A refrigerator including a freezing chamber, a freezing chamber door, an ice making device provided in the freezing chamber and making ice, and a dispenser part provided with an ice outlet and discharging the ice made in the ice making device to an external side of the refrigerator. The dispenser part includes an ice lever selectively operating a supply and a stoppage of ice, a cover member moving between a closing position closing the ice outlet and an opening position opening the ice outlet in cooperation with the ice lever, a cover opening and closing sensor sensing opening and closing of the cover member, and a display part displaying a signal corresponding to the opening and closing of the cover member, from the cover opening and closing sensor. The refrigerator is capable of sensing the opening state of a cover accurately and reducing loss of energy.
FIG. 4

1. Does cover opening and closing sensor sense opening of cover member?

2. Yes

3. Does controller judge whether predetermined time passes?

4. Yes

5. Is it determined whether opening signal is sensed?

6. No

7. Operating warning part by controller

END
REFRIGERATOR

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority from Korean Patent Application No. 10-2005-0115118, filed on Nov. 29, 2005, in the Korean Intellectual Property Office, the disclosure of which is incorporated herein by reference.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] The present invention relates to a refrigerator. More particularly, to a refrigerator having an improved dispenser.

[0004] 2. Description of the Related Art

[0005] In general, a conventional refrigerator having a freezing chamber for keeping food such as meat and fish at a temperature below freezing, and a refrigerating chamber for keeping food such as fruits and vegetables at a temperature above freezing. The freezing chamber includes an ice making device which is supplied with water from an external water feeding device to make a predetermined size of ice in the freezing chamber, and in a front part of a freezing chamber door is provided a dispenser part receiving ice made in an ice making chamber and drinking water from an external side.

[0006] An example of a conventional refrigerator having such a dispenser part is disclosed in Korean Patent Application No. 1997-0082482. The dispenser part of the conventional refrigerator is provided with an ice outlet so that an ice making chamber can be connected with the dispenser part when ice is supplied, and a cover for opening and closing the ice outlet.

[0007] However, when ice is caught in such a cover or the cover is left open due to malfunction, the conventional refrigerator operates with its freezing chamber being connected with an external side. In this case, frost is stuck in the ice outlet, and temperature in the freezing chamber rises to increase an operating rate, thereby increasing consumption of an electric power.

SUMMARY OF THE INVENTION

[0008] Accordingly, an aspect of the present invention is achieved by providing a refrigerator which is capable of sensing the opening state of a cover accurately and reducing loss of energy.

[0009] Additional aspects and/or advantages of the invention will be set forth in part in the description which follows, and, in part, will be apparent from the description, or may be learned by practice of the invention.

[0010] These foregoing and/or other aspects of the present invention can be achieved by providing a refrigerator including a freezing chamber, a freezing chamber door, an ice making device provided in the freezing chamber and making ice, and a dispenser part provided with an ice outlet and discharging the ice made in the ice making device to an external side. The dispenser part including an ice lever selectively operating a supply and a stoppage of ice, a cover member moving between a closing position closing the ice outlet and an opening position opening the ice outlet in cooperation with the ice lever, a cover opening and closing sensor sensing opening and closing of the cover member, and a display part displaying a signal from the cover opening and closing sensor.

[0011] The refrigerator further includes a warning part to inform a user of the signal, and a controller controlling the warning part to operate when the cover opening and closing sensor senses the opening of the cover member for over a predetermined time.

[0012] The refrigerator further includes a delay part delaying the closing of the cover member for a predetermined delaying time when the ice lever is press-removed to stop supplying the ice after the ice is discharged from the dispenser part, wherein the controller controls delaying operating of the warning part to be delayed for the predetermined delaying time.

[0013] According to an aspect of the present invention, the display part includes a display.

[0014] According to an aspect of the present invention, the warning part includes an acoustic warning device and/or a visual warning device.

[0015] According to an aspect of the present invention, the cover opening and closing sensor includes a light sensing device.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] These and/or other aspects and advantages of the present invention will become apparent and more readily appreciated from the following description of the embodiments, taken in conjunction with the accompanying drawings of which:

[0017] FIG. 1 is a front perspective view illustrating a refrigerator according to an embodiment of the present invention.

[0018] FIG. 2 is a side sectional view illustrating a freezing chamber of a refrigerator according to an embodiment of the present invention.

[0019] FIG. 3 is a block diagram illustrating a refrigerator according to an embodiment of the present invention.

[0020] FIG. 4 is a flow diagram view illustrating a refrigerator according to the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0021] Reference will now be made in detail to the embodiments of the present invention, examples of which are illustrated in the accompanying drawings, wherein like reference numerals refer to like elements throughout. The embodiments are described below so as to explain the present invention by referring to the figures.

[0022] In explaining an embodiment of the present invention, a side-by-side type of refrigerator is taken as an example, but the present invention is not limited to any particular type of refrigerator, and may vary accordingly.

[0023] In FIGS. 1 to 3, a refrigerator according to the present invention comprises a main body 1 provided with refrigerating and freezing chambers 2 and 3, doors 4 and 5.
opening and closing the refrigerating and freezing chambers 2 and 3, respectively, an ice making chamber 70, and a dispenser part 60 supplying ice to an external side of the refrigerator.

[0024] The refrigerating chamber 2 and the freezing chamber 3 are provided to right and left sides of a partitioned wall, respectively. The refrigerating chamber door 4 and the freezing chamber door 5 are coupled with the refrigerating chamber 2 and the freezing chamber 3 for opening and closing the front opening thereof, respectively. Also, a door guide 6 is arranged vertically in an internal side of the doors 4 and 5 to contain bottles or the like. Furthermore, a plurality of shelves 7 comparing an internal side of the refrigerating chamber 2 are vertically arranged in an upper part of the refrigerating chamber 2, and a plurality of drawers 8 are arranged in a lower part thereof.

[0025] An ice making chamber 70 is provided in an upper part of the freezing chamber 3 and comprises an ice making device 71 for making ice, and a plurality of shelves (not shown) and a plurality of drawers (not shown) are vertically arranged in a lower part thereof. Also, in a front face of the freezing chamber door 5 is provided a dispenser part 60 to be supplied with ice made in the ice making chamber 70 and water from an external side of the refrigerator.

[0026] In the ice making chamber 70 is installed the ice making device 71 to supply water from an external water feeding apparatus (not shown) to the ice making device 71, and an ice storage part 10 is positioned under the ice making device 71 to store ice from the ice making device 71. Also, in an end part of the ice making device 71 is provided an ice separating motor (not shown) to separate ice made from the ice making device 71, and under the ice making device 71 is provided an ice detecting lever 73 to detect the amount of ice in the ice storage part 10.

[0027] The ice storage part 10 comprises an ice container 11 and a guide case 15. The ice container 11 stores ice separated from the ice making device 71. The ice made in the ice device 71 has different shapes according to the configuration of the ice making device 71. For example, cubic ice may be made. However, the shape of the ice is not limited to hereto, and may vary as necessary. On a side of the ice container 11 is provided an ice outlet 17 to discharge ice to the outside.

[0028] The guide case 15 is provided in a first end area of the ice container 11 and the ice outlet 17 is provided in a lower part thereof to discharge ice to a guide part 9 arranged in the freezing chamber door 5. The guide case 15 may be provided to surround a first end area of the ice container 11 except for the ice outlet 17 provided in a lower part thereof.

[0029] An ice carrying unit 12 is provided in an internal side of the ice container 11. The ice carrying unit 12 comprises a driving motor (not shown) arranged in a second end area of the ice container 11, a rotating shaft 13 extended from the driving motor (not shown) toward the first end side of the ice container 11 and a spiral blade 14 coupled to the rotating shaft 13, and discharges ice in the ice storage part 10 toward the ice outlet 17. The spiral blade 14 rotates together with the rotating shaft 13 to discharge ice in the ice storing tool 11 toward the ice outlet 17.

[0030] The guide part 9 is formed to be connected with the freezing chamber door 5 so that ice passing through the ice outlet 17 can be supplied for the dispenser part 60.

[0031] The dispenser part 60 comprises a water lever 61 for supplying drinking water, an ice lever 62 for supplying ice, and a button part 63 provided so that a user can select cubic ice, flake ice or powdered ice, for example.

[0032] The dispenser part 60 comprises a cover member 64 in cooperation with the ice lever 62 to move between a closing position “A” closing an ice outlet 69 and an opening position “B” opening the ice outlet 69, a cover opening and closing sensor 65 sensing an opening or closing of the cover member 64, and a display part 67 displaying a result sensed by the cover opening and closing sensor 65.

[0033] The button 63 may be provided to have a touch screen or a lead switch. However, the button is not limited hereto, and may vary as necessary. The ice lever 62 arranged in the ice outlet 69 supplies ice when pressed, and stops supplying ice when press-removed.

[0034] The cover member 64 is rotatably coupled with the ice outlet 69 to open and close the ice outlet 69. The cover member 64 comprises a shape corresponding to the ice outlet 69. The cover member 64 operates in cooperation with the ice lever 62. As shown in FIG. 2, the cover member 64 moves to the opening position “B” opening the ice outlet 69 when the ice lever 62 is pressed, and the cover member 64 moves to the closing position “A” closing the ice outlet 69 when the ice lever 62 is press-removed. The cover member 64 may be rotatably coupled with the ice outlet 69, for example. However, the cover member 64 is not limited hereto, and may vary as necessary. Though it is described above that the cover member 64 operates in cooperation with the ice lever 62, the cover 64 and the ice lever 62 may be integrally formed, for example.

[0035] The cover opening and closing sensor 65 senses the opening position “B” opening the ice outlet 69 so that the ice making chamber 70 can be connected to the outside. The cover opening and closing sensor 65 may be made of various light sensing devices sensing light. For example, the cover opening and closing sensor 65 may be provided to have a photo sensor, a proximate sensor, and a light sensing sensor.

[0036] The display part 67 is provided to display a signal sensed in the cover opening and closing sensor 65. The display part 67 is preferably provided to discriminate the opening position “B” and the closing position “A” of the cover member 64. For example, icons may be provided to display the opening position “B” and the closing position “A" of the cover member 64, or to display only the opening position “B”.

[0037] A warning part 68 transmits a signal sensed in the cover opening and closing sensor 65 to a user so that the user can recognize the signal. The warning part 68 comprises an acoustic warning device stimulating a user’s auditory sense and/or a visual warning device stimulating a user’s eyesight. The acoustic warning device may be provided as a buzzer or a siren. The visual warning device may be provided as a display like the display part 67 as described above, and an extra lamp to be flickered.

[0038] A controller 100 controls the warning part 68 to operate when the cover opening and closing sensor 65 senses the opening of the cover member 64 for over a predetermined time.

[0039] The refrigerator according to the present invention may further comprise a delay part 66 delaying a movement
of the cover member 64 to the closing position “A” for a predetermined time when the ice lever 62 is press-removed after ice is supplied. The delay part 66 is not limited to any particular type of delay mechanism, and may vary accordingly. For example, the delay part 66 may comprise an air damper connected with the cover member 64 and an oil damper thereto. The delay part 66 can prevent the phenomenon that undischarged ice is left to the guide part 9 when the ice lever 62 is press-removed after discharge of ice and the ice carrying unit 12 stops immediately to close and the cover member 64. Here, the delaying time is set so that ice carried by the ice carrying unit 12 can be completely discharged to the outside.

[0040] The controller 100 controls the warning part 68 so that an operation of the warning part 68 can be delayed for the delaying time.

[0041] An operation of the refrigeration according to the present invention will be described below by referring to FIG. 4.

[0042] In operation 1, a user selects the kind of ice through the button part. Then, when the ice lever is pressed, the ice carrying unit is driven and the cover member moves from the closing position “A” to the opening position “B”. Then, the opening and closing sensor senses whether the cover member is opened and displays the result on the display part. The cover opening and closing sensor may sense the opening of the cover member to display on the display part when not only the cover moves to the opening position “B” but also the freezing chamber door opens. When it is determined that the cover member is opened in operation 1, ice stored in the ice container is discharged through the ice outlet via the guide part 9 to the external side of the ice carrying unit. When a user is supplied with ice and then removes the press of the ice lever, the ice carrying unit stops. Then in operation 3, the controller judges whether a predetermined time passes after the cover opening and closing sensor first senses an opening signal of the cover member. Then, from operation 3, the process moves to operation 5 where it is determined whether the opening signal is sensed even after a predetermined time passes. If it is determined that the opening signal is sensed in operation 5, the process moves to operation 7 where the controller operates the warning part. Accordingly, a user can recognize the malfunction of the cover member, thereby coping with a problem rapidly.

[0043] Meanwhile, the predetermined time may be set in advance by a user, for example.

[0044] As an alternative, in the case of a refrigerator having the delay part in accordance with an embodiment of the present invention, the delay part delays movement of the cover member to the closing position “A” for a predetermined delaying time. Thus, when the opening of the cover member is sensed by the cover opening and closing sensor 65 even after the predetermined delaying time passes in operation 5, the process moves to operation 7, where the controller drives the warning part to inform a user of malfunction of the cover member. In this case, the predetermined time is set to include the delaying time.

[0045] Through this configuration, undesired opening of the cover member is accurately sensed in order to be corrected rapidly. Accordingly, frost can be prevented from being adhered in the guide part, and a temperature rise of the freezing chamber can be prevented. Also, an electric power consumption increase caused by a cooling operation increase can be prevented in advance.

[0046] As described above, the refrigerator according to the present invention, can sense the opening state of the cover member accurately, thereby reducing loss of energy.

[0047] Although a few embodiments of the present invention have been shown and described, it would be appreciated by those skilled in the art that changes may be made in these embodiments without departing from the principles and spirit of the invention, the scope of which is defined in the claims and their equivalents.

What is claimed is:

1. A refrigerator comprising
   a freezing chamber having a freezing chamber door;
   an ice making device positioned in the freezing chamber and making ice; and
   a dispenser part including an ice outlet and discharging the ice made in the ice making device to an external side of the refrigerator,

   wherein the dispenser part comprises:
   an ice lever selectively operating a supply and a stoppage of ice,
   a cover member moving between a closing position closing the ice outlet and an opening position opening the ice outlet in cooperation with the ice lever,
   a cover opening and closing sensor sensing opening and closing of the cover member, and
   a display part displaying a signal corresponding to the opening and closing of the cover member,

2. The refrigerator according to claim 1, further comprising:
   a warning part to inform a user of the signal; and
   a controller controlling the warning part to operate when the cover opening and closing sensor senses the opening of the cover member for over a predetermined time.

3. The refrigerator according to claim 2, further comprising a delay part delaying closing of the cover member for a predetermined delaying time when the ice lever is pressure-removed to stop supplying the ice after the ice is discharged from the dispenser part,

   wherein the controller controls delaying operating of the warning part to be delayed for the predetermined delaying time.

4. The refrigerator according to claim 3, wherein the display part comprises a display.

5. The refrigerator according to claim 4, wherein the warning part comprises an acoustic warning device and/or a visual warning device.

6. The refrigerator according to claim 1, wherein the cover opening and closing sensor comprises a light sensing device.

7. The refrigerator according to claim 2, wherein the cover opening and closing sensor comprises a light sensing device.

8. The refrigerator according to claim 3, wherein the cover opening and closing sensor comprises a light sensing device.
9. The refrigerator according to claim 4, wherein the cover opening and closing sensor comprises a light sensing device.

10. The refrigerator according to claim 5, wherein the cover opening and closing sensor comprises a light sensing device.

11. A refrigerator comprising a freezing chamber having a door, and an ice making device installed in the freezing chamber, to make ice, the refrigerator comprising:
   a dispenser part to receive ice from ice making device and comprising:
   an outlet to discharge the ice to an external side of the refrigerator,
   a lever to selectively supply ice to the external side of the refrigerator through the outlet,
   a cover to open and close the outlet in cooperation with the lever,
   a sensor to sense the opening and closing of the cover, and
   a display to display a signal corresponding to the opening and closing of the cover sensed by the sensor.

12. The refrigerator of claim 11, further comprising a warning part comprising an audio device or visual device to transmit the signal sensed by the sensor, to thereby warn a user of the opening of the cover.

13. The refrigerator of claim 12, wherein the cover moves between a first position corresponding to the opening of the cover and a second position corresponding to the closing of the cover.

14. The refrigerator of claim 11, wherein the sensor senses the opening of the cover and the opening of the door of the freezing chamber.

15. The refrigerator of claim 11, wherein the cover is rotatably coupled with the outlet.

16. The refrigerator of claim 13, further comprises a controller which determines whether a predetermined time period passes after the sensor senses that the cover is in the first position, and operates the warning part when the predetermined time period passes.

17. The refrigerator of claim 16, wherein the predetermined time period is set in advance by the user.