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(54) **A COOLING SYSTEM**

(57) A system (S) for cooling of beverages, comprises a machine compartment (2) wherein the motor (2a) is positioned; a cooling compartment (1) comprising a chamber (1a) in which the container (E) is placed, suitable for introducing water and ice therein for cooling the container (E), a main shaft (1 b) positioned in the chamber (1 a) such that at least one side thereof is connected to the motor (2a), wherein the container (E) is positioned such that it contacts thereto, and which rotates about its axis with the movement of the motor (2a); a main pool (2c) in the machine compartment (2), wherein the excess water from the chamber (1a) is collected; a drain (2f) in the main pool (2c); a main transfer line (B1) which is connected to the drain (2f); and a discharge device, for transferring the excess water from the chamber (1a) into the main pool (2c).

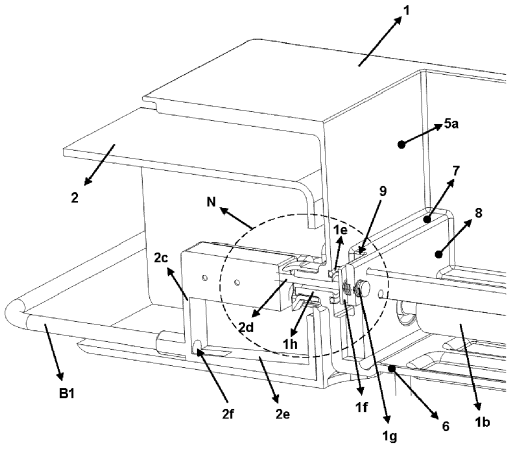

Figure 5

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Description

Relevant Field of Art

[0001] The present invention relates to cooling systems for rapid cooling of beverages in a container (especially in a cylindrical container) such as fruit juice, milk, water etc.

Background Art

[0002] Particularly, in cooling devices such as refrigerators, deep-freezers etc. for cooling food products or keeping them below a certain temperature, beverages in a container are cooled down by disposing the container in an inner volume (for example on a shelf) of the cooling device. During the cooling process, at first the container loses its heat followed by the cooling of the beverage layer-by-layer towards the center of the container. However, said layered-cooling towards the center may take a very long time, and if it is desired to drink a beverage in a short period of time, then it may be drunk without being cooled down adequately. For example, under normal conditions, when a beverage of 32°C is placed in a cooling compartment of a cooling device, it slowly loses its heat and is, for example, brought to 5°C in approximately 5-6 hours. Therefore, said duration is quite long for the users, especially in summer times.

[0003] Various applications are available in the prior art for solving said problem. One of them is disclosed in US6314751 B1. In the said document, it is disclosed a chilling apparatus for chilling a liquid in a container, which comprises a compartment sized to accept and retain the container; and a coolant receptacle adjoining a side portion of the compartment, for retaining a coolant, e.g., an ice/water mixture. The adjoining side portion has at least one aperture that allows the coolant to flow through to enter the compartment and surround the container therein. The liquid in the container is chilled by rotating the container within the coolant. However, said application is not suitable for use in a cooling device, and the container is manually rotated within the coolant. Moreover, in the said application, after the usage, the coolant must be replaced for subsequent use. Furthermore, it is silent about a solution for discharging excess fluid generated by the melting of the ice.

Brief Description of the Invention

[0004] The cooling system according to the present invention, which is suitable for use in a cooling device and which allows rapid cooling of beverages in a container, comprises at least one machine compartment wherein at least one motor is positioned; at least one cooling compartment comprising at least one chamber in which the container to be cooled down is placed, which is suitable for introducing water and ice therein for cooling the container and which has at least one rear wall, at least one bottom and at least one front wall positioned opposite to the rear wall; at least one main shaft positioned in the chamber such that at least one side thereof is connected to the motor, wherein the container containing the beverage to be cooled down is positioned in the chamber such that it contacts thereto, and which rotates about its axis with the movement of the motor, during the cooling process, thereby rotating the container that is in contact with it; at least one main pool which is positioned in the machine compartment, and in which excess water is collected so as to prevent it from causing damage by overflowing from the chamber to the area where the cooling system is located when the water available in the chamber is above a safe amount of water during cooling process, the safe amount of water being an amount that prevents the water in the chamber not only from lifting the container but also from overflowing to an environment where the chamber is located; at least one drain positioned in the main pool and having at least two apertures, at least one of which is opened to the main pool; at least one main transfer line at least one side of which is connected to the other aperture of the drain, wherein the excess water received from the chamber into the main pool is passed therethrough and removed from the main pool; and at least one discharge equipment positioned at a certain height above the bottom, according to the safe amount of water that can be available in the chamber, for transferring the excess water present in the cooling compartment into the main pool in the motor compartment during the cooling process.

[0005] In the cooling system according to the present invention, since the container is rotated about its axis by means of the main shaft and in the meantime the heat of melting of the ice is utilized, the temperature of the beverage is able to be reduced in a very short period of time (for example, to 5°C in about 10 minutes) though depending on the type and amount of the beverage and/or the size of the container.

Object of the Invention

[0006] An object of the present invention is to provide a cooling system for rapid cooling of a beverage in a container, which is suitable for use in cooling devices.

[0007] Another object of the present invention is to provide a cooling system where the coolant therein can be discharged, if it is in excess amount.

[0008] Another object of the present invention is to provide a cooling system wherein the efficiency of the cooling is increased by the rotation of the container.

[0009] Another object of the present invention is to provide a cooling system which is able to be used outside of the cooling device.

[0010] Still a further object of the present invention is to provide a cooling system which is easy-to-use, durable and reliable.

Description of the Drawings

[0011] The illustrative embodiments of the cooling system according to the present invention are illustrated in the enclosed drawings, in which:

Figure 1 is a schematic view of the cooling system.
Figure 2 is a perspective view of an illustrative embodiment of the cooling system.
Figure 3 is a side sectional perspective view of the cooling system.
Figure 4 is a view of a detail "M" in figure 3.
Figure 5 is another side sectional perspective view of the cooling system.
Figure 6 is a view of a detail "N" in figure 5.
Figure 7 is another side sectional perspective view of the cooling system.

[0012] All the parts illustrated in the drawings are individually assigned a reference numeral and the corresponding terms of these numbers are listed as follows:

Cooling device	(C)
Cooling system	(S)
Main transfer line	(B1)
Additional transfer line	(B2)
Insulation wall	(D)
Container	(E)
Cover	(F)
0°C compartment	(A)
Evaporation tray	(H1)
Auxiliary tray	(H2)
Compressor	(K)
Air blowing unit	(U)
Cooling compartment	(1)
Chamber	(1 a)
Main shaft	(1 b)
Connection shaft	(1c)
Main connection	(1d)
Sealing member	(1 e)
Discharge cover	(1f)
Resilient member	(1g)
Passage	(1h)
Support piece	(1j)
Machine compartment	(2)
Motor	(2a)
Motor connection	(2b)
Main pool	(2c)
Pin	(2d)
Pool base	(2e)
Drain	(2f)
Controller	(3)
Fixing member	(4)
Rear wall	(5a)
Front wall	(5b)
Bottom	(6)
First wall	(7)
Second wall	(8)
Discharge pool	(9)
Guide	(10)

Description of the Invention

[0013] Beverages in containers wherein a liquid such as a beverage is located are generally cooled by being placed in a cooling device. However, such cooling process is achieved by breaking heat layers towards the center of the container, which takes a relatively long period of time. For example, in case a beverage having a temperature of 32°C is cooled down in a cooling device, the temperature of the beverage is reduced to 5°C in 5-6 hours on average. Therefore, various applications are needed to reduce the temperature of the liquid in a container in a shorter period of time. Although various applications are available in the prior art directed to said rapid cooling process, these applications cannot ensure sufficient efficiency and cannot fully meet the needs of the users. Therefore, with the present invention, there is provided a cooling system wherein the disadvantages of the prior art applications are eliminated and the cooling efficiency is increased.

[0014] The cooling system (S) according to the present invention, as illustrated in figures 1-7, which ensures rapid cooling of beverages in a container (E), is suitable for use in a cooling device (C), as shown in figure 2, and is able to be engaged to and disengage from the cooling device (C) by means of a sliding mechanism preferably such as a slide, rail etc. The inventive cooling system (S) comprises at least one machine compartment (2) wherein at least one motor (2a) is positioned (which is preferably fixed at least at two points by means of a shock-prevention member such as a felt, rubber etc. in order to prevent any shock that may be generated); at least one cooling compartment (1) comprising at least one chamber (1a), in which the container (E) to be cooled down is placed preferably in horizontal direction, which is suitable for introducing water and ice therein for cooling the container (E), and which has at least one rear wall (5a) preferably facing the machine compartment (2), at least one bottom (6) and at least one front wall (5b) positioned opposite to the rear wall (5a), and the cooling compartment (1) being preferably engaged to and disengaged from the cooling device (C) by means of at least one sliding mechanism such as a slide, rail etc. (said sliding mechanism is also preferably positioned on a side wall of the cooling compartment (1)); and at least one main shaft (1 b) positioned in the chamber (1 a) such that one side thereof is preferably connected to rear wall (5a) (for example by means of a sealing member such as an oil seal),

and the other side thereof is preferably connected to the front wall (5b) (for example by means of a bearing member such as a plastic bearing), and at least one side thereof (preferably that one which is connected to the rear wall (5a)) is connectable to the motor (2a), wherein the container (E) containing the beverage to be cooled down is positioned in the chamber (1a) such it contacts thereto, and which rotates about its axis with the movement of the motor (2a), during the cooling process, thereby rotating the container (E) that is in contact with it and which is preferably coated with a non-sliding material (e.g. rubber). The cooling compartment (1) and the machine compartment (2) may either be integral or separate from each other, in which case the cooling compartment (1) is able to be moved close to and away from the machine compartment (2) with respect to the machine compartment (2). In case the cooling compartment (1) is movable with respect to the machine compartment (2), the main shaft (1b) can be connected to and disconnected from the motor (2a) based on the said movement of the cooling compartment (1) with respect to the machine compartment (2). The cooling system (S) also comprises at least one main pool (2c) positioned in the machine compartment (2), wherein if the water available in the chamber (1a) during the cooling process is in excess amount, the excess water is collected in order to prevent it from flowing from the chamber (1 a) and causing damage to the area it is located (for example inside of the cooling device (C)) (said main pool (2c) also ensures that the noise of the water is reduced during the discharge of the water from cooling compartment (1) and it is not heard from the outside); at least one drain (2f) positioned in the main pool (2c) such that it is preferably located on at least one pool base (2e), and having at least two apertures at least one of which is opened to the main pool (2c); at least one main transfer line (B1), at least one side of which is connected to the other aperture of the drain (2f), wherein the excess water received from the chamber (1a) into the main pool (2c) is passed therethrough, preferably through the pool base (2e) inclined towards the drain (2f), and removed from the main pool (2c) (for example transferred into a waste water line of an house); and at least one discharge equipment positioned at a certain height above the bottom (6), according to the safe amount of water that can be available in the chamber (1a), for transferring the excess water available in chamber (1a) of the cooling compartment (1), into the main pool (2c) in the motor compartment (2) during the cooling process. Additionally, said cooling system (S) preferably comprises at least one cover (F) suitable for closing said chamber (1a) (which cover (F) may either be a piece such as a shelf provided in the cooling device (C) or may be an external piece). If the water in the chamber (1a) exceeds a certain amount after the container (E) containing the beverage to be cooled down is placed into the chamber (1a), it lifts the said container (E) and prevents contact of the container (E) with the main shaft (1b), in which case the container (E) cannot rotate and the cooling process cannot be performed in an efficient manner. Furthermore, in case there is an excess amount of water, the water in the chamber (1 a) overflows. Said safe amount of water is defined as a level where the water in the chamber (1a) is prevented from lifting the container (E), and the water in the chamber (1a) is also prevented from overflowing to an environment where the chamber (1 a) is situated.

[0015] In an exemplary embodiment of the invention, water is introduced into the chamber (1a) in the cooling compartment (1) and it is brought to a certain temperature level (for example, the temperature (0-5°C) of the cooling compartment of the cooling device (C) where the cooling system (S) is to be used). In other words, for example in case the cooling system (S) is used in the cooling compartment of the cooling device (C), the chamber (1 a) is filled with some water at the initial use of the cooling system (S). If the water has a temperature that is higher than that of the cooing compartment of the cooling device (C), the cooling system (1) is positioned in the cooling compartment of the cooling device (C) and the water is brought to a temperature value that is close to the melting temperature of ice (i.e. the temperature of the cooling compartment of the cooling device (C)). Then, the container (E) containing the beverage to be cooled down is disposed in the chamber (1a) of the cooling system (S) such that it contacts the main shaft (1b). Thereafter, pieces of ice are disposed inside the chamber (1a). In case the cooling compartment (2) is independent from the machine compartment (1), the main shaft (1b) is also connected to the motor (2a) for example by moving the cooling compartment (1) close to the machine compartment (2) (the machine compartment (2) wherein the motor (2a) is positioned can either be stationary in the cooling device (C) or it can have a structure so as to be engaged to or disengage from the cooling device (C) along with the cooling compartment (1)). By energizing the motor (2a) in the cooling system (S) inserted into the cooling device (C) for rapid cooling process (the motor (2a) may either be connected with the energy system of the cooling device (C) or may be energized by means of an external power supply), the main shaft (1 b) is rotated about its axis and the container (E) disposed in the chamber (1a) is also rotated. In this way, heat exchange of the container (E) with a mixture of water and ice is accelerated, and instead of reaching to the center of the container (E) gradually and layer-by-layer, heat is allowed to reach thereto in a direct manner by breaking said layers, so that the beverage in the container (E) is cooled rapidly. When the water in the chamber (1a) that has increased depending on the melting of the ice reaches to a certain level, the excess water is passed into the main pool (2c) in machine compartment (2) by means of the discharge equipment of the cooling system (S) and then into the main transfer line (B1) by means of the drain (2f) so that it is removed from the cooling system (S). In this manner, the beverage in a container (E) is cooled in a rapid and practical manner, and also the excess water is prevented from flowing

from the chamber (1 a) and causing damage to the surrounding parts. Furthermore, since a mixture of water and ice is used as a coolant, a durable cooling system (S) is obtained which is ready to use, when necessary, and which does not cause additional cost when a coolant supplement is required.

[0016] In a preferred exemplary embodiment of the invention, the cooling system (S) comprises, as a discharge equipment, at least one passage (1 h), , preferably in the form of a pipe, at least one end of which is opened to the chamber (1 a) by means of at least one hole provided on the chamber (1a) (preferably on a wall of the chamber (1a) [for example rear wall (5)]) such that the hole is located at a certain height above the bottom (6) based on the safe amount of water that can be available in the chamber (1 a), and at least another end of which is opened to the main pool (2c); and which comprises at least one channel wherein the channel connects the two ends to each other and the excess water in the chamber (1a) is passed through this channel into the main pool (2c); at least one discharge cover (1f) positioned on a side of the wall - where the hole is located - that faces the chamber (1a), and which opens and closes the said hole, preferably based on the position of the cooling compartment (1) with respect to the machine compartment (2) (that is, based on the connection of the main shaft (1 b) to the motor (2a) or disconnection of the same); and at least one pin (2d) which is fixed to the main pool (2c) at a side thereof, which is suitable for extending through the channel in the passage (1h) and through the hole on the wall, where the hole is located, towards the chamber (1a), which ensures the opening of the hole such that excess water is passed therethrough by extending into the chamber (1a) in case the cooling process is performed in the cooling compartment (1) (or in case the main shaft (1b) is connected to the motor (2a)) and by contacting the discharge cover (1f) at this extending side so as to move the discharge cover (1f) from the hole , and which has a cross-sectional area smaller than the width of the said channel and the hole. In this embodiment, when the main shaft (1 b) is connected to the motor (2a) such that the motor (2a) rotates the main shaft (1b) (or in case the cooling process is performed), said pin (2d) - at a state of the cooling chamber (1) where the motor (2a) is not connected to the main shaft (1 b) (or in case the cooling process is not performed) - contacts the discharge cover (1f) located at a position covering said hole and moves the discharge cover (1f) away from the hole so that the hole is opened. During the cooling process, as the ice in the water contained in the chamber (1a) melts with the heat from the beverage container (E), the amount of water in the chamber (1 a) increases and when said amount of water exceeds a safe level, it reaches to the hole. Since the discharge cover (1f) is spaced from the hole, said excess water is passed through the opened hole into the passage (1h) and then into the main pool (2c). The water that has reached to the main pool (2c) is in turn passed through the drain (2f) and removed from the cooling system (S) by means of the main transfer line (B1). In this embodiment, the cooling system also preferably comprises at least a first wall (7), preferably parallel to bottom (6), positioned at a certain height above the bottom (6) based on a safe amount of water that can be available in the chamber (1 a), and which extends from the wall where the hole is located (preferably from the rear wall (5)) towards the chamber (1 a); at least a second wall (8) which extends towards the bottom (6) from an end of the first wall (7) extending towards the chamber (1a) and which is preferably parallel to the wall where the hole is located (for example rear wall (5)); at least a discharge pool (9) interposed between the wall where the hole is located, the first wall (7) and the second wall (8), and to which said hole is opened (that is, that surrounds the said hole); and at least one resilient member (1g) (preferably a spring) which is connected to the second wall (8) at a side, and at another side, to the discharge cover (1f), and which exerts force on the discharge cover (1f) towards the hole so as to ensure that the discharge cover (1f) closes the hole when the pin (2d) does not contact the discharge cover (1f). In this way, during the cooling process (when the main shaft (1b) is connected to the motor (2a)), when the water in the chamber (1a) exceeds said safe level, it is filled into the discharge pool (9) via the first wall (7) and the second wall (8). The discharge cover (1f) is maintained at a distance away from the hole by means of the pin (2d) extending from the main pool (2c) into the chamber (1a), and thus the hole is kept opened. In the meantime, force is accumulated on the resilient member (1g) located between the second wall (8) and the discharge cover (1f). For example, when the cooling compartment (1) is moved away from the machine compartment (2) (that is, the motor (2a) is disconnected from the main shaft (1b) or when the cooling process is terminated), due to the force accumulated on the resilient member (1g), the resilient member (1g) moves the discharge cover (1f) towards the wall where the hole is located, and thus the hole is closed. In this manner, the cooling system (S) is operated in a reliable and effective manner and a cooling system is achieved which is easy-to-use and practical. In this embodiment, the cooling system (S) also comprises at least one sealing member (1 e) (for example a seal, o-ring etc.) which is positioned around the hole and seals the discharge cover (1f). In this embodiment, the cooling system (S) alternatively comprises at least a guide (10) which is preferably positioned such as to surround the passage (1 h), and at least one side of which is inclined so as to extend to the main pool (2c). Thus, water is guided into the main pool (2c) in case of a leakage.

[0017] In another preferred alternative embodiment of the invention, the cooling system (S) comprises at least one motor connection (2b) which is connected to the motor (2a), at one side, such that it is rotated when the motor (2a) is energized, and which has, on another side thereof, a plurality of teeth and grooves with different geometrical shapes, and at least one main connection (1d) which is

connected, at least at one side, to the said main shaft (1b) preferably by means of at least one connection shaft (1c) (which may either be integral with the main shaft (1b) or may be an external piece) and which has, at least at another side, a plurality of grooves with geometrical shapes suitable for receiving the teeth provided on the motor connection (2b) and a plurality of teeth with geometrical shapes suitable for being received into the grooves on the motor connection (2b), which ensures that the main shaft (1 b) is appropriately connected to the motor (2a) by means of a close-fit of its teeth and grooves with the teeth and grooves on the motor connection (2b) and that the motion of the motor (2a) is effectively transferred to the main shaft (1 b), and which is rotatable about its axis upon energizing the motor (2a).

[0018] In another illustrative embodiment of the invention, the cooling system (S) comprises at least two fixing members (4), preferably having magnetic property (for example magnets), at least one of which is positioned in the cooling compartment (1) (preferably on the rear wall (5), and on that side of the rear wall (5) facing the machine compartment (2)), and at least another of which is positioned in the machine compartment (2), preferably on that side of the machine compartment (2) facing the cooling compartment (1). With this embodiment, when the motor (2a) is connected such that it rotates the main shaft (1 b), the fixing members (4) are also connected to each other, and due to the force generated with the rotation of the main shaft (1b) about its axis during the cooling process, the cooling compartment (1) is prevented from moving away from the machine compartment (2) and accordingly a disconnection of the motor (2a) from the main shaft (1 b) is prevented so that the cooling system (S) is operated effectively.

[0019] In another illustrative embodiment of the invention, another side of the main transfer line (B1) of the cooling system (S) that is not connected with the drain (2f) opens into at least one evaporation tray (H1) provided in the cooling device (C), and preferably located in the area where the compressor (K) of the cooling device (C) is positioned. In this way, excess water is received into the existing evaporation tray (H1) in the cooling device (C) without causing extra cost, so that excess water is evaporated by the heat of the compressor (K) and removed. In this embodiment, the cooling system (S) preferably comprises at least one auxiliary tray (H2) and at least one additional transfer line (B2) connecting the evaporation tray (H1) with the auxiliary tray (H2). Thus, when the amount of water in the evaporation tray (H1) is high, excess water is received into the auxiliary tray (H2) by means of the additional transfer line (B2) so that the water in the evaporation tray (H1) is prevented from overflowing and causing damage to the area it is located. In this embodiment, the cooling system (S) preferably comprises at least one sensor that measures the level of water collected in the auxiliary tray (H2). In this way, when the water collected in the auxiliary tray (H2) exceeds a certain level, the user is notified and water is prevented from overflowing and causing damage to the area it is located. The cooling system (S) also comprises preferably at least one heating member (for example a resistance or a pipe for superheated steam exiting from the compressor (K)) positioned in the evaporation tray (H1) and/or the auxiliary tray (H2). In this way, the water collected in the evaporation tray (H1) and/or the auxiliary tray (H2) is evaporated more rapidly. In another preferred embodiment, the other side of the main transfer line (B1) that is not connected with the drain (2f) can be directly connected to a waste water line. In another embodiment, the other side of the additional transfer line (B2), one side of which is connected with the evaporation tray (H1), can be connected to a waste water line instead of the auxiliary tray (H2).

[0020] In another alternative preferred embodiment of the invention, the cooling system (S) is suitable to be positioned adjacent to at least one compartment (exemplified as 0°C compartment (A) in the drawings) of the cooling device (C) and comprises at least one insulation wall (D) for heat exchange with the said compartment of the cooling device (C) in order to prevent a reduction in the operation efficiency of the said compartment and itself.

[0021] In another preferred embodiment of the invention, the cooling system (S) comprises at least one blowing unit (U), through which the air inside the cooling compartment of the cooling device (C) is passed over the cooling system (S). When the cooling system (S) is positioned next to a cooling device compartment having a temperature of 0°C or below, since the water in the chamber (1a) can be frozen due to the low temperature of this compartment, said air blowing unit (U) is allowed to convey the air of the cooling compartment of the cooling device (C), having a temperature of approx. 5°C, through the cooling system (S) so that the water in the chamber (1 a) is prevented from freezing. In this embodiment, the cooling system (S) preferably comprises air vents, wherein air inside the chamber (1a) can also be circulated during the air circulation of air blowing unit (U).

[0022] In another alternative embodiment, the cooling system (S) can comprise at least one heating member (for example a resistance) for preventing freezing of the water in the chamber (1a).

[0023] In another illustrative embodiment of the invention, the cooling system (S) comprises at least one controller (3) for controlling operation thereof. By means of the controller (3), the user can for example select the type of the beverage desired to be cooled down, and the cooling system (S) is able to ensure a cooling process which is performed under conditions suitable for that beverage (e.g. duration of rotational speed etc.). Furthermore, the user, if desired, can manually adjust the rotational speed of the main shaft (1 b), the duration of cooling etc. by means of the controller (3).

[0024] In another alternative embodiment of the invention, the cooling system (S) comprises at least one support piece (1j) in order to ensure that the contact of the

container (E) with the main shaft (1 b) is not interrupted as the container (E) is rotated by the main shaft (1 b). Preferably, the support piece (1j) is in the form of a shaft, rod positioned so as to extend between the rear wall (5a) and the front wall (5b), or it can have an inclined form.

[0025] In the cooling system (S) according to the present invention, since the container (E) is rotated about its axis by means of the main shaft (1b) and in the meantime the heat of melting of the ice is utilized, the temperature of the beverage is able to be reduced in a short period of time (for example, to 5°C in about 10 minutes) though depending on the type and amount of the beverage and/or the size of the container (E). In the present invention, as the container (E) and the beverage therein is rotated by the main shaft (1 b) (for example 90 revolutions per second), the energy of the ice is used to reduce the temperature of the beverage. The water in the chamber (1a) ensures that energy of the ice is conveyed to the container (E) and to the beverage in an effective manner. The cooling system (S) is suitable for use in any size of cans, plastic and glass bottles, and for example, a beverage in a 330 ml can of 32°C is cooled to 5°C in 2 minutes, a beverage in a 750 ml glass bottle is cooled from 32°C to 5°C in 7 minutes and a beverage in a 1 liter plastic bottle is cooled from 32°C to 5°C in 10 minutes. In this way, an effective and efficient cooling can be achieved.

Claims

1. A cooling system (S) which is suitable for use in a cooling device (C) and which ensures rapid cooling of beverages in a container (E), comprising:

- at least one machine compartment (2) wherein at least one motor (2a) is positioned;
- at least one cooling compartment (1) comprising at least one chamber (1 a) in which the container (E) to be cooled down is placed, which is suitable for introducing water and ice therein for cooling the container (E) and which has at least one rear wall (5a), at least one bottom (6) and at least one front wall (5b) positioned opposite to the rear wall (5a) ;
- at least one main shaft (1b) positioned in the chamber (1a) such that at least one side thereof is able to be connected to the motor (2a), wherein the container (E) containing the beverage to be cooled down is positioned in the chamber (1a) such that it contacts thereto, and which rotates about its axis with the movement of the motor (2a), during the cooling process, thereby rotating the container (E) that is in contact with it;

characterized by comprising;

- at least one main pool (2c) which is positioned in the machine compartment (2), and in which excess water is collected so as to prevent it from causing damage by overflowing from the chamber (1a) to the area where the cooling system (S) is located when the water available in the chamber (1a) is above a safe amount of water during cooling process, the safe amount of water being an amount that prevents the water in the chamber (1a) not only from lifting the container (E) but also from overflowing to an environment where the chamber (1a) is located;
- at least one drain (2f) positioned in the main pool (2c) and having at least two apertures at least one of which is opened to the main pool (2c);
- at least one main transfer line (B1) at least one side of which is connected to the other aperture of the drain (2f), wherein the excess water received from the chamber (1a) into the main pool (2c) is passed therethrough, and removed from the main pool (2c);
- at least one discharge equipment positioned at a certain height above the bottom (6) according to the safe amount of water that can be available in the chamber (1a), for transferring the excess water available in the chamber (1a) of the cooling compartment (1) into the main pool (2c) in the machine compartment (2) during the cooling process.

2. A cooling system (S) according to claim 1, **characterized in that** the said rear wall (5a) is a wall facing the machine compartment (2).

3. A cooling system (S) according to claim 1, **characterized in that** the cooling compartment (1) and the machine compartment (2) are independent from each other.

4. A cooling system (S) according to claim 3, **characterized in that** the said cooling compartment (1) is movable with respect to the machine compartment (2) so as to move close to or away from the machine compartment (2).

5. A cooling system (S) according to claim 1, **characterized by** comprising at least one sliding mechanism in order to engage the cooling compartment (1) to and disengage from the cooling device (C).

6. A cooling system (S) according to claim 1 or 5, **characterized in that** the machine compartment (2) is engageable to and from the cooling device (C) along with the cooling compartment (1).

7. A cooling system (S) according to claim 1, **characterized by** comprising as a discharge equipment,

- at least one passage (1 h), at least one end of which is opened to the chamber (1a) by means of at least one hole provided on a wall of the chamber (1a) such that the hole is located at a certain height above the bottom (6) based on the safe amount of water that can be available in the chamber (1 a), and at least another end of which is opened to the main pool (2c); and which comprises at least one channel wherein the channel connects the two ends to each other and the excess water in the chamber (1 a) is passed through this channel into the main pool (2c);
- at least one discharge cover (1f) which opens and closes the said hole, which is provided at a position covering said hole when the cooling process is not performed in the cooling compartment (1), and which is positioned on a side of the wall - where the hole is located - that faces the chamber (1 a), and
- at least one pin (2d) which is fixed to the main pool (2c) at a side thereof, which is suitable for extending through the channel in the passage (1 h) and through the said hole towards the chamber (1a), which ensures the opening of the hole such that excess water is passed therethrough by extending into the chamber (1a) and contacting the discharge cover (1f) at this extending side so as to move the discharge cover (1f) from the hole , and which has a cross-sectional area smaller than the width of the said channel and the hole.

8. A cooling system (S) according to claim 7, **characterized by** comprising at least a first wall (7) positioned at a certain height above the bottom (6) based on the safe amount of water that can be available in the chamber (1a), and which extends from the wall where the hole is located towards the chamber (1a); at least a second wall (8) which extends towards the bottom (6) from an end of the first wall (7) extending towards the chamber (1a); at least a discharge pool (9) interposed between the wall where the hole is located, the first wall (7) and the second wall (8), and to which said hole is opened, and into which the water in the chamber (1 a) flows over the first wall (7) and the second wall (8) when it exceeds the safe level; and at least one resilient member (1 g) which is connected to the second wall (8) at a side, and at another side, to the discharge cover (1f), and which exerts force on the discharge cover (1f) towards the hole in order to ensure that the discharge cover (1f) closes the hole when the pin (2d) does not contact the discharge cover (1f).

9. A cooling system (S) according to claim 7 or 8, **characterized by** comprising at least a guide (10) which is positioned such as to surround the passage (1h) in order to guide the water into the main pool (2c) in case of a leakage, and at least one side of which is inclined so as to extend to the main pool (2c).

10. A cooling system (S) according to claim 1, **characterized by** comprising at least one motor connection (2b) which is connected to the motor (2a), at one side, such that it is rotated when the motor (2a) is energized, and which has, on another side thereof, a plurality of teeth and grooves with different geometrical shapes; and at least one main connection (1d) which is connected, at least at one side, to the said main shaft (1 b) and which has, at least at another side, a plurality of grooves with geometrical shapes suitable for receiving the teeth provided on the motor connection (2b) and a plurality of teeth with geometrical shapes suitable for being received into the grooves on the motor connection (2b), which ensures that the main shaft (1 b) is appropriately connected to the motor (2a) by means of a close-fit of its teeth and grooves with the teeth and grooves on the motor connection (2b) and that the motion of the motor (2a) is effectively transferred to the main shaft (1 b), and which is rotatable about its axis upon energizing the motor (2a).

11. A cooling system (S) according to claim 10, **characterized by** comprising at least one connection shaft (1c) for connecting the main connection (1d) to the main shaft (1b).

12. A cooling system (S) according to claim 3, **characterized by** comprising at least two fixing members (4), at least one of which is positioned in the cooling compartment (1) and at least another of which is positioned in the machine compartment (2), and which are connected to each other when the motor (2a) is connected such that it rotates the main shaft (1 b), in order to prevent the cooling compartment (1) from moving away from the machine compartment (2) and thus a disconnection of the motor (2a) from the main shaft (1b), due to the force generated with the rotation of the main shaft (1b) about its axis during the cooling process.

13. A cooling system (S) according to claim 1, **characterized in that** another side of the main transfer line (B1) that is not connected with the drain (2f) opens into at least one evaporation tray (H1) provided in the cooling device (C).

14. A cooling system (S) according to claim 13, **characterized by** comprising at least one auxiliary tray (H2) into which excess water is transferred when the amount of water in the evaporation tray (H1) is high, and at least one additional transfer line (B2) connecting the evaporation tray (H1) with the auxiliary tray (H2) in order to transfer the excess water to the aux-

iliary tray (H2).

15. A cooling system (S) according to claim 14, **characterized by** comprising at least one sensor that measures the level of water collected in the auxiliary tray (H2).

16. A cooling system (S) according to claim 1, **characterized in that** another side of the main transfer line (B1) that is not connected with the drain (2f) is directly connected with a waste water line.

17. A cooling system (S) according to claim 1, **characterized by** comprising at least one additional transfer line (B2), one side of which is connected with the evaporation tray (H1), and at least another side of which is connected with a waste water line.

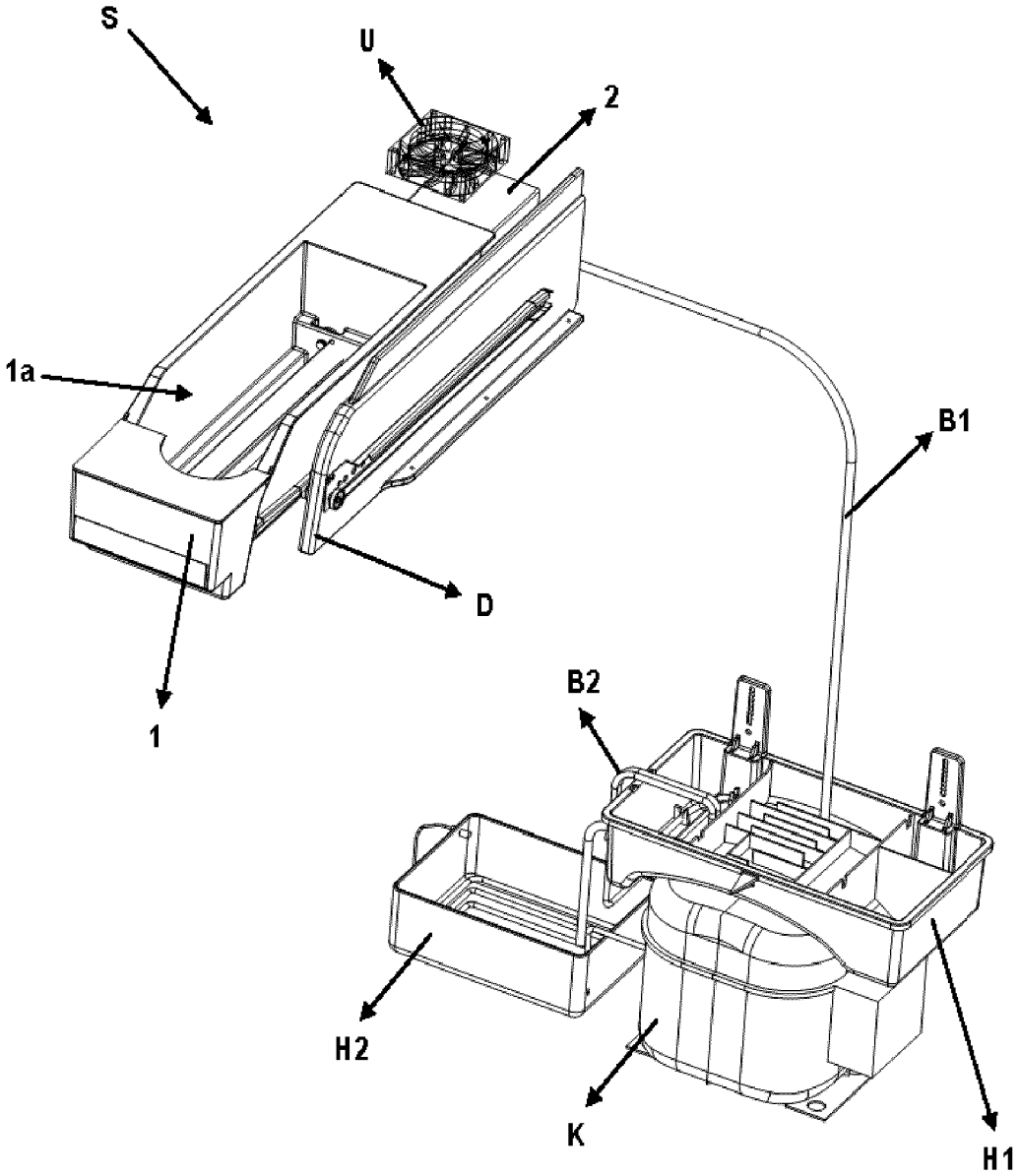

Figure 1

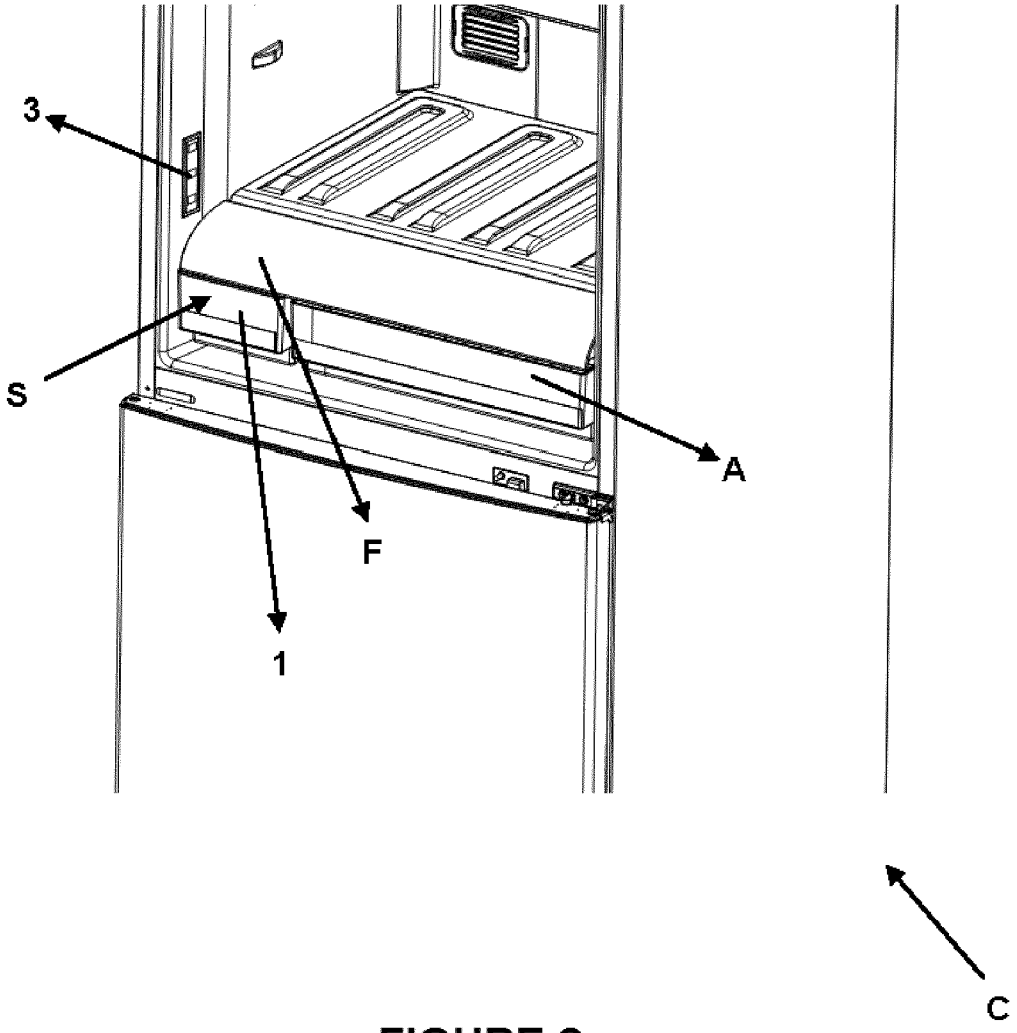

FIGURE 2

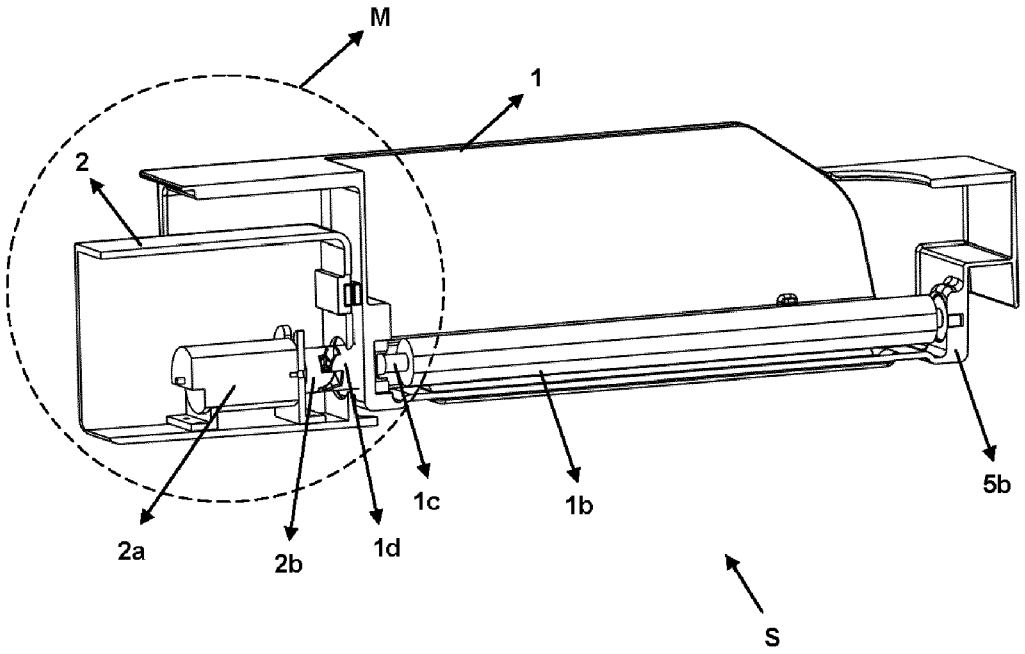

Figure 3

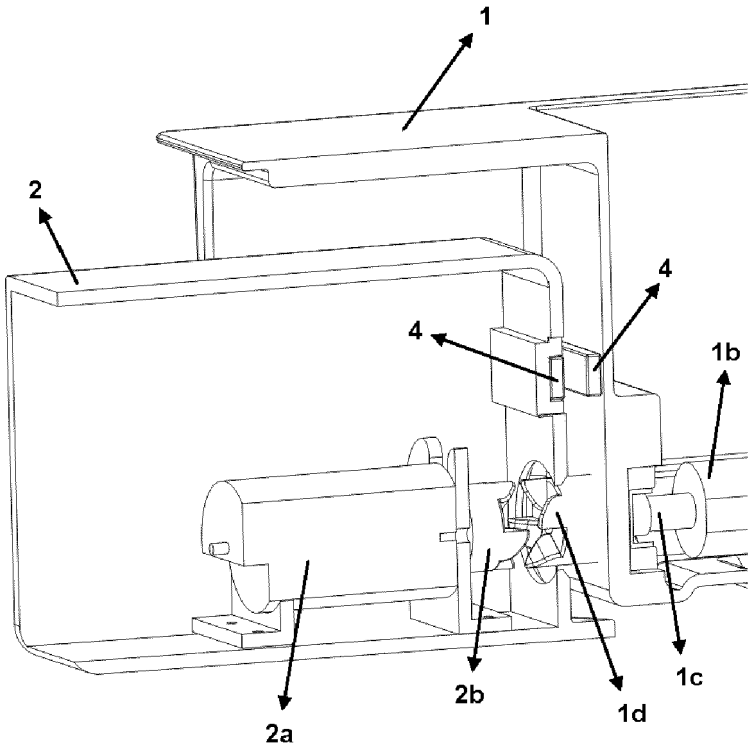

Figure 4

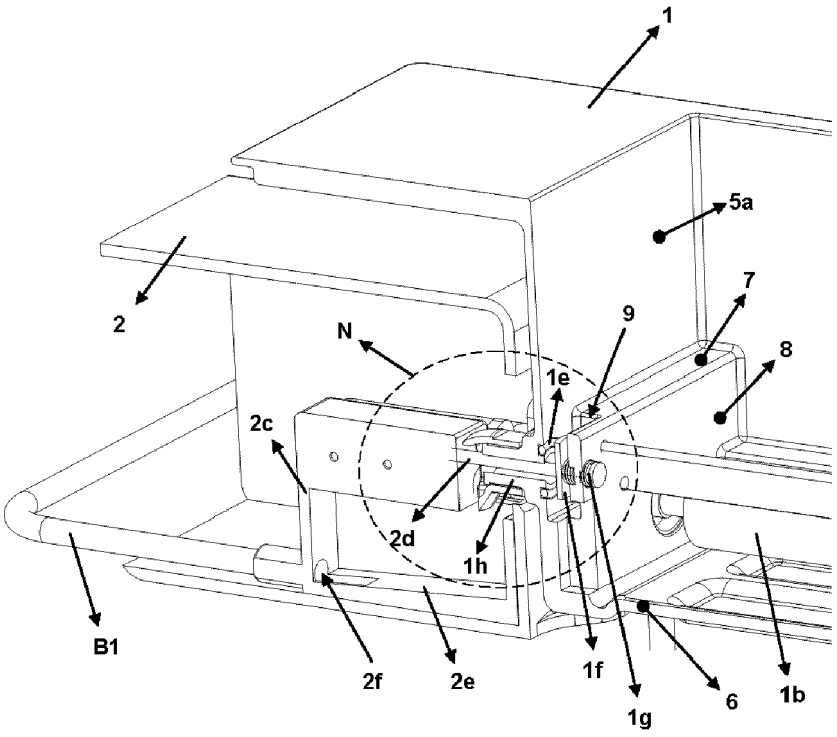

Figure 5

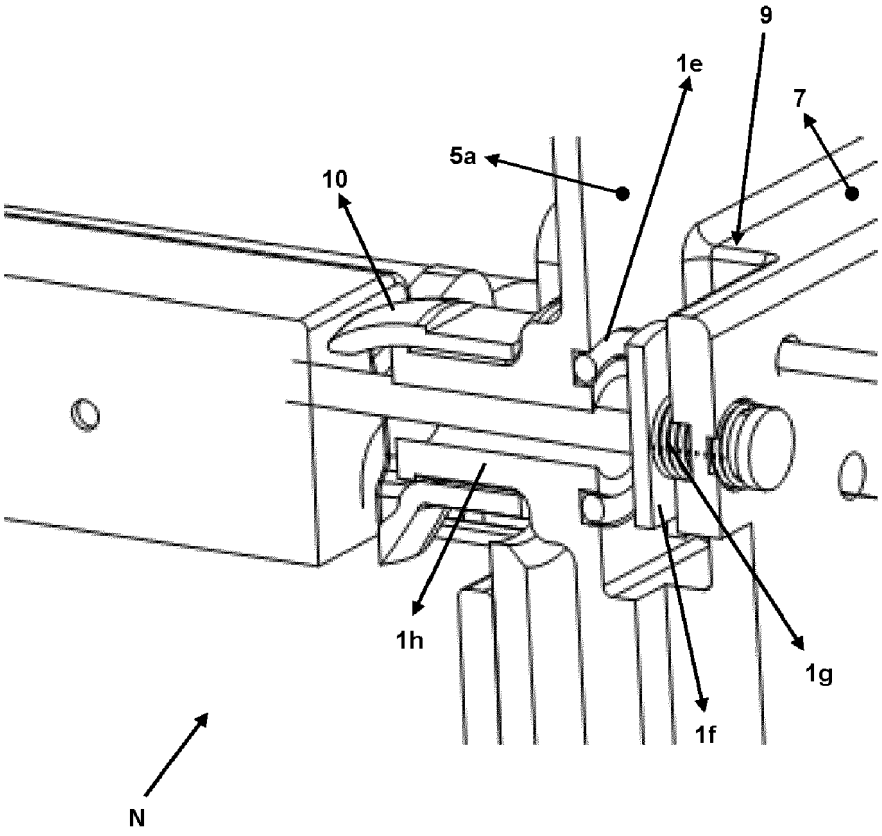

Figure 6

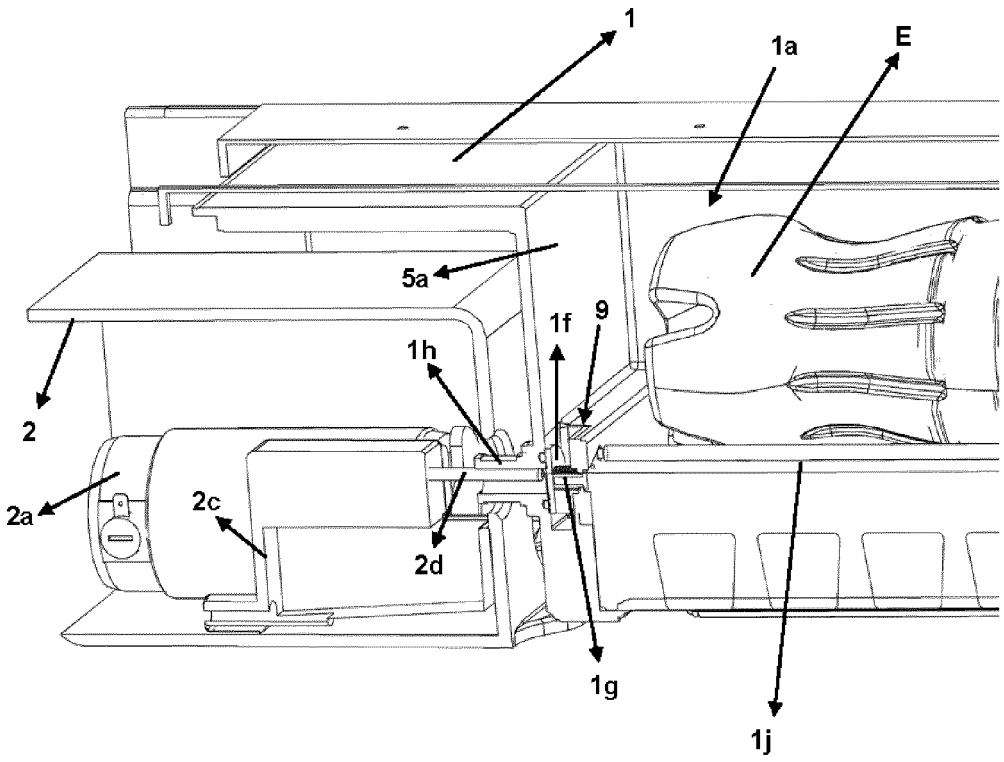

Figure 7

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EUROPEAN SEARCH REPORT

Application Number
EP 16 18 4431

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	EP 1 662 218 A1 (CONDE HINOJOSA JOSE RAMON [ES]) 31 May 2006 (2006-05-31) * paragraphs [0108], [0125], [0135], [0136]; figures *	1-17	INV. F25D3/02 F25D23/12
Y	US 2006/090480 A1 (LOIBL GREGORY H [US] ET AL) 4 May 2006 (2006-05-04) * paragraphs [0003], [0008], [0012], [0023] - [0035]; figures *	1-17	
A	KR 2002 0027724 A (LG ELECTRONICS INC [KR]) 15 April 2002 (2002-04-15) * figures *	5,6	

TECHNICAL FIELDS SEARCHED (IPC)

F25D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	2 December 2016	Vigilante, Marco

CATEGORY OF CITED DOCUMENTS

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02-12-2016

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1662218 A1	31-05-2006	CN 1856687 A	01-11-2006
		EP 1662218 A1	31-05-2006
		ES 2222812 A1	01-02-2005
		US 2006185372 A1	24-08-2006
		WO 2005010448 A1	03-02-2005
US 2006090480 A1	04-05-2006	US 2006090480 A1	04-05-2006
		US 2008134695 A1	12-06-2008
KR 20020027724 A	15-04-2002	NONE	

EPO FORM P0459

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

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Patent documents cited in the description

- US 6314751 B1 **[0003]**