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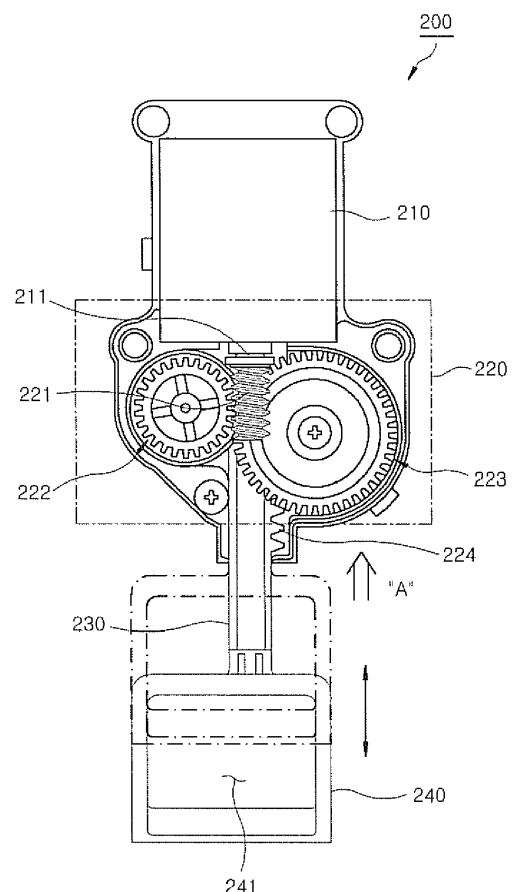
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(54) **AN ICE SELECTOR APPARATUS AND METHOD**

(57) Embodiments include ice selector devices and methods. In one embodiment, an ice selector operates to crush ice in a refrigerator with relatively low operating noise. In one embodiment, a refrigerator ice selector, comprises: a motor portion (210) configured to rotate a shaft (211); a reducer (220) configured to be coupled to the motor portion; a connecting rod portion (230) coupled to the reducer, the connecting rod configured to perform a linear reciprocating motion depending on a rotating direction of the shaft; and a lever portion (240) having one side coupled to the connecting rod portion and the other side coupled to a connection member of an ice crusher, the lever portion configured to provide an external force to the connection member depending on a force from the connecting rod portion. The motor portion can be a DC motor which includes a shaft that can rotate two different directions.

FIG. 3



Description

Related Applications

[0001] This application is based on and claims priority to Korean Patent Application No. 10-2015-0085831, filed on June 17, 2015, the disclosure of which is incorporated herein in its entirety by reference.

Field of the Invention

[0002] The present invention relates to an ice selector for crushing ice for a refrigerator and a method of operating the ice selector.

Background of the Invention

[0003] A refrigerator is an apparatus for storing food at a relatively low temperature and may be configured to store food in a frozen state or a refrigerated state. A decision to store food in a frozen state or refrigerated state may depend on the kind of food to be stored.

[0004] The interior of the refrigerator is cooled by supplied cold air, in which the cold air is typically generated by a temperature exchange action of a refrigerant according to a cooling cycle including compression, condensation, expansion and evaporation. The cold air supplied to the inside of the refrigerator can be distributed in the refrigerator by convection. Thus, items within the refrigerator can be stored at a desired temperature.

[0005] A refrigerator typically includes a main body having a rectangular parallelepiped shape with an open front side. A refrigerating compartment (e.g., refrigerating space, portion, room, etc.) and a freezing compartment (e.g., freezing space, portion, room, etc.) may be provided within the main body. A refrigerating compartment door and a freezing compartment door for selectively closing and opening the refrigerator compartment and the freezing compartment may be provided on the front side or surface of the main body. A plurality of drawers, shelves and container boxes for storing different kinds of food in a desired state may be provided in the internal storage spaces of the refrigerating compartment and freezing compartment.

[0006] Conventionally, mainstream refrigerators are top-mount-type refrigerators having a freezing compartment positioned at an upper side or portion of the refrigerator and a refrigerating compartment positioned at the lower side or portion of the refrigerator. There are also commercially available bottom-freeze-type refrigerators. Bottom-freeze-type refrigerators can enhance user convenience in which a more frequently-used refrigerating compartment is positioned at an upper portion of the refrigerator and a less frequently used freezing compartment is positioned at a lower portion of the refrigerator. This provides an advantage in that a user can conveniently use the refrigerating compartment. However, the bottom-freeze-type refrigerators (in which the freezing

compartment is positioned at the lower portion or side) can pose an inconvenience when a user does access the freezing compartment, in that a user typically has to bend at the waist to open the freezing compartment door (e.g., to take out pieces of ice, food, etc.).

[0007] Traditional attempts at solving the above problem in the bottom freeze type refrigerators have included an ice dispenser installed in the refrigerating compartment or refrigerating compartment door in some implementations. In this approach, the refrigerating compartment door or the inside of the refrigerating compartment may be provided with an ice maker which generates ice.

[0008] The ice-making device may include an ice-making assembly provided with an ice tray for producing pieces of ice (e.g., in various shapes including cubes, cylindrical, semi-spherical, etc.), an ice bucket which stores the pieces of ice, and a feeder assembly which feeds the pieces of ice stored in the ice bucket to the dispenser.

[0009] The ice which is made in the ice making assembly may fall to the ice bucket positioned below the ice tray and may accumulate inside the ice bucket. Further, the ice which is stored in the ice bucket may be transferred to a front discharge port by the transfer assembly.

[0010] The transfer assembly may be configured to include an auger motor generating a torque applied to an auger that transfers ice forward, a flange coupled with the auger to transfer the torque of the auger motor to the auger, an ice crusher rotating together with the auger to crush ice, and an ice selector for selecting whether or not the ice is crushed by the ice crusher.

[0011] In this configuration, the ice selector is an apparatus which may be coupled via a connection member (e.g., link, etc.) to the ice crusher. The ice crusher typically includes an AC motor supplied with AC power, a moving member connected to the AC motor, and a lever portion connected to the moving member and the connection member. The lever portion selectively provides an external force to the connection member depending on a position of the lever portion corresponding to a selection of whether or not to crush ice.

[0012] However, traditional ice selectors are typically operated at a relatively high voltage since the AC motor is supplied with the AC power. This can have a very loud operating sound that causes additional noise while crushing ice. Furthermore, traditional ice selectors are often supplied with the AC power even in the standby state (e.g., when it does not crush ice) resulting in increased power consumption. A conventional standby state can result in heat generation even when not crushing ice. The heat generation can increase a risk of fire. Even if traditional ice selectors may be operated quickly (e.g., by directly transmitting power or force from the AC motor to the moving member, etc.), usually there is still an objectionable operating noise.

Summary of the Invention

[0013] Embodiments include ice selector devices and

methods. In one embodiment, an ice selector operates to crush ice in a refrigerator with relatively low operating noise. The ice selector is capable of increasing performance while reducing power consumption and reducing heat output by not applying power in a standby state in which ice is not crushed.

[0014] In one embodiment, a refrigerator ice selector, comprises: a motor portion configured to rotate a shaft; a reducer configured to be coupled to the motor portion; a connecting rod portion coupled to the reducer, the connecting rod configured to perform a linear reciprocating motion depending on a rotating direction of the shaft; and a lever portion having one side coupled to the connecting rod portion and the other side coupled to a connection member of an ice crusher, the lever portion configured to provide an external force to the connection member depending on a force from the connecting rod portion. The motor portion can be a DC motor which includes a shaft that can rotate two different directions.

[0015] In one exemplary implementation, the reducer can include: a worm gear portion formed on a rotating shaft of the motor portion; a first gear portion coupled to the worm gear portion, the first gear portion configured to rotate depending on force from the worm gear portion; a second gear portion coupled to the first gear portion, the second gear portion configured to move based upon a force from the first gear portion, second gear portion having a diameter larger than that of the first gear portion; and a rack gear portion formed at one side of the connecting rod portion, the rack gear configured to be supplied with a force from the second gear portion and include a rack gear portion. The first gear portion can include: a first driven gear coupled to the worm gear portion; and a driving gear coupled to the first driven gear, the driving gear configured to rotate with the first driven gear. The second gear portion can include: a second driven gear coupled to the driving gear; and a pinion gear coupled to the second driven gear and the rack gear portion, the pinion gear configured to rotate with the second driven gear. The driving gear can have a substantially equal or smaller diameter size than that of the first driven gear, the second driven gear has a diameter larger than that of the driving gear, and the pinion gear has a substantially equal or smaller diameter size than that of the second driven gear. The lever portion may include a connection groove in which the connection member is fitted.

[0016] In one embodiment, a method of crushing ice includes: selectively operating a motor causing a shaft to rotate in a first direction or a second direction; introducing a difference between a first speed and a first torque at which a first gear coupled to the shaft rotates and a second speed and second torque at which a second gear rotates, the first gear coupled to the second gear; moving a support member of an ice crusher in accordance with rotation of the second gear; and crushing ice in accordance with the selective operation of the motor. The motor can be a DC motor. The method can further comprise an ice selector process including: receiving a

rotational first force from the shaft; translating the rotational first force to a rotational second force; and converting the rotational second force into a rotational third force; wherein the rotational second force is generated at a greater rotational speed and lower torque than the rotational third force; and transforming the rotational third force into a linear fourth force. The force from the shaft can be translated into a force of the first gear. The converting can include converting the second force into the third force, wherein a first rotation speed and torque associated with the second force and a second rotation speed and torque associated with the third force are different. The converting can include creating a difference in a first rotational speed and first torque associated with the first gear compared to a second rotational speed and second torque associated with the second gear. The size of the first gear portion can be different from the size of the second gear portion.

[0017] In one embodiment a reducer can include: a worm gear portion formed on a rotating shaft of the motor portion; a first gear portion coupled to the worm gear portion, the first gear portion configured to rotate depending on force from the worm gear portion; a second gear portion coupled to the first gear portion, the second gear portion configured to move based upon a force from the first gear portion and the second gear portion having a diameter larger than that of the first gear portion; and a rack gear portion formed at one side of the connecting rod portion, the rack gear configured to be supplied with a force from the second gear portion and include a rack gear portion. The first gear portion can include: a first driven gear coupled to the worm gear portion; and a driving gear coupled to the first driven gear, the driving gear configured to rotate with the first driven gear. The second gear portion can include: a second driven gear coupled to the driving gear; and a pinion gear coupled to the second driven gear and the rack gear portion, the pinion gear configured to rotate with the second driven gear. The driving gear can have a substantially equal or smaller diameter size than that of the first driven gear, the second driven gear has a diameter larger than that of the driving gear, and the pinion gear has a substantially equal or smaller diameter size than that of the second driven gear. The lever portion can include a connection groove in which the connection member is fitted.

Brief Description of the Drawings

[0018] The objects and features of the present invention will become apparent from the following description of embodiments given in conjunction with the accompanying drawings, in which:

FIG. 1 is a perspective view illustrating an ice maker of a refrigerator in which an ice selector for crushing ice according to an embodiment of the present invention is installed;

FIG. 2 is a side cross-sectional view of FIG. 1;

FIG. 3 is a diagram illustrating a configuration of the ice selector for crushing ice according to an embodiment of the present invention; and

FIG. 4 is a diagram viewing FIG. 3 from "A".

FIG. 5 is a flow chart of an exemplary ice crushing method in accordance with one embodiment.

FIG. 6 is a flow chart of an exemplary ice selector operation method in accordance with one embodiment. The ice selector method can include a process of reducing the power or force supplied from a motor portion by a reducer.

Detailed Description of the Embodiments

[0019] Reference will now be made in detail to the preferred embodiments, examples of which are illustrated in the accompanying drawings. While the invention will be described in conjunction with the preferred embodiments, it will be understood that they are not intended to limit the invention to these embodiments. On the contrary, the invention is intended to cover alternatives, modifications and equivalents, which may be included within the spirit and scope of the invention as defined by the appended claims. Furthermore, in the following detailed description of the present invention, numerous specific details are set forth in order to provide a thorough understanding of the present invention. However, it will be obvious to one ordinarily skilled in the art that the present invention may be practiced without these specific details. In other instances, well known methods, procedures, components, and circuits have not been described in detail as not to unnecessarily obscure aspects of the current invention.

[0020] Terms including an ordinal number such as 'first', 'second', etc., can be used to describe various components, but the components are not to be construed as being limited to the terms. The terms are used to distinguish one component from another component.

[0021] It is to be understood that when one element is referred to as being "connected to" or "coupled to" another element, it may be connected directly to or having another element intervening inbetween. On the other hand, it is to be understood that when one element is referred to as being "connected directly to" or "coupled directly to" another element, it may be connected to or coupled to another element without the other element intervening inbetween.

[0022] Terms used in the present application are used in order to describe specific embodiments rather than limiting the present invention. Singular forms are intended to include plural forms unless the context clearly indicates otherwise. It will be further understood that the terms "comprises" or "have" used in this application, specify the presence of stated features, numerals, steps, operations, components, parts, or a combination thereof, but do not preclude the presence or addition of one or more other features, numerals, steps, operations, components, parts, or a combination thereof.

[0023] FIG. 1 is a perspective view illustrating an ice maker of a refrigerator in which an ice selector for crushing ice according to an embodiment of the present invention is installed and FIG. 2 is a side cross-sectional view of FIG. 1.

[0024] Referring to FIGS. 1 and 2, an ice maker 100 installed in a refrigerator (not shown) includes an ice making assembly 110. The ice making assembly 110 includes an ice tray 111 configured to generate ice, an ice bucket 120 configured to store the generated ice, and a transfer assembly 130 configured to transfer the ice stored in the ice bucket 120 to a dispenser.

[0025] The ice made in the ice making assembly 110 falls into the ice bucket 120 which is positioned under the ice tray 111 and may be accumulated inside the ice bucket 120. Further, the ice stored in the ice bucket 120 may be transferred to a front discharge port 121 by the transfer assembly 130.

[0026] The transfer assembly 130 may be configured to include an auger motor 131 generating a torque, an auger portion 132 driven by the torque of the auger motor 131 and configured to transfer ice forward, a flange 133 coupled with the auger portion 132 to transfer the torque of the auger motor 131 to the auger portion 132, an ice crusher 134 rotating together with the auger portion 132 and configured to crush ice, and an ice selector 200 operable to select whether or not the ice is crushed by the ice crusher 134.

[0027] In one embodiment, the ice crusher 134 includes a blade 135 rotating together with the auger portion 132 to crush ice, a support member 136 disposed under the blade 135 to support ice while being crushed by the blade 135, and a connection member 137 coupling the support member 136 and the ice selector 200 to transmit power from the ice selector 200 to the support member 136.

[0028] When the ice selector 200 is driven up and down, the connection member 137 rotates and moves to thereby allow the support member 136 to support ice or not to support ice. Therefore, the ice may be supplied to the dispenser through the discharge port 121 in a crushed or not crushed state.

[0029] An example ice selector 200 for crushing ice according to one embodiment of the present invention can be described with reference to FIGS. 3 and 4. FIG. 3 is a diagram illustrating a configuration of the ice selector for crushing ice according to an embodiment and FIG. 4 is a diagram viewing FIG. 3 from cut away line "A".

[0030] The ice selector 200 may include a motor portion 210, a reducer 220, a connecting rod portion 230, and a lever portion 240. Referring to FIG. 3, the motor portion 210 is a component which is supplied with power to generate movement. A bi-directional motor which can rotate in one direction or in an opposite direction (e.g., forward and reverse, right and left, clockwise and counter-clockwise, etc.) may be used. The motor portion 210 may be a DC type motor which may be driven by DC power. The motor portion 210 can rotate in different di-

rections (e.g., forward or reverse) by changing the polarity of power supplied to the motor portion 210. Changing the direction of the motor portion can result in ice being crushed or not crushed.

[0031] The reducer 220 is disposed at one side of the motor portion 210. Power for the reducer 220 and the motor portion 210 may come from the same source. The reducer 220 can be supplied with power from the motor portion 210 and may reduce revolutions per minute (RPM) of the supplied power and increase the torque. Therefore, the power of the motor portion 210 may have a reduced RPM while increasing torque by the reducer 220.

[0032] The connecting rod portion 230 may be coupled with the reducer 220 to perform a linear reciprocating motion depending on the rotational direction of the motor portion 210. The connecting rod portion 230 may be coupled with the reducer 220 by coupling or combining gear mechanisms. For example, when the motor portion 210 rotates in one direction, the connecting rod portion 230 may move in one direction (e.g., rise, forward, etc.) and when the motor 210 rotates in an opposite direction, the connecting rod portion 230 may move in another direction (e.g., fall, reverse, etc.).

[0033] In one exemplary implementation, one side of the lever portion 240 is coupled with the connecting rod portion 230 and thus may integrally move with the connecting rod portion 230. When the connecting rod portion 230 rises, the lever portion 240 also rises and when the connecting rod portion 230 falls, the lever portion 240 also falls.

[0034] The other side of the lever portion 240 may be coupled to the connection member 137 to provide an external force to the connection member 137 and which transfers the force to the ice crusher 134. The ice may be crushed or may not be crushed, depending on the change in the position of the lever portion 240 and the connecting rod portion 230 which transfers the external force to the connection member 137. The lever portion 240 may be provided with a connection groove 241 in which the connection portion 137 is fitted.

[0035] In one embodiment, the reducer 220 may be configured to include a worm gear portion 221, a first gear portion 222, a second gear portion 223, and a rack gear portion 224. The first gear portion 222, the worm gear portion 221, second gear portion 223, and rack gear portion 224 are coupled by coupling or combining gear mechanisms. The worm gear portion 221 is formed on a rotating shaft 211 of the motor portion 210 and transfers power or force from the motor portion 210 while rotating together with the rotating shaft 211. The first gear portion 222 may rotate by being supplied with power or force from the worm gear portion 221. The second gear portion 223 rotates by being supplied with power or force from the first gear portion 222. The second gear portion 223 has a diameter larger than that of the first gear portion 222 and thereby reduces revolutions per minute (RPM) of second gear portion 223 compared to first gear portion

222. The rack gear portion 224 can be supplied with power or force from the second gear portion 223. The rack gear portion 224 may be formed at one side of the connecting rod portion 230.

[0036] The first gear portion 222 is configured to include a first driven gear 222a and a driving gear 222b as illustrated in FIG. 4 in accordance with one embodiment. The first driven gear 222a is coupled with the worm gear portion 221 and thus may rotate by being supplied with power or force from the worm gear portion 221. The driving gear 222b is coupled with the first driven gear 222a via shaft 222c and thus may rotate at the same RPM and torque as the first driven gear 222a. In one exemplary implementation, the second gear portion 223 is configured to include a second driven gear 223a and a pinion gear 223b. The second driven gear 223a is coupled with the driving gear 222b and thus rotates by being supplied with power or force from the driving gear 222b.

[0037] In one embodiment, the second driven gear 223a has a diameter larger than that of the driving gear 222b and thus has a gear ratio larger than 1:1, and as a result may obtain the effect of reducing the RPM in the second driven gear 223a compared to the driving gear 222b and increasing the torque. The driving gear 222b may have the same diameter as the first driven gear 222a or a diameter smaller than that of the first driven gear 222a.

[0038] The pinion gear 223b may be coupled with the second driven gear 223a via shaft 223c to rotate at the same RPM and torque as the second driven gear 223a and may be coupled with the rack gear portion 224 to transfer power to the connecting rod portion 230. The pinion gear 223b may be formed at the same diameter as the second driven gear 223a or a diameter smaller than that of the second driven gear 223a.

[0039] The power or force from the motor portion 210 can be transferred to the connecting rod portion 230 and the lever portion 240. The operating speed of the lever portion 240 may be slow and the force applied by lever portion 240 may be changed significantly. Therefore, the noise may be also reduced while the lever portion 240 is being operated to apply force to the connection member 137.

[0040] FIG. 5 is a flow chart of an exemplary ice crushing method in accordance with one embodiment. A motor is selectively operated causing a shaft to rotate in a first direction or a second direction (e.g., S510). A difference is introduced between a first speed and a first torque at which a first gear coupled to the shaft rotates and a second speed and second torque at which a second gear rotates (e.g., S520). In one embodiment, the difference is introduced by an ice selector operation. The first gear is coupled to the second gear. A support member of an ice crusher is moved in accordance with rotation of the second gear (e.g., S530). Ice is crushed in accordance with the selective operation of the motor (e.g., S540).

[0041] FIG. 6 is a flow chart of an exemplary ice selector operation method in accordance with one embodi-

ment. The ice selector method can include a process of reducing the power or force supplied from a motor portion by a reducer.

[0042] A first power or force from a motor portion is received (e.g., S610). In one exemplary implementation, the motor portion includes a DC motor.

[0043] The first power or force is translated to a second power or force (e.g., S620). A first power or force from a motor portion can be translated into a second power or force. In one embodiment, a power or force from a motor portion is translated into a power or force of a first gear portion.

[0044] A second power or force is converted into a third power or force (e.g., S630). In one exemplary implementation, one rotational power or force is converted into another rotational power or force. The conversion can include creating a difference in the rotational speed (e.g., RPM, etc.) and torque of the second power or force compared to the third power or force. The difference can include the rotational speed of the third power or force is slower than the rotational speed of the second power or force while the torque of the third power or force is greater than the torque of the second power or force. In one embodiment, a power or force from a first gear portion is converted into a power or force of a second gear portion. The size of the first gear portion can different from the size of the second gear portion.

[0045] The third power or force is transformed into a fourth power or force (e.g., S640). In one embodiment, a power or force from a second gear portion is transformed into the power or force of a connecting rod member. A rotational power or force of the second gear portion can be transformed into a linear reciprocating power or force of connecting rod member.

[0046] In one embodiment, a process of transferring the power supplied from the reducer 220 to the connecting rod portion 230 may be performed. The rack gear portion 224 may be formed on one side of the connecting rod portion 230 so that the connecting rod portion 230 may be supplied with the power supplied from the reducer 220. Further, a process of transferring the power supplied from the connecting rod portion 230 to the lever portion 240 may be performed. When the power is transferred to the lever portion 240, the lever portion 240 together with the connecting rod portion 230 performs a linear reciprocating motion. The connection member 137 of the ice crusher 134 may be operated depending on the change in the position of the lever portion 240.

[0047] In one embodiment, it is possible for the motor portion and ice selector for crushing ice to reduce operating noise compared to traditional approaches. The motor portion may include a DC motor supplied with the DC power. The voltage may be selectively applied at the time of the operation so as not to apply power in the standby state in which ice is not crushed, thereby reducing the power consumption of the product and reducing the heating value compared to traditional approaches. The operating power can also be by reduced using the reducer.

The RPM of the power or force supplied from the motor portion may be reduced and the torque may be increased by the reducer, thereby reducing power consumption.

[0048] While the present invention has been described with respect to the preferred embodiments, the scope of the present invention is not limited to the specific embodiments. It will be understood that a person having ordinary skill in the art to which the present invention pertains may substitute and change components without any limitation and these substitutions and changes also belong to the scope of the present invention.

[0049] The foregoing descriptions of specific embodiments of the present invention have been presented for purposes of illustration and description. They are not intended to be exhaustive or to limit the invention to the precise forms disclosed, and obviously many modifications and variations are possible in light of the above teaching. The embodiments were chosen and described in order to best explain the principles of the invention and its practical application, to thereby enable others skilled in the art to best utilize the invention and various embodiments with various modifications as are suited to the particular use contemplated. It is intended that the scope of the invention be defined by the Claims appended hereto and their equivalents. The listing of steps within method claims do not imply any particular order to performing the steps, unless explicitly stated in the claims.

Claims

1. A refrigerator ice selector, comprising:

a motor portion configured to rotate a shaft;
a reducer configured to be coupled to the motor portion;
a connecting rod portion coupled to the reducer, the connecting rod configured to perform a linear reciprocating motion depending on a rotating direction of the shaft; and
a lever portion having one side coupled to the connecting rod portion and the other side coupled to a connection member of an ice crusher, the lever portion configured to provide an external force to the connection member depending on a force from the connecting rod portion.

2. The ice selector of claim 1, wherein the motor portion is a DC motor which includes a shaft that can rotate two different directions.

3. The ice selector of claim 1, wherein the reducer includes:

a worm gear portion formed on a rotating shaft of the motor portion;
a first gear portion coupled to the worm gear portion, the first gear portion configured to rotate

- depending on force from the worm gear portion;
a second gear portion coupled to the first gear
portion, the second gear portion configured to
move based upon a force from the first gear por-
tion, second gear portion having a diameter lar-
ger than that of the first gear portion; and
a rack gear portion formed at one side of the
connecting rod portion, the rack gear configured
to be supplied with a force from the second gear
portion and include a rack gear portion.
4. The ice selector of claim 3, wherein the first gear
portion includes:
- a first driven gear coupled to the worm gear por-
tion; and
a driving gear coupled to the first driven gear,
the driving gear configured to rotate with the first
driven gear.
5. The ice selector of claim 4, wherein the second gear
portion includes:
- a second driven gear coupled to the driving gear;
and
a pinion gear coupled to the second driven gear
and the rack gear portion, the pinion gear con-
figure to rotate with the second driven gear.
6. The ice selector of claim 5, wherein the driving gear
has a substantially equal or smaller diameter size
than that of the first driven gear, the second driven
gear has a diameter larger than that of the driving
gear, and the pinion gear has a substantially equal
or smaller diameter size than that of the second driv-
en gear.
7. The ice selector of claim 1, wherein the lever portion
includes a connection groove in which the connec-
tion member is fitted.
8. A method of crushing ice comprising:
- selectively operating a motor causing a shaft to
rotate in a first direction or a second direction;
introducing a difference between a first speed
and a first torque at which a first gear coupled
to the shaft rotates and a second speed and sec-
ond torque at which a second gear rotates, the
first gear coupled to the second gear,
moving a support member of an ice crusher in
accordance with rotation of the second gear; and
crushing ice in accordance with the selective op-
eration of the motor.
9. The method of claim 8 wherein the motor is a DC
motor.
10. The method of claim 8 further comprising an ice se-
lector process including:
- receiving a rotational first force from the shaft;
translating the rotational first force to a rotational
second force; and
converting the rotational second force into a ro-
tational third force; wherein the rotational sec-
ond force is generated at a greater rotational
speed and lower torque than the rotational third
force; and
transforming the rotational third force into a lin-
ear fourth force.
11. The method of claim 8 wherein force from the shaft
is translated into a force of the first gear.
12. The method of claim 8 wherein the converting in-
clude converting the second force into the third force,
wherein a first rotation speed and torque associated
with the second force and a second rotation speed
and torque associated with the third force are differ-
ent.
13. The method of claim 8 Wherein the converting in-
clude creating a difference in a first rotational speed
and first torque associated with the first gear com-
pared to a second rotational speed and second
torque associated with the second gear.
14. The method of claim 8 wherein the size of the first
gear portion can different from the size of the second
gear portion.

FIG. 1

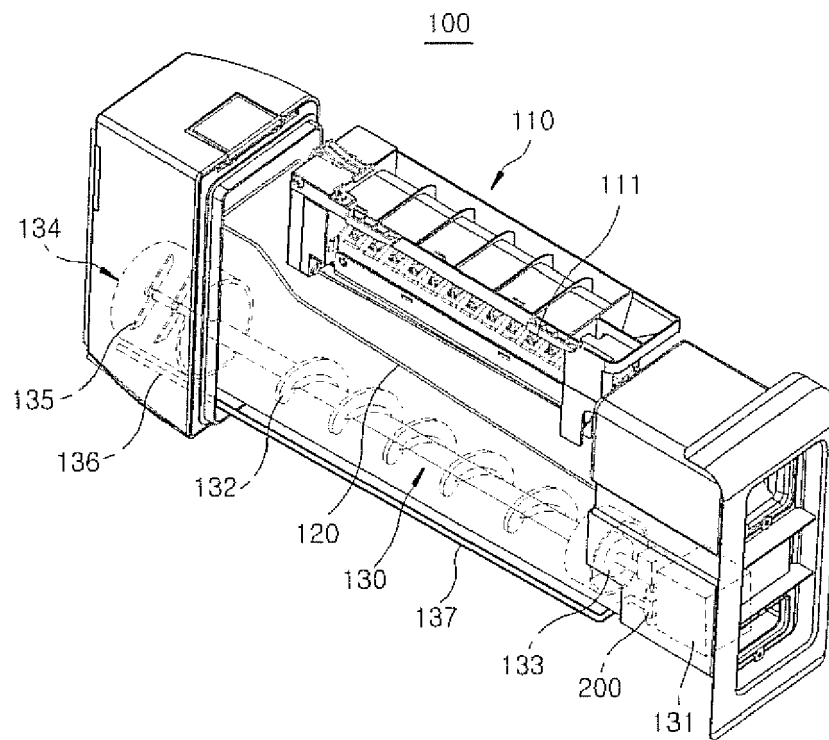


FIG. 2

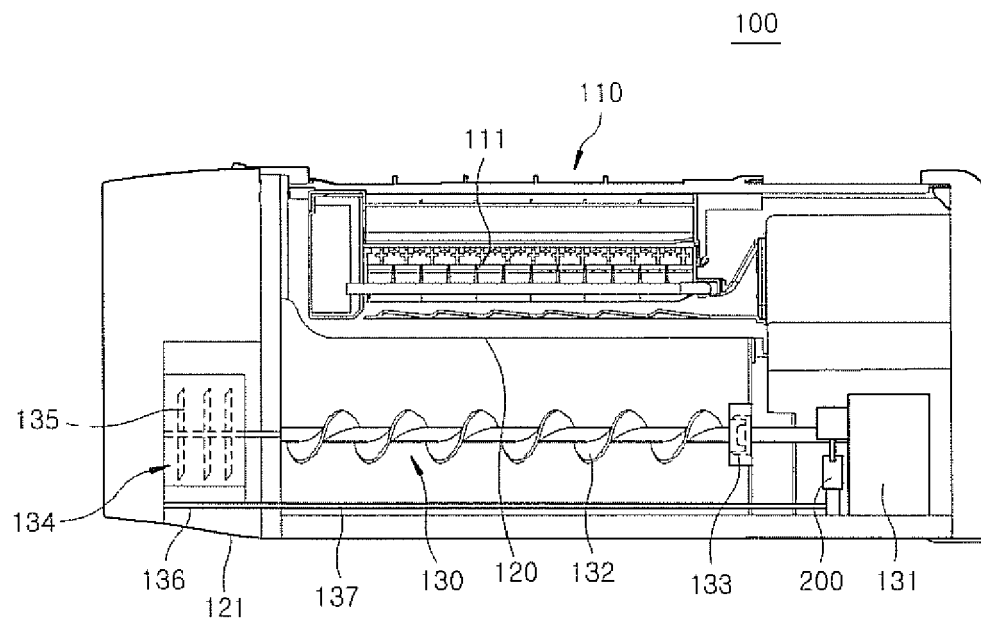


FIG. 3

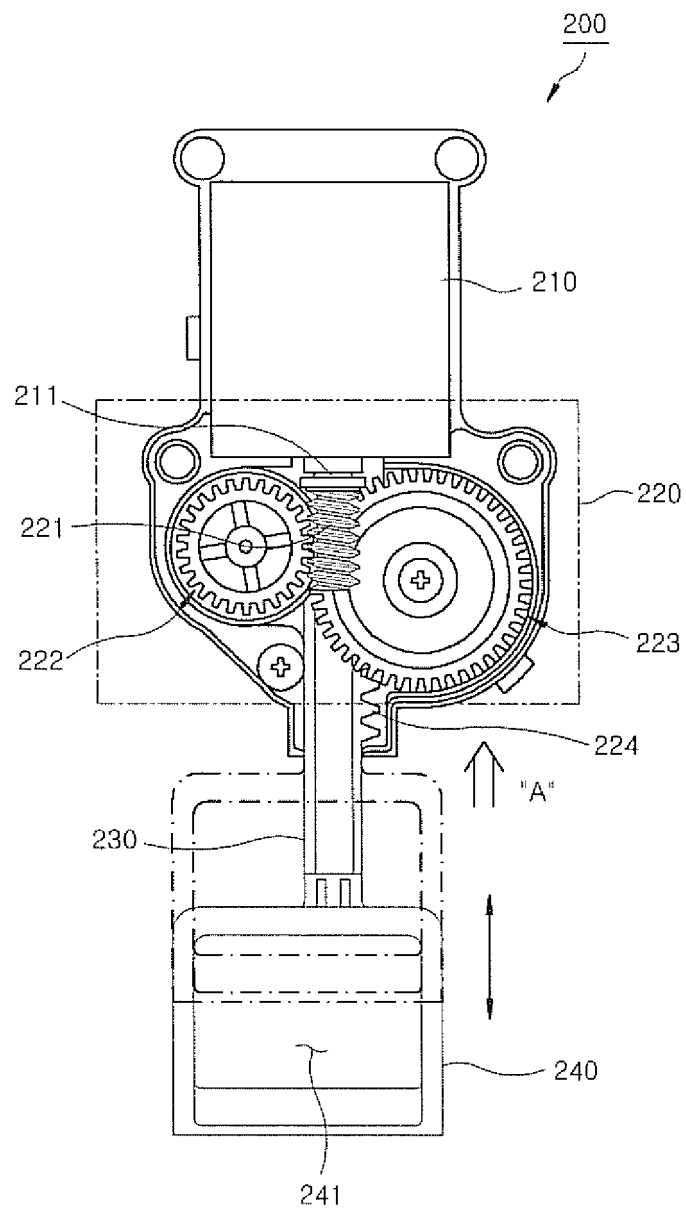


FIG. 4

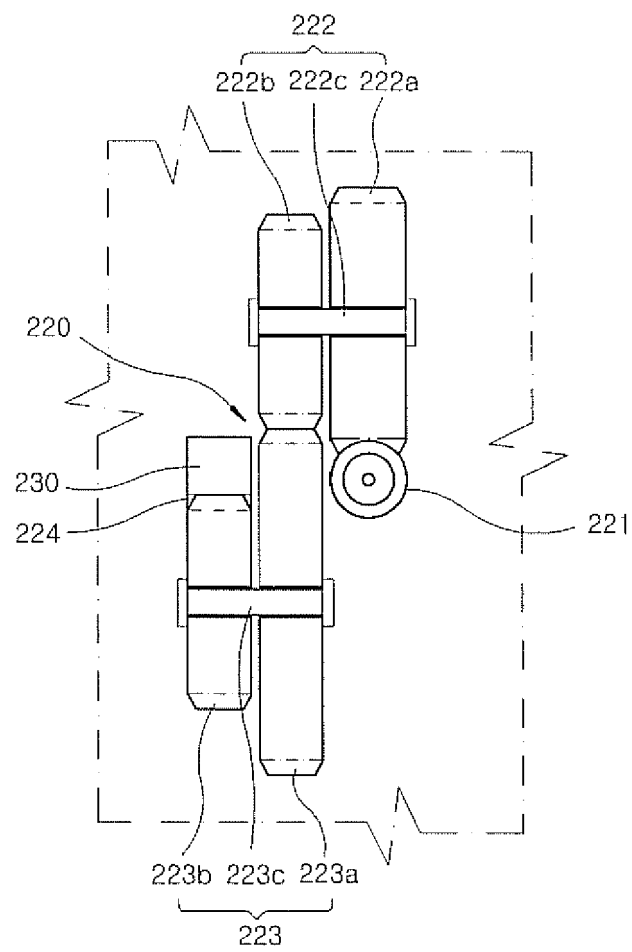


FIG. 5

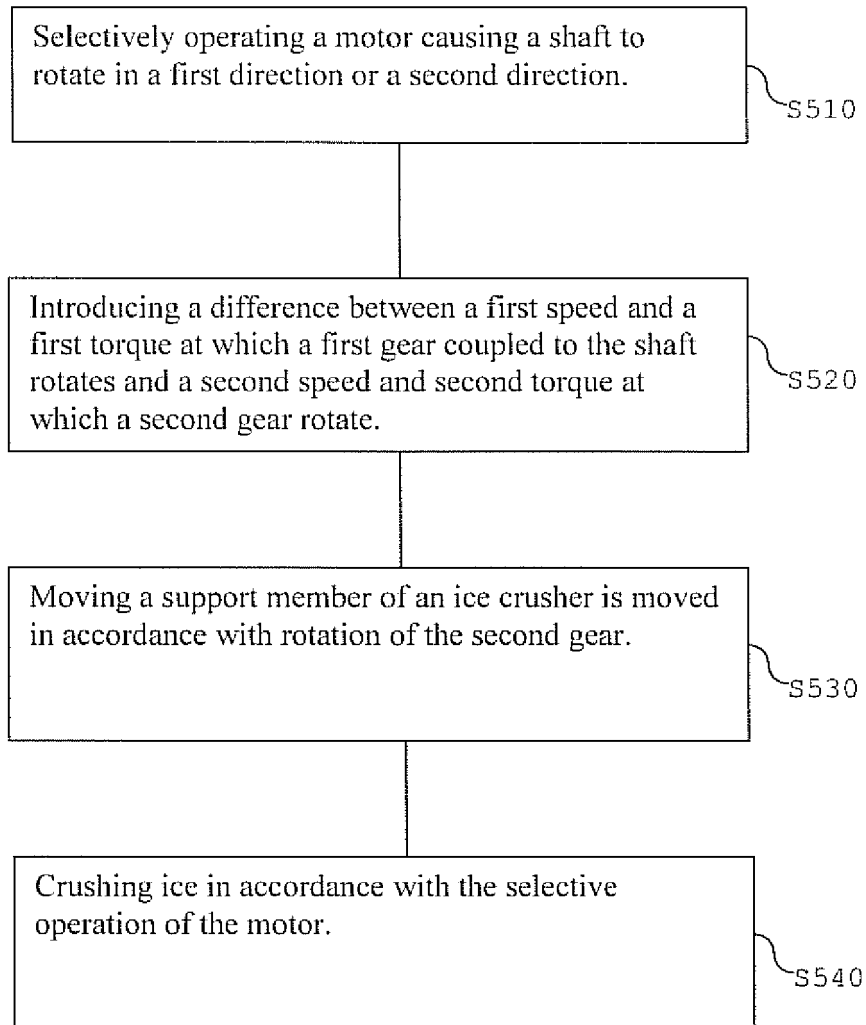
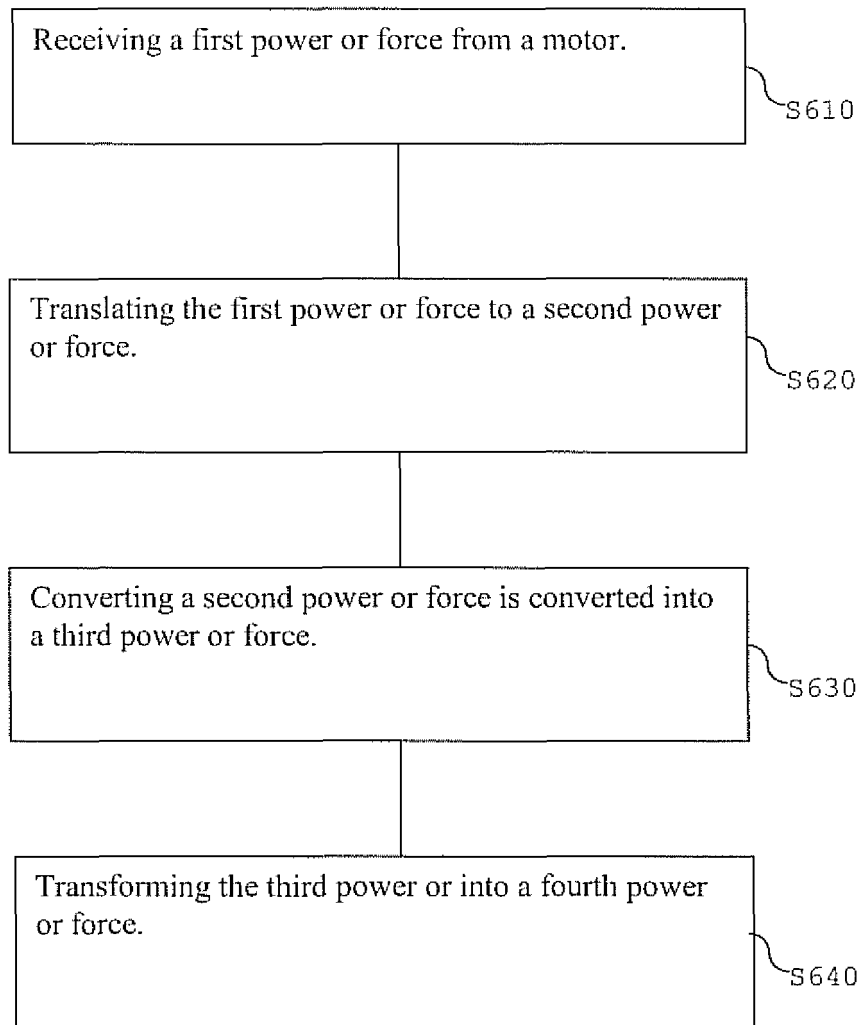


FIG. 6





EUROPEAN SEARCH REPORT

Application Number
EP 15 18 6844

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 2014/003453 A1 (SCD CO LTD [KR]) 3 January 2014 (2014-01-03) * abstract * * figures 1-13 *	1-14	INV. F25C5/04 F25C5/00
A	US 2004/163405 A1 (JUNG SANG GYU [KR]) 26 August 2004 (2004-08-26) * paragraphs [0026] - [0031]; figures 4,5 *	1	
			TECHNICAL FIELDS SEARCHED (IPC)
			F25C
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 4 November 2016	Examiner Léandre, Arnaud
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EPO FORM 1503 03/02 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 15 18 6844

5

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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04-11-2016

10

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2014003453 A1	03-01-2014	CN 104220825 A	17-12-2014
		KR 101310329 B1	23-09-2013
		WO 2014003453 A1	03-01-2014

US 2004163405 A1	26-08-2004	CN 1517646 A	04-08-2004
		EP 1441189 A2	28-07-2004
		KR 20040067144 A	30-07-2004
		US 2004163405 A1	26-08-2004

15

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EPO FORM P0459

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- KR 1020150085831 [0001]