94 which sends cold air cooled by the cooler 93 to each storage compartment within the refrigerator 100 are provided at a back side of the refrigerator 100. The cooler 93 is provided above the compressor 92, and the air-sending fan 94 is provided above the cooler 93. An air passage 95 for introducing the cold air cooled by the cooler 93 to each storage compartment is formed above the air-sending fan 94.

[0018]

The temperature of each storage compartment is detected by a thermistor (not shown) installed at each storage compartment. Control means (not shown) controls the opening degree of a damper (not shown) installed on the air passage 95, the capacity of the compressor 92, and the amount of air sent by the air-sending fan 94 based on the temperature detected by each thermistor, such that the temperature within each storage compartment becomes a preset temperature. In addition, a door opening frequency detection sensor (not shown) which detects door opening frequency of the refrigerator 100 is provided at each storage compartment.

[0019]

A storage case 2a which is able to store food is provided in the switching compartment 2. A storage case 4a which stores food is provided in the freezing compartment 4. An outer case 5a which is able to store food is provided in the vegetable compartment 5. The number of cases provided in each storage compartment may be 1, but a plurality of cases may be provided in accordance with the entire capacity of the refrigerator to improve the organizing performance within the storage compartment.

[0020]

Next, flow of the cold air cooled by the cooler 93 will be described.

The cold air cooled by the cooler 93 is sent through the air passage 95 to

level. The control means (not shown) calculates one or a plurality of power saving plans for achieving a power saving target value 19 set by the user, in accordance with the power saving target value 19. The number of power saving plans displayed on the operation display panel 6 is not limited to three as described above, but may be one or two, or may be four or more. Each power saving plan of Embodiment 1 corresponds to a target temperature setting plan of the present invention.

[0032]

The simple explanation display area 22 is an area in which wording which explains the power saving plan setting buttons 21a, 21b, and 21c is displayed, and the wording is, for example, "balance type plan", "freezing saving type plan", and "ice-making stop type plan". As it is recognized that the "balance type plan" is explanation of the "power saving plan A", the "freezing saving type plan" is explanation of the "power saving plan B", and the "ice-making stop type plan" is explanation of the "power saving plan C", the "balance type plan", the "freezing saving type plan", and the "ice-making stop type plan" are displayed so as to be associated with the respective power saving plans.

[0033]

Next, an operation example of Fig. 5 will be described.

When the user selects the power saving plan setting button 21a from among the power saving plan setting buttons 21a, 21b, and 21c, the screen transitions to Fig. 6.

[0034]

Fig. 6 is a diagram showing an example of a power saving plan temperature detailed explanation diagram displayed on the operation display panel 6 of the refrigerator 100 according to Embodiment 1 of the present invention. Fig. 6 is a screen displayed when the power saving plan setting

before), and 8 hr before (8 hours before), a mark 28a is displayed which indicates that the opening frequency for the storage compartment is equal to or greater than a predetermined time.

[0046]

Next, an operation example of Fig. 8 will be described.

When the user moves the pointer 10 such that the pointer 10 is located within a coordinate area in which the mark 28a is displayed, the frequency for each storage compartment for which the door opening time is equal to or greater than the predetermined time is displayed on the operation display panel 6. For example, "refrigerating compartment: 2 times" and "freezing compartment: 2 times" are displayed as shown in Fig. 8. Thus, it is recognized that the door at the refrigerating compartment 1 was opened for the predetermined time or longer twice and the door at the freezing compartment 4 was opened for the predetermined time or longer twice.

[0047]

As described above, the refrigerator 100 according to Embodiment 1 includes: operation display means which displays a plurality of power saving levels each indicating a power saving index and accepts an operation input of selecting one power saving level from among the plurality of power saving levels; and control means which, when an operation input of selecting one power saving level from among the plurality of power saving levels displayed on the operation display means is made, calculates one or a plurality of power saving plans corresponding to the selected one power saving level. The operation display means displays the power saving plans calculated by the control means and accepts an operation input of executing the power saving plan. Thus, after confirming that a target temperature setting plan corresponding to the selected one power saving level is suitable for a user's use state, the user is allowed to

the power saving target value 19 is set in Fig. 4. As shown in Fig. 12, the current temperature etc. display area 20, the power saving plan display area 21, wording 50, and a simple explanation display area 52 are displayed on the operation display panel 6. In Embodiment 3, the description of the parts common to Embodiments 1 and 2 is omitted, and the difference from Embodiments 1 and 2 will be mainly described.

[0067]

In Embodiment 3, unlike Embodiment 2, a load detection sensor (not shown) or a refrigerant interior capturing camera (not shown) with which it is possible to determine a food load amount is provided to each storage compartment of the refrigerator 100. There are no particular limitations on the detection method of the sensor which determines a food load amount, and, for example, a mechanical sensor or an optical sensor may be used. The control means determines the power saving level set by the user and a food load amount in the refrigerator 100 by using detection information of the load detection sensor or the refrigerant interior capturing camera, and a recommended power saving plan suitable for the user is displayed on the operation display panel 6. A specific example will be described below. The load detection sensor or refrigerant interior capturing camera corresponds to load detection means of the present invention.

[0068]

As shown in Fig. 12, a phrase "recommended ice-making stop type plan" within the simple explanation display area 52 is displayed so as to be associated with the power saving plan setting button 21c, and the user is allowed to understand that the "power saving plan C" is more recommended than the "power saving plan A" and the "power saving plan B". The wording 50 is wording indicating a reason why the above "power saving plan C" is

Embodiments 1 to 3 is omitted, and the difference from Embodiments 1 to 3 will be mainly described.

[0072]

As shown in Fig. 13, similarly to Fig. 6, the current temperature etc. display area 20, the set temperature etc. display area 23, the caution point button 24, the decision button 25, and the cancel button 26 are displayed. On the other hand, in Fig. 13, unlike Fig. 6, current power consumption 58 is displayed below the current temperature etc. display area 20, and power consumption 59 during the power saving plan is displayed below the set temperature etc. display area 23. For example, the current power consumption 58 is "current power consumption: 0.924 kwh/d", and the power consumption 59 during the power saving plan is "expected power consumption during this plan: 0.814 kwh/d". The current power consumption 58 and the power consumption 59 during the power saving plan as described above are calculated by the control means, for example, based on detection information of a power consumption detection sensor (not shown) which detects the power consumption of the refrigerator 100.

[0073]

As described above, since the value of power consumption in each operating state is displayed on the operation display panel 6, the user is allowed to quantitatively understand the power consumption, which leads to improvement in motivating the user to save power.

[0074]

As power consumption, on the operation display panel 6, the current temperature and the temperature after power saving may not be displayed as described above, and a relative value between the current power consumption and the power saving plan may be displayed, or an electricity price per day calculated from power consumption may be displayed.

consumption detection sensor is equal to or higher than the threshold electric energy is transmitted from the other external device to the refrigerator 100.

[0078]

The method of reducing power consumption is not limited to the above-described example, and when the power consumption of the external device other than the refrigerator 100 increases as described above, the control means may delay startup of a defrost heater having relatively high power consumption in operation of the refrigerator 100, to execute peak cut.

[0079]

Embodiment 6

Next, Embodiment 6 will be described. In Embodiment 6, the description of the parts common to Embodiments 1 to 5 is omitted, and the difference from Embodiments 1 to 5 will be mainly described. In Embodiment 6 as well, similarly to Embodiment 2, a network as in Fig. 9 is established, and the refrigerator 100 is configured to be able to exchange information with the Internet cloud 300 via the centralized controller 132.

[0080]

Hereinafter, transmission and reception of data in Embodiment 6 will be described.

When the refrigerator 100 transmits operation information, such as information indicating, for example, power consumption and a load of the refrigerator 100 and information indicating the door opening frequency, to the Internet cloud 300 via the centralized controller 132, the Internet cloud 300 stores the operation information of the refrigerator 100. The operation information may be transmitted from the refrigerator 100 to the Internet cloud 300 each time the operation information is updated within the refrigerator 100, or may be transmitted from the refrigerator 100 to the Internet cloud 300 every given time.

evaluation section 12a figure 13 integral determination evaluation section 13a figure 14 evaluation display guide section 14a, 14b, 14c, 14d, 14e figure 15 power saving adjustment button16 detail check button 17 power consumption reduction rough indication 18 power saving state cursor 19 power saving target value 20 current temperature etc. display area 21 power saving plan display area 21a, 21b, 21c power saving plan setting button 22 simple explanation display area 23 set temperature etc. display area 24 caution point button 25 decision button 26 cancel button27 integral determination level transition graph 28 door opening state display area 28a mark 29 use advice display area 29a, 29b wording 30 history confirmation button 31 door opening frequency display graph 41 power consumption saving mode icon 42 power consumption saving mode icon 43 set temperature etc. display area 44 caution point button 45 decision button 46 cancel button 50 wording 52 simple explanation display area 58 current power consumption 59 power consumption during power saving plan 92 compressor 93 cooler 94 air-sending fan 95 air passage 100 refrigerator 132 centralized controller 134 air-conditioning device 135 television 136 tablet terminal 137 switchboard 139 solar panel 140 electric vehicle 200 house 300 Internet cloud

CLAIMS

[Claim 1]

A refrigerator comprising:

a storage compartment;

operation display means configured to display a plurality of power saving levels each indicating a power saving index and to accept an operation input of selecting one power saving level from among the plurality of power saving levels; and

control means configured to, when an operation input of selecting one power saving level from among the plurality of power saving levels displayed on the operation display means is made, calculate one or a plurality of target temperature setting plans regarding a target temperature for the storage compartment in accordance with the selected one power saving level, wherein

the operation display means displays the target temperature setting plans calculated by the control means and accepts an operation input of executing the target temperature setting plan.

[Claim 2]

The refrigerator of claim 1, further comprising

load detection means configured to detect a food load amount within the storage compartment, wherein

when the operation input of selecting one power saving level from among the plurality of power saving levels displayed on the operation display means is made, the control means calculates a target temperature setting plan based on the selected one power saving level and a load detected by the load detection means.

[Claim 3]

The refrigerator of claim 2, wherein

the control means calculates a plurality of target temperature setting plans including the target temperature setting plan calculated based on the selected one power saving level and the load detected by the load detection means, and

in displaying the plurality of target temperature setting plans, the operation display means displays the target temperature setting plans such that the target temperature setting plan calculated based on the selected one power saving level and the load detected by the load detection means is distinguished from the other target temperature setting plans.

[Claim 4]

The refrigerator of any one of claims 1 to 3, further comprising

a door opening frequency detection sensor configured to detect an opening frequency of a door of the storage compartment, wherein

the control means calculates the current power saving level based on information indicating the opening frequency of the door detected by the door opening frequency detection sensor and a set temperature for the storage compartment, and

the operation display means displays either one of or both the power saving level calculated by the control means and information which prompts power saving.

[Claim 5]

The refrigerator of any one of claims 1 to 4, wherein the operation display means is of a touch panel type.

[Claim 6]

The refrigerator of any one of claims 1 to 5, further comprising

external device communication means configured to communicate with an external device, wherein

upon acquiring, via the external device communication means, information

indicating that power consumption of the external device is increased to be equal to or higher than a threshold, the control means switches to a target temperature setting plan in which power consumption is lower than the current power consumption.

[Claim 7]

The refrigerator of any one of claims 1 to 6, further comprising

cloud communication means configured to communicate with an Internet cloud via a network, wherein

the control means transmits operation information of the refrigerator via the cloud communication means to the Internet cloud to store the operation information of the refrigerator in the Internet cloud.

[Claim 8]

The refrigerator of any one of claims 1 to 7, further comprising

external device communication means configured to communicate with an external device, wherein

upon acquiring, via the external device communication means, information indicating that it is difficult to supply power, the control means calculates a target temperature setting plan in which power consumption of the refrigerator is minimized, and

the operation display means displays the target temperature setting plan in which the power consumption of the refrigerator is minimized.

[Claim 9]

The refrigerator of claim 8, wherein

upon acquiring, via the external device communication means, the information indicating that it is difficult to supply power, the control means calculates a plurality of target temperature setting plans including the target temperature setting plan in which the power consumption of the refrigerator is

minimized, and

the operation display means displays the plurality of target temperature setting plans including the target temperature setting plan in which the power consumption of the refrigerator is minimized.

[Claim 10]

The refrigerator of any one of claims 1 to 9, wherein the operation display means displays either one of or both a current set temperature for the storage compartment and a current power saving level.

94 which sends cold air cooled by the cooler 93 to each storage compartment within the refrigerator 100 are provided at a back side of the refrigerator 100. The cooler 93 is provided above the compressor 92, and the air-sending fan 94 is provided above the cooler 93. An air passage 95 for introducing the cold air cooled by the cooler 93 to each storage compartment is formed above the air-sending fan 94.

[0018]

The temperature of each storage compartment is detected by a thermistor (not shown) installed at each storage compartment. Control means 80 controls the opening degree of a damper (not shown) installed on the air passage 95, the capacity of the compressor 92, and the amount of air sent by the air-sending fan 94 based on the temperature detected by each thermistor, such that the temperature within each storage compartment becomes a preset temperature. In addition, a door opening frequency detection sensor (not shown) which detects door opening frequency of the refrigerator 100 is provided at each storage compartment.

[0019]

A storage case 2a which is able to store food is provided in the switching compartment 2. A storage case 4a which stores food is provided in the freezing compartment 4. An outer case 5a which is able to store food is provided in the vegetable compartment 5. The number of cases provided in each storage compartment may be 1, but a plurality of cases may be provided in accordance with the entire capacity of the refrigerator to improve the organizing performance within the storage compartment.

[0020]

Next, flow of the cold air cooled by the cooler 93 will be described.

The cold air cooled by the cooler 93 is sent through the air passage 95 to

level. The control means 80 calculates one or a plurality of power saving plans for achieving a power saving target value 19 set by the user, in accordance with the power saving target value 19. The number of power saving plans displayed on the operation display panel 6 is not limited to three as described above, but may be one or two, or may be four or more. Each power saving plan of Embodiment 1 corresponds to a target temperature setting plan of the present invention.

[0032]

The simple explanation display area 22 is an area in which wording which explains the power saving plan setting buttons 21a, 21b, and 21c is displayed, and the wording is, for example, "balance type plan", "freezing saving type plan", and "ice-making stop type plan". As it is recognized that the "balance type plan" is explanation of the "power saving plan A", the "freezing saving type plan" is explanation of the "power saving plan B", and the "ice-making stop type plan" is explanation of the "power saving plan C", the "balance type plan", the "freezing saving type plan", and the "ice-making stop type plan" are displayed so as to be associated with the respective power saving plans.

[0033]

Next, an operation example of Fig. 5 will be described.

When the user selects the power saving plan setting button 21a from among the power saving plan setting buttons 21a, 21b, and 21c, the screen transitions to Fig. 6.

[0034]

Fig. 6 is a diagram showing an example of a power saving plan temperature detailed explanation diagram displayed on the operation display panel 6 of the refrigerator 100 according to Embodiment 1 of the present invention. Fig. 6 is a screen displayed when the power saving plan setting

before), and 8 hr before (8 hours before), a mark 28a is displayed which indicates that the opening frequency for the storage compartment is equal to or greater than a predetermined time.

[0046]

Next, an operation example of Fig. 8 will be described.

When the user moves the pointer 10 such that the pointer 10 is located within a coordinate area in which the mark 28a is displayed, the frequency for each storage compartment for which the door opening time is equal to or greater than the predetermined time is displayed on the operation display panel 6. For example, "refrigerating compartment: 2 times" and "freezing compartment: 2 times" are displayed as shown in Fig. 8. Thus, it is recognized that the door at the refrigerating compartment 1 was opened for the predetermined time or longer twice and the door at the freezing compartment 4 was opened for the predetermined time or longer twice.

[0047]

As described above, the refrigerator 100 according to Embodiment 1 includes: operation display means which displays a plurality of power saving levels each indicating a power saving index and accepts an operation input of selecting one power saving level from among the plurality of power saving levels; and control means 80 which, when an operation input of selecting one power saving level from among the plurality of power saving levels displayed on the operation display means is made, calculates one or a plurality of power saving plans corresponding to the selected one power saving level. The operation display means displays the power saving plans calculated by the control means 80 and accepts an operation input of executing the power saving plan. Thus, after confirming that a target temperature setting plan corresponding to the selected one power saving level is suitable for a user's use state, the user is allowed to

the power saving target value 19 is set in Fig. 4. As shown in Fig. 12, the current temperature etc. display area 20, the power saving plan display area 21, wording 50, and a simple explanation display area 52 are displayed on the operation display panel 6. In Embodiment 3, the description of the parts common to Embodiments 1 and 2 is omitted, and the difference from Embodiments 1 and 2 will be mainly described.

[0067]

In Embodiment 3, unlike Embodiment 2, a load detection sensor (not shown) or a refrigerant interior capturing camera (not shown) with which it is possible to determine a food load amount is provided to each storage compartment of the refrigerator 100. There are no particular limitations on the detection method of the sensor which determines a food load amount, and, for example, a mechanical sensor or an optical sensor may be used. The control means 80 determines the power saving level set by the user and a food load amount in the refrigerator 100 by using detection information of the load detection sensor or the refrigerant interior capturing camera, and a recommended power saving plan suitable for the user is displayed on the operation display panel 6. A specific example will be described below. The load detection sensor or refrigerant interior capturing camera corresponds to load detection means of the present invention.

[0068]

As shown in Fig. 12, a phrase "recommended ice-making stop type plan" within the simple explanation display area 52 is displayed so as to be associated with the power saving plan setting button 21c, and the user is allowed to understand that the "power saving plan C" is more recommended than the "power saving plan A" and the "power saving plan B". The wording 50 is wording indicating a reason why the above "power saving plan C" is

Embodiments 1 to 3 is omitted, and the difference from Embodiments 1 to 3 will be mainly described.

[0072]

As shown in Fig. 13, similarly to Fig. 6, the current temperature etc. display area 20, the set temperature etc. display area 23, the caution point button 24, the decision button 25, and the cancel button 26 are displayed. On the other hand, in Fig. 13, unlike Fig. 6, current power consumption 58 is displayed below the current temperature etc. display area 20, and power consumption 59 during the power saving plan is displayed below the set temperature etc. display area 23. For example, the current power consumption 58 is "current power consumption: 0.924 kwh/d", and the power consumption 59 during the power saving plan is "expected power consumption during this plan: 0.814 kwh/d". The current power consumption 58 and the power consumption 59 during the power saving plan as described above are calculated by the control means 80, for example, based on detection information of a power consumption detection sensor (not shown) which detects the power consumption of the refrigerator 100.

[0073]

As described above, since the value of power consumption in each operating state is displayed on the operation display panel 6, the user is allowed to quantitatively understand the power consumption, which leads to improvement in motivating the user to save power.

[0074]

As power consumption, on the operation display panel 6, the current temperature and the temperature after power saving may not be displayed as described above, and a relative value between the current power consumption and the power saving plan may be displayed, or an electricity price per day calculated from power consumption may be displayed.

consumption detection sensor is equal to or higher than the threshold electric energy is transmitted from the other external device to the refrigerator 100.

[0078]

The method of reducing power consumption is not limited to the above-described example, and when the power consumption of the external device other than the refrigerator 100 increases as described above, the control means 80 may delay startup of a defrost heater having relatively high power consumption in operation of the refrigerator 100, to execute peak cut.

[0079]

Embodiment 6

Next, Embodiment 6 will be described. In Embodiment 6, the description of the parts common to Embodiments 1 to 5 is omitted, and the difference from Embodiments 1 to 5 will be mainly described. In Embodiment 6 as well, similarly to Embodiment 2, a network as in Fig. 9 is established, and the refrigerator 100 is configured to be able to exchange information with the Internet cloud 300 via the centralized controller 132.

[0080]

Hereinafter, transmission and reception of data in Embodiment 6 will be described.

When the refrigerator 100 transmits operation information, such as information indicating, for example, power consumption and a load of the refrigerator 100 and information indicating the door opening frequency, to the Internet cloud 300 via the centralized controller 132, the Internet cloud 300 stores the operation information of the refrigerator 100. The operation information may be transmitted from the refrigerator 100 to the Internet cloud 300 each time the operation information is updated within the refrigerator 100, or may be transmitted from the refrigerator 100 to the Internet cloud 300 every given time.

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CLAIMS

[Claim 1]

A refrigerator comprising:

a storage compartment;

operation display means configured to display a plurality of power saving levels each indicating a power saving index and to accept an operation input of selecting one power saving level from among the plurality of power saving levels; and

control means configured to, when an operation input of selecting one power saving level from among the plurality of power saving levels displayed on the operation display means is made, calculate one or a plurality of target temperature setting plans regarding a target temperature for the storage compartment in accordance with the selected one power saving level, wherein

the operation display means displays the target temperature setting plans calculated by the control means and accepts an operation input of executing the target temperature setting plan.

[Claim 2]

The refrigerator of claim 1, wherein

when the operation input of selecting one power saving level from among the plurality of power saving levels displayed on the operation display means is made, the control means calculates a target temperature setting plan based on the selected one power saving level and a food load amount within the storage compartment.

[Claim 3]

The refrigerator of claim 2, wherein

the control means calculates a plurality of target temperature setting plans including the target temperature setting plan calculated based on the selected

one power saving level and the load detected by the load detection means, and

in displaying the plurality of target temperature setting plans, the operation display means displays the target temperature setting plans such that the target temperature setting plan calculated based on the selected one power saving level and the load detected by the load detection means is distinguished from the other target temperature setting plans.

[Claim 4]

The refrigerator of any one of claims 1 to 3, wherein

the control means calculates the current power saving level based on an opening frequency of a door of the storage compartment and a set temperature for the storage compartment, and

the operation display means displays either one of or both the power saving level calculated by the control means and information which prompts power saving.

[Claim 5]

The refrigerator of any one of claims 1 to 4, wherein the operation display means is of a touch panel type.

[Claim 6]

The refrigerator of any one of claims 1 to 5, wherein

the control means has a function of communicating with an external device, and switches to a target temperature setting plan in which power consumption is lower than the current power consumption upon acquisition of information indicating that power consumption of the external device is increased to be equal to or higher than a threshold.

[Claim 7]

The refrigerator of any one of claims 1 to 6, wherein

the control means has a function of communicating with an Internet cloud

via a network, and transmits operation information of the refrigerator via the cloud communication means to the Internet cloud to store the operation information of the refrigerator in the Internet cloud.

[Claim 8]

The refrigerator of any one of claims 1 to 7, wherein

the control means has a function of communicating with an external device, and calculates a target temperature setting plan in which power consumption of the refrigerator is minimized upon acquisition of information indicating that it is difficult to supply power, and

the operation display means displays the target temperature setting plan in which the power consumption of the refrigerator is minimized.

[Claim 9]

The refrigerator of claim 8, wherein

upon acquiring the information indicating that it is difficult to supply power, the control means calculates a plurality of target temperature setting plans including the target temperature setting plan in which the power consumption of the refrigerator is minimized, and

the operation display means displays the plurality of target temperature setting plans including the target temperature setting plan in which the power consumption of the refrigerator is minimized.

[Claim 10]

The refrigerator of any one of claims 1 to 9, wherein the operation display means displays either one of or both a current set temperature for the storage compartment and a current power saving level.