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(54) **HOUSEHOLD ICE MAKER AND METHOD OF MAKING ICE BY USING THE SAME**

HAUSHALTSEISMASCHINE UND VERFAHREN ZUR HERSTELLUNG VON EIS DAMIT

MACHINE À GLAÇONS MÉNAGER ET PROCÉDÉ DE FABRICATION DE GLAÇONS À L'AIDE DE
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Description

Technical Field

[0001] The present disclosure relates, in general, to a home ice maker and, more particularly, to a transparent ice maker and a method for making funny-shaped ice using the same in which ice-making water present in the ice maker is fluctuated so as to efficiently make compact and transparent ice, the corrosion of an evaporation tube is prevented so as to easily maintain the evaporation tube, and the temperature of supplied ice-making water is increased even without using a separate heat source so as to improve the transparency of transparent ice.

Background Art

[0002] In general, an ice maker is a device that makes ice by cooling supplied ice-making water.

[0003] A conventional ice maker includes an ice maker body, and an ice making unit, wherein the ice maker body includes an ice storage which stores ice made in the ice making unit, and the ice making unit consists of an ice making plate, a cooling plate, and an evaporation tube. Ice-making water is filled in the ice making plate, and multiple cooling protrusions immersed in ice-making water are installed on the lower surface of the cooling plate. The evaporation tube is installed on the upper surface of the cooling plate, and is connected to a refrigeration system. Refrigerant flows in the evaporation tube and the cooling plate and the cooling protrusions are cooled by heat exchange of the refrigerant therewith.

[0004] Recently, proposed is an ice maker in which cloudy ice formed by bubbles frozen in ice-making water can be prevented so as to make transparent ice.

[0005] Cloudiness that occurs in ice during an ice making process is caused by a non-uniform ice making speed during the ice making process. As water surrounded by partially pre-formed ice becomes ice and increases in volume, the tissue of the pre-formed ice is destroyed, and gaps generated in the ice tissue cause cloudiness of the ice.

[0006] In order to remove this cloudiness, gaps or bubbles occurring in ice made in the ice making process are required to be removed by fluctuating ice-making water in the ice making plate.

[0007] In order to fluctuate ice-making water, proposed is a conventional ice maker in which a fluctuation part having an L shaped structure is installed under the ice making plate, but according to the conventional technology, vibration is applied to an end part of the fluctuation part from the outside of a water plate and a bent portion of the fluctuation part is a shaft, so an installation structure for embodying this in the water plate is complicated, and a detection structure for detecting ice in contact with the fluctuation part is embodied in the water plate, which causes more complicated structure.

[0008] In addition, proposed is a conventional ice ma-

ker in which the ice making plate is extended at one side thereof and has a biased axial point to increase the rotation range of the ice making plate such that the fluctuation of ice-making water is generated.

[0009] However, according to the conventional technology, one side of the ice maker is extended and thus the size of the ice making plate is increased, and space for rotating the ice making plate so as to remove ice is required, but due to the ice making plate having increased size, the size of the ice maker is increased as a whole, and accordingly, the amount of ice-making water received in the ice making plate is increased, thereby lowering ice making efficiency.

[0010] Furthermore, as for a conventional transparent ice maker, when a spraying method is used to make transparent ice, it is difficult to arbitrarily adjust transparency of ice, and thus only transparent ice having uniform transparency is unavoidably made, so it is difficult to make transparent ice having various shapes.

[0011] In addition, as illustrated in FIG. 11, in the conventional ice maker, in order to fix the evaporation tube arranged in a U shape, a bracket is welded to and supports the evaporation tube. However, in the conventional ice maker, the bracket is required to be connected to the evaporation tube while supporting the same, and thus is welded to the lower part of the evaporation tube so as to fix the evaporation tube. Accordingly, ice-making water or electrolytes easily permeates or accumulates in a connection portion between the bracket and the evaporation tube, so corrosion easily occurs in the connection portion and this causes the corrosion of the evaporation tube.

[0012] EP0580951A1 illustrates for example a mechanism for detecting completion of ice formation and for preventing such opacification of ice pieces in an ice making machine, in which a multiplicity of freezing fingers formed on the lower surface of a freezing base plate are dipped in the water supplied to a freezing chamber defined in a water tray to carry out a freezing operation and form inverted dome-shaped ice pieces gradually around the freezing fingers ; characterized in that said mechanism consists of a rocking plate which is rocked with respect to said freezing fingers by a rocking means ; and a position detector which is actuated when a pre-determined size of ice pieces are formed around the freezing fingers , and said rocking plate is brought into contact with these ice pieces . In this ice making machine, completion of formation of ice pieces around the freezing fingers is designed to be detected easily and securely by the signal from said position detector, and also transparent ice pieces of high commercial value free from opacification can be formed, while opacification of ice pieces to be formed around the freezing fingers can effectively be prevented since the water to be frozen in the water tray is fully agitated by the rocking motion of the rocking plate having formed thereon a multiplicity of through holes and/or side walls also having such through holes .

[0013] US4199956A relates to an ice cube making machine includes agitator paddles which oscillate or

reciprocate in a horizontal path between freezing elements to agitate the water to provide clear ice cubes. An ice cube thickness sensor is carried by the agitating paddle assembly and moves in a path toward and away from the cube. When the desired ice cube thickness has been attained, the sensor actuates circuitry to interrupt the freezing cycle and initiate the harvest cycle. Control of the various functions of the machine is afforded by a compact control module which contains proximity switches located adjacent exterior faces of the module and eliminates the need for limit switches. Feelers or links containing switch actuating magnets swing past the proximity switches to initiate or trigger or discontinue the various cycles. Also disclosed is a freezing element for an evaporator about which the cubes form and which has a copper shell or jacket which is closed at one end and which receives copper tubing in the other end for supply of refrigerant. The copper shell is crimped about the copper tubing and brazed to provide a seal. The rounded end of the element causes formation of a cube with a rounded end so that the only generally planar surface is the top of the cube.

[0014] US2012186292A1 concerns an ice maker having an immersion type ice making unit, and a method of controlling the same. The ice maker includes a water tray member receiving raw water for ice-making from a water tank, an ice making unit cooling the raw water received in the water tray member and forming ice, a heating unit heating the raw water received in the water tray member, and a control unit controlling an operation of the heating unit such that the raw water received in the water tray member is heated before the ice making unit cools the raw water in the water tray member. According to the ice maker, the temperature of the raw water received in an ice-making water tray is raised to a preset temperature at the initial stage of an ice making process, thereby preventing the formation of an opaque layer in the central portion of ice.

Disclosure

Technical Problem

[0015] Accordingly, the present disclosure has been made to solve the above problems occurring in the related art.

[0016] The invention is defined in the independent claims. Further advantageous embodiments are defined in the dependent claims.

Technical Solution

[0017] In order to achieve the above objectives, according to the present disclosure, there is provided a home ice maker including: a casing; a compressor and a condenser installed inside the casing and through which refrigerant circulates; an ice making module having an ice making tray in which ice-making water is

received, the ice making module being configured to freeze ice-making water by refrigerant supplied from the condenser; an ice storage tank which stores ice formed in the ice making module; a guide plate being connected to the ice making tray, the guide plate being configured to guide formed ice to the ice storage tank during rotation of the ice making tray; and a fluctuation module which fluctuates ice-making water, wherein the ice making module is provided with an evaporation tube connected to the condenser and arranged to have a U shape inside the ice making tray; cooling protrusions installed by protruding toward a bottom of the ice making tray from the evaporation tube; and a tray driving part which rotates the ice making tray, and the fluctuation module is provided with a fluctuation part which is inserted into the ice making tray and fluctuates ice-making water toward the cooling protrusions of the ice making module.

Advantageous Effects

[0018] According to the ice maker of the present disclosure having the above-described configuration, without rocking the ice making tray, ice-making water is allowed to sufficiently fluctuate by the rotation of the fluctuation part, thereby easily forming transparent ice without increasing the size of the ice making tray.

[0019] In addition, the fluctuation part and the ice making tray are formed coaxially, and when rotating the fluctuation part so as to remove ice, the fluctuation part is rotated relative to the central axis of the ice making tray, thereby realizing a compact configuration of the ice maker without requiring additional space for the ice removal.

[0020] Furthermore, according to the present disclosure, the evaporation tube is easily supported in the ice maker and corruption is prevented in a connection portion between the evaporation tube and a part, thereby stably maintaining the evaporation tube.

[0021] Additionally, according to the present disclosure, a portion of a first ice-making water supply tube is extended and is disposed on the outer peripheral surface of the compressor so as to receive the heat of the compressor without using a separate heat source, thereby efficiently making ice by increasing the temperature of supplied ice-making water.

Description of Drawings

[0022]

FIG. 1 is a view illustrating an ice maker of the present disclosure.

FIG. 2 is a perspective view of the inside of the ice maker of the present disclosure.

FIG. 3 is a partially cut perspective view of the ice maker of the present disclosure.

FIG. 4 is a view illustrating an ice making module and a fluctuation module according to the present dis-

closure.

FIG. 5 is a view illustrating an ice making tray and a fluctuation part according to the present disclosure.

FIG. 6 is a view illustrating the rotation of the ice making tray and the fluctuation part according to the present disclosure.

FIG. 7 is a view illustrating a compressor and a second ice-making water supply tube according to the present disclosure.

FIGS. 8 and 9 are a top plan view and a side view, respectively, illustrating an evaporation tube and a support bracket according to the present disclosure.

FIG. 10 is a flowchart illustrating an ice making method according to the present disclosure.

FIG. 11 is a view illustrating an evaporation tube and a support bracket according to a conventional technology.

Best Mode

[0023] In order to achieve the above-described objectives, a home ice maker according to the present disclosure includes: a casing; a compressor and a condenser installed inside the casing and through which refrigerant circulates; an ice making module having an ice making tray in which ice-making water is received, the ice making module being configured to freeze ice-making water by refrigerant supplied from the condenser; an ice storage tank which stores ice formed in the ice making module; a guide plate being connected to the ice making tray, the guide plate being configured to guide formed ice to the ice storage tank during rotation of the ice making tray; and a fluctuation module which fluctuates ice-making water, wherein the ice making module is provided with an evaporation tube connected to the condenser and arranged to have a U shape inside the ice making tray; cooling protrusions installed by protruding toward a bottom of the ice making tray from the evaporation tube; and a tray driving part which rotates the ice making tray, and the fluctuation module is provided with a fluctuation part which is inserted into the ice making tray and fluctuates ice-making water toward the cooling protrusions of the ice making module.

[0024] Here, the fluctuation part is inserted and arranged in a center of the evaporation tube arranged in a U shape, and has a plurality of coolant passage holes formed in the fluctuation part.

[0025] Here, the fluctuation module further includes: a fluctuation shaft connected to the fluctuation part and to a rotation shaft of the ice making tray; a fluctuation-part driving part which rotates the fluctuation shaft; a fluctuation head installed on an end of one side of the fluctuation shaft; and a limit switch installed to be adjacent to the fluctuation head, the limit switch being configured to detect contact of the fluctuation head with the limit switch so as to limit rotation of the fluctuation head.

[0026] Here, the home ice maker further includes: an ice-making water supply tube which injects ice-making

water supplied from an ice-making water supply source into the ice making tray, and a first ice-making water temperature sensor which is installed on one side of the ice-making water supply tube and measures a temperature of ice-making water supplied thereto.

[0027] Here, the home ice maker further includes: a second ice-making water temperature sensor which detects a temperature of ice-making water received inside the ice making tray.

Mode for Invention

[0028] Hereinafter, an embodiment of the home ice maker according to the present disclosure will be described in detail with reference to the accompanying drawings.

[0029] As illustrated in FIGS. 1 to 9, the home ice maker 1 of the present disclosure includes a casing 2, a condenser 3, a compressor 4, an ice storage tank 6, an ice making module 10, and a fluctuation module 20.

[0030] The casing 2 is provided with a lower casing 2a, a casing body, and an upper casing 2b, and a cooling module, the ice storage tank, the ice making module, and the fluctuation module are received in the casing 2.

[0031] Inside the casing 2, the compressor 4, the condenser 3, and an evaporator (not shown) are installed on the upper part of the lower casing 2a. Refrigerant becomes high-temperature and high-pressure vapor in the compressor 4, moves to the condenser 3, becomes a high-pressure liquid in the condenser 3, moves to the evaporator along a capillary, becomes a low-pressure wet vapor, and is introduced into an evaporation tube 12 to be described later. In this case, as the refrigerant absorbs heat from a surrounding thereof while evaporating, cold air is supplied to the periphery of the evaporation tube 12.

[0032] A status light (not shown) is installed on the upper surface of the casing 2 such that the status of the ice maker may be checked from a distance.

[0033] The ice making module 10 is provided with an ice making tray 11, the evaporation tube 12, cooling protrusions 12a, and a tray driving part 14.

[0034] The ice making tray 11 is formed to have an approximately semicircular cross-section, and ice-making water is supplied from an ice-making water supply source and is received in the ice making tray 11.

[0035] The evaporation tube 12 and the cooling protrusions 12a are received in the ice making tray 11. The evaporation tube 12 is arranged in an approximately U shape inside the ice making tray 11.

[0036] Each of the cooling protrusions 12a is formed by protruding downward from the evaporation tube 12 toward a side of the ice making tray 11. The evaporation tube 12 is configured to constitute a portion of the refrigeration cycle of a circulation structure of leading back to the evaporation tube through the compressor, the condenser, and an expansion valve. The cooling protrusions 12a are immersed in ice-making water received in the ice

making tray 11, and the ice-making water around the cooling protrusions is cooled by evaporation temperature conducted from the evaporation tube 12 so as to form ice. The cooling protrusions 12a are installed on the evaporation tube 12, which is formed in a U shape, so as to form a two-row structure.

[0037] The evaporation tube 12 is supported by a support bracket 50.

[0038] The support bracket 50 is configured to be connected to the evaporation tube at a first side thereof and to be connected to an inner casing of the ice maker at a second side thereof so as to support the evaporation tube.

[0039] According to the present disclosure, as illustrated in FIGS. 8 and 8, the support bracket 50 is preferably connected to an upper part of the center of the evaporation tube in a height direction thereof.

[0040] As illustrated in FIG. 11, in an ice maker according to a conventional technology, a bracket is welded to the lower part of an evaporation tube so as to be connected to the evaporation tube while supporting the same, and in this case, ice-making water or electrolytes easily permeates or accumulates in a connection portion between the bracket and the evaporation tube, and thus corrosion or rust R easily occur in the connection portion and this causes the corrosion of the evaporation tube.

[0041] In the embodiment of the present disclosure, the support bracket 50 is preferably connected to the upper part of the evaporation tube relative to the center line of the evaporation tube when viewed the section of the evaporation tube in the height direction thereof. The support bracket 50 is connected to the upper part of the curved part of the evaporation tube in the height direction thereof, and thus a gap or space between the evaporation tube and the support bracket 50 may be prevented, so even if the evaporation tube is immersed in ice-making water or electrolyte, rust or corrosion is prevented from occurring between the evaporation tube and the support bracket.

[0042] In addition, as illustrated in FIG. 8, the support bracket 50 is connected to the curved arc part of the evaporation tube having a U shape in the range α of the curved arc part, and is configured to support the evaporation tube in a part most likely to sag

[0043] The ice making tray 11 may be rotated by the tray driving part 14.

[0044] A tray rotation shaft 13 is provided on an outer side of the body of the ice making tray 11. In the embodiment, the tray rotation shaft 13 is formed on the center of the ice making tray 11, and separate additional space is not required during the rotation of the ice making tray 11, thereby realizing the compact configuration of the ice maker.

[0045] The tray rotation shaft 13 may be connected to the tray driving part 14 so as to rotate the ice making tray. Transparent ice removed due to the rotation of the ice making tray 11 performed by the tray driving part 14 may be transferred to the ice storage tank.

[0046] The fluctuation module 20 is provided on one side of the ice making module 10 so as to fluctuate ice-making water.

[0047] The fluctuation module 20 is provided with a fluctuation part 22, a limit switch 23, a fluctuation head 24, and a fluctuation-part driving part 25.

[0048] The fluctuation part 22 is inserted into the ice making tray and fluctuates ice-making water toward the cooling protrusions of the ice making module.

[0049] The fluctuation part 22 is configured coaxially with the tray rotation shaft 13 of the ice making tray 11 so as to rotate relative to the rotation shaft of the ice making tray. The fluctuation part 22 is arranged between each row of the cooling protrusions arranged in two rows.

[0050] Due to the configuration of the fluctuation part 22, without rocking the ice making tray, ice-making water may be sufficiently fluctuated by the rotation of the fluctuation part, and thus as additional space as a rocking range for rocking the ice making tray is not required as is required in the conventional ice maker, thereby realizing compact configuration of the ice maker and facilitating the formation of transparent ice.

[0051] The fluctuation part 22 is provided with a fluctuation shaft 221, a fluctuation plate 222, and coolant passage holes 223. The fluctuation shaft 221 is configured to be connected to the tray rotation shaft 13.

[0052] The fluctuation plate 222 is formed in an approximately plate shape, and the plurality of coolant passage holes 223 is formed in the fluctuation plate 222. The coolant passage holes 223 are configured such that ice-making water of opposite sides of the fluctuation part may pass through the coolant passage holes 223, and may make the rotation of the fluctuation part easier.

[0053] The fluctuation-part driving part 25 is installed on a fluctuation module fixing part 21 fixed to the inner casing 5. The fluctuation-part driving part 25 is connected to the fluctuation part 22 through the fluctuation head 24.

[0054] Due to the driving of the fluctuation-part driving part 25, the fluctuation part 22 is rotated leftward and rightward inside the ice making tray 11 so as to fluctuate ice-making water received in the ice making tray 11 such that transparent ice is formed.

[0055] The limit switch 23 is installed on each of the left and right sides of the fluctuation head 24. The limit switch 23 may detect the degree of rotation of the fluctuation part 22 by contact with the fluctuation head 24.

[0056] As the size of transparent ice produced by the cooling protrusions increases gradually, the rotation range of the fluctuation part decreases gradually, and accordingly, the rotation range of the fluctuation head 24 decreases. When there is no contact of the fluctuation head with the limit switch 23 due to the decrease of the rotation range of the fluctuation head, it is determined that transparent ice is completely made, thereby easily detecting whether ice making is completed.

[0057] A guide plate 7 and the ice storage tank 6 are provided at one side of the ice making tray 11.

[0058] As illustrated in FIG. 4, the guide plate 7 in-

cludes: a first guide plate 7a in contact with an end of the side surface of the ice making tray during the rotation of the ice making tray; a second guide plate 7b having an inclination angle different from an inclination angle of the first guide plate 7a; and a guide connection part 7c

connecting the first guide plate with the second guide plate.
[0059] The ice storage tank 6 is provided to be adjacent to the guide plate 7. The ice storage tank 6 is received in the inner casing 5 in which the ice making module and the ice storage tank are received, and transparent ice removed after the ice is completely made by the ice making module 10 is transferred to and stored in the ice storage tank 6. The opening of the bottom surface of the ice storage tank 6 is minimized so as to minimize melting of stored ice due to the warm temperature of room temperature water.

[0060] Meanwhile, a first ice-making water supply tube 30 is connected to the ice making tray 11. The first ice-making water supply tube 30 receives ice-making water from the ice-making water supply source, and the ice-making water is supplied to the ice making tray.

[0061] A first ice-making water temperature sensor 31 is installed on one side of the first ice-making water supply tube 30. The first ice-making water temperature sensor 31 is installed to measure the temperature of ice-making water supplied to the ice making tray 11, and the temperature of the ice-making water is controlled to be an optimum temperature for ice making, whereby the efficiency of ice making may be improved. In addition, a period of ice making time is controlled according to the temperature of ice-making water measured by the first ice-making water temperature sensor 31, and the rotation speed of the fluctuation part according to the temperature of ice-making water is adjusted so as to reduce the period of ice making time.

[0062] In addition, the ice maker further includes a second ice-making water temperature sensor 41 which detects the temperature of ice-making water received in the ice making tray. A first side of the second ice-making water temperature sensor 41 is connected to the inner casing by the support bracket 50, and a second side of the second ice-making water temperature sensor 41 is immersed in the ice-making water received in the ice making tray 11.

[0063] The first ice-making water temperature sensor 31 and the second ice-making water temperature sensor 41 are provided so as to measure the temperature of ice-making water which is made into ice inside the ice making tray, and a period of circulation time of refrigerant circulating through the evaporation tube and the cooling protrusions, or the rotation speed of the fluctuation part is controlled, thereby improving the efficiency of ice making.

[0064] Meanwhile, a portion of the first ice-making water supply tube 30 is extended to be configured as a second ice-making water supply tube 30'. As illustrated in FIG. 7, the second ice-making water supply tube 30' is

arranged to cover the outer peripheral surface of the compressor 4. The second ice-making water supply tube 30' is arranged to spirally cover the outer peripheral surface of the compressor 4, and ice-making water passing through the second ice-making water supply tube 30' may receive heat supplied from the compressor so as to increase the temperature of ice-making water.

[0065] For example, while ice-making water of 5°C supplied from the ice-making water supply source passes through the second ice-making water supply tube 30' arranged on the compressor, the temperature of the ice-making water of 5°C increases to 10°C and the ice-making water of 10°C is supplied to the ice making module, and the ice-making water having increased temperature is frozen by refrigerant of the cooling protrusions. The ice-making water having increased temperature takes more time to be frozen than low-temperature ice-making water and thus may be frozen even if the fluctuation part rotates at a low speed, and accordingly, when transparent ice is formed, the transparency of the transparent ice may be improved.

[0066] The method for making funny-shaped ice using the ice maker having the above-described configuration according to the present disclosure will be described.

[0067] In the method for making funny-shaped ice according to the present disclosure, a transparent ice part and a translucent ice part are alternately formed in one ice, and thus are formed like a tree ring when viewed in cross section so as to form funny-shaped ice.

[0068] The method for making funny-shaped ice according to the present disclosure first has a transparent ice formation step S1 at which transparent ice is formed around the cooling protrusions. At the transparent ice formation step, ice-making water around the cooling module is cooled by heat exchange with refrigerant while the fluctuation part is rotating so as to form transparent ice around the cooling module.

[0069] In this case, the temperature of the ice-making water of the ice making module is measured, and according to the measured temperature, the rotation speed of the fluctuation part is preferably adjusted.

[0070] In addition, it is preferable that the fluctuation part is controlled to be rotated at a low speed when the temperature of the ice-making water is high and is controlled to be rotated at a high speed when the temperature of the ice-making water is low.

[0071] High-temperature ice-making water takes more time to be frozen by refrigerant than low-temperature ice-making water, so even if the fluctuation part is rotated at a low speed, the ice-making water may be frozen while fluctuating sufficiently, and accordingly, when transparent ice is formed, transparency thereof may be improved.

[0072] A portion of the first ice-making water supply tube 30 may be arranged to cover the outer peripheral surface of the compressor 4 and may receive heat supplied from the compressor so as to increase the temperature of ice-making water. For example, ice-making water having a predetermined temperature supplied from the

ice-making water supply source has an increased temperature while passing through the portion of the first ice-making water supply tube arranged on the compressor and is supplied to the ice making module. The ice-making water having the increased temperature takes more time to be frozen by refrigerant of the cooling protrusions than low-temperature ice-making water, and thus may be frozen even if the fluctuation part rotates at a low speed, and accordingly, when transparent ice is formed, transparency thereof may be improved.

[0073] After transparent ice is formed around the cooling protrusions by having a predetermined thickness, translucent ice is formed on the outer peripheral surface of the transparent ice at S2.

[0074] At the translucent ice formation step, ice-making water around the cooling module is cooled without the rotation of the fluctuation part so as to form translucent ice around the cooling module. In a transparent ice formation method by a spraying method, it is difficult to form translucent or opaque ice as described above, but in the ice making method of the present disclosure, when ice-making water is cooled without the rotation of the fluctuation part, translucent ice may be easily formed as described above.

[0075] Next, the ice making method of the present disclosure has a step S3 of alternately repeating the transparent ice formation step and the translucent ice formation step.

[0076] Accordingly, transparent ice part and translucent ice part are alternately formed in one ice, and thus ice formed like a tree ring when viewed in cross section may be formed.

Claims

1. A home ice maker (1) comprising:

a casing (2);
 a compressor (4) and a condenser (3) installed inside the casing (2) and through which refrigerant circulates;
 an ice making module (10) having an ice making tray (11) in which ice-making water is received, the ice making module (10) being configured to freeze ice-making water by refrigerant supplied from the condenser (3);
 an ice storage tank (6) which stores ice formed in the ice making module (10);
 a guide plate (7) being connected to the ice making tray (11), the guide plate (7) being configured to guide formed ice to the ice storage tank (6) during rotation of the ice making tray(11); and
 a fluctuation module (20) which fluctuates ice-making water,
 an ice-making water supply tube (30) which injects ice-making water supplied from an ice-

making water supply source into the ice making tray (11), and

a first ice-making water temperature sensor (31) which is installed on one side of the ice-making water supply tube (30) and measures a temperature of ice-making water supplied thereto, a second ice-making water temperature sensor (41) which detects a temperature of ice-making water received inside the ice making tray (11), wherein the fluctuation module further comprises:

a fluctuation shaft (221) connected to a fluctuation part (22) and to a rotation shaft (13) of the ice making tray (11);
 a fluctuation-part driving part (25) which rotates the fluctuation shaft (221);
 a fluctuation head (24) installed on an end of one side of the fluctuation shaft (221); and
 a limit switch (23) installed to be adjacent to the fluctuation head (24), the limit switch (23) being configured to detect contact of the fluctuation head (24) with the limit switch (23) so as to limit rotation of the fluctuation head (24),

wherein the ice making module (10) is provided with an evaporation tube (12) connected to the condenser (3) and arranged to have a U shape inside the ice making tray (11); cooling protrusions installed by protruding toward a bottom of the ice making tray (11) from the evaporation tube (12); and a tray driving part (14) which rotates the ice making tray (11), and

the fluctuation module (20) is provided with the fluctuation part (22) which is inserted into the ice making tray (11) and fluctuates ice-making water toward the cooling protrusions of the ice making module(10),

wherein the fluctuation module (20) controls a rotation speed of the fluctuation part (22) according to a value measured by the second ice-making water temperature sensor (41) , and the ice making module (10) controls a period of ice making time according to a value measured by the first ice-making water temperature sensor (31), wherein the fluctuation part (22) is inserted and arranged in a center of the evaporation tube (12) arranged in a U shape, and has a plurality of coolant passage holes (223) formed in the fluctuation part (22).

2. The home ice maker of claim 1, wherein one side of the ice-making water supply tube (30) is extended and arranged by being spirally wound on an outer peripheral surface of the compressor (4).

3. The home ice maker of claim 1, further comprising:

a support bracket (50) being connected to the evaporation tube (12) at a first side thereof and connected to an inner casing (2) of the ice maker at a second side thereof so as to support the evaporation tube (12),
wherein the support bracket (50) is connected to an upper part of a center of the evaporation tube (12) in a height direction thereof.

4. The home ice maker of claim 3, wherein the support bracket (50) is connected to a curved arc part of the evaporation tube (12) having a U shape.

5. A method for making ice using an ice maker according to anyone of claims 1 to 4, the ice making method comprising:

a transparent ice formation step at which ice-making water around the cooling protrusions is cooled while the fluctuation part (22) is rotating so as to form transparent ice around the cooling protrusions;
a translucent ice formation step at which ice-making water around the cooling protrusions is cooled without the rotation of the fluctuation part (22) so as to form translucent ice around the cooling protrusions; and
a step of alternately repeating the transparent ice formation step and the translucent ice formation step, wherein at the transparent ice formation step, a temperature of ice-making water of the ice making module (10) is measured and according to the measured temperature, a rotation speed of the fluctuation part (22) is adjusted, wherein the fluctuation part (22) is controlled to be rotated at a low speed when the temperature of the ice-making water is high and is controlled to be rotated at a high speed when the temperature of the ice-making water is low.

6. The method of claim 5, wherein at the transparent ice formation step, a temperature of ice-making water supplied to the ice making module (10) is adjusted to be increased so as to increase transparency of the transparent ice.

Patentansprüche

1. Haushalts-Eismaschine (1), umfassend:

ein Gehäuse (2);
einen Kompressor (4) und einen Kondensator (3), die im Inneren des Gehäuses (2) installiert sind und durch die Kältemittel zirkuliert;
ein Eisbereitungsmodul (10) mit einer Eisberei-

tungsschale (11), in der Eisbereitungswasser aufgenommen wird, wobei das Eisbereitungsmodul (10) so konfiguriert ist, dass es das Eisbereitungswasser durch vom Kondensator (3) zugeführtes Kältemittel gefriert;
einen Eisspeichertank (6), der das im Eisbereitungsmodul (10) gebildete Eis speichert;
eine Führungsplatte (7), die mit der Eisbereitungsschale (11) verbunden ist, wobei die Führungsplatte (7) so ausgelegt ist, dass sie das gebildete Eis während der Drehung der Eisbereitungsschale (11) zum Eisspeichertank (6) leitet; und
ein Rührmodul (20), das das Eiswasser umrührt, eine Eiswasserzufuhrleitung (30), die von einer Eiswasserquelle zugeführtes Eiswasser in die Eiswannen (11) einspritzt, und
einen ersten Eiswasser-Temperatursensor (31), der an einer Seite des Eiswasser-Zufuhrrohrs (30) angebracht ist und die Temperatur des ihm zugeführten Eiswassers misst,
einen zweiten Eiswasser-Temperatursensor (41), der die Temperatur des im Eisbehälter (11) aufgenommenen Eiswassers erfasst,
wobei das Rührmodul ferner umfasst:

eine Schwingungswelle (221), die mit einem Schwingungsteil (22) und mit einer Drehwelle (13) der Eismwürfelwanne (11) verbunden ist;
ein Schwingungsteil-Antriebsteil (25), das die Schwingungswelle (221) dreht;
einen Schwingkopf (24), der an einem Ende einer Seite der Schwingwelle (221) angebracht ist; und
einen Endschalter (23), der benachbart zum Schwingkopf (24) angebracht ist, wobei der Endschalter (23) so konfiguriert ist, dass er einen Kontakt des Schwingkopfs (24) mit dem Endschalter (23) erfasst, um die Drehung des Schwingkopfs (24) zu begrenzen, wobei
das Eisherstellungsmodul (10) mit einem Verdampferrohr (12) versehen ist, das mit dem Kondensator (3) verbunden und so angeordnet ist, dass es innerhalb der Eisherstellungsschale (11) eine U-Form aufweist; Kühlvorsprünge, die so angebracht sind, dass sie vom Verdampferrohr (12) aus in Richtung eines Bodens der Eiswannen (11) vorstehen; und ein Wannenantriebsteil (14), das die Eiswannen (11) dreht, und
das Schwingmodul (20) mit einem Schwingungsteil (22) versehen ist, das in die Eiswannen (11) eingeführt ist und das Eiswasser in Richtung der Kühlvorsprünge des Eiswannenmoduls (10) schwingt,
wobei das Schwingungsmodul (20) eine

- Drehgeschwindigkeit des Schwingungsteils (22) entsprechend einem vom zweiten Eiswassertemperatursensor (41) gemessenen Wert steuert, und das Eisbildungsmodul (10) eine Dauer der Eisbildungszeit entsprechend einem vom ersten Eiswassertemperatursensor (31) gemessenen Wert steuert, wobei das Schwingungsteil (22) in die Mitte des U-förmig angeordneten Verdampfungsrohrs (12) eingesetzt und dort angeordnet ist und eine Vielzahl von Kühlmittel-Durchgangsöffnungen (223) aufweist, die im Schwingungsteil (22) ausgebildet sind.
2. Haushalts-Eismaschine nach Anspruch 1, wobei eine Seite des Eiswasser-Zufuhrrohrs (30) verlängert und so angeordnet ist, dass sie spiralförmig um eine Außenumfangsfläche des Kompressors (4) gewickelt ist.
3. Haushalts-Eismaschine nach Anspruch 1, ferner umfassend:
- eine Halterung (50), die an einer ersten Seite mit dem Verdampferrohr (12) und an einer zweiten Seite mit einem Innengehäuse (2) der Eismaschine verbunden ist, um das Verdampferrohr (12) zu stützen, wobei die Halterung (50) in Höhenrichtung mit einem oberen Teil in der Mitte des Verdampferrohrs (12) verbunden ist.
4. Haushalts-Eismaschine nach Anspruch 3, wobei die Halterung (50) mit einem gekrümmten Bogenabschnitt des Verdampfungsrohrs (12) verbunden ist, der eine U-Form aufweist.
5. Verfahren zur Herstellung von Eis unter Verwendung eines Eismachers gemäß einem der Ansprüche 1 bis 4, wobei das Verfahren zur Herstellung von Eis umfasst:
- einen Schritt zur Bildung von transparentem Eis, bei dem das Eiswasser um die Kühlvorsprünge herum gekühlt wird, während sich der Schwingungsabschnitt (22) dreht, um transparentes Eis um die Kühlvorsprünge herum zu bilden; einen Schritt zur Bildung von durchscheinendem Eis, bei dem das Eiswasser um die Kühlvorsprünge herum ohne Drehung des Schwingungsteils (22) gekühlt wird, um durchscheinendes Eis um die Kühlvorsprünge herum zu bilden; und einen Schritt des abwechselnden Wiederholens des Schritts zur Bildung von transparentem Eis und des Schritts zur Bildung von durchscheinendem Eis, wobei im Schritt zur Bildung von transparentem Eis die Temperatur des Eisher-

tellungswassers des Eisherstellungsmoduls (10) gemessen wird und entsprechend der gemessenen Temperatur die Drehzahl des Schwingteils (22) angepasst wird, wobei das Schwingteil (22) so gesteuert wird, dass es mit einer niedrigen Drehzahl rotiert, wenn die Temperatur des Eisherstellungswassers hoch ist, und so gesteuert wird, dass es mit einer hohen Drehzahl rotiert, wenn die Temperatur des Eisherstellungswassers niedrig ist.

6. Verfahren nach Anspruch 5, wobei im Schritt der Bildung von transparentem Eis die Temperatur des dem Eisbildungsmodul (10) zugeführten Eisbildungswassers so erhöht wird, dass die Transparenz des transparenten Eises erhöht wird.

Revendications

1. Machine à glaçons domestique (1) comprenant :
- un boîtier (2) ;
- un compresseur (4) et un condenseur (3) installés à l'intérieur du boîtier (2) et dans lesquels circule un fluide frigorigène ;
- un module de fabrication de glace (10) comportant un bac de fabrication de glace (11) dans lequel est reçue l'eau destinée à la fabrication de glace, le module de fabrication de glace (10) étant configuré pour congeler l'eau destinée à la fabrication de glace à l'aide du fluide frigorigène fourni par le condenseur (3) ;
- un réservoir de stockage de glace (6) qui stocke la glace formée dans le module de fabrication de glace (10) ;
- une plaque de guidage (7) reliée au bac de fabrication de glace (11), la plaque de guidage (7) étant configurée pour guider la glace formée vers le réservoir de stockage de glace (6) pendant la rotation du bac de fabrication de glace (11) ; et
- un module de brassage (20) qui brasse l'eau de fabrication de glace,
- un tuyau d'alimentation en eau de fabrication de glace (30) qui injecte l'eau de fabrication de glace fournie par une source d'alimentation en eau de fabrication de glace dans le bac de fabrication de glace (11), et
- un premier capteur de température de l'eau de fabrication de glace (31) qui est installé sur un côté du tube d'alimentation en eau de fabrication de glace (30) et mesure la température de l'eau de fabrication de glace qui y est fournie,
- un deuxième capteur de température de l'eau de fabrication de glace (41) qui détecte la température de l'eau de fabrication de glace reçue à l'intérieur du bac de fabrication de glace (11),

dans lequel le module de fluctuation comprend en outre :

un arbre de fluctuation (221) relié à une partie de fluctuation (22) et à un arbre de rotation (13) du bac de fabrication de glace (11) ;
 une partie d'entraînement de la partie de fluctuation (25) qui fait tourner l'arbre de fluctuation (221) ;
 une tête d'oscillation (24) installée à une extrémité d'un côté de l'arbre d'oscillation (221) ; et
 un interrupteur de fin de course (23) installé de manière adjacente à la tête d'oscillation (24), l'interrupteur de fin de course (23) étant configuré pour détecter le contact de la tête d'oscillation (24) avec l'interrupteur de fin de course (23) de manière à limiter la rotation de la tête d'oscillation (24), dans lequel le module de fabrication de glace (10) est muni d'un tube d'évaporation (12) relié au condenseur (3) et agencé de manière à présenter une forme en U à l'intérieur du bac de fabrication de glace (11) ; des saillies de refroidissement installées en faisant saillie vers le fond du bac de fabrication de glace (11) à partir du tube d'évaporation (12) ; et une partie d'entraînement du bac (14) qui fait tourner le bac de fabrication de glace (11), et
 le module de fluctuation (20) est muni d'une partie de fluctuation (22) qui est insérée dans le bac de fabrication de glace (11) et fait fluctuer l'eau de fabrication de glace vers les saillies de refroidissement du module de fabrication de glace (10), dans lequel le module de fluctuation (20) commande une vitesse de rotation de la partie de fluctuation (22) en fonction d'une valeur mesurée par le deuxième capteur de température de l'eau de fabrication de glace (41), et le module de fabrication de glace (10) commande la durée de fabrication de glace en fonction d'une valeur mesurée par le premier capteur de température de l'eau de fabrication de glace (31), dans lequel la partie de fluctuation (22) est insérée et disposée au centre du tube d'évaporation (12) agencé en forme de U, et comporte une pluralité de trous de passage de réfrigérant (223) formés dans la partie de fluctuation (22).

2. Machine à glaçons domestique selon la revendication 1, dans laquelle un côté du tube d'alimentation en eau de fabrication de glace (30) est prolongé et disposé en étant enroulé en spirale sur une surface

périphérique extérieure du compresseur (4).

3. Machine à glaçons domestique selon la revendication 1, comprenant en outre :

un support (50) relié au tube d'évaporation (12) au niveau d'un premier côté de celui-ci et relié à un boîtier intérieur (2) de la machine à glaçons au niveau d'un second côté de celui-ci de manière à supporter le tube d'évaporation (12), dans laquelle le support (50) est relié à une partie supérieure du centre du tube d'évaporation (12) dans le sens de la hauteur de celui-ci.

4. Machine à glaçons domestique selon la revendication 3, dans laquelle le support (50) est relié à une partie courbe en arc du tube d'évaporation (12) ayant une forme en U.

5. Procédé de fabrication de glace à l'aide d'une machine à glaçons selon l'une quelconque des revendications 1 à 4, le procédé de fabrication de glace comprenant :

une étape de formation de glace transparente au cours de laquelle l'eau de fabrication de glace autour des saillies de refroidissement est refroidie pendant que la partie oscillante (22) tourne de manière à former de la glace transparente autour des saillies de refroidissement ;
 une étape de formation de glace translucide au cours de laquelle l'eau de fabrication de glace autour des saillies de refroidissement est refroidie sans rotation de la partie oscillante (22) de manière à former de la glace translucide autour des saillies de refroidissement ; et
 une étape consistant à répéter alternativement l'étape de formation de glace transparente et l'étape de formation de glace translucide, dans laquelle, lors de l'étape de formation de glace transparente, la température de l'eau de fabrication de glace du module de fabrication de glace (10) est mesurée et, en fonction de la température mesurée, la vitesse de rotation de la partie oscillante (22) est ajustée, la partie oscillante (22) étant commandée pour tourner à basse vitesse lorsque la température de l'eau de fabrication de glace est élevée et pour tourner à haute vitesse lorsque la température de l'eau de fabrication de glace est basse.

6. Procédé selon la revendication 5, dans lequel, lors de l'étape de formation de glace transparente, la température de l'eau de fabrication de glace fournie au module de fabrication de glace (10) est ajustée de manière à être augmentée afin d'accroître la transparence de la glace transparente.

Fig. 1

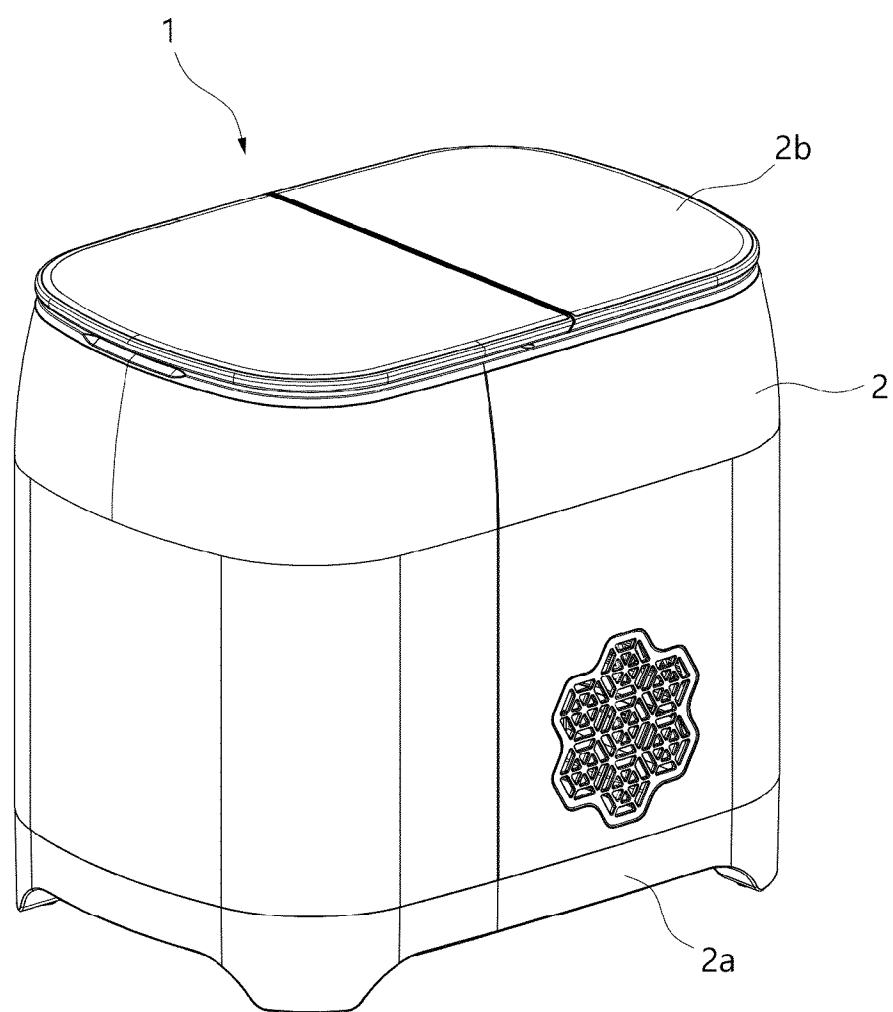


Fig. 2

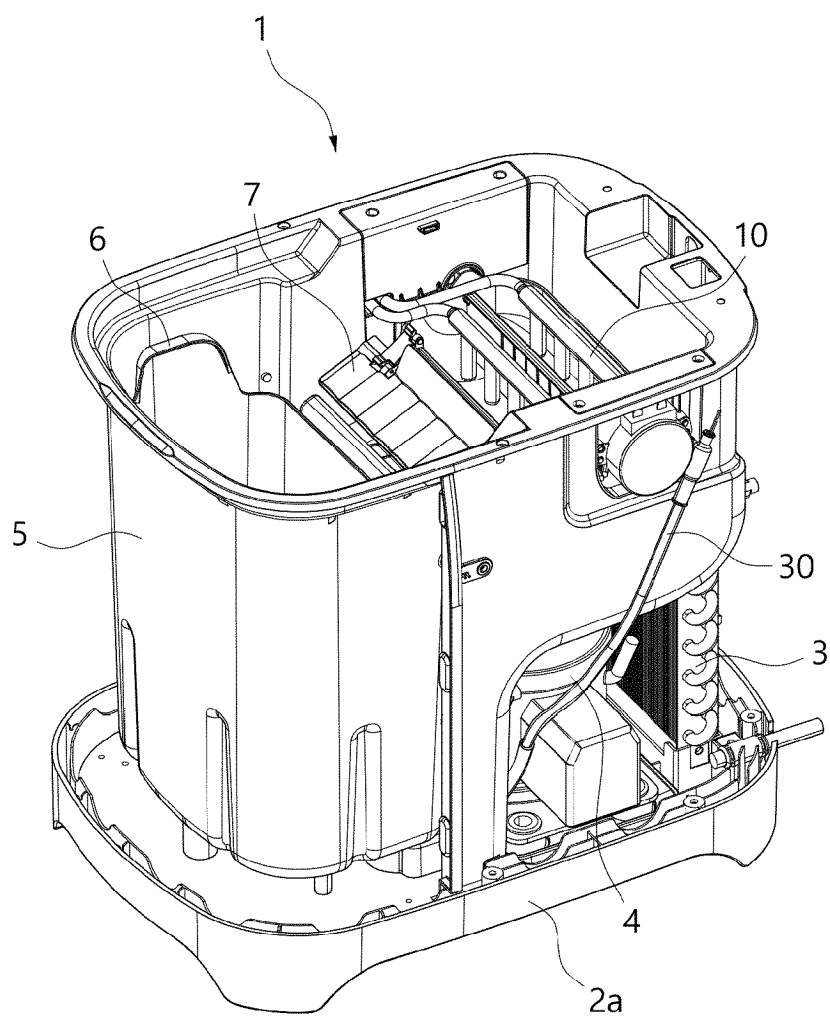


Fig. 3

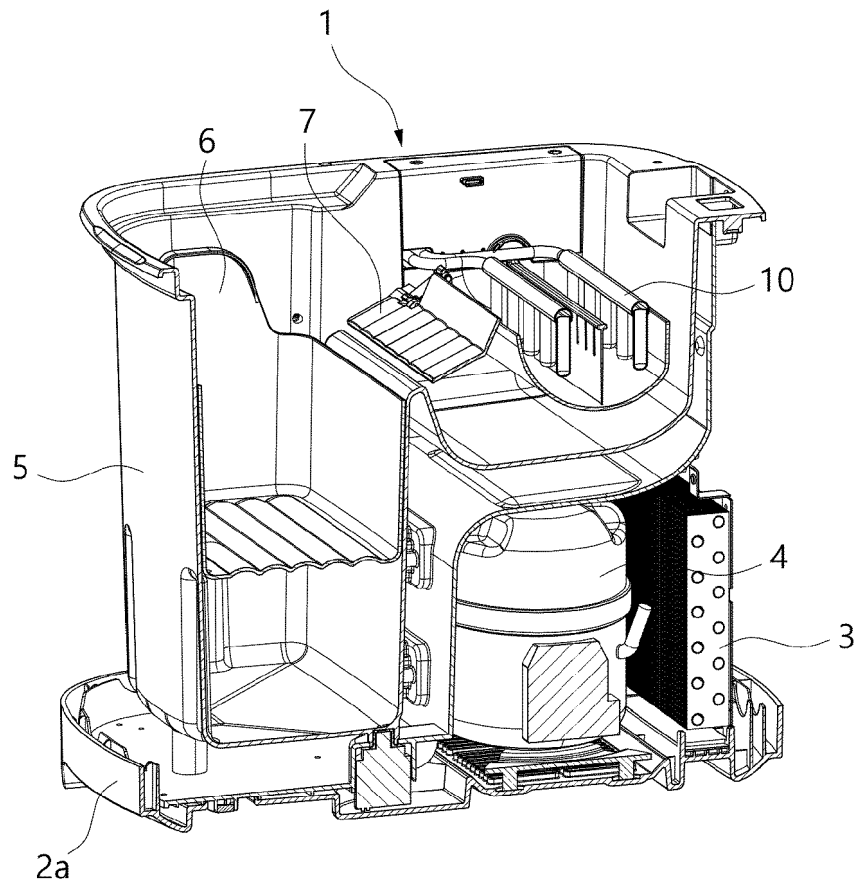


Fig. 4

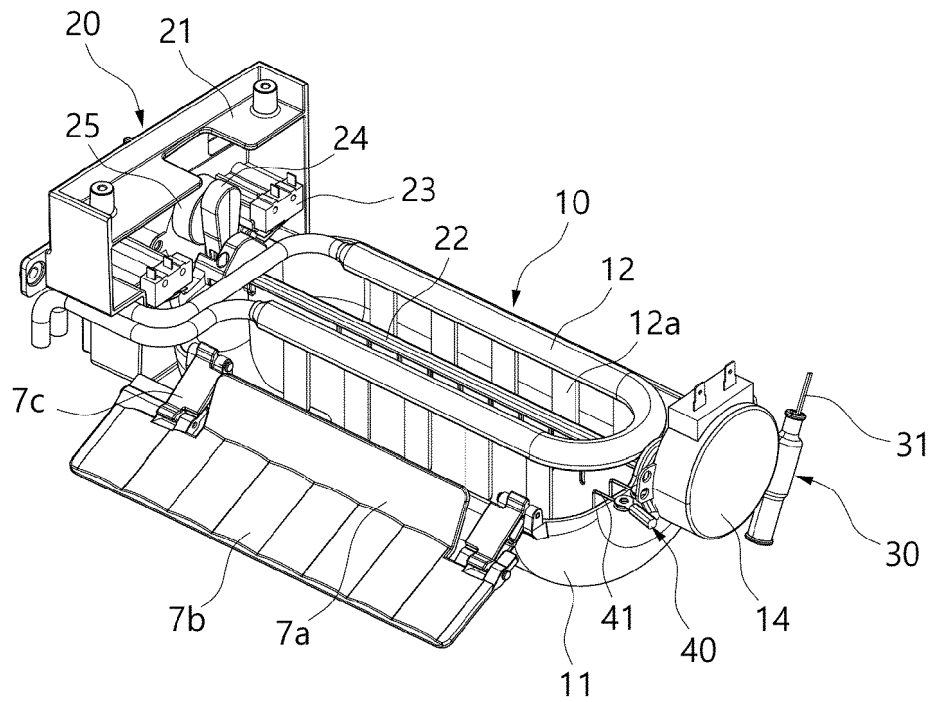


Fig. 5

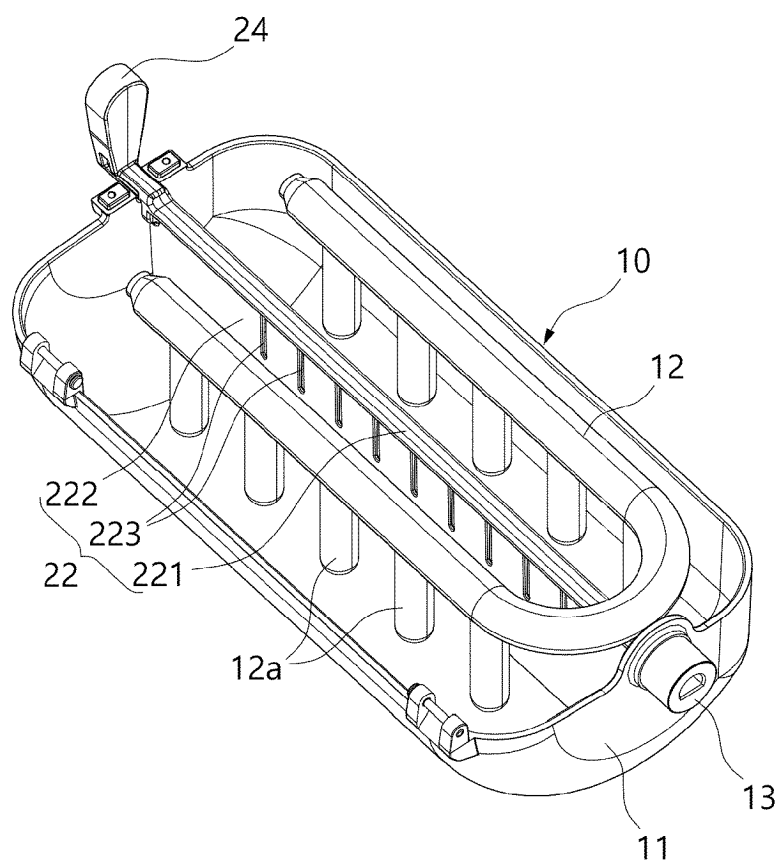


Fig. 6

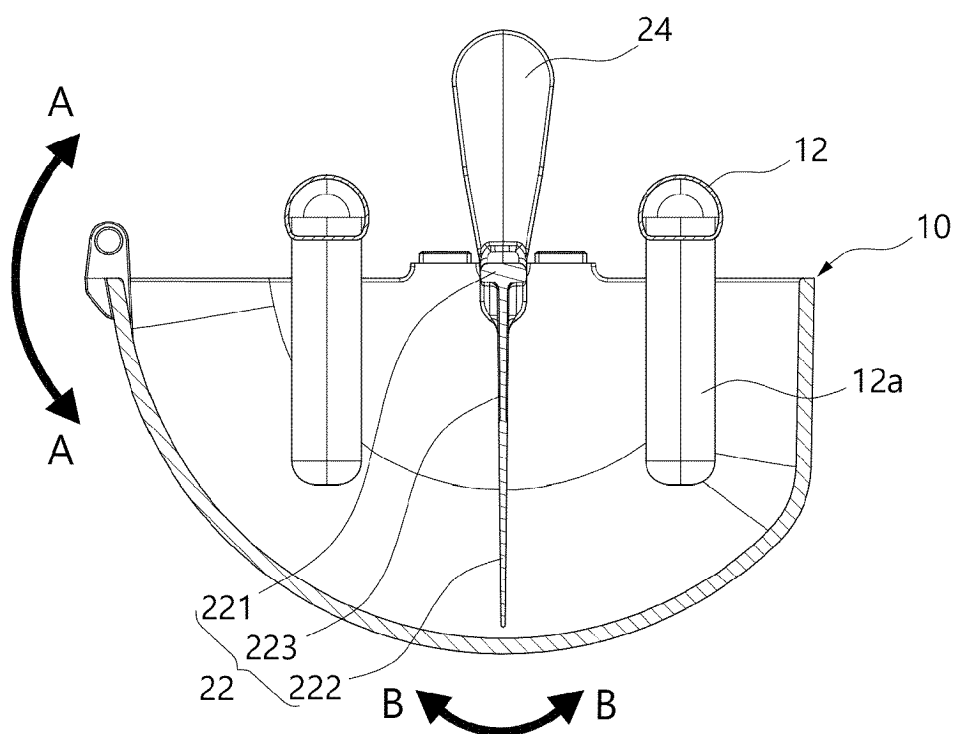


Fig. 7

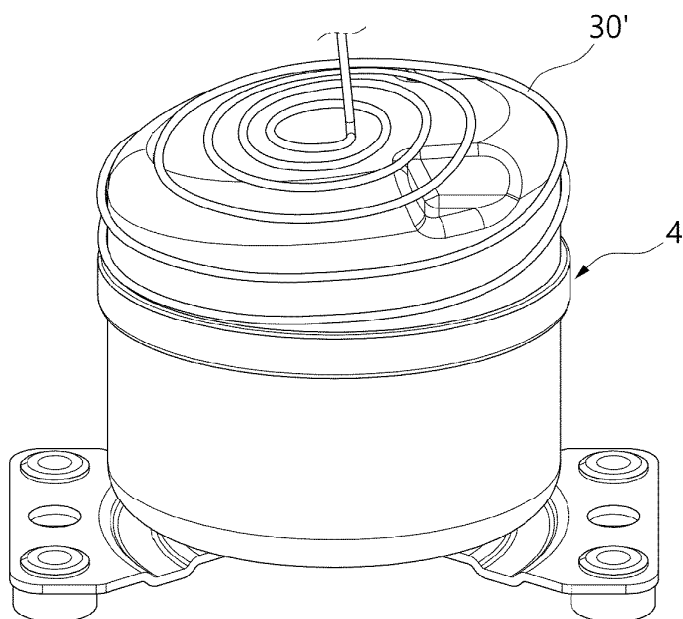


Fig. 8

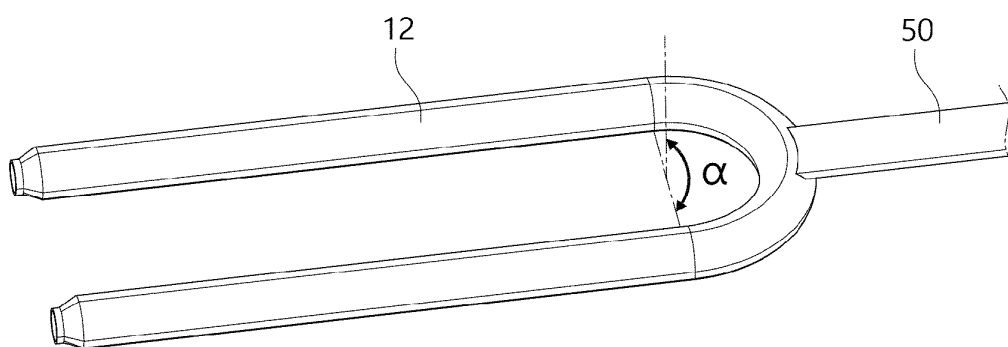


Fig. 9

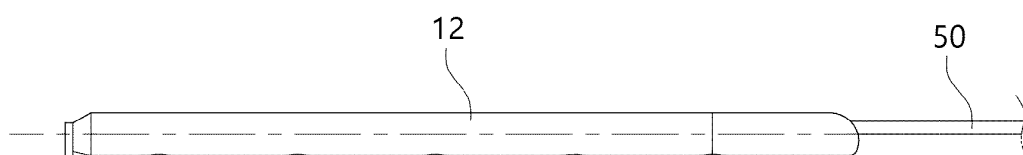


Fig. 10

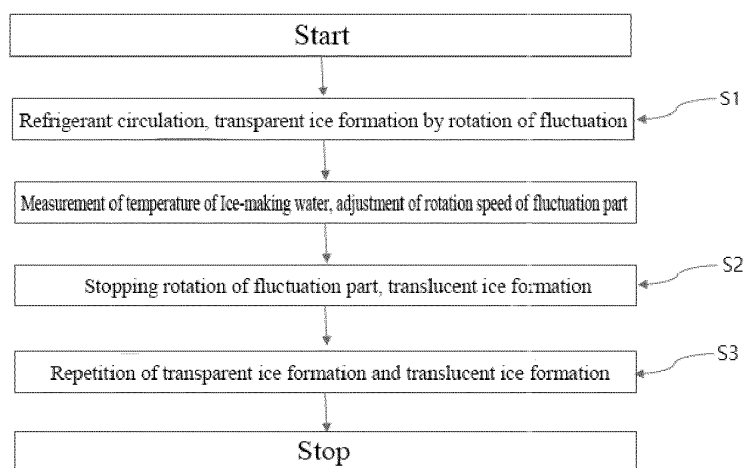
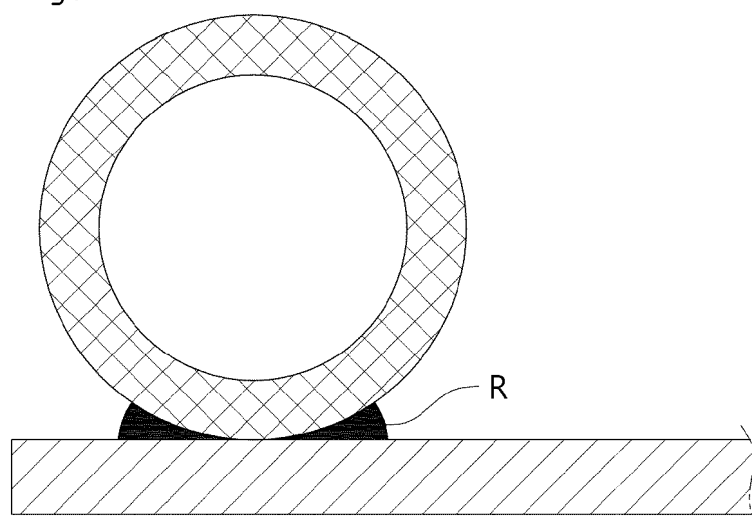


Fig. 11



REFERENCES CITED IN THE DESCRIPTION

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