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(54) **ICE-MAKING MOLD AND ICE-MAKING METHOD**

(57) An ice making mold (100) and an ice making method for preparing transparent ice. The ice making mold (100) comprises: a base (10) having a first body (11), the first body (11) is provided with a first water storage chamber (12), and an upper cover (20) having a second body (21), the second body (20) is provided with a second water storage chamber (22), the second water storage chamber (22) corresponding to the first water storage chamber (12); wherein a thermal conductivity of the first body (11) is greater than the thermal conductivity of the second body (21), and wherein when the upper cover (20) is combined with the base (10), the first water storage chamber (12) and the second water storage chamber (22) form a chamber for containing water for making the transparent ice.

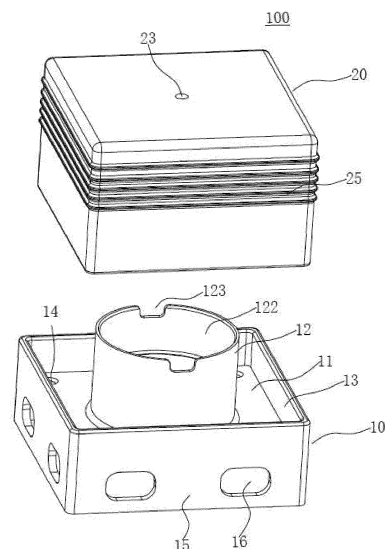


FIG. 1

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Description

TECHNICAL FIELD

[0001] The present invention relates to the field of ice making devices, and particularly to an ice making mold and an ice making method for making transparent spherical ice.

BACKGROUND

[0002] Conventional ice making molds are used to make irregular or cubic or spherical solid ice. During making the solid ice, the surface is first frozen so that impurities and air in water are squeezed towards the center, such that opaque cloud-like matter occurs in finally made solid ice and the crystallinity of the ice is not enough.

[0003] Meanwhile, many ice available in the market are used to chill wine, beverages, etc. Transparent solid ice can make wine, beverages and so on look better; in addition, transparent solid ice free of bubbles naturally have a higher density, melt slowly, and are unlikely to cause the taste of the chilled beverages to be lowered. In addition, the transparent solid ice are not prone to cracking and can maintain the integrity of the shape of the ice.

[0004] In view of the forgoing, it is necessary to provide a new ice making mold to solve the above problems.

SUMMARY

[0005] An object of the present invention is to provide a new ice making mold for making transparent spherical ice, which can make transparent spherical ice by controlling the water in the ice making mold to be cooled and frozen in a single direction.

[0006] This invention provides an ice making mold for making transparent ice, wherein the ice making mold comprises:

a base having a first body, the first body is provided with a first water storage chamber, and an upper cover having a second body, the second body is provided with a second water storage chamber, the second water storage chamber corresponding to the first water storage chamber; wherein the thermal conductivity of the first body is greater than the thermal conductivity of the second body, and wherein when the upper cover is combined with the base, the first water storage chamber and the second water storage chamber form a chamber for containing water for making transparent ice.

[0007] Preferably, the first water storage chamber comprises a first hemispherical chamber located at a lower portion and a cylindrical chamber located at an upper portion, the first hemispherical chamber and the cylindrical

chamber communicate with each other; the second water storage groove includes a second hemispherical chamber; a first edge of the first hemispherical chamber and a second edge of the second hemispherical chamber abut against each other to form a spherical chamber.

[0008] Preferably, wherein an overflow port is provided at an upper end of a wall of the cylindrical chamber.

[0009] Preferably, the second body further comprises a combining slot which is disposed around an outer wall of the second hemispherical chamber, wherein after the base is combined with the upper cover, the wall of the cylindrical chamber is inserted into the combining slot, and the first edge of the first hemispherical chamber and the second edge of the second hemispherical chamber abut against each other to form the spherical chamber.

[0010] Preferably, a vent hole is disposed at a top of the second hemispherical chamber, and the vent hole communicates the spherical chamber with the outside of the upper cover.

[0011] Preferably, the lowest position of the first hemispherical chamber has a first thickness, the lowest position of the second hemispherical chamber has a second thickness, and the first thickness is less than the second thickness.

[0012] Preferably, a first extension portion is disposed on one side of the first body, the first extension portion extends toward the upper cover, and a drainage hole is disposed on the first extension portion and/or the first body.

[0013] Preferably, wherein a second extension portion is disposed on the other side of the first body, the second extension portion extends away from the upper cover, and at least one through hole is disposed on the second extension portion.

[0014] Preferably, wherein the base is a plastic base or a metal base, and the upper cover is a silica gel upper cover.

[0015] This invention provides a method for preparing transparent spherical ice, wherein the method comprises:

Step S1: providing an ice making mold;

Step S2: filling water into a first water storage chamber of a base of the ice making mold;

Step S3: combining an upper cover of the ice making mold with the base, a first edge of a first hemispherical chamber of the base and a second edge of a second hemispherical chamber of the upper cover abutting against each other to form a spherical chamber, the water in the first water storage chamber entering the spherical chamber; and

Step S4: freezing the ice making mold so that the water in the spherical chamber gradually freezes from the first hemispherical chamber toward the second hemispherical chamber to form a transparent ice ball;

wherein, a volume of water entering the spherical chamber accounts for 90% of the volume of the

spherical chamber, and the ice making mold is the ice making mold according to any of the above mentioned ice making mold.

[0016] As compared with the prior art, the present invention provides an ice making mold and an ice making method. The thermal conductivity of the base of the ice making mold is greater than the thermal conductivity of the upper cover, so that the freezing direction of the water contained in the ice making mold can be controlled to form a single-direction freezing manner to obtain transparent ice with a higher transparency.

[0017] The present invention will be described in detail below with reference to the accompanying drawings and specific embodiments, but the detailed description is not intended to limit the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018]

FIG. 1 is a schematic view of an ice making mold before being closed according to the present invention.

FIG. 2 is a schematic cross-sectional view of the ice making mold in FIG. 1.

FIG. 3 is a schematic view of the ice making mold after being closed according to the present invention.

FIG. 4 is a schematic cross-sectional view of the ice making mold in FIG. 3.

DETAILED DESCRIPTION

[0019] In order to make the objectives, technical solutions and advantages of the present invention clearer, the present invention will be further described in detail below with reference to the embodiments and the accompanying drawings. It should be appreciated that the specific embodiments described herein are only intended to explain the present invention, not to limit the present invention.

[0020] FIG. 1 is a schematic view of an ice making mold according to the present invention before being combined. FIG. 2 is a schematic cross-sectional view of the ice making mold in FIG. 1.

[0021] The present invention provides an ice making mold 100 which is suitable for making transparent ice. An example is taken hereunder in which the ice making mold 100 is used to make spherical transparent ice to illustrate the configuration of the ice making mold 100 and a method of making the spherical transparent ice.

[0022] It should be appreciated that in other embodiments of the present invention, transparent ice in various shapes can be formed by changing shapes of a base and a water storage chamber in an upper cover of the ice making mold.

[0023] As shown in FIG. 1 and FIG. 2, the ice making mold 100 comprises a base 10 and an upper cover 20,

wherein a thermal conductivity of the base 10 is greater than the thermal conductivity of the upper cover 20, so that when using the ice making mold 100 to make ice, water gradually gets frozen from a first water storage chamber 12 of the base 10 towards a second water storage chamber 22 of the upper cover 20, thereby forming the transparent ice.

[0024] Preferably, the base 10 is for example a metal base, a plastic base, etc. The metal base is for example made of aluminum or an aluminum alloy material; the plastic base is for example made of a polyethylene (PP) material; the upper cover 20 is for example an upper cover made of a soft material with a poor thermal conductivity and an excellent thermal insulation performance such as silica gel.

[0025] Further referring to FIG. 1 and FIG. 2, the base 10 comprises a first body 11, and the first body is provided with a first water storage chamber 12. The first water storage chamber 12 comprises a first hemispherical chamber 121 located at a lower portion and a cylindrical chamber 122 located at an upper portion, and the first hemispherical chamber 121 and the cylindrical chamber 122 communicate with each other, wherein the wall of the cylindrical chamber 122 is disposed partially around the outer wall of the first hemispherical chamber 121, so that a first edge 1211 of the first hemispherical chamber 121 protrudes from an inner side of the wall of the cylindrical chamber 122.

[0026] The cylindrical chamber 122 protrudes from a first side of the first body 11, and the top of the wall of the cylindrical chamber 122 is higher than the first edge 121. In addition, the top of the wall of the cylindrical chamber 122 has an overflow port 123 for making a volume of the first water storage chamber 12 equal to 90% of the volume of the transparent spherical ice to be made. This is because the density of ice is about 90 percent of the density of water, and the volume of water increases after water freezes. Considering the volume change caused by the above phase transition, the overflow port 123 maintains the volume of the first water storage chamber 12 at 90% of the volume of transparent spherical ice to be made, and the water exceeding this volume flows out through the overflow port 123.

[0027] The base 10 is provided with a drainage hole 14, and the drainage hole 14 may be formed on the first body 11 for draining the water flowing out through the overflow port 123. In the present embodiment, the drainage hole 14 is formed at corners of the first body 11, but not limited to the corners.

[0028] A first extension portion 13 is provided on one side of the first body 11, and the first extension portion 13 extends toward the upper cover 20. The first extension portion 13 is disposed around the edge of the first body 11. The first extension portion 13, part of the first body 11 and the outer side of the wall of the cylindrical chamber 122 form an accommodating space. After the upper cover 20 and the base 10 are combined together, a lower region of the upper cover 20 is combined into the accommodat-

ing space.

[0029] In other embodiments of the present invention, the drainage hole may also be provided on the first extension portion, or the drainage hole may also be provided at a junction of the first extension portion and the first body. That is, the drainage hole can be substantially disposed on the first body and/or the first extension portion.

[0030] A second extension portion 15 is disposed on the opposite side of the first body 11, and the second extension portion 15 extends away from the upper cover 20. The second extension portion 15 is disposed around the edge of the first body 11, wherein the first body 11 is for example a quadrilateral, and the second extension portion 15 comprises a plurality of extension walls corresponding to the quadrilateral, and the plurality of extension walls are respectively provided with at least one through hole 16. The at least one through hole 16 allows cool air to circulate at the second extension portion 15 of the base 10, which improves the heat exchange efficiency of the base 10 and facilitates the water contained in the first water storage chamber 12 to be cooled preferably. The lowest position of the first hemispherical chamber 121 protrudes from the second side of the first body 11, so that the cold air passing through the at least one through hole 16 first starts to cool the lowest position of the first hemispherical chamber 121, controlling the water in the first hemispherical chamber 121 to be cooled and frozen from bottom to top to finally form the transparent ice.

[0031] It needs to be appreciated that the focus of the present invention is to control the water contained in the ice making mold 100 to freeze in a single direction. In the present embodiment, the direction in which the water freezes is from bottom to top, but not limited thereto. In other embodiments of the present invention, depending on the position where the ice making mold is placed, the direction in which the water freezes may be other directions, as long as the water freezes in a single direction.

[0032] In addition, in other embodiments of the present invention, after the ice making mold 100 completes ice making, at least one through hole 16 can be held by the user to separate the base 10 from the upper cover 20.

[0033] The base 10 may be formed by integral molding such as injection molding, 3D printing, or casting.

[0034] As shown in FIG. 1 and FIG. 2, the upper cover 20 comprises a second body 21 and a second hemispherical chamber 22 recessed from a bottom surface 212 of the second body 21 toward a top surface 211, wherein the second hemispherical chamber 22 is used to form an upper half of a spherical chamber S (as shown in FIG. 4). When a second edge 221 of the second hemispherical chamber 22 and the first edge 1211 of the first hemispherical chamber 121 abut against each other, the first hemispherical chamber 121 and the second hemispherical chamber 22 form the spherical chamber S (as shown in FIG. 4). The top surface 211 is opposite to the bottom surface 212.

[0035] The second edge 221 is higher than the bottom

surface 212 of the second body 21, and the bottom surface 212 faces toward the base 10.

[0036] A vent hole 23 is disposed at the highest position of the second hemispherical chamber 22, and the vent hole 23 communicates the second hemispherical chamber 22 with atmosphere outside the top surface 211 of the second body 21. In other words, the vent hole 23 is used to communicate the spherical chamber S with ambient atmosphere, and the excess air in the spherical chamber S is discharged to the ambient atmosphere through the vent hole 23. A diameter of the vent hole 23 is small, about 5 mm.

[0037] The upper cover 20 further comprises a combining slot 24 which is disposed around an outer wall 222 of the second hemispherical chamber 22, and the outer wall 222 can be regarded as a wall of the combining slot 24. The combining slot 24 is adapted to fit with the wall of the cylindrical chamber 122. When the upper cover 20 fits with the base 10, the wall of the cylindrical chamber 122 extends into the combining slot 24. Since the upper cover 20 is made of a silica gel material which has a certain elasticity, when the groove wall of the cylindrical chamber 122 is combined with the combining slot 24, the combining slot 24 and the groove wall of the cylindrical chamber 122 are in close contact with each other, and the excess air between the upper cover 20 and the base 10 can be squeezed and discharged out through the vent hole 23.

[0038] In addition, the second hemispherical chamber 22 is located inside the wall of the cylindrical chamber 122, and the second hemispherical chamber 22 is closely fitted with the wall of the cylindrical chamber 122, so that the second hemispherical chamber 22 and the first hemispherical chamber 121 are in a relatively sealed space. When cooling the water contained in the first hemispherical chamber 121 and the second hemispherical chamber 22, the air dissolved in the water gradually escapes from the first hemispherical chamber 121 toward the second hemispherical chamber 22 and is discharged out through the vent hole 23 at the bottom of the second hemispherical chamber 22 of the upper cover 20.

[0039] On the other hand, a top end of the wall of the cylindrical chamber 122 is further provided with a guiding slope 1221 corresponding to the combining slot 24, and the guiding slope 1221 enables smoother combination of the wall of the cylindrical chamber 122 and the combining slot 24.

[0040] As shown in FIG. 2, a thickness of the lowest position of the first hemispherical chamber 121 is smaller than the thickness of the highest position of the second hemispherical chamber 22. Furthermore, since the thermal conductivity of the base 10 of the ice making mold 100 is greater than the thermal conductivity of the upper cover 20, the direction in which water freezes can be better controlled when the thickness of the lowest position of the first hemispherical chamber 121 is smaller than the thickness of the highest position of the second hemispherical chamber 22.

[0041] FIG. 3 is a schematic view of the ice making mold according to the present invention after being closed. FIG. 4 is a schematic cross-sectional view of the ice making mold in FIG. 3.

[0042] The combination of the ice making mold 100 of the present invention will be described in detail below with reference to FIG. 3 and FIG. 4.

[0043] As shown in FIG. 3 and FIG. 4, the ice making mold 100 is closed by combining the upper cover 20 with the base 10, wherein the wall of the cylindrical chamber 122 of the first water storage chamber 12 of the base 10 is inserted into the combining slot of the upper cover 20. At this time, the wall of the cylindrical chamber 122 is closely fitted with the combining slot 24, and the outer wall 222 of the second hemispherical chamber 22 is closely fitted with the inner side of the groove wall of the cylindrical chamber 122, so that the spherical chamber S formed by the first hemispherical chamber 121 and the second hemispherical chamber 22 is in a relatively sealed space. The interior of the spherical chamber S communicates with the external through the vent hole 23 in the upper cover 20. In addition, a lower portion of the second body 21 of the upper cover 20 is caught in an accommodating space between the outer side of the wall of the cylindrical chamber 122 and the inner side of the first extension portion 13, and the upper cover 20 is stably combined to the base 10.

[0044] When the ice making mold 100 is used to make spherical transparent ice, it is placed in a freezing environment, and cold passes through at least one through hole 16 in the second extension portion 15 of the first body 11 of the base 10 and performs heat exchange with the bottom (the lowest position) of the first hemispherical chamber 121. Since the bottom (the lowest position) of the first hemispherical chamber 121 has a small thickness and a high thermal conductivity, it is cooled down first. However, the upper cover 20 has a small thermal conductivity, and the bottom of the second hemispherical chamber 22 in the second body 21 of the upper cover 20 has a large thickness, so it is difficult for the bottom of the second hemispherical chamber 22 to exchange heat with the cold in the freezing environment. When the water in the lower portion of the first hemispherical chamber 121 is cooled and frozen, the cold will be gradually transferred from the first hemispherical chamber 121 towards the second hemispherical chamber 22, so that the ice is gradually formed from bottom to top, and the air dissolved in the water is squeezed toward the upper portion of the water and discharged out through the vent hole 23 to obtain spherical transparent ice with a high degree of transparency.

[0045] The present invention further provides an ice making method for making ice by using the ice making mold 100 shown in FIG. 1, the ice making method comprising:

- Step S1: providing the ice making mold ;
- Step S2: filling water into the first water storage

chamber of the base of the ice making mold;

Step S3: combining the upper cover of the ice making mold with the base, and the second edge of the second hemispherical chamber of the upper cover abutting against the first edge of the first hemispherical chamber in the first water storage chamber to form a spherical chamber, the water in the first water storage chamber entering the spherical chamber; and Step S4: freezing the ice making mold so that the water in the spherical chamber gradually freezes from the first hemispherical chamber toward the second hemispherical chamber to form a transparent ice ball ;

Wherein, the volume of water entering the spherical chamber accounts for 90% of the volume of the spherical chamber, and the ice making mold 100 is as stated above.

[0046] In addition, the ice making method further comprises step S5: opening the base 10 and the upper cover 20 , and taking out the transparent ice ball. The user holding at least one through hole 16 on the second extension portion 15 of the base 10 with one hand and holding an anti-slip pattern 25 on the outer surface of the upper cover 20 with the other hand, rotates the based 10 and the upper cover 20 in opposite directions and/or draws the based 10 and the upper cover 20 to separate them, and then takes out the transparent ice ball.

[0047] In addition, in step S3 of combining the upper cover of the ice making mold with the base, since the first water storage chamber 12 is filled with water in advance, when the outer wall 222 of the second hemispherical chamber 22 slides against the inner side of the wall of the cylindrical chamber 122 until the second edge 221 abuts against the first edge 1211. At this time, a small amount of water in the first water storage chamber 12 might overflow through the overflow port 123 at the top of the groove wall of the cylindrical chamber 122 and flow along the outer surface of the groove wall of the cylindrical chamber to the first side of the first body 11 , and be discharged out through the drainage hole 14.

[0048] To sum up, the present invention provides an ice making mold and an ice making method using the same. The thermal conductivity of the base of the ice making mold is greater than the thermal conductivity of the upper cover, so that the freezing direction of the water contained in the ice making mold can be controlled to form a single direction freezing manner to obtain transparent ice with a higher transparency.

[0049] Certainly, the present invention can also have other various embodiments. Without departing from the spirit and essence of the present invention, those skilled in the art can make various corresponding changes and variations according to the present invention, but these corresponding changes and variations all should fall within the protection scope of the appended claims of the present invention.

Claims

1. An ice making mold for making transparent ice, wherein the ice making mold comprises:

a base having a first body, the first body is provided with a first water storage chamber, and an upper cover having a second body, the second body is provided with a second water storage chamber, the second water storage chamber corresponding to the first water storage chamber; wherein the thermal conductivity of the first body is greater than the thermal conductivity of the second body, and wherein when the upper cover is combined with the base, the first water storage chamber and the second water storage chamber form a chamber for containing water for making transparent ice.

2. The ice making mold according to claim 1, wherein the first water storage chamber comprises a first hemispherical chamber located at a lower portion and a cylindrical chamber located at an upper portion, the first hemispherical chamber and the cylindrical chamber communicate with each other; wherein the second water storage groove comprises a second hemispherical chamber; a first edge of the first hemispherical chamber and a second edge of the second hemispherical chamber abut against each other to form a spherical chamber.

3. The ice making mold according to claim 2, wherein an overflow port is provided at an upper end of a wall of the cylindrical chamber.

4. The ice making mold according to claim 2, wherein the second body further comprises a combining slot which is disposed around an outer wall of the second hemispherical chamber, wherein after the base is combined with the upper cover, the wall of the cylindrical chamber is inserted into the combining slot, and the first edge of the first hemispherical chamber and the second edge of the second hemispherical chamber abut against each other to form the spherical chamber.

5. The ice making mold according to claim 2, wherein a vent hole is disposed at a top of the second hemispherical chamber, and the vent hole communicates the spherical chamber with the outside of the upper cover.

6. The ice making mold according to claim 2, wherein the lowest position of the first hemispherical chamber has a first thickness, the lowest position of the second hemispherical chamber has a second thickness, and the first thickness is less than the second thick-

ness.

7. The ice making mold according to claim 1, wherein a first extension portion is disposed on one side of the first body, the first extension portion extends toward the upper cover, and a drainage hole is disposed on the first extension portion and/or the first body.

8. The ice making mold according to claim 1, wherein a second extension portion is disposed on the other side of the first body, the second extension portion extends away from the upper cover, and at least one through hole is disposed on the second extension portion.

9. The ice making mold according to claim 1, wherein the base is a plastic base or a metal base, and the upper cover is a silica gel upper cover.

10. A method for preparing transparent spherical ice, wherein the method comprises:

Step S1: providing an ice making mold;

Step S2: filling water into a first water storage chamber of a base of the ice making mold;

Step S3: combining an upper cover of the ice making mold with the base, a first edge of a first hemispherical chamber of the base and a second edge of a second hemispherical chamber of the upper cover abutting against each other to form a spherical chamber, the water in the first water storage chamber entering the spherical chamber; and

Step S4: freezing the ice making mold so that the water in the spherical chamber gradually freezes from the first hemispherical chamber toward the second hemispherical chamber to form a transparent ice ball;

Wherein a volume of water entering the spherical chamber accounts for 90% of the volume of the spherical chamber, and the ice making mold is the ice making mold according to any of claims 1-9.

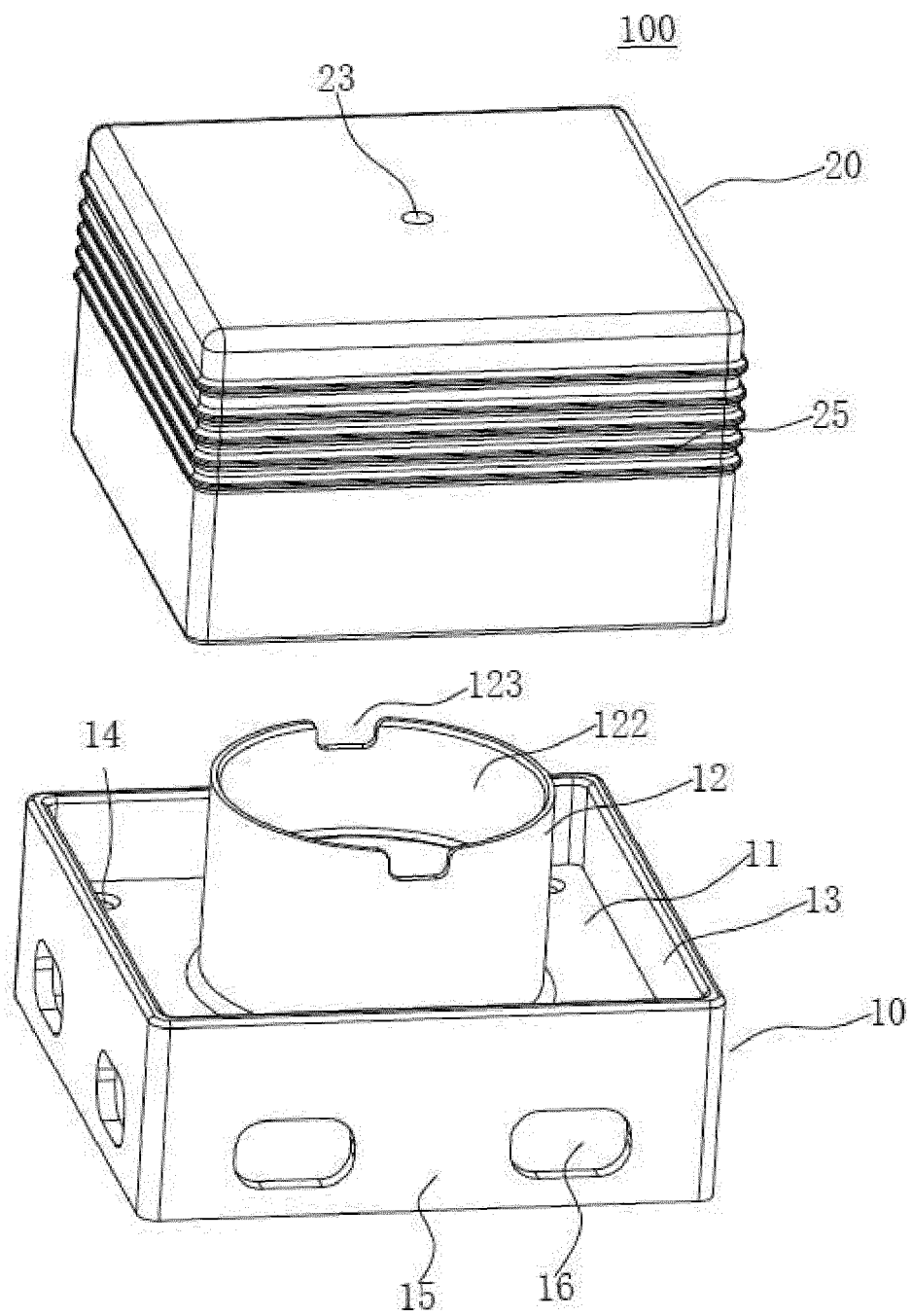


FIG.1

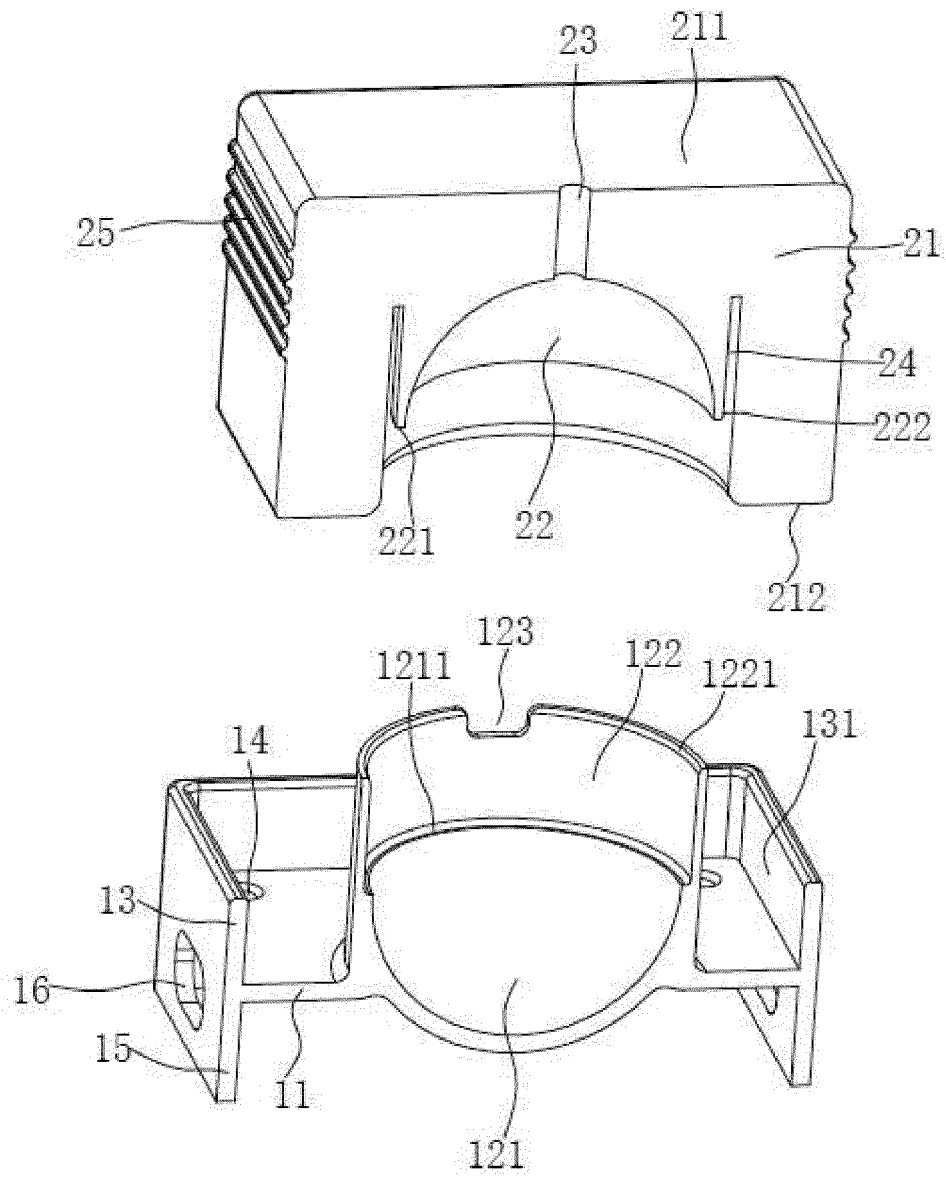


FIG.2

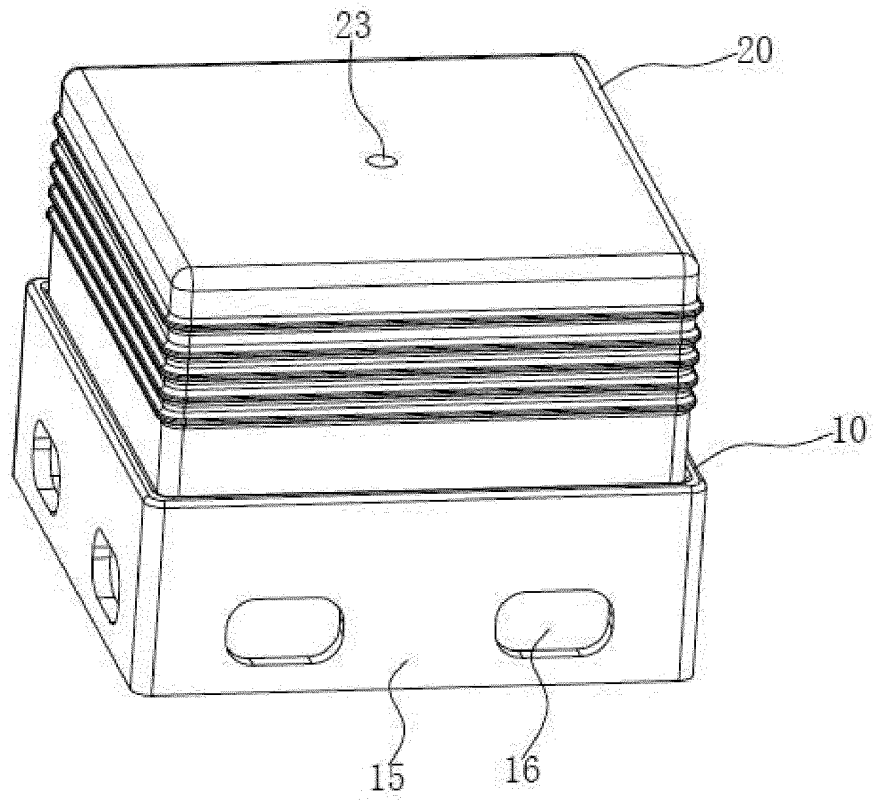


FIG.3

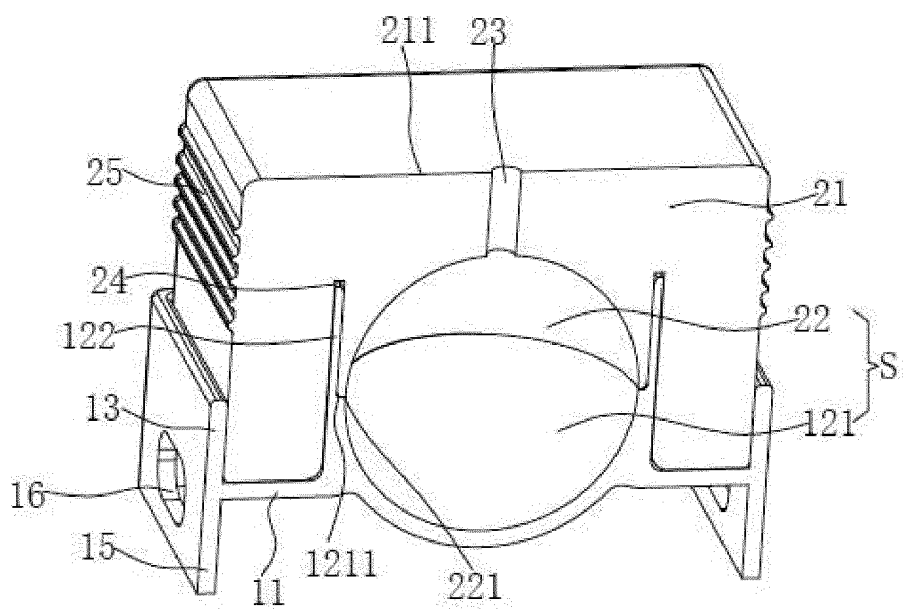


FIG.4

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2020/137534

A. CLASSIFICATION OF SUBJECT MATTER

F25C 1/22(2018.01)i; F25C 5/04(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

F25C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CNABS, CNTXT, SIPOABS, DWPI, 读秀, 中国期刊网全文数据库: 结冰方向, 单向结冰, 排水孔, 导热, 热导, 传热, 排气孔, 半球, 延伸, 延伸部, 凸缘, 透明度, 溢流口, 排水, 厚度, 通气, 制冰, air, vent, wall, heat, transfer+, refrigerat+, cell, groove, ice, maker, bottom, lid, cover, hole, outflow+, thickness, drainage, drip, vai, through, hemisphere, stretch+, extend

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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☐ Further documents are listed in the continuation of Box C.
 ☒ See patent family annex.

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Date of the actual completion of the international search

08 March 2021

Date of mailing of the international search report

22 March 2021

Name and mailing address of the ISA/CN

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Authorized officer

Telephone No.

Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

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