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(71) Applicant: **SAMSUNG ELECTRONICS CO., LTD.
Suwon-si,
Gyeonggi-do (KR)**

(72) Inventors:
• **Seo, Kook-jeong,**
Shinhyundai Apt. 3-801
Seoul (KR)
• **Yoon, Won-jae,**
Hyundai Apt. 1-1201,
Seoul (KR)
• **Lee, Jae-seung,**
Hyundai Apt. 210-102,
Gyeonggi-do (KR)

(74) Representative: **Derry, Paul Stefan et al**
Venner Shipley LLP
20 Little Britain
London EC1A 7DH (GB)

(54) **Icemaker**

(57) An icemaker, includes an ice cube tray (20) formed with cubes (22) to be filled with the water. The icemaker also includes an ultrasonic vibrator (70) attached to the ice cube tray, to apply ultrasonic vibration

to the ice cube tray to undulate the water filled in the cubes. Thus, air included in water filled in cubes of an ice cube tray is uniformly removed

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Description

[0001] The present invention relates to an icemaker, comprising an ice cube tray comprising a plurality of depressions for holding water; and an ultrasonic vibrator.

[0002] Generally, an icemaker is used to freeze water, and is widely employed in household appliances such as refrigerators and water purifiers. The quality of the icemaker is determined according to the transparency and strength of the ice made thereby.

[0003] A conventional icemaker includes an ice cube tray, a water supply to supply water into the ice cube tray, and a driver to twist the ice cube tray to release the ice from the ice cube tray. A conventional icemaker also includes an ice reservoir to receive the ice that has fallen from the ice cube tray and an air-removing unit to remove air from water in the ice cube tray.

[0004] When an icemaking process begins, the water is first frozen at a surface thereof. Thus, air present in the water cannot be discharged from the water. The air included in the ice reduces the transparency and the strength of the ice, thereby causing the ice to be easily broken when the ice is released from the ice cube tray. To solve this problem, there has been used a method of undulating the water filled in the ice cube tray. An icemaker which undulates the water filled in the ice cube tray includes a reciprocating unit to reciprocate the ice cube tray or an ultrasonic vibrator to directly vibrate the water. Icemakers including the reciprocating unit and ultrasonic vibrator are disclosed in Korean Patent Application Nos. 1995-18572 and 2001-26283, respectively.

[0005] The structure of the reciprocating unit can be complicated and difficult to install. Also, the efficiency of removing the air from water filled in the ice cube tray may not be good.

[0006] The structure of the ultrasonic vibrator is relatively simple. However, ultrasonic vibration of the ultrasonic vibrator is not uniformly applied to the water filled in the ice cube tray and partitioned into a plurality of cubes. Thus, the efficiency of removing the air from water filled in the ice cube tray is not uniform.

[0007] Accordingly, it is an aim of the present invention to provide an icemaker in which air included in water filled in cubes of an ice cube tray is more uniformly removed.

[0008] The invention is characterized in that the ultrasonic vibrator is operable to apply ultrasonic vibrations directly to the ice cube tray.

[0009] Embodiments of the present invention will now be described with reference to the accompanying drawings of which:

Figure 1 is a perspective view of one embodiment of an icemaker according to the present invention; Figure 2 is an exploded perspective view of the icemaker of Figure 1; Figure 3 is a perspective view illustrating an operation of the icemaker of Figure 1; and Figure 4 is a plan view of an ice cube tray of the

icemaker of Figure 2.

[0010] As shown in Figures 1 through 4, an icemaker includes an ice cube tray 20 formed with a plurality of depressions 22, a driver 30 coupled with the ice cube tray 20, to rotate the ice cube tray 20, and a stopper 40 to contact one end of the rotated ice cube tray 20 to cause the ice cube tray 20 to be twisted.

[0011] The icemaker also includes a supporting bracket 50 to support the ice cube tray 20 and the driver 30, an ice reservoir 60 placed under the ice cube tray 20 to receive ice released from the ice cube tray 20, and an ultrasonic vibrator 70 coupled to the ice cube tray 20, to vibrate the ice cube tray 20.

[0012] The ice cube tray 20 has a rectangular shape, and its opposite sides thereof are provided with a driver coupling groove 24 to be coupled with a rotating shaft (not shown) of the driver 30. The ice cube tray 20 also includes a supporting shaft 26 to be stably and rotatably supported in the supporting bracket 50.

[0013] The plurality of depressions 22 of the ice cube tray 20 are arranged along longitudinal and transverse directions, allowing the ice cube tray 20 to make a plurality of ice-cubes. Ice may be released from the depression 22 when the driver 30 rotates and twists the ice cube tray 20.

[0014] The driver 30 includes a motor (not shown) to generate a rotational force. The driver 30 also includes the rotating shaft (not shown) to connect the motor with the driver coupling groove 24 and to transfer the rotational force from the motor to the ice cube tray 20, rotating the ice cube tray 20 at a predetermined angle. The driver 30 may be selected among well-known drivers.

[0015] The stopper 40 is provided in one side of the supporting bracket 50, to stop one side of the ice cube tray 20 from rotating. This causes the ice cube tray 20 to twist. The shape and position of the stopper may vary as long as the ice cube tray 20 can be supported and twisted.

[0016] The supporting bracket 50 is connected to the ice cube tray 20 and the driver 30. The supporting bracket 50 has a supporting shaft coupling groove 52 at one side to which the supporting shaft 26 of the ice cube tray 20 is coupled and supported.

[0017] The ultrasonic vibrator 70 vibrates the ice cube tray 20 and indirectly undulates water filled in the depressions 22 of the ice cube tray 20, discharging air from the water. Thus, the air is uniformly removed from the water filled in the depressions 22 of the ice cube tray 20.

[0018] The ultrasonic vibrator 70 is attached to an outer side of the ice cube tray 20. The position of the ultrasonic vibrator may vary as long as it causes the ice cube tray to vibrate. Further, more than one ultrasonic vibrator may be provided.

[0019] Also, the ultrasonic vibrator may be detachably provided in the ice cube tray 20. Therefore, when the quality of the ice is not important, for example, when shattered ice is needed, the ultrasonic vibrator may be detached from the ice cube tray 20.

[0020] According to the configuration above, operations of the icemaker will now be described with respect to Figure 3.

[0021] First, the depressions 22 of the ice cube tray 20 are filled with water supplied from a water supply. Then, the water filled in the depressions 22 is frozen by driving a freezing unit (not shown). While the water is being frozen, the ultrasonic vibrator 70 vibrates the ice cube tray 20, discharging air from the water.

[0022] When the water has frozen, the driver 30 drives the ice cube tray 20 in order to release the ice from the depressions 22. The ice cube tray 20 rotates to a predetermined angle and contacts the stopper 40 provided in one side of the supporting bracket 50.

[0023] The driver 30 continues to drive the ice cube tray 20 to rotate in a state whilst one side of the ice cube tray 20 is stopped by the stopper 40 so the other side thereof continues to rotate, thereby twisting the ice cube tray 20. Thus, the ice is released from the depressions 22 and falls into the ice reservoir 60 placed under the ice cube tray 20.

[0024] In the above-described embodiment, the the icemaker twists the ice cube tray 20 to release the ice from the ice cube tray 20. However, the ultrasonic vibrator may be applied to an icemaker that includes a heater and an ice-releasing blade to release the ice from the ice cube tray. In this case, the ultrasonic vibrator should be placed such that it is not affected by the heater.

[0025] As described above, the present invention provides an icemaker in which an ultrasonic vibrator is attached to an ice cube tray, so that the ultrasonic vibrator is easily installed and air is uniformly discharged from water filled in cubes of the ice cube tray, enhancing the transparency and the strength of the ice.

[0026] Although embodiments of the present invention have been shown and described, it will be appreciated by those skilled in the art that changes may be made in these embodiments without departing from the principles of the invention, the scope of which is defined in the appended claims.

Claims

1. An icemaker, comprising:

an ice cube tray (20) comprising a plurality of depressions (22) for holding water; and
an ultrasonic vibrator (70),

characterized in that the ultrasonic vibrator is operable to apply ultrasonic vibrations directly to the ice cube tray.

2. An icemaker as claimed in claim 1, wherein the ultrasonic vibrator is coupled directly to the ice cube tray.

3. An icemaker as claimed in claim 2, wherein the ul-

trasonic vibrator is attached to the outside of the ice cube tray.

4. An icemaker as claimed in claim 2 or claim 3, wherein the ultrasonic vibrator is detachable from the ice cube tray.

5. An icemaker to freeze water into ice, comprising:

an ice cube tray formed with cubes to be filled with the water; and
an ultrasonic vibrator attached to the ice cube tray, to apply ultrasonic vibration to the ice cube tray to undulate the water filled in the cubes.

6. The icemaker according to claim 5, wherein the ultrasonic vibrator is attached to an outer side of the ice cube tray.

7. The icemaker according to claim 5, wherein the ultrasonic vibrator is detachably provided in the ice cube tray.

8. The icemaker according to claim 7, wherein the ultrasonic vibrator is detachably provided in the ice cube tray.

9. The icemaker according to claim 5, wherein the ultrasonic vibrator is plurally provided in the ice cube tray.

10. An icemaker, comprising:

an ice cube tray formed with a plurality of cubes to be filled with water;
a driver coupled to the ice cube tray, to rotate the ice cube tray;
a stopper to contact one end of the rotated ice cube tray, to cause the ice cube tray to be twisted;
a supporting bracket to support the ice cube tray and driver;
an ice reservoir placed under the ice cube tray, to receive ice released from the ice cube tray; and
an ultrasonic vibrator coupled to the ice cube tray, to vibrate the ice cube tray and undulate the water filled in the cubes.

11. The icemaker according to claim 10, further comprising:

a rotational shaft provided in the driver;
a driver coupling groove coupled with a rotational shaft of the driver; and
a motor provided in the driver, to generate a rotational force,
wherein the rotational shaft connects the motor

with the driver coupling groove and transfers the rotational force from the motor to the ice cube tray, rotating the ice cube tray at a predetermined angle.

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- 12.** The icemaker according to claim 11, further comprising:

a supporting shaft stably and rotatably supported in the supporting bracket.

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- 13.** The icemaker according to claim 12, wherein the supporting bracket comprises:

a supporting shaft coupling groove at one side of the supporting bracket to which the supporting shaft is coupled and supported, the supporting bracket being connected to the ice cube tray and the driver.

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- 14.** The icemaker according to claim 10, wherein the stopper is provided in one side of the supporting bracket, to stop one side of the ice cube tray from rotating, twisting the ice cube tray.

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- 15.** The icemaker according to claim 10, wherein the driver drives the ice cube tray to rotate in a state in which one side of the ice cube tray is supported by the stopper, one side of the ice cube tray is stopped by the stopper, and an other side continues to rotate, twisting the ice cube tray.

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- 16.** The icemaker according to claim 10, wherein the ultrasonic vibrator is detachably provided in the ice cube tray.

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- 17.** The icemaker according to claim 10, wherein the ultrasonic vibrator is plurally provided in the ice cube tray.

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FIG. 1

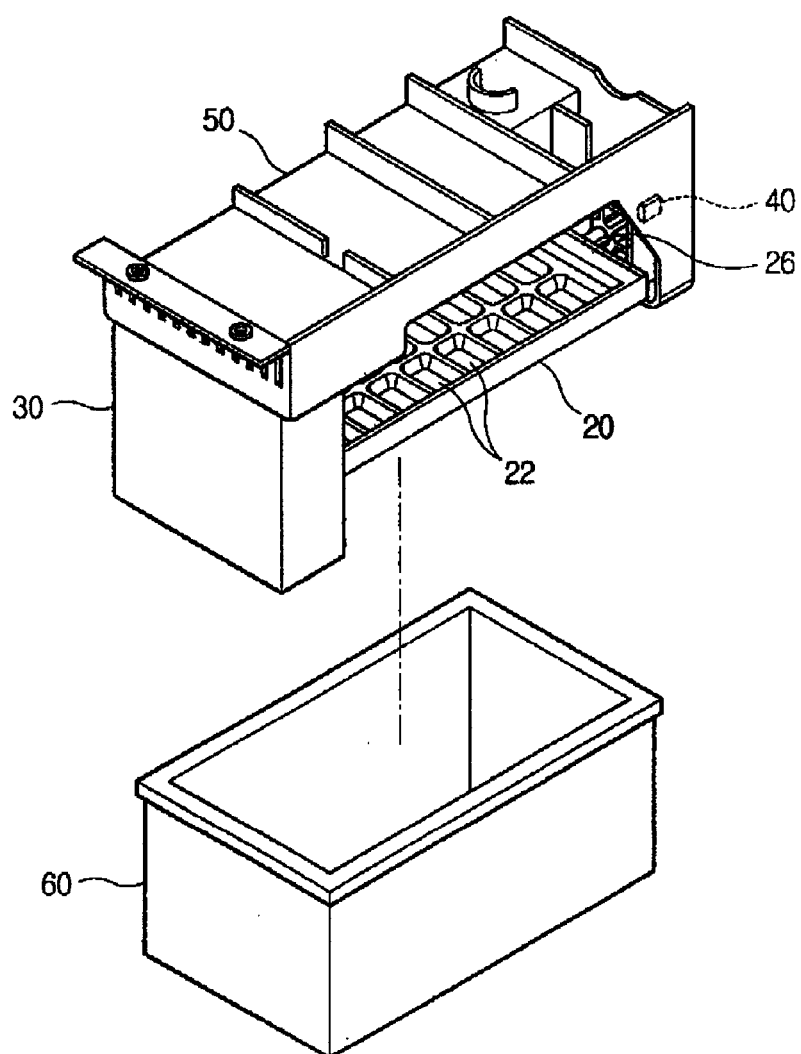


FIG. 2

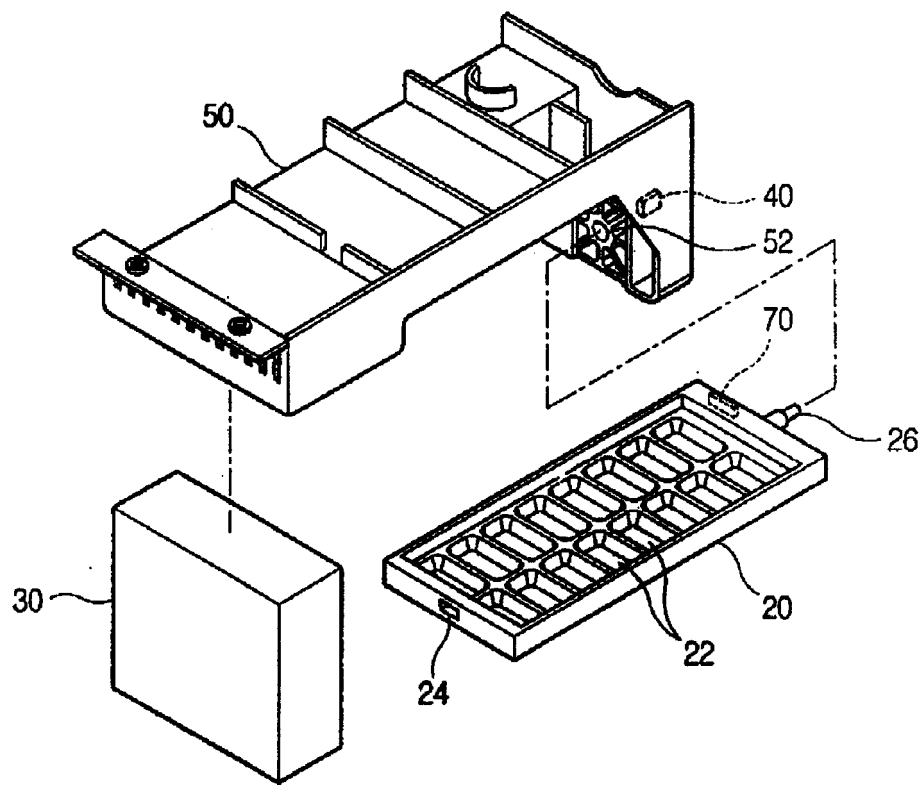


FIG. 3

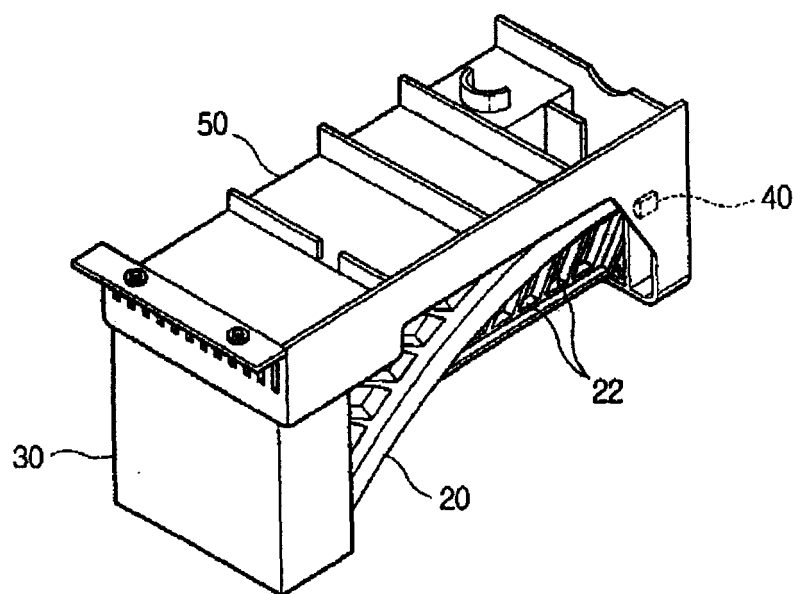


FIG. 4

