct (710) in a waterfall-like manner (see Figure 4).

[0034] An embodiment of the present invention may comprise an inner surface structure extending along at least a portion of the inner surface of the ice delivery duct (710), which directs and delivers the water passing from the ice storage container (410) to the ice delivery

duct (710) up to the portion where the water discharge duct (600) is connected to the ice delivery duct (710).

[0035] In an embodiment of the present invention, the cooling device (100) comprises the ice storage container (410) having a container base (412) that is inclined toward the end facing the ice delivery duct (710) so as to advance the water toward the ice delivery duct (710). Here, the end of the container base (412) facing the device door (300), in other words the end from which the water is discharged, is closer to a base of the device body (200) than the other end.

[0036] In an embodiment of the present invention, the cooling device (100) comprises a control unit configured to initiate a defrosting operation in the ice-making unit (400) in order to melt the ice in the ice storage container (410) when ice made by the ice-making unit (400) is not dispensed from the ice dispenser (700) for a selected waiting period. In this embodiment of the present invention, the melting of the ice in the ice storage container (410) may occur in an automatic, or manually controlled manner. When the ice made by the ice-making unit (400) is not dispensed from the ice dispenser (700) for the selected waiting period, the ice loses its freshness. Since it is desired to serve fresh ice to the user from the ice dispenser (700), the ice in the ice storage container (410) should be melted, the melted ice water should be discharged, and fresh ice making should be resumed. In automatic control, the control unit initiates the defrosting operation when ice is not dispensed from the ice dispenser (700) for the selected waiting period. In manual control, the control unit generates a freshness warning signal and informs the user via an interface when ice is not dispensed from the ice dispenser (700) for the selected waiting period. When the user provides a defrosting approval via the interface, the control unit initiates the defrosting operation. When the defrosting operation is completed and the water in the ice storage container (410) is discharged, the control unit resumes ice making via the ice-making unit (400).

[0037] In an embodiment of the present invention, the cooling device (100) comprises at least one ice-making cartridge (420) provided in the ice-making unit (400); at least one heater (430) for heating the ice-making cartridge (420); ice transfer arms (440) for transferring the ice in the ice-making cartridge (420) to the ice storage container (410); and a control unit configured to transfer the ice in the ice-making cartridge (420) to the ice storage container (410) by means of the ice transfer arms (440) when the ice in the ice-making cartridge (420) is not transferred to the ice storage container (410) for a selected waiting period, and to initiate a defrosting operation in the ice-making unit (400) in order to melt the ice in the ice storage container (410). In the ice-making unit (400) of this embodiment of the present invention, ice-making cartridges (420) manufactured from metal are provided. The ice-making cartridges (420) are preferably in a semi-disc form. During

the ice-making process, as cold air in the ice-making unit (400) passes over the surface of the ice-making cartridges (420), the water in the ice-making cartridges (420) cools and turns into ice. When the ice in the ice-making cartridges (420) is required to be transferred to the ice storage container (410), the heater (430) first heats the ice-making cartridges (420) to a certain extent, thereby enabling the ice pieces to detach from the surface to which they adhere. Subsequently, the ice transfer arms (440) push the ice pieces in the ice-making cartridges (420), thereby enabling the ice pieces to be transferred to the ice storage container (410). In this embodiment of the present invention, when the ice pieces in the ice-making cartridge (420) are not transferred to the ice storage container (410) for the selected waiting period, the ice pieces may become stale and/or deform into a form that is undesirable for the user. In this case, the ice in the ice-making cartridge (420) must be removed. In this embodiment, when the ice pieces in the ice-making cartridge (420) are not transferred to the ice storage container (410) for the selected waiting period, the ice pieces in the ice-making cartridge (420) are transferred to the ice storage container (410) by means of the ice transfer arms (440). Thereafter, the control unit initiates the defrosting operation. The ice melted to take the water form passes from the ice storage container (410) to the ice delivery duct (710). The water is transferred from the ice delivery duct (710) to the wastewater tank (500) by means of the water discharge duct (600). Thus, stale, deformed ice in the ice storage container (410) is removed without requiring any mechanical intervention by the user. Thereafter, the ice-making unit (400) becomes ready for making fresh ice.

[0038] In an embodiment of the present invention, the cooling device (100) comprises a control unit configured to heat the ice-making cartridge (420) by means of the heater (430) for a selected heating period in order to evaporate the water in the ice-making cartridge (420). In this embodiment of the present invention, the heater (430), which enables the ice pieces to detach from the surface to which they adhere by heating the ice-making cartridges (420) to a certain extent, is used to evaporate the water in the ice-making cartridges (420). Here, the control unit may be configured to heat the ice-making cartridge (420) by means of the heater (430) for a selected heating period in order to evaporate the water in the ice-making cartridge (420) upon detecting that the mains power has been interrupted for a period exceeding a selected interruption duration.

[0039] In an embodiment of the present invention, the cooling device (100) comprises a water collection chamber (610) disposed in the water discharge duct (600); a first discharge duct (620) for transferring water at a first level of the water collection chamber (610); a second discharge duct (630) for transferring water at a second level above the first level of the water collection chamber (610) to the wastewater tank (500); a water

level sensor (640) configured to detect whether water is present at the second level in the water collection chamber (610); a valve (660) configured to connect the first discharge duct (620) to the second discharge duct (630) when no water is detected at the second level of the water collection chamber (610), and to connect the water in the first discharge duct (620) to a third discharge duct (650) opening to a dispenser wastewater tray (730) when water is detected at the second level of the water collection chamber (610); and a connecting duct (670) connecting the dispenser wastewater tray (730) to the wastewater tank (500). In this embodiment of the present invention, after entering the water discharge duct (600), the water in the ice delivery duct (710) first reaches the water collection chamber (610). Subsequently, the water continues to be discharged through the first discharge duct (620). In this case, the first discharge duct (620) is connected to the second discharge duct (630) by means of the valve (660) (see Figure 6). The water is delivered to the wastewater tank (500), to which the outlet of the second discharge duct (630) is connected, and discharged. When, at any time, the water level sensor (640) detects that the water is present at the second level of the water collection chamber (610), it is understood that excess water has started to accumulate in the water collection chamber (610) (see Figure 7). The accumulation of excess water in the water collection chamber (610) may be caused by the defrosting process occurring very rapidly or the start of clogging in a portion between the point where the second discharge duct (630) is connected to the first discharge duct (620) and the outlet thereof. When the water is present at the second level of the water collection chamber (610), the water begins to be discharged from the water collection chamber (610) via the first discharge duct (620) and the second discharge duct (630). In this case, that is, when the water level sensor (640) detects that the water is present at the second level of the water collection chamber (610), the first discharge duct (620) is connected to the third discharge duct (650) by means of the valve (660) (see Figure 7). The outlet of the third discharge duct (650) opens into the dispenser wastewater tray (730). The water to be discharged through the third discharge duct (650) is transferred to the dispenser wastewater tray (730). The dispenser wastewater tray (730) is connected to the wastewater tank (500) via the connecting duct (670). Here, the connecting duct (670) may be directly connected to the wastewater tank (500), or may be connected to the end of the second discharge duct (630) to provide connection to the wastewater tank (500) (see Figures 6 and 7). Thus, the water in the dispenser wastewater tray (730) is delivered to the wastewater tank (500) and discharged.

[0040] In an embodiment of the present invention, the cooling device (100) comprises at least one light source (800) provided in the ice-making unit (400) and configured to emit disinfecting light radiation.

[0041] In an embodiment of the present invention, the cooling device (100) comprises the light source (800) that is an LED configured to emit light radiation at at least one wavelength in the ultraviolet spectrum range and/or mainly at a wavelength of 405 nm.

[0042] In an embodiment of the present invention, the cooling device (100) comprises a light-transmitting window (820) surrounding the light source (800) so as to protect the same against external mechanical effects. The window (820) is manufactured from a material that has high impact resistance at low temperatures and can maintain high light transmittance for wavelengths in the ultraviolet spectrum over a long period. The window (820) may preferably comprise polycarbonate, acrylic, polyethylene terephthalate glycol, or stabilized polypropylene material.

[0043] In an embodiment of the present invention, the cooling device (100) comprises at least one reflective member (810) provided in the ice-making unit (400) and configured to reflect the light radiation emitted by the light source (800).

[0044] In an embodiment of the present invention, the cooling device (100) comprises the control unit configured to operate the light source (800) when ice made by the ice-making unit (400) is not dispensed from the ice dispenser (700) for a selected waiting period. By means of this embodiment of the present invention, the ice to be melted in the ice storage container (410), and thus the melted ice water, is enabled to be disinfected. Thus, odor problems that may occur in the water discharge duct (600) are eliminated.

[0045] In an embodiment of the present invention, the cooling device (100) comprises a volatile organic compound sensor (900) provided in the ice-making unit (400); and the control unit configured to operate the light source (800) when a volatile organic compound value above a selected measurement value is measured in the ice-making unit (400) by means of the volatile organic compound sensor (900). The volatile organic compound sensor (900) can detect unpleasant odors caused by bacterial growth. The volatile organic compound sensor (900) may comprise metal oxide semiconductor sensors or infrared (IR) sensors.

Claims

1. A cooling device (100) **comprising** a device body (200); a device door (300); an ice-making unit (400) disposed in the device body (200) and having an ice storage container (410); an ice dispenser (700) disposed in the device door (300) for dispensing ice from the ice storage container (410); and an ice delivery duct (710) for enabling the ice in the ice storage container (410) to be delivered to the ice dispenser (700), **characterized by** a water discharge duct (600) connected to the ice delivery duct (710) in order to deliver the water, which

passes from the ice storage container (410) to the ice delivery duct (710), to a wastewater tank (500).

2. A cooling device (100) as in Claim 1, **characterized by** the ice delivery duct (710) and the wastewater tank (500) disposed in the device door (300).
3. A cooling device (100) as in Claim 1 or Claim 2, **characterized by** a flap (720) provided in the ice delivery duct (710) and configured to open and close the ice delivery duct (710) to regulate the passage of ice through the ice delivery duct (710); and the water discharge duct (600) connected to a portion of the ice delivery duct (710) where the flap (720) is positioned when in a closed position.
4. A cooling device (100) as in any one of the above claims, **characterized by** a water guiding port (411) arranged in the ice storage container (410) and configured to direct the water in the ice storage container (410) toward the ice delivery duct (710).
5. A cooling device (100) as in any one of the above claims, **characterized in that** a container base (412) of the ice storage container (410) is inclined toward the end facing the ice delivery duct (710) so as to advance the water toward the ice delivery duct (710).
6. A cooling device (100) as in any one of the above claims, **characterized by** a control unit configured to initiate a defrosting operation in the ice-making unit (400) in order to melt the ice in the ice storage container (410) when ice made by the ice-making unit (400) is not dispensed from the ice dispenser (700) for a selected waiting period.
7. A cooling device (100) as in any one of the above claims, **characterized by** at least one ice-making cartridge (420) provided in the ice-making unit (400); at least one heater (430) for heating the ice-making cartridge (420); ice transfer arms (440) for transferring the ice in the ice-making cartridge (420) to the ice storage container (410); and a control unit configured to transfer the ice in the ice-making cartridge (420) to the ice storage container (410) by means of the ice transfer arms (440) when the ice in the ice-making cartridge (420) is not transferred to the ice storage container (410) for a selected waiting period, and to initiate a defrosting operation in the ice-making unit (400) in order to melt the ice in the ice storage container (410).
8. A cooling device (100) as in Claim 7, **characterized by** a control unit configured to heat the ice-making cartridge (420) by means of the heater (430) for a selected heating period in order to evaporate the water in the ice-making cartridge (420).

9. A cooling device (100) as in any one of the above claims, **characterized by** a water collection chamber (610) disposed in the water discharge duct (600); a first discharge duct (620) for transferring water at a first level of the water collection chamber (610); a second discharge duct (630) for transferring water at a second level above the first level of the water collection chamber (610) to the wastewater tank (500); a water level sensor (640) configured to detect whether water is present at the second level in the water collection chamber (610); a valve (660) configured to connect the first discharge duct (620) to the second discharge duct (630) when no water is detected at the second level of the water collection chamber (610), and to connect the water in the first discharge duct (620) to a third discharge duct (650) opening to a dispenser wastewater tray (730) when water is detected at the second level of the water collection chamber (610); and a connecting duct (670) connecting the dispenser wastewater tray (730) to the wastewater tank (500). 5 10 15 20
10. A cooling device (100) as in any one of the above claims, **characterized by** at least one light source (800) provided in the ice-making unit (400) and configured to emit disinfecting light radiation. 25
11. A cooling device (100) as in Claim 10, **characterized by** the light source (800) that is an LED configured to emit light radiation at at least one wavelength in the ultraviolet spectrum range and/or mainly at a wavelength of 405 nm. 30
12. A cooling device (100) as in Claim 10 or Claim 11, **characterized by** a light-transmitting window (820) surrounding the light source (800) so as to protect the same against external mechanical effects. 35 40
13. A cooling device (100) as in any one of Claims 10 to 12, **characterized by** at least one reflective member (810) provided in the ice-making unit (400) and configured to reflect the light radiation emitted by the light source (800). 45
14. A cooling device (100) as in any one of Claims 10 to 13, **characterized by** the control unit configured to operate the light source (800) when ice made by the ice-making unit (400) is not dispensed from the ice dispenser (700) for a selected waiting period. 50
15. A cooling device (100) as in any one of Claims 10 to 14, **characterized by** a volatile organic compound sensor (900) provided in the ice-making unit (400); and the control unit configured to operate the light source (800) when a volatile organic compound value above a selected measurement value is measured in the ice-making unit (400) by means of the volatile organic compound sensor (900). 55

Figure 1

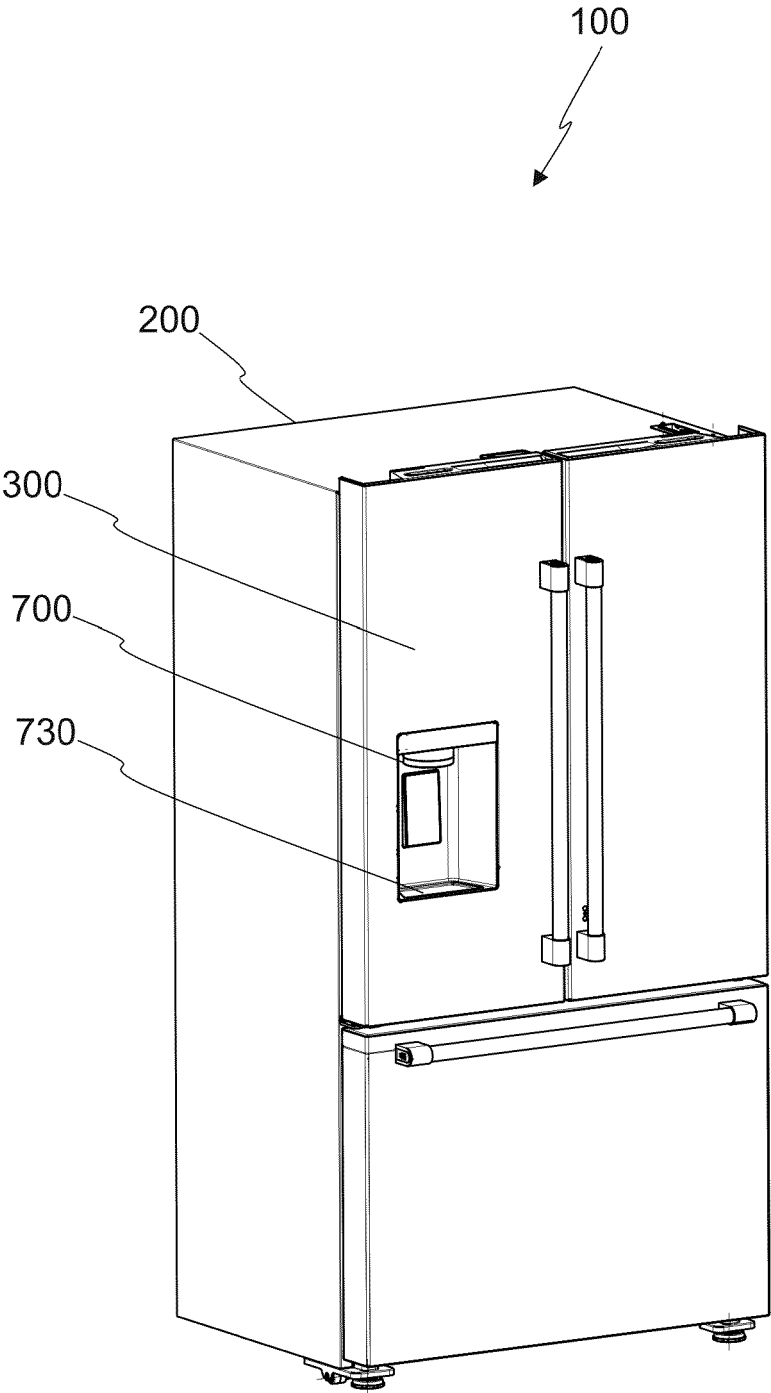


Figure 2

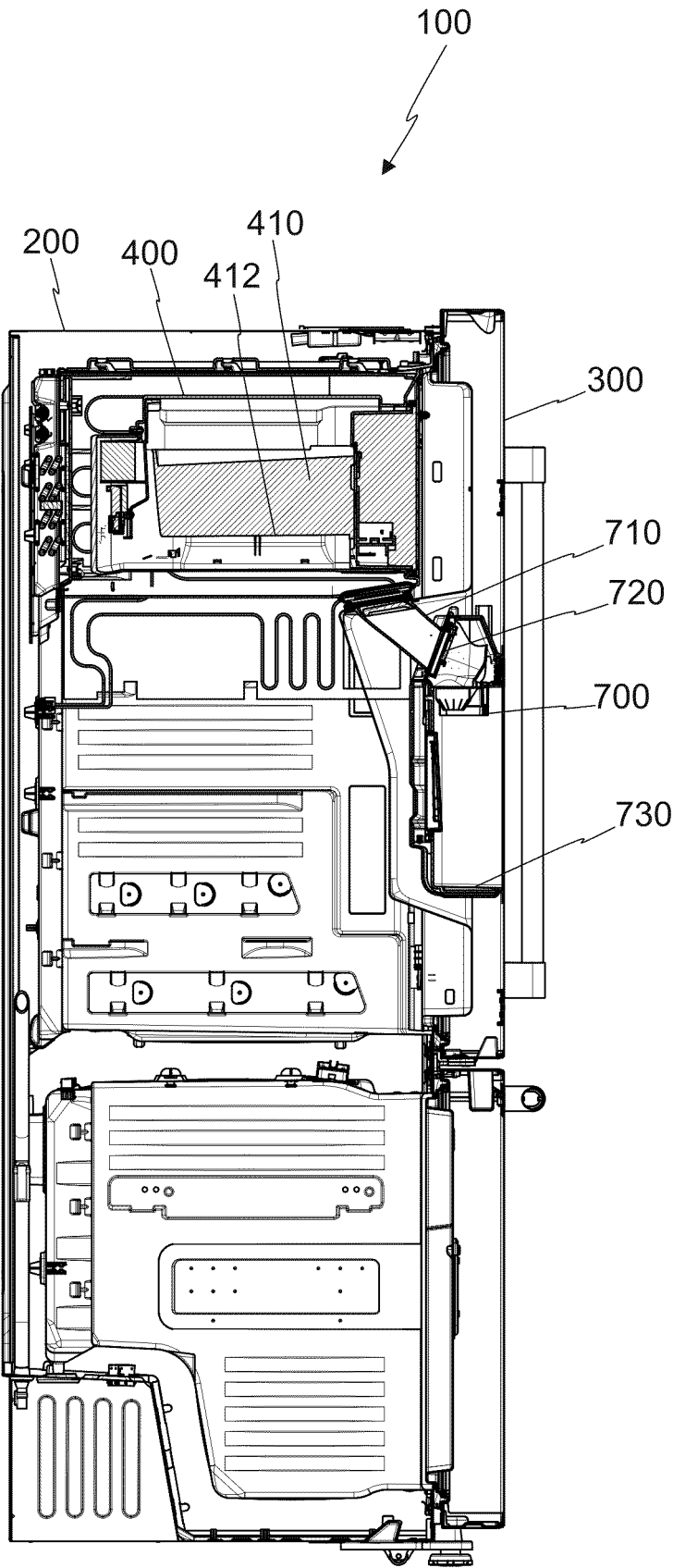


Figure 3

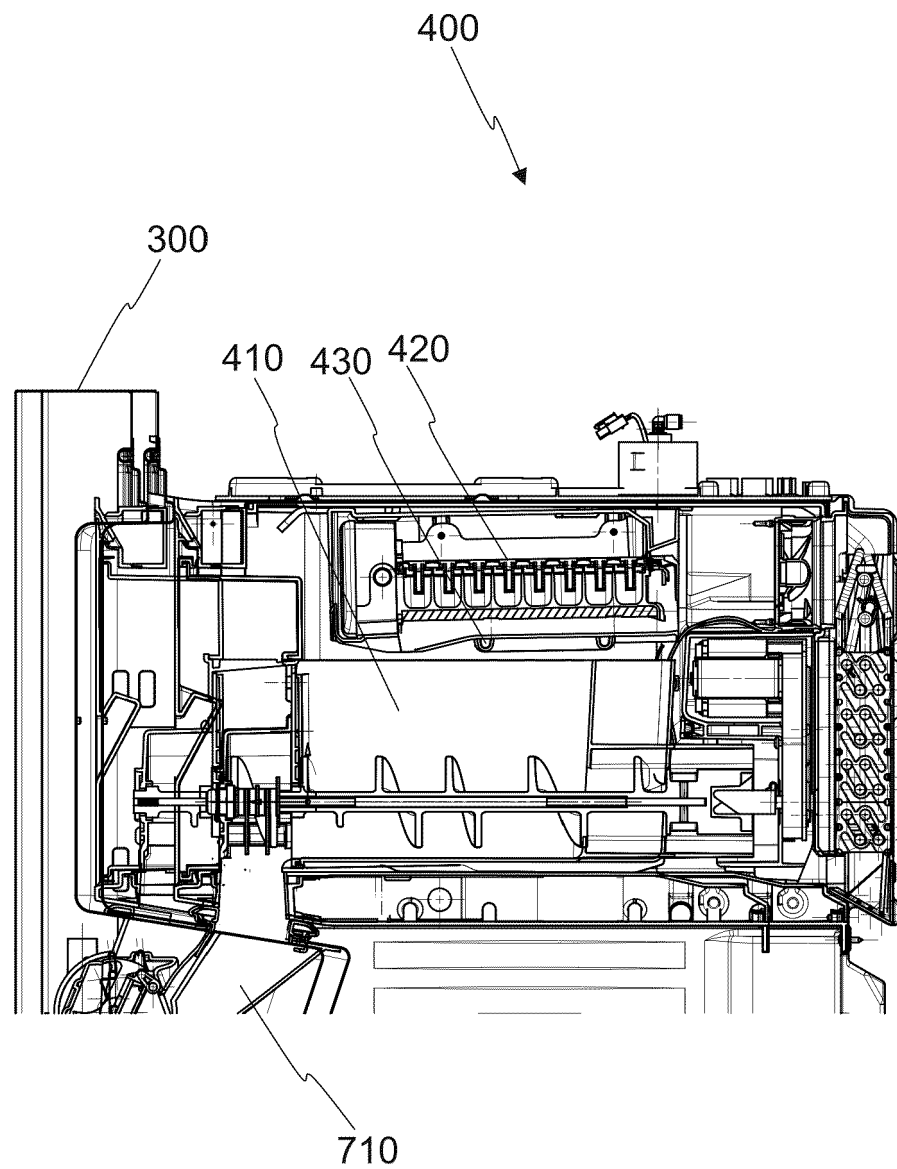


Figure 4

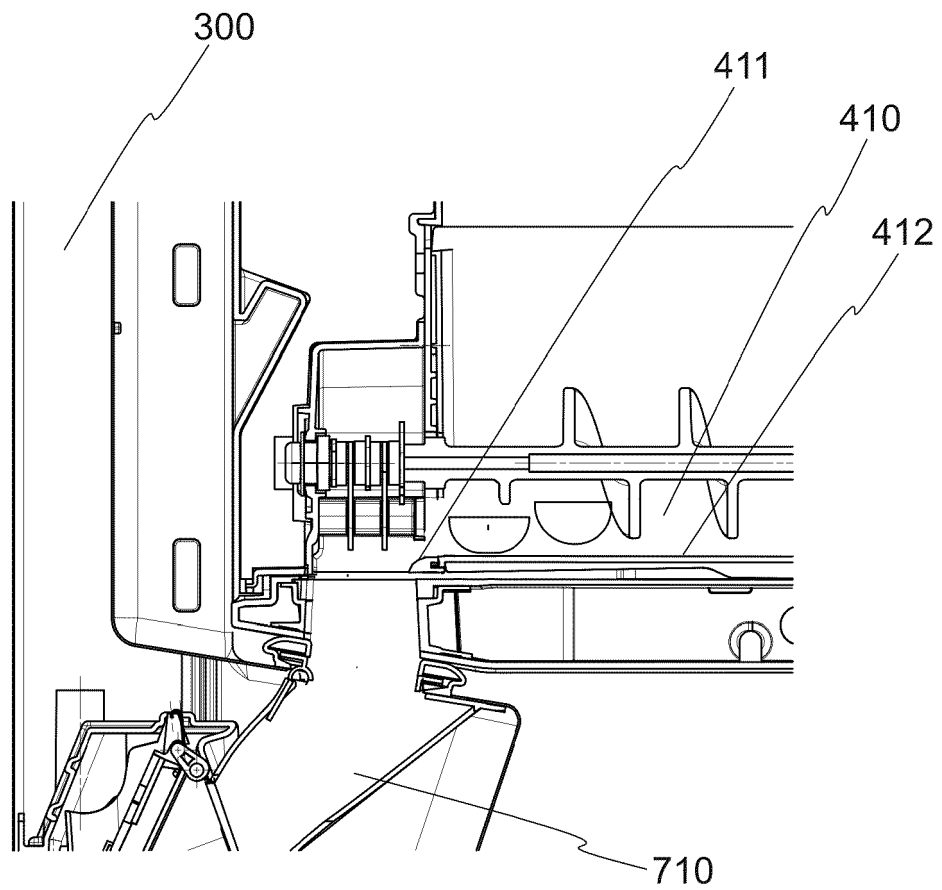


Figure 5

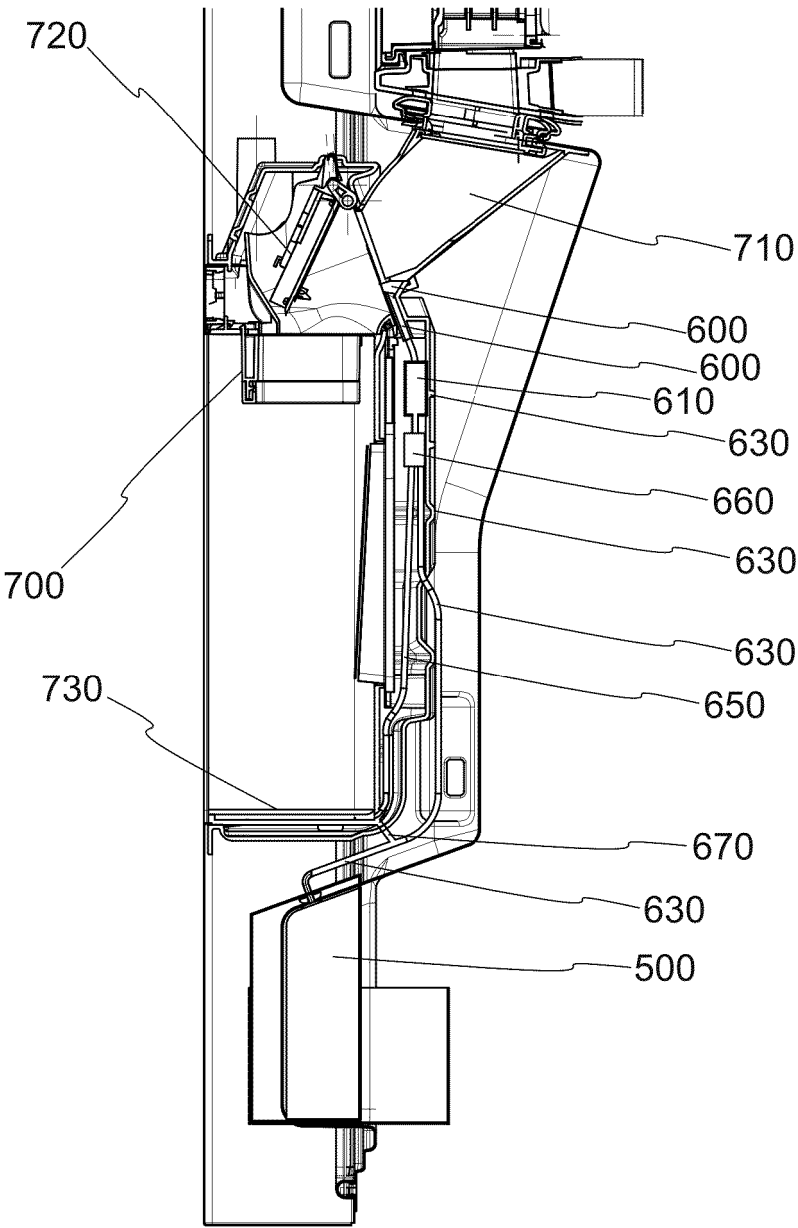


Figure 6

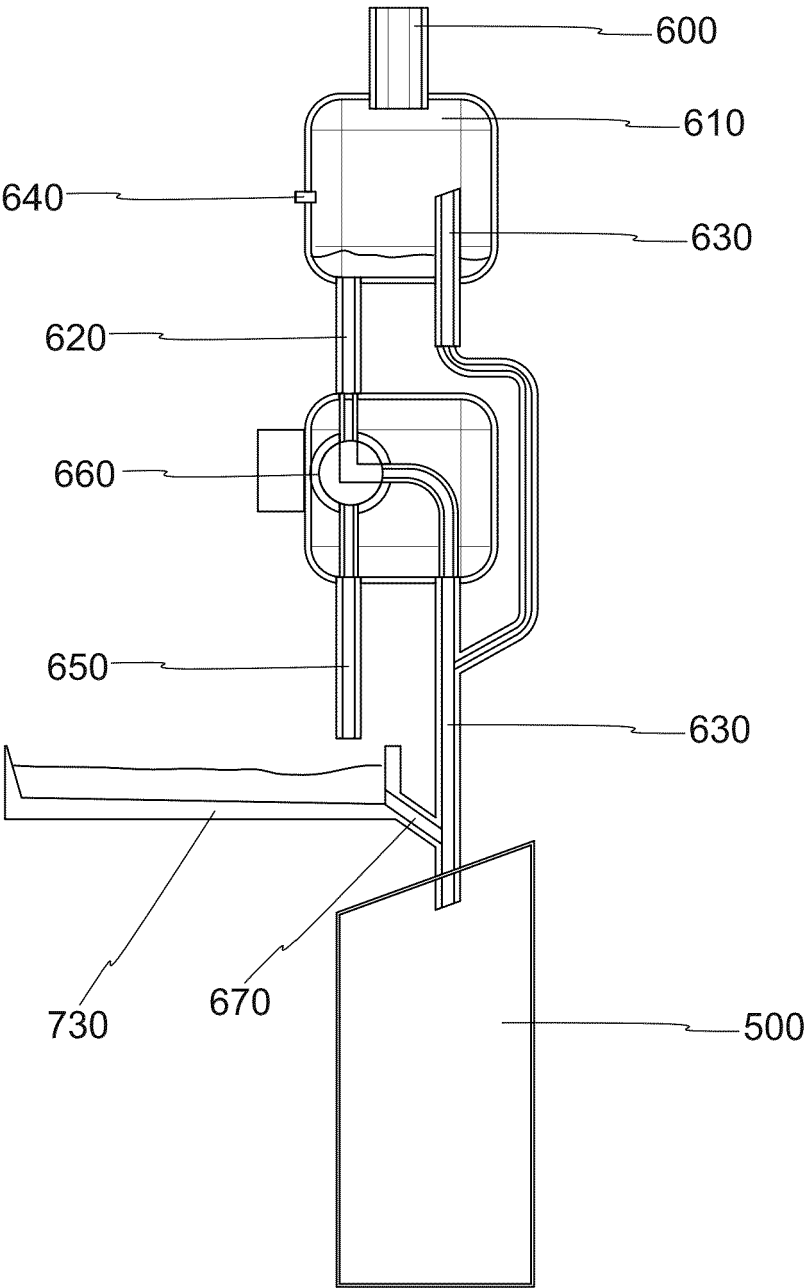


Figure 7

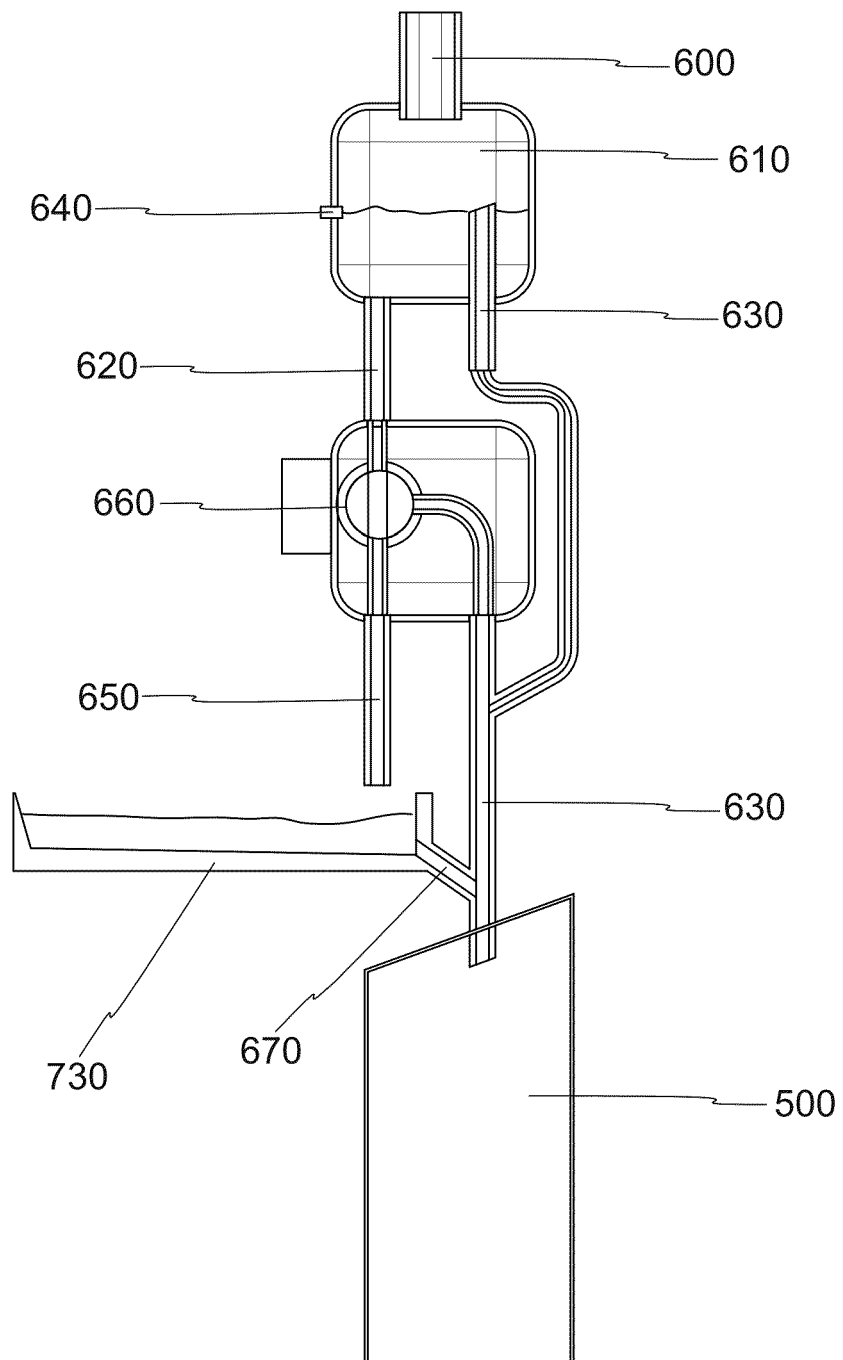
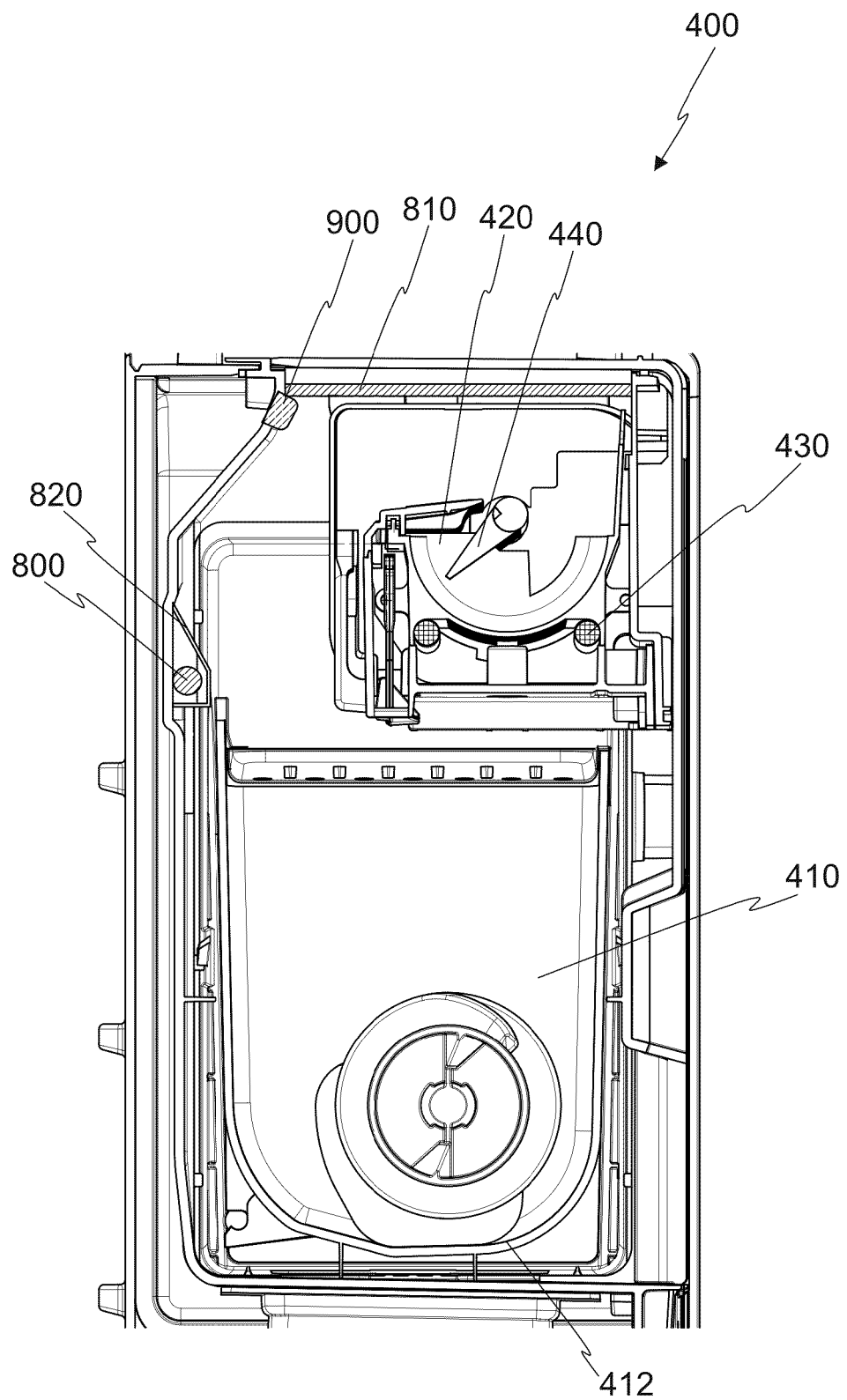


Figure 8



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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