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(54) **A method for defrosting process**

(57) The method of the invention is developed for the cooler devices that can detect the time of defrosting, and the initiation time of the defrosting process can be controlled by using this method. In the method of the invention, while the said cooler device continues to operate, the next defrosting time is calculated momentarily depending on the changing inner and outer environment

conditions. For the said purposes, the values measured by the inner and outer environment temperature and/or humidity meter are evaluated by the control unit. The time of the next defrosting process is calculated in accordance with the duration that at least one of the compartment doors of the device is kept close.

EP 2 375 198 A2

Description

Technical Field

[0001] The present invention relates to the methods that control the defrosting process of the cooler devices.

Prior Art

[0002] The most common problem that one faces during the operation of the cooler devices is frosting of the evaporator that is used for the cooling process. The ambient humidity in the compartment where the evaporator is placed causes frosting on the evaporator and decreases the cooling efficiency of the evaporator. For this reason, the ice on the evaporator should be defrosted. As for the defrosting process, either the refrigerator is stopped or the ice is defrosted by means of a heater placed on the evaporator. In case, the heat inside the cooler device increases, and the heat of the food that is kept inside the refrigerator consequently increases. This process creates even a bigger problem for the food that is kept inside the freezer compartment. It is important that the food inside the freezer compartment is kept at a fixed temperature for a long time and that it is not exposed to increases in temperature. However, operations such as opening and closing door of the freezer compartment, storing additional foodstuff are factors that damage the balance of temperature inside the freezer compartment. It is also known that the defrosting process is the most important factor that damages the said balance. As examples of the known state of the art, in the published patent applications No US2007295015 and No KR100286173; cooler devices are disclosed that control the defrosting period in accordance with leaving the door of the cooler device open and the outdoor temperature. However, the said applications do not disclose the process of independently controlling the defrosting duration depending on how much time at least one compartment door of the device being kept closed and the environment temperature.

Brief Disclosure of the Invention

[0003] The method of the invention is developed for cooler devices that can detect the defrosting time; and the initiation time of the defrosting process is controlled by said method. In the method of the invention, while said cooler device continues to operate, the next defrosting time is calculated on a momentarily basis in accordance with the changing conditions of inner and outer environment. To this end, the values that are measured by the inner and outer environment temperature and/or humidity meters are evaluated by the control unit. In accordance with the duration during which at least one door of compartment provided in the device is kept closed, the initiation of the defrosting time is calculated.

The Objective of the Invention

[0004] The aim of the present invention is to control the initiation of the defrosting process of the cooler devices that are used for the preservation of food products.

[0005] Another aim of the present invention is to save energy by controlling the defrosting durations of said cooler devices.

[0006] Yet another aim of the present invention is to develop a method for controlling defrosting that is reliable and easy to implement.

Disclosure of the Invention

[0007] As it is known, from time to time, the surface of the cooling elements (for example the evaporators) placed in the cooling compartments of the cooler devices, that are used for preserving the food products, freezes over and this decreases the cooling performance of the device. In addition, due to the frequency and the duration that the defrosting process takes, in order to provide the inner temperature equilibrium of the device in a rapid way; the cooling system of the device cools at a very high performance level and this increases the electricity consumption of the device. For this reason; in addition to the necessity of defrosting of the ice that accumulates on surface of the cooling elements, the initiation of the defrosting process should also be controlled. It is further known that the ambient temperature, the indoor temperature of the inner compartments of the device and durations in open and closed state of the device door are the factors effecting the initiation time of the defrosting process.

[0008] In the method of the invention, the duration between the two defrosting process is determined in accordance with the outer environment conditions (such as humidity and temperature) and the duration that the doors of the device are left closed. In the cooler device to be used for this method, there are separate compartments where the food products are kept and these said compartments have separate doors. In other words, the device has at least one cooling compartment and this compartment has a door that is opening outside; and at least one freezer compartment and this compartment has a door that is opening outside. The open or closed state of the doors is detected by the electrical elements (for example, these can be the key for the freezer compartment and the key for the cooling compartment or (the sensors)). In addition, the device comprises at least one humidity and/or temperature meter that measures the outer environment conditions. The device may comprise cooling cycle elements such as a compressor, a condenser and an evaporator (cooling element), and it may also have the capability to provide cooling through thermo-electric elements (such as peltier). The device also comprises a temperature and/or humidity meter that measures the inner environment conditions. The operation of all of the electrical elements in the cooler device

is controlled by at least one control unit. The control unit is an electronic system having the capability of performing all of the adjustments / calculations that control its operation. (The defrosting process of the device is preferably provided by at least one heater placed near the refrigerating element).

[0009] In the method of the invention, while the said refrigerating device continues to operate, the next defrosting time, are calculated momentarily due to the changing inner and outer environment conditions. For the said purposes, the values measured by the inner and outer environment temperature and/or humidity meter are evaluated by the control unit. In case that the doors of the freezer and the cooling compartment of the device are kept close for a period of time as predetermined; the initiation of the next defrosting time is calculated in accordance with the environment temperature. The steps of the method are disclosed below in sequence and in detail.

[0010] In the first step of the method, the time that the device gets into the next defrosting process is calculated momentarily by at least one control unit provided in the device depending on the values that are measured by at least one inner environment temperature and/or humidity meter and by at least one outer environment temperature and/or humidity meter and in accordance with the cooling capacity of the device. (At this stage the device is rearranging the time that it gets into the defrosting time momentarily depending on the inner and outer environment conditions).

[0011] In the second step, within the period that passes until the initiation of the defrosting process previously calculated, whether the cooling compartment door of the device or the freezer compartment door of the device is opened or not is reported to the control unit by at least one electrical element (the said element can be a sensor or a switch) related to the cooling compartment door and/or the freezer compartment door switch.

[0012] In the third step, in case the information that the doors of the freezer compartment and/or the cooling compartment are not opened is detected by the control unit; for the initiation of the next defrosting process, the defrosting process is initiated after the duration calculated in the first step elapses. In this step, if the information that at least one of the doors of the freezer compartment and/or the cooling compartment is opened is detected by the control unit; the method is resumed to operate from the fourth step mentioned below.

[0013] In the fourth step, in accordance with the duration that the doors of the freezing compartment and/or the cooling compartment are kept open and the changing outer and inner environment temperature and/or humidity values, the control unit calculates again when the device initiates the next defrosting process.

[0014] In the fifth step, the method is resumed from the second step in accordance with the time previously calculated within the fourth step.

[0015] By the method of the invention, by means of the

control unit calculating momentarily the initiation time of the defrosting process in accordance with the conditions mentioned above, the refrigerating device does not perform defrosting operation before the operation is required. For this reason, it becomes possible to perform the defrosting operation only when it is required since it is a process that increases the consumption of energy; and the non performing of the operation at predetermined fixed times provides energy saving.

Claims

1. A method for calculation of initiation time of the defrosting process for the cooler devices used for keeping the food products and **characterized in that**; it respectively comprises the following steps wherein;

- In the first step of the method, the time that the device gets into the next defrosting process is calculated momentarily by at least one control unit provided in the device depending on the values that are measured by at least one inner environment temperature and/or humidity meter and by at least one outer environment temperature and/or humidity meter and the cooling capacity of the device;

- In the second step, within the period that passes until the initiation of the defrosting process previously calculated, whether the cooling compartment door of the device or the freezer compartment door of the device is opened or not is reported to the control unit by at least one electrical element related to the cooling compartment door and/or the freezer compartment door;

- In the third step, in case the information that the doors of the freezer compartment and/or the cooling compartment are not opened is detected by the control unit; for the initiation of the next defrosting process, the defrosting process is initiated after the running out of the duration calculated in the first step; also in this stage, in case that at least one of the doors of the freezer compartment and/or the cooling compartment is opened is detected by the control unit; the method is resumed to operate from the fourth step;

- In the fourth step, in accordance with the duration that the doors of the freezing compartment and/or the cooling compartment are kept open and the changing outer and inner environment temperature and/or humidity values, the control unit calculates again when the device initiates the next defrosting process; in the fifth step, the method is resumed from the second step in accordance with the time previously calculated within the fourth step.

2. A method according to the Claim 1 **characterized**

in that a switch is used as an electrical element.

3. A method according to the Claim 1 **characterized**
in that a sensor is used as an electrical element.

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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