

RAPID COOLING SHAVED ICE MANUFACTURING DEVICE

BACKGROUND OF THE INVENTION

1. Field of the Invention

5 [0001]

The present invention relates to a rapid cooling shaved ice manufacturing device in which an ice layer forming rotary drum is used.

2. Description of the Related Art

10 [0002]

First, Patent Literature 1 describes a basic principle of the present invention. The basic principle includes: a water supplying means that supplies water to a water receptacle; a rapid cooling means that has concentric, elongated, double
15 cylinders; a refrigerant that is supplied from the rapid cooling means; an ice layer forming rotary drum that, as a result of the refrigerant, forms a film-like ice layer on an outer circumferential surface, while rotating the water that is supplied from the water supplying means in a manner similar to
20 a "waterwheel;" and a cutting blade that is provided such as to intersect the outer circumferential surface of the ice layer forming rotary drum and continuously shaves off the film-like ice layer.

[0003]

25 However, an issue of the invention described in Patent

Literature 1 is to provide a rapid cooling shaved ice manufacturing device that is capable of forming the film-like ice layer by water being supplied to the outer circumferential surface of the cooling drum from above, through a water supply pipe 28b and a water supply receptacle 28a, and has an efficient and simple configuration.

[0004]

In addition, a means for solving the issue of the invention is characterized by including: a cooling drum 21 that forms an ice layer of a predetermined thickness on an outer circumferential surface thereof while rotating with the outer circumferential surface being maintained at a temperature that is equal to or below a freezing point; an ice shaving blade 29 that is set such as to substantially be in contact with the outer circumferential surface of the cooling drum and formed on the outer circumferential surface of the cooling drum; and a water supplying means 28 that includes a water supply suit (receptacle) 28a in which edge portions of both side surface portions and an edge portion of a front surface portion are substantially in contact with the outer circumferential surface of the cooling drum, and a water supply pipe 28b that supplies water to a space that is formed by the water supply suit 28b and the outer circumferential surface of the cooling drum 21 (see Fig. 3). Here, reference numbers are those given in Patent Literature 1.

[0005]

The above-described invention in Patent Literature 1 has an advantage in that the film-like ice layer can be instantaneously formed. However, the invention also has issues
5 such as those below.

(a) Because "snow-like shaved ice" falls directly into a large storage container, the snow-like shaved ice is accumulated in a pile-like state in a specific portion of the storage container. In addition, because a turntable such as that in the
10 invention of the present application is not provided, the snow-like shaved ice that falls into a shaved-ice receptacle container (cup-like container) that is normally commonly used cannot be received (served) in an even state.

(b) For reasons such as bearing members being attached to
15 left and right side walls of a vertically elongated casing, the cooling drum 21 being provided inside the casing with the bearing members therebetween, the ice shaving blade 29 being provided in a tilted state inside the casing, the water supplying means 28 that has a complex configuration being arranged near an area
20 above the cooling drum 21 to supply water from above the outer circumferential surface of the cooling drum 21, the cooling drum 21, the ice shaving blade 29, the water supplying means 28, and the like cannot easily be attached to the casing. Therefore, manufacturing is troublesome. In addition, a space portion of
25 a front wall of the casing cannot be effectively used. As a

result, the constituent components such as the water supply means 28, the cooling drum 21, the ice shaving blade 29, and a shaved-ice guidance member being rationally combined and the device being reduced in size are desired.

5 (c) For example, a storage container that receives the "snow-like shaved ice" that is shaved off by the ice shaving blade 29 is provided inside the casing. Therefore, in addition to insertion and removal of a storage container 30 being troublesome, the overall device increases in size. Therefore,
10 size reduction of the device is desired for reasons similar to above-described (b).

 (d) A structure for preventing gas that has been rapidly vaporized in an internal space of the cooling drum 21 from leaking outside is not described. In addition, because a packing for
15 maintaining airtightness is not present, a compressor cannot be made powerful.

 (e) Furthermore, control to prevent water from overflowing from the water supply suit 28a is difficult, soft and safe water for shaved ice cannot be used, and a realistic feeling of
20 shaved-ice manufacturing cannot be produced.

[0006]

Next, Patent Literature 2 describes a shaved ice machine that includes: a rotation mechanism 18; a rotating base 17 that rotates as a result of driving force from the rotation mechanism;
25 a cup-like container 14 that is placed on an upper surface of

the rotating base; a cylindrical guidance means 9 in the cup-like container that guides "shaved ice" that is shaved off by a cutting blade to an opening portion of the cup-like container; a hopper 3 that receives small chunks of ice, a speed reducer 5 and a driving motor 6 that are arranged in a lower end portion of the hopper; and a rotating blade 4 that is provided inside the hopper. The shaved ice machine described in Patent Literature 2 does not require serving with the cup-like container held in a hand. Therefore, the shaved ice machine has an advantage of being hassle-free. However, this shaved ice machine is not configured to include an ice layer forming rotary drum in which a film-like ice layer is formed on an outer circumferential surface while rotating in a manner similar to a waterwheel, such as that described in Patent Literature 1. Therefore, feature principles differ from those of Patent Literature 1.

[0007]

Therefore, an issue of the invention that is to rationally arrange each component of a rapid cooling shaved ice manufacturing device that includes an ice layer forming rotary drum and reduce the size of the device is not present in Patent Literature 2 (reference numbers are those given in Patent Literature 2).

[0008]

Here, in a shaved ice machine in Patent Literature 3 as well, a rotating base 23 that rotates as a result of driving

force of a rotation mechanism is described. However, the shaved ice machine in Patent Literature 3 is configured such that a rectangular ice piece 8 is pressed by numerous spikes 17 of a flat blade gear 16. In addition, the rotating base 23 is positioned substantially directly below the flat blade gear 16 and a shaving blade 11. Therefore, in a manner similar to Patent Literature 2, the issue of the invention that is to rationally arrange each component of the rapid cooling shaved ice manufacturing device that includes the ice layer forming rotary drum and reduce the size of the device is not present (reference numbers are those given in Patent Literature 3).

[0009]

[Patent Literature 1] Japanese Patent Laid-open Publication No. Heisei 10-68564

[Patent Literature 2] Japanese Patent Laid-open Publication No. 2007-155272

[Patent Literature 3] Japanese Utility Model Laid-open Publication No. Heisei 2-120678

[0010]

A first issue of the present invention is to set a position of a vertical output shaft on a first turntable side to an optimal position in relation to a horizontal center axis on an ice layer forming rotary drum side, and receive (serve), in an even state, snow-like shaved ice that falls into a shaved-ice receptacle container (cup-like container) that is normally commonly used

as a result of the first turntable being rotated, while taking advantage of the advantages of the invention in Patent Literature

1. Preferably, the first issue is to serve the snow-like shaved ice in the cup-like container in an even state by rotating at least the first turntable by motor (labor saving).

A second issue is to enable an attachment space portion that is present between left and right protruding support portions that are provided on a front surface of a casing to be effectively used, and components such as the ice layer forming rotary drum, a shaving blade, and a shaved ice guidance member to be easily assembled. The first issue is to, as a result, actualize improved efficiency in manufacturing operations and size reduction of the device.

[0011]

A third issue is to enable "airtightness" to be sufficiently maintained so that gas that flows to an internal space of the ice layer forming rotary drum does not easily leak outside, even when pressure of a compressor that configures a cooling means is increased. In addition, depending on an embodiment, the third issue is to enable a sealing member to have excellent durability.

A fourth issue is to enable "non-sticky (not immediately melted), fluffy" snow-like shaved ice to be manufactured using soft and safe water for shaved ice.

[0012]

In addition, there are incidental issues such as preventing cooling heat of the ice layer forming rotary drum from escaping through bearings, and producing a realistic feeling of shaved-ice manufacturing.

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SUMMARY OF THE INVENTION

[0013]

A rapid cooling shaved ice manufacturing machine of the present invention is characterized by including: a casing that has left and right protruding support portions; an ice layer forming rotary drum that is provided in a horizontal state in an attachment space portion between the protruding support portions with left and right bearing members therebetween, and rotates as a result of driving force from a driving motor; an open-upper-end water storage tray that is arranged in a horizontal state below the ice layer forming rotary drum and temporarily receives "water for shaved ice" from a water supplying portion that is provided in the casing, through a water introduction path; a shaving blade that is provided in a horizontal state in the left and right protruding support portions such as to substantially be in contact with a front side of the ice layer forming rotary drum, and shaves off a film-like ice layer that is formed on an outer circumferential surface of the ice layer forming rotary drum; and a guidance member that is provided in a fixed state in the left and right protruding support portions such as to be capable of guiding

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"snow-like shaved ice" that is shaved off by the shaving blade in a predetermined direction, in which further, a first turntable that rotates as a result of driving force from a first rotation mechanism is provided in front of a lower portion side of the casing, and the first turntable is provided such as freely rotate in a base at an attitude in which a vertical axial line y that passes through a center thereof and a horizontal axial line x that passes through a center of the ice layer forming rotary drum and is projected further frontward than the shaving blade are orthogonal (claim 1). Effects of the invention are as described hereafter.

[0014]

In the above-described configuration, the rapid cooling shaved ice manufacturing machine is characterized by the first turntable being capable of rotating as a result of a control signal from a control unit. As a result of this configuration, labor saving can be achieved.

[0015]

In addition, the rapid cooling shaved ice manufacturing machine is characterized by a second turntable being rotatably provided on an upper surface of the first turntable in a position that is eccentric in relation to the vertical axial line y , and while the first turntable is rotating, the second turntable being also capable of rotating together with the first turntable as a result of driving force from a second rotation mechanism. As

a result of this configuration, the snow-like shaved ice can be served in a well-balanced manner along an inner circumferential wall of the cup-like container.

[0016]

5 In addition, the rapid cooling shaved ice manufacturing machine is characterized by a cylindrical protruding portion that is supported such as to freely rotate by one bearing member being provided in either of the left and right bearing members on one side wall of the ice layer forming rotary drum, inner and outer
10 narrow elongated circular cylindrical pipes that configure a rapid cooling means being concentrically fitted into the cylindrical protruding portion, and further at least a first sealing member being provided between an outer circumferential surface of the outer narrow elongated circular cylindrical pipe
15 and an inner circumferential surface of an annular recess formed in the cylindrical protruding portion. As a result of this configuration, "airtightness" can be sufficiently maintained so that gas that flows to an internal space of the ice layer forming rotary drum does not easily leak outside, even when
20 pressure of a compressor that configures a rapid cooling means is increased.

[0017]

In addition, the water supplying portion of the casing can supply "water for shaved ice" that is softened by an ion
25 exchange resin portion and from which germs are removed by a

filtration processing portion. As a result of the configuration, snow-like shaved ice that is "delicious and safe," and in addition, does not immediately melt and is fluffy can be manufactured.

5 [0018]

Furthermore, the rapid cooling shaved ice manufacturing machine is characterized by an open/close door that shields a container that receives shaved ice being provided in a base on the casing side, and the open/close door being opened and closed
10 in a circumferential direction of the first turntable. As a result of this configuration, there are effects such as a realistic feeling of shaved-ice manufacturing being able to be imparted on viewers, and the open/close door not getting in the way because the open/close door does not protrude in left and
15 right directions.

EFFECTS OF THE INVENTION

[0019]

The present invention is capable of taking advantage of the basic principle and advantages of the invention described
20 in Patent Literature 1. In addition, as a result of a position of a vertical output shaft on the first turntable side being set to an optimal position and the first turntable being rotated, the snow-like shaved ice that falls into a shaved-ice receptacle container (cup-like container) that is normally commonly used
25 can be served in an even state. Furthermore, the attachment

space portion that is present between the left and right protruding support portions that are provided on the front surface of the casing can be effectively used, and components such as the ice layer forming rotary drum, the shaving blade, and the shaved-ice guidance member can be easily attached to the left and right protruding support portions. As a result, improved efficiency in manufacturing operations, size reduction of the device, and the like can be actualized.

[0020]

In addition, depending on the embodiment, while the first turntable is rotating, the second turntable can also be rotated together with the first turntable as a result of driving force from a second rotation mechanism, and as a result, the snow-like shaved ice can be served in the cup-like container in a more even state. Moreover, there are excellent effects such as vaporized gas that has been sprayed into the internal space of the ice layer forming rotary drum and lost cooling temperature being prevented from leaking outside, snow-like shaved ice that is "delicious and safe," and in addition, does not immediately melt and is fluffy being able to be manufactured because water W for shaved ice is used, a realistic feeling of shaved-ice manufacturing being able to be imparted on viewers, and the open/close door not getting in the way because the open/close door does not protrude in the left and right directions.

BRIEF DESCRIPTION OF THE DRAWING

[0021]

Fig. 1 to Fig. 17 are explanatory diagrams according to a first embodiment of the present invention. Fig. 18 to Fig. 23 are explanatory diagrams according to a second embodiment of the present invention. Fig. 24 to Fig. 28 are explanatory diagrams according to a third embodiment of the present invention.

Fig. 1 is a front view of an overall shaved ice device including a casing (a rotating mechanism is in virtual lines);

Fig. 2 is a right-side view of Fig. 1 (the rotating mechanism and a vertical axis thereof and an ice layer forming rotary drum and a horizontal axis thereof are in virtual lines);

Fig. 3 is a perspective view of main sections (x is a horizontal axial line passing through a center of the ice layer forming rotary drum and projected further frontward than a shaving blade, and y is a vertical axial line passing through a center of a first turntable);

Fig. 4 is an explanatory diagram showing arrangement locations of main components that are visible when a right side wall of a casing is removed (other components are omitted);

Fig. 5 is an explanatory diagram schematically showing main sections (a heat exchanging means and a compressor are omitted);

Fig. 6 is an explanatory diagram showing an enlarged view

of the main sections in Fig. 5, and in particular, an explanatory diagram schematically showing a shaft sealing device (gland packing) that includes a first sealing member, a second sealing member, and the like;

5 Fig. 7 is an explanatory diagram of a state in which a packing retainer is tightened;

 Fig. 8 is an explanatory diagram of main sections (flow amount control member and water storage tray);

 Fig. 9 is a cross-sectional view taken along line 9-9 in
10 Fig. 8;

 Fig. 10 is an overall explanatory diagram of main sections (water source, ion exchange resin portion, and water supplying portion of filtration processing portion casing);

 Fig. 11 is an explanatory diagram of the ion exchange resin
15 portion;

 Fig. 12 is an explanatory diagram of a state in which an arc-shaped lower side of an ice layer forming rotary drum is immersed in water for shaved ice in a shallow recess of the water storage tray;

20 Fig. 13 is an explanatory diagram of main sections (cover, shaving blade, guidance member, and the like);

 Fig. 14 is an overall cross-sectional explanatory diagram of inner and outer narrow, elongated, circular cylindrical pipes configuring a rapid cooling means;

25 Fig. 15 is a schematic explanatory diagram of the rapid

cooling means connected in a circulating manner to the ice layer forming rotary drum;

Fig. 16 is an overall explanatory diagram showing a state in which snow-like shaved ice is served in a receptacle container
5 when a turntable is rotating;

Fig. 17 is an overall explanatory diagram of an electrical system;

Fig. 18 is a front view similar to Fig. 1, according to a second embodiment;

10 Fig. 19 is a right side view similar to Fig. 2;

Fig. 20 is a perspective view of main sections similar to Fig. 3;

Fig. 21 is an overall cross-sectional explanatory diagram of main sections (first turntable and second turntable including
15 direc drive;

Fig. 22 is an overall explanatory diagram similar to Fig. 16;

Fig. 23 is an overall explanatory diagram of an electrical system similar to Fig. 17;

20 Fig. 24 is a front view similar to Fig. 1, according to a third embodiment (an open/close door is in a closed state);

Fig. 25 is a right side view similar to Fig. 2 (the open/close door is in the closed state);

Fig. 26 is an overall explanatory diagram of main sections
25 (open/close door and motor for open/close door);

Fig. 27 is an explanatory diagram of a state in which the open/close door is open; and

Fig. 28 is an overall explanatory diagram of an electrical system similar to Fig. 17.

5 **EXPLANATION OF REFERENCE NUMBERS**

[0022]

1: casing

2: first housing portion

3: second housing portion

10 3a: rear housing portion

3b: protruding support portion

4: attachment space portion

5: ice layer forming rotary drum

6: water supplying portion

15 7: bearing member

10: receptacle container

11: rapid cooling means

28: inner narrow, elongated, circular cylindrical pipe

29: outer narrow, elongated, circular cylindrical pipe

20 28a: suction opening

29a: spray hole

30: cylindrical protruding portion

21, 83, 95: driving motor

23: water introduction path

25 24: flow amount control member

25: water storage tray
 47: shaving blade
 48: guidance member
 31: gland packing
 5 37: first sealing member
 38: second sealing member
 39: third sealing member
 40: fourth sealing member
 41: fastener
 10 42: packing retainer
 50: ice layer
 50a: snow-like shaved ice
 60: water source
 61: ion exchange resin portion
 15 62: filtration processing portion
 W: water for shaved ice
 70: first rotation mechanism
 71: vertical shaft
 72: first turntable
 20 73: anti-slip sheet
 80: second rotation mechanism
 81: vertical shaft
 82: second turntable
 84: power supply
 25 85: switch

90: open/close door
91: flange portion
92: bevel gear portion
93: shielding wall portion
5 94: third rotation mechanism
96: driving gear

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0023]

10 First, a configuration of a casing 1 of a rapid cooling shaved ice manufacturing device (referred to, hereafter, as a "device X") will briefly be described with reference to Fig. 1 to Fig. 4. With reference to Fig. 1 that is a front view and Fig. 2 that is a right side view, the casing 1 is configured
15 by a case-like first housing portion 2 that corresponds to a lower portion and a case-like second housing portion 3 that is integrally provided above the first housing portion 2.

[0024]

In addition, the second housing portion 3 is configured
20 by a rear housing portion 3a in which a water supplying portion 6 can be set on an upper surface thereof, and a pair of left and right protruding support portions 3b that extend in a horizontal state from both left and right end portions of the rear housing portion 3a. The left and right protruding support
25 portions 3b protrude by a predetermined amount in a box-like

shape from a front wall 2a of the first housing portion 2. In addition, an attachment space portion 4 of which a top, a bottom, and a front is open in a communicating manner is present between the left and right protruding support portions 3b. For example,
5 this attachment space portion 4 is a rectangular component attachment space.

[0025]

In Fig. 2, 8 is a support base for the first housing portion 2 that is formed to be larger than the casing 1. 9 is a movable
10 or fixed base that is set on an upper surface of the support base. 10 is a cup-like receptacle container.

[0026]

Fig. 3 shows each of a hollow, circular cylindrical ice layer forming rotary drum 5 that is provided in a horizontal
15 state in the attachment space portion 4 between the left and right protruding support portions 3 with left and right bearing members 7 therebetween, and rotates as a result of driving force from a driving motor 21, described hereafter, and a water supplying portion (such as a storage water tank that has a lid
20 body or a tank) 6 that is freely arranged on the upper surface of the rear housing portion 3a and receives water from a water source 60, described hereafter.

[0027]

Here, a first switch for rotating a driving motor in a
25 forward direction and a second switch for rotating the driving

motor in a reverse direction are provided on a front surface of either of the left and right protruding support portions 3b (not shown). In addition, a control unit that provides forward rotation and reverse rotation control signals to the driving
5 motor, a storage unit that records therein a program for driving motor control for the rotary drum, a timer that counts shaving time, a water level sensing means, an open/close valve, a compressor, and the like are arranged as appropriate inside the casing 1 (not shown).

10 [0028]

Here, a vertical axial line y and a horizontal axial line x will be described with reference to Fig. 3. In the present invention, a first turntable 72 that rotates as a result of driving force from a first rotation mechanism is provided in
15 front of a lower portion side of the casing 1. The first turntable 72 is provided on the base 9 such as to freely rotate at an attitude in which the vertical axial line y that passes through a center thereof is orthogonal to the horizontal axial line x that passes through a center of the ice layer forming
20 rotary drum 5 and is projected further frontward than a shaving blade 47, described hereafter (feature point).

[0029]

Next, Fig. 4 shows main components that are visible on the outside in a state in which a right side wall of the casing 1
25 is removed. A compressor (virtual line) 12 and a heat exchanging

means (solid line) 13 that configure a rapid cooling means 11 are housed in the case-like first housing portion 2 of the lower portion.

[0030]

5 Here, for example as shown in Fig. 2, a first rotation mechanism 70 is provided inside in a substantially center portion on a front side of the support base 8. The rotation mechanism 70 includes a turntable motor that is not shown and a speed reducer that reduces speed of the turntable motor. Of course,
10 the rotation mechanism 70 may be direct drive. Here, for convenience, reference number 71 denotes a vertical shaft (output shaft) on the first rotation mechanism 70 side.

[0031]

Reference number y denotes the vertical axial line that
15 passes through the center (vertical shaft 71) of the first turntable 72 that is provided in a horizontal state in the base 9. According to the present embodiment, the first turntable 72 is fitted such as to have play into a fitting hole 9a that is formed in a penetrating state in the base 9.

20 [0032]

The first turntable 72 is supported by the vertical shaft 71 that is provided in a center of a lower surface thereof or the vertical shaft 71 that is provided in the first rotation mechanism 70. Of course, a support configuration of the first
25 turntable 72 is not a substantive matter of the invention.

Therefore, for example, the first turntable 72 may be supported to the base 9 by a sliding support member (not shown) that is provided in either of the upper surface of the support base 8 or the lower surface of the base 9. Here, reference number 73
5 denotes a circular or polygonal anti-slip sheet (such as a rubber sheet) that is adhered to the upper surface of the first turntable 72.

[0033]

In addition, a refrigerant supply pipe, a vaporized gas
10 return pipe, a control unit, and the like are omitted. According to the embodiment, vaporized gas that has lost cooling temperature in an internal space of the ice layer forming rotary drum 5 is returned to the compressor 12 that is housed in the casing 1.

15 [0034]

Meanwhile, in the case-like second housing portion 3 of an upper portion, the rear housing portion 3a and at least either of the protruding support portions 3b communicate in a front/rear direction, and a power transmission means 19 is provided in an
20 internal space thereof with front and back sprockets therebetween. That is, 15 is an output shaft of the driving motor 21. 16 is an input shaft of the ice layer forming rotary drum 5. 17 is a driving sprocket. 18 is a driven sprocket. 19 is a power transmission means such as a chain or a timing belt.
25 Here, the driving motor 21 described hereafter is preferably

arranged in a lateral state in the rear housing portion 3a. Meanwhile, the ice layer forming rotary drum 5 is arranged in the attachment space portion 4 as shown in Fig. 3.

[0035]

5 Next, the left and right bearing members 7 and the ice layer forming rotary drum 5 will be described together with other members, with reference to Fig. 5. To enable main sections of the present invention to be understood, Fig. 5 schematically shows, for convenience, the driving motor 21 for the rotary drum,
10 the power transmission means 19, a water introduction path 23 that is connected to the water supplying portion 6 that houses water W for shaved ice and has an open/close valve 22 that is either of an automatic and manual type, a pipe-like flow amount control member (virtual line) 24 that is removably connected
15 to the water introduction path, a water storage tray (virtual line) 25 that is arranged below the ice layer forming rotary drum 5, and the like.

[0036]

20 In Fig. 5, 27 is a pair of vertical support plates that are composed of metal and provided in a fixed state on inner wall surfaces of the left and right protruding support portions 3b. 7 is a left and right pair of bearing members that are provided in a fixed state on the vertical support plates 27 and include a ball bearing 7a on an inner circumferential surface
25 thereof. 5 is the hollow circular cylindrical ice layer forming

rotary drum that is supported by the bearing members 7 such as to freely rotate. 28 and 29 are inner and outer narrow elongated circular cylindrical pipes that configure the rapid cooling means 11. 30 is a cylindrical protruding portion that is provided on one side wall (left side wall in Fig. 5) of the ice layer forming rotary drum 5. 31 is a gland packing that is provided in a fixed state in the cylindrical protruding portion. In addition, one end portion of another refrigerant supply pipe 33 and one end portion of a discharge pipe 34 for returning vaporized gas are respectively connected to protruding outer end portions (left side in Fig. 5) of the inner and outer narrow elongated circular cylindrical pipes 28 and 29, with a two-way joint 32 therebetween.

[0037]

Here, according to the embodiment, a metal material that is excellent for rapid cooling is used in the ice layer forming rotary drum. The bearing member 7 is formed into a cylindrical body that has a flange portion using a synthetic resin material (preferably Teflon) so that cooling heat from the metal material is not, to the greatest extent possible, transmitted to the left and right vertical support plates 27 that are composed of metal through the left and right pair of bearing members 7 (that is, so that cooling heat does not escape).

[0038]

Next, a configuration of the gland packing 31 of the device

X will be described with reference to Fig. 6 and Fig. 7. According to the embodiment, on one side wall of the ice layer forming rotary drum 5, the cylindrical protruding portion 30 that is supported such as to freely rotate by one bearing member 7 is provided in either of the left and right bearing members 7. The inner and outer narrow elongated circular cylindrical pipes 28 and 29 that configure the rapid cooling means 11 are concentrically fitted into the cylindrical protruding portion 30. Furthermore, at least a first sealing member 37 is provided between an outer circumferential surface of the outer narrow elongated circular cylindrical pipe 29 and an inner circumferential surface of an annular recess 36 that is formed in the cylindrical protruding portion 30.

[0039]

Here, there are various aspects of the gland packing 31. Here, the gland packing 31 according to the embodiment is configured by: the first sealing member 37 that has a rectangular cross-sectional shape and has a notched portion 37a that has a laterally collapsed chevron shape on one side surface (left in Fig. 6) on a receiving side; a second sealing member 38 that similarly has a notched portion 38a that has a laterally collapsed chevron shape on one side surface on the receiving side, and also has a chevron-shaped protruding portion 38b on another side surface (right in Fig. 6) on a side opposite the one side surface that is crimped such as to be wedged into the

notched portion 37; a third sealing member 39 that has an aspect that is substantially similar to that of the second sealing member; a final fourth sealing member 40 that has a chevron-shaped protruding portion 40b that is crimped
5 such as to be wedged into a chevron-shaped notched portion 39a of the third sealing member 39; and a packing retainer 42 that has a plurality of fasteners 41 that are screwed into the cylindrical protruding portion 30.

[0040]

10 In this manner, in the preferred gland packing 31, the thick second sealing member 38 is arranged such as to be provided together with the thick first sealing member 37 in an axial center direction of the outer narrow elongated circular cylindrical pipe 29, and the third sealing member 39 and the like that follow
15 the thick second sealing member 38 are crimped such as to be close together.

[0041]

Next, a flow amount control member 24 and a water storage tray 25 will be described with reference to Fig. 8 and Fig. 9.
20 As described above, the open/close valve 22 that is either of the automatic and manual type is provided in the water introduction path 23. The pipe-like flow amount control member 24 is connected to the open/close valve 23 towards the water storage tray 25. An opening 24a on an upper end portion of the
25 flow amount control member 24 has a large diameter, and meanwhile,

a control opening 24b on a lower end portion has a smaller diameter than the opening so that the water for shaved ice can be sent into the water storage tray a little at a time.

[0042]

5 In addition, the open-upper-end water storage tray 25 includes a flat portion 25a that receives the "water W for shaved ice" and a shallow recess 25b that is continuous with the flat portion. A bottom wall inner surface of the recess is formed such as to curve inward so that an arc-shaped lower side of the
10 ice layer forming rotary drum 5 is immersed in the water W for shaved ice at all times.

[0043]

Next, the water source 60, an ion exchange resin portion 61, and a filtration processing portion 62 will be described
15 with reference to Fig. 10 and Fig. 11. For example, the water source 60 is preferably tap water. However, the water source 60 may be lake water or well water. An example of the ion exchange resin portion 61 is as shown in Fig. 11. In addition, the filtration processing portion 62 may be a single filtration
20 processing portion 62 or a plurality thereof. However, a hollow fiber membrane that is capable of removing germs is preferably used. In this manner, the water supplying portion 6 of the casing 1 according to the embodiment temporarily stores the "water W for shaved ice" that is softened by the ion exchange resin portion
25 61 and from which germs have been removed by the filtration

processing portion 62. Here, the ion exchange resin portion 61 that serves as a soft water generating portion includes a generating tank 61a that has an inflow portion and an outflow portion in an upper end portion, an ion exchange resin 61b that is in a granular state and provided inside the generating tank 61a, and a pipe-like delivery pipe 61c that is provided inside the generating tank 61a.

[0044]

Next, Fig. 12 shows a positional relationship between the ice layer forming rotary drum 5 and the water storage tray 25. Unlike the complex water supplying means in Patent Literature 1, the water storage tray 25 according to the embodiment is arranged in a horizontal state below the ice layer forming rotary drum 5, and when the open/close valve 22 is set to an "open state" simultaneously with or with a slight delay from the driving motor 21 being started by the control signal from the control unit, the water storage tray 25 temporarily receives the "water W for shaved ice" that flows from the opening 24a in the upper end portion of the flow amount control member 24. At this time, the amount of "water W for shaved ice" that flows from the flow amount control member 24 is preferably set to substantially correspond to a thickness and an amount of a film-like ice layer that is formed on the outer circumferential surface of the ice layer forming rotary drum 5.

[0045]

Next, Fig. 13 is an explanatory diagram of a cover 45. The cover 45 is transparent or translucent. The cover 45 is such that left and right end surfaces are formed into a substantially L-like shape, and is capable of covering the exposed outer
5 circumferential surface of the ice layer forming rotary drum 5 and the shaving blade 47. Here, when the cover 45 is provided in the attachment space portion 4, a base end portion of the horizontal portion may be axially supported to upper portions of inner ends of the left and right protruding support portions
10 3b, and the cover 45 may be such that a vertical or tilted portion is lifted upward from a front side.

[0046]

Next, Fig. 14 is an overall cross-sectional explanatory diagram of the inner and outer narrow elongated circular
15 cylindrical pipes 28 and 29 that configure the rapid cooling means 11. The outer narrow elongated circular cylindrical pipe 29 sprays, in a vaporized state, a refrigerant that is sent by pressure from the compressor 12 that is housed inside the casing through the heat exchanging means 13, into the internal space
20 of the ice layer forming rotary drum 5, through a single or a plurality of small spray holes 29a, and meanwhile, the inner narrow elongated circular cylindrical pipe 28 receives the vaporized gas that has been sprayed into the internal space and lost cooling temperature, through a single or a plurality of
25 suction openings 28a.

[0047]

Next, Fig. 15 is a schematic explanatory diagram of the rapid cooling means 11 that is connected in a circulating manner to the ice layer forming rotary drum 5. In Fig. 15, 12 is the
5 compressor that is provided inside the first housing portion 2 of the casing and compresses a refrigerant. For example, the compressor 12 includes a tank main body, a condenser that condenses the compressed refrigerant, a condenser fan for releasing heat that is generated in the condenser during
10 condensation outside the system, an expansion valve, and the like.

[0048]

13 is a heat exchanging means that is arranged in the first housing portion 2 such as to be adjacent to the compressor 12
15 and is connected to the compressor 12 by one refrigerant supply pipe 33. The refrigerant that is heat exchanged by the heat exchanging means 13 is sent to the outer narrow elongated circular cylindrical pipe 29 through the other refrigerant supply pipe 33 and the two-way joint 32. The refrigerant that
20 is sent to the outer narrow elongated circular cylindrical pipe 29 is forcefully sprayed into the internal space of the ice layer forming rotary drum 5 through the small spray hole 29a, and as a result, for example, the outer circumferential surface of the ice layer forming rotary drum 5 is cooled to about minus 14
25 degrees. The vaporized gas that has been forcefully sprayed

into the internal space of the ice layer forming rotary drum
5 and lost generated heat enters the inner narrow elongated
circular cylindrical pipe 28 from the suction opening 28a, and
is returned to the compressor 12 in a circulating manner through
5 the two-way joint 32 and the return pipe 34.

[0049]

Here, a type of refrigerant and the like are not
particularly limited. For example, the refrigerant can be used
by being selected as appropriate from hydrocarbon refrigerants,
10 carbon dioxide refrigerants, and the like that are commonly used.
In addition, according to the embodiment, because the gland
packing 31 is used in one of the bearings 7, a large (powerful)
compressor 12 can be used.

[0050]

15 Next, the shaving blade 47 and the guidance member 48 will
briefly be described with reference to Fig. 12 and Fig. 13. The
shaving blade 47 is directly or indirectly provided in a
horizontal state in the left and right protruding supporting
portions 3b of the casing 1 such as to substantially be in contact
20 with a front side of the ice layer forming rotary drum 5, and
shaves off a film-like ice layer 50 that is rapidly formed during
rotation on the outer circumferential surface of the ice layer
forming rotary drum 5. Here, "substantially be in contact" is
meant to also include a case of slight physical separation.
25 According to the embodiment, the shaving blade 47 is positioned

orthogonal to the outer circumferential surface such as to be positioned below a center axial line of the ice layer forming rotary drum 5. An angle of a tip end portion of the shaving blade 47 is preferably set as appropriate to be oriented slightly upward and/or slightly downward and the like, in correspondence to a rotation direction of the ice layer forming rotary drum 5.

[0051]

Here, according to the embodiment, the shaving blade 47 is positioned below a center line in an axial direction of the ice layer forming rotary drum 5, and on the front side of the outer circumferential surface of the ice layer forming rotary drum 5. In addition, the ice layer forming rotary drum 5 rotates in an arrow direction as shown in Fig. 3 when the "snow-like shaved ice 50a" is shaved off, but rotates in a direction opposite the arrow direction when the film-like ice layer 50 is completely shaved off. Therefore, the control unit can also control not only a rotation frequency but also the rotation direction based on a signal received from an input unit.

[0052]

As shown in Fig. 13, the guidance member 48 is preferably provided integrally with a surface of the shaving blade 47. In addition, the guidance member 48 has a laterally elongated rectangular opening 49 through which the water storage tray 25 that has a shallow bottom can be inserted and removed.

[0053]

Therefore, 48a is a tilted base plate that has the opening 49 and is formed such as to be slightly tapered towards a lower end. The tilted base plate 48a is fixed as appropriate to the
5 inner wall surfaces of the left and right protruding end portions 3a of the casing 1. 48b is a left and right pair of surrounding plates that are fixed to left and right end portions of the tilted base plate 48a, and the surrounding plates 48b are bent such as to be closer to each other from a center portion towards the
10 lower end.

[0054]

Therefore, for example, the guidance member 48 can enable the water storage tray 25 with a shallow bottom to be freely inserted and removed during cleaning, and guide the "snow-like
15 shaved ice 50a" that has been shaved off by the shaving blade 47 to an opening in a predetermined direction (receptacle container 10).

[0055]

Next, Fig. 16 shows a state in which the snow-like shaved
20 ice 50a is served in the receptacle container 10 when the first turntable 72 rotates. In Fig. 16, the receptacle container 10 is placed in a substantially center portion (including a vicinity of the center portion) on the upper surface of the first turntable 72. In this case, the receptacle container 10 is preferably
25 placed such that a center thereof substantially coincides with

a center point O at which the vertical axial line y that passes through the center of the first turntable 72 and the horizontal axial line x that passes through the center of the ice layer forming rotary drum and is projected further frontward than the shaving blade are orthogonal. For example, when the first rotation mechanism 70 is started, the first turntable 72 slowly rotates in a clockwise direction and the snow-like shaved ice 50a flows in, in a manner similar to an avalanche, along an inner circumferential wall of the receptacle container 10. When the first turntable 72 continues to slowly rotate in this state, the snow-like shaved ice 50a is served in the receptacle container 10 in a substantially even state.

[0056]

Next, Fig. 17 is an overall explanatory diagram of an electrical system. In Fig. 17, reference number 100 denotes an input unit such as a power supply button or a touch panel. Operating information a that is related to ON/OFF of switchitches, detection information of a water level detecting means that is not shown, and driving information b that is related to start and stop of the driving motor 21 are entered into the input unit 100. Reference number 101 denotes a control unit that processes information from the input unit. The control unit 101 includes a storage unit 102 that records therein a control program, and a timer 103 that counts driving time of the driving motor 21. Reference number 104 denotes an output unit, and 105 denotes

a display unit.

[0057]

In addition, a control signal of the control unit 101 is sent to the open/close valve (in the case of an automatic type) 22, the driving motor 21, the first rotation mechanism 70, the compressor 12, and the like through the output unit 104. Therefore, according to the embodiment, the first turntable 27 is capable of rotating as a result of a control signal c from the control unit 101.

10 [Other embodiments]

[0058]

Next, a second embodiment and a third embodiment will be described with reference to Fig. 18 to Fig. 28. Here, in describing these embodiments, sections that are identical to those according to the first embodiment are given the same or similar reference numbers. Redundant descriptions are omitted.

[0059]

Fig. 18 to Fig. 23 are explanatory diagrams of the second embodiment of the present embodiment. The second embodiment takes into consideration other configurations (second turntable 82) in the first embodiment. That is, the second turntable 82 that is smaller than the first turntable 72 and rotated by a second rotation mechanism 80 is rotatably provided in a position that is eccentric in relation to the vertical axial line y on the upper surface of the first turntable 72.

[0060]

In addition, according to the second embodiment, as shown in Fig. 21, a driving motor 83 for the second turntable that has a vertical shaft 81 is fixed to the upper surface of the first turntable 72, and the second turntable 82 that has a downward U-shaped cross-section is supported by the vertical shaft 81 such as to surround the driving motor 83.

[0061]

A rotation speed of the second rotation mechanism 80 that includes the driving motor 83 is a low speed. In addition, the driving motor 83 rotates as a result of a power supply (such as a secondary battery) 84 that is provided inside the second turntable 82. Furthermore, a switch 85 for starting and stopping the driving motor 83 is provided on a peripheral wall 82a of the second turntable 82, and for example, the switch 85 for starting and stopping is controlled by radio waves from a transmitter, not shown, on the control unit 101 side (see Fig. 23). Here, a receiver is provided on the switch 85 side.

[0062]

Fig. 22 shows that, while the first turntable 72 is rotating, the second turntable 82 is also capable of rotating together with the first turntable 72. Preferably, when the first turntable 72 rotates as a result of the control signal from the control unit 101, the second turntable 82 also substantially simultaneously rotates together with the first

turntable 72. In addition, when a predetermined amount of time elapses, the first turntable 72 and the second turntable 82 substantially simultaneously stop. Here, reference number 73 denotes an anti-slip sheet that is adhered to an upper surface
5 of the second turntable 82.

As a result of such a configuration, the snow-like shaved ice 50a can be served in the receptacle container 10 more "evenly" than that according to the first embodiment.

[0063]

10 Finally, Fig. 24 to Fig. 28 are explanatory diagrams of the third embodiment of the present invention. Here, the third embodiment takes into consideration other configurations (open/close door 90) in the first embodiment or the second embodiment.

15 The third embodiment mainly differs from the above-described first example in that the open/close door 90 that shields a front side of the container 10 or an overall circumference of the container 10 that receives the shaved ice is provided in the base 9 on the casing 1 side. According to
20 the embodiment, a semi-cylindrical shielding wall portion 93 is positioned, with required space, on a front side of the container 10 that receives the shaved ice. The open/close door 90 may be manually or electrically rotated, but is preferably electrically rotated. According to the embodiment, the
25 open/close door 90 opens and closes in a circumferential

direction of the first turntable 72 as a result of a control signal from the control unit 101.

[0064]

As shown in Fig. 26 and Fig. 27, the open/close door 90
5 is composed of a ring-shaped flange portion 91 that is fitted outside the first turntable 72, a bevel gear portion 92 that is provided in an annular shape on a lower surface of the flange portion, and the shielding wall portion 93 that is provided in a semi-cylindrical shape on an upper surface of the flange
10 portion. The lower surface of the flange portion 91 is supported on a peripheral edge portion of the fitting hole 9a of the base 9, such as to freely rotate.

[0065]

In addition, the open/close door 90 rotates 180 degrees
15 as a result of driving force from a driving motor 95 of a third rotation mechanism 94 that is provided inside the base 9. According to the embodiment, before the shaved ice is manufactured, the shielding wall portion 93 of the open/close door 90 covers at least the front side of the receptacle container
20 10. Meanwhile, when the shaved ice is manufactured, a driving gear 96 of the driving motor 95 rotates and the open/close door 90 that has the bevel gear portion 92 that ? together with the driving gear 96 rotates 180 degrees. Then, as shown in Fig. 27, the shielding wall portion 93 of the open/close door 90 is
25 positionally displaced to a rear side of the receptacle container

10.

[0066]

As a result of a configuration such as this, during manufacturing, in addition to a realistic feeling being imparted,
5 there is an advantage in that the open/close door 9 does not get in the way because the open/close door 90 does not protrude from left and right ends of the base 9. Here, when the open/close door 90 is manually opened and closed, instead of the above-described bevel gear portion 92, a plurality of arc-shaped
10 slide pieces or an annular slide piece that engages with a guidance member (such as a rail) that is provided in the base 9 and is not shown can be provided.

INDUSTRIAL APPLICABILITY

[0067]

15 For example, the present invention is used to manufacture "non-sticky (not immediately melted), fluffy" snow-like shaved ice for industrial use.

CLAIMS

What is claimed is:

1. A rapid cooling shaved ice manufacturing device comprising:

5 a casing that has left and right protruding support portions;

an ice layer forming rotary drum that is provided in a horizontal state in an attachment space portion between the protruding support portions with left and right bearing members
10 therebetween, and rotates as a result of driving force from a driving motor;

an open-upper-end water storage tray that is arranged in a horizontal state below the ice layer forming rotary drum and temporarily receives "water for shaved ice" from a water
15 supplying portion that is provided in the casing, through a water introduction path;

a shaving blade that is provided in a horizontal state in the left and right protruding support portions such as to substantially be in contact with a front side of the ice layer
20 forming rotary drum, and shaves off a film-like ice layer that is formed on an outer circumferential surface of the ice layer forming rotary drum; and

a guidance member that is provided in a fixed state in the left and right protruding support portions such as to be capable
25 of guiding "snow-like shaved ice" that is shaved off by the

shaving blade in a predetermined direction, wherein further,
a first turntable that rotates as a result of driving force
from a first rotation mechanism is provided in front of a lower
portion side of the casing, and

5 the first turntable is provided such as freely rotate in
a base at an attitude in which a vertical axial line y that passes
through a center thereof and a horizontal axial line x that passes
through a center of the ice layer forming rotary drum and is
projected further frontward than the shaving blade are
10 orthogonal.

2. The rapid cooling shaved ice manufacturing device
according to claim 1, characterized in that:

the first turntable is capable of rotating as a result of
15 a control signal from a control unit.

3. The rapid cooling shaved ice manufacturing device
according to claim 1 or 2, characterized in that:

a second turntable is rotatably provided on an upper
20 surface of the first turntable in a position that is eccentric
in relation to the vertical axial line y , and while the first
turntable is rotating, the second turntable is also capable of
rotating together with the first turntable as a result of driving
force from a second rotation mechanism.

25

4. The rapid cooling shaved ice manufacturing device according to claim 1, characterized in that:

a cylindrical protruding portion that is supported such as to freely rotate by one bearing member is provided in either
5 of the left and right bearing members on one side wall of the ice layer forming rotary drum,

inner and outer narrow elongated circular cylindrical pipes that configure a rapid cooling means are concentrically fitted into the cylindrical protruding portion, and further

10 at least a first sealing member is provided between an outer circumferential surface of the outer narrow elongated circular cylindrical pipe and an inner circumferential surface of an annular recess formed in the cylindrical protruding portion.

15 5. The rapid cooling shaved ice manufacturing device according to claim 1, characterized in that:

the water supplying portion of the casing temporarily stores the "water for shaved ice" that is softened by an ion
20 exchange resin portion and from which germs are removed by a filtration processing portion; and further

the water introduction path that has an open/close valve is connected to the water supplying portion.

25 6. The rapid cooling shaved ice manufacturing device

according to claim 1, characterized in that:

an open/close door that shields a container that receives shaved ice is provided in a base on the casing side, and the open/close door is opened and closed in a circumferential
5 direction of the first turntable.