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(54) **REFRIGERATOR**

KÜHLVORRICHTUNG

RÉFRIGÉRATEUR

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Description

Technical Field

[0001] The invention relates to a refrigerator, especially to a household or commercial refrigerator.

Background Art

[0002] The freezing compartment of a refrigerator can usually reach a temperature of lower than minus ten °C or more.. The refrigerator body and the door of the refrigerator are provided with heat insulating layers to avoid losing of cold energy caused by heat exchange between the cold air within the refrigerator and the surrounding environment. However, as the increase in the refrigerator's volume and in the number of the components of the refrigerator door (for example, a dispenser for dispensing water or ice), some portions of the refrigerator door which are exposed to the atmosphere may have relatively low temperature under the influence of the storage compartment. When the difference between the temperature of the surface exposed to the atmosphere and the atmosphere temperature reaches dew point temperature, condensation will appear on the surface.

[0003] The sidewall of the refrigerator door remote from the rotation axis of the door will be influenced by the freezing compartment during the closing of the door. Thus, it is possible to generate condensate drops on this side wall. This is especially obvious when the refrigerator door is provided with an ice dispenser.

[0004] International application for patent No. 2010/066728 A2 discloses a refrigerator which comprises a thermally insulated cabinet including a refrigerating or a freezing chamber and a pair of door bodies pivotally hinged relative to the cabinet for opening and closing the chamber. The refrigerator further comprises a heating device provided to at least one of ends of the door bodies facing each other when closing the chamber.

[0005] US-American application for patent No. 2005/0091999 A1 discloses a refrigerator according to the preamble of claim 1 and describes a freezer access door and an ice dispensing door between a freezer enclosure and the ambient through which ice is dispensed. A heater is provided in one of the door and doorframe for each of the doors to prevent the doors from freezing to their associates frames.

[0006] US American patent No. 5,725,294 discloses a refrigerator which comprises a case including a fresh food and/ or a freezer chamber, and a door for opening and closing the chamber. The refrigerator further comprises a suitable strip of foil which is in intimate contact with the inside surface of one of the case walls.

Summary of the Invention

[0007] An object of the invention is to overcome at least one of the above technical problems existed in the prior

art, and to provide a refrigerator for greatly reducing the possibility of presence of condensate drops on the freezing compartment door.

[0008] The invention relates to a refrigerator as defined in claim 1.

[0009] Other features which are disclosed individually or in combination as features of the invention are defined in attached claims.

[0010] According to a preferred embodiment of the invention, the heater is located on the inner side of the sidewall.

[0011] According to a preferred embodiment of the invention, the refrigerator includes adhesive means for attaching the heater to the inner side of the sidewall.

[0012] According to a preferred embodiment of the invention, the refrigerator includes a heat conducting element for transmitting heat generated by the heater to the sidewall, the heat conducting element being located between the inner surface of the sidewall and the heater. Thereby, the heat generated by the heater can rapidly spread out so as to avoid overheating of any partial region of the door.

[0013] According to a preferred embodiment of the invention, the door is rotatable around a rotation axis parallel to a vertical axis, and the sidewall is parallel to the rotation axis. According to a particularly preferred embodiment of the invention, the sidewall is located distant from the rotation axis.

[0014] According to a preferred embodiment of the invention, the heater is, in a transverse direction, at least partially overlapped with the dispenser, so as to greatly reduce the possibility of generating condensate drops on a part of the sidewall which transversely overlaps the dispenser and is otherwise easy to generate condensate drops. Such a configuration can effectively reduce the possibility of generating condensate drops on the whole sidewall of the door.

[0015] According to a preferred embodiment of the invention, the refrigerator further comprises a control unit and a sensing unit for detecting at least one parameter, and the heater is automatically controlled by the control unit based on the parameter detected by the sensing unit.

[0016] According to a preferred embodiment of the invention, the parameter comprises ambient temperature and/or ambient relative humidity and/or the temperature of the sidewall.

[0017] The structure and other objects and advantages of the invention will be apparent from the description to the preferred embodiments with reference to the drawings.

Brief Description of the Drawings

[0018] The invention will be further understood by reading the following detailed description with reference to the drawings which are incorporated herein as a part of the description and illustrate the invention and in which:

Figure 1 is a schematic perspective view of a refrigerator.

Figure 2 is a schematic partial sectional view taken along a direction indicated by line I-I of Figure 1.

Figure 3 is a schematic view of a partly assembled door of the refrigerator.

Figure 4 is a schematic layout of a heating unit of a dispenser casing of the refrigerator.

Figure 5 is a schematic block diagram of the refrigerator.

Detailed Description of Preferred Embodiments

[0019] Please refer to the drawings, in particular Figures 1 and 2. A refrigerator 1 comprises a refrigerator body 2 and two doors 3 connected to the refrigerator body 2, as shown in Figures 1 and 2.

Brief Description of the Drawings

[0020] The invention will be further understood by reading the following detailed description with reference to the drawings which are incorporated herein as a part of the description and illustrate the invention and in which:

Figure 1 is a schematic perspective view of a refrigerator.

Figure 2 is a schematic partial sectional view taken along a direction indicated by line I-I of Figure 1.

Figure 3 is a schematic view of a partly assembled door of the refrigerator.

Figure 4 is a schematic layout of a heating unit of a dispenser casing of the refrigerator.

Figure 5 is a schematic block diagram of the refrigerator according to a preferred embodiment of the invention.

Detailed Description of Preferred Embodiments

[0021] Please refer to the drawings, in particular Figures 1 and 2. A refrigerator 1 comprises a refrigerator body 2 and two doors 3 connected to the refrigerator body 2, as shown in Figures 1 and 2.

[0022] The refrigerator body 2 comprises an outer shell 11, an inner shell 12 and a heat insulating layer 6 disposed between the outer shell 11 and the inner shell 12. In this embodiment, the heat insulating layer 6 is a foam-based insulating layer and is formed by foaming a heat insulating foam material. The refrigerator body 2 defines at least one storage space for storing food. In this em-

bodiment, the storage space comprises a freezing compartment 7 and a refrigerating compartment (not shown) which are juxtaposed with each other.

[0023] The doors 3 are pivotably connected to the refrigerator body 2 by hinges 4 respectively, and are rotatable about their corresponding rotation axes which are parallel to a vertical axis. As shown in Figure 2, it is also provided with a foam-based insulating layer 6 inside each of the doors 3. The doors 3 are usually closed to avoid escape of cold air from the freezing compartment 7 and the refrigerating compartment. When desired, the user may open the corresponding door 3 to perform an operation, such as taking out food from the freezing compartment or refrigerating compartment, or putting food into a corresponding storage compartment. The user can open or close the doors 3 by means of handles 5.

[0024] In this embodiment, each door 3 is configured to completely open or completely close a corresponding storage compartment. It can be understood that the invention is not limited thereto, and other embodiments are also possible. For example, in an alternative embodiment, one of the storage compartments may be opened or closed by two doors 3. That is to say, each door 3 may only open or close a part of such a storage compartment.

[0025] The door 3 which is corresponded to the freezing compartment 7 (hereinafter referred to as freezing compartment door) is equipped with a dispenser 8 to allow a user to take out ice and/or beverage (for example water), such as ice stored in the freezing compartment and water stored in a water tank arranged in the refrigerating compartment, without opening the door 3. Although in this embodiment the dispenser 8 is arranged in the door 3 which is corresponded to the freezing compartment, it shall be appreciated that it is also possible to arrange the dispenser 8 in a suitable way in the door 3 which is corresponded to the refrigerating compartment.

[0026] As shown in Figures 2 and 3, the freezing compartment door 3 comprises a door panel 13 forming its front surface and an inner lining 23 facing towards the freezing compartment 7 when the freezing compartment door 3 is in its closed position. In this embodiment, the door panel 13 is made of a sheet metal material, and both sides of the door panel 13 are bent backwardly and extend to form into first and second longitudinal sidewalls 48 and 49 respectively. The heat insulating layer 6 is in tight contact with the door panel 13 and the first and second longitudinal sidewalls 48 and 49.

[0027] The door panel 13 has an opening 9 corresponding to the dispenser 8, which opening 9 having a substantially square or rectangular shape. The dispenser 8 comprises a dispenser casing 10 received between the door panel 13 and the inner lining 23. The dispenser casing 10 forms a cavity 14 which is inwardly recessed and has a front open end. The shape and dimension of the front open end of the inner cavity 14 correspond to that of the opening 9 substantially. The inner lining 23 protrudes toward the freezing compartment 7 at the location

corresponded to the dispenser casing 10, with a predetermined distance between the protruding portion of the inner lining 23 and the dispenser casing 10 for disposing the heat insulating layer 6.

[0028] The dispenser 8 comprises a partition plate 15 within the inner cavity 14. The partition plate 15 is parallel to a horizontal plane and separates the inner cavity 14 into upper and lower portions. The portion of the inner cavity 14 located below the partition plate 15 forms into a dispensing cavity 16 whose front end is kept open. The dispensing cavity 16 is configured to accept at least a part of an external container such as a cup. In this embodiment, the dispensing cavity 16 is recessed backwardly from the front surface of the door 3 with a certain curvature to a predetermined depth.

[0029] The dispensing cavity 16 has a substantially flat support wall 17 for stably putting the external container thereon. The support wall 17 has a plurality of thin through holes (not shown), through which any liquid that is splashed out or overflows accidentally during an ice or water dispensing process flows into a water gathering slot 19 arranged below the support wall 17.

[0030] The refrigerator 1 comprises a control panel 20 arranged on the freezing compartment door 3, and the control panel 20 comprises a display screen 21 and a plurality of buttons or a touch area 22 for controlling the refrigerator 1. The display screen 21 can display the state of the refrigerator 1 and/or selectable parameters, etc.

[0031] In this embodiment, the control panel 20 is arranged along the upper end of the opening 9, closely adjacent to the dispensing cavity 16. The portion of the opening 9 located above the partition plate 15 is adapted to be conformed to the out profile of the control panel 20, such that the control panel 20 can be engaged by the corresponding edge of the opening 9. The portion of the inner cavity 14 located above the partition plate 15 is shielded by the control panel 20.

[0032] The dispenser casing 10 comprises a cavity wall delimiting the inner cavity 14. The cavity wall comprises a first portion 24 located below the partition plate 15. The first portion 24 comprises a longitudinal wall 30 for forming a longitudinal boundary of the dispensing cavity 16. The longitudinal wall 30 is perpendicular to the horizontal plane and has a substantially arc-shaped cross-section. The longitudinal wall 30 has a rear surface which is closely adjacent to the heat insulating layer 6 and an outer surface which is exposed to the atmosphere.

[0033] The first portion 24 further comprises a bottom wall 31 which is connected to the lower end of the longitudinal wall 30 and extends forwardly. The bottom wall 31 is located below the support wall 17 and spaced from the support wall 17 by a certain distance so as to form the above-mentioned water gathering slot 19.

[0034] The cavity wall of the dispenser casing 10 further comprises a second portion 25 which is connected to the upper end of the first portion 24 and is located above the partition plate 15. The second portion 25 comprises an inclined wall 26 which extends from the longitudinal wall 30 and is inclined forwardly. The inclined wall 26 comprises a through hole 27 which allows ice to pass therethrough. The through hole 27 is configured as a part of an ice transfer passage 29. The ice transfer passage 29 is used for transferring ice from an ice storage unit 28 located within the freezing compartment 7 to the dispensing cavity 16. The second portion 25 further comprises a top wall 32 which forms the upper boundary of the inner cavity 14. The second portion 25 has a hole 33 through which a water supply pipe (not shown) passes, which water supply pipe transmitting drinkable water to the dispensing cavity 16.

[0035] An ice discharge pipe 34 forming a major part of the ice transfer passage 29 is embedded in the freezing compartment door 3. One end of the ice discharge pipe 34 is connected to the second portion 25 and is in communication with the through hole 27. The other end of the ice discharge pipe is oriented towards a discharge outlet of the ice storage unit 28 within the freezing compartment 7 when the freezing compartment door 3 is closed. Thereby, the ice discharged from the ice storage unit 28 enters into the ice discharge pipe 34, and then is guided to the dispensing cavity 16 by means of an ice outlet 18 provided in the partition plate 15.

[0036] As shown in Figure 2, the portion of the inner cavity 14 which lies above the partition plate 15 is shielded by the control panel 20; however, the second portion 25 of the dispenser casing 10 still communicates with the atmosphere, that is, the second portion 25 is still exposed to the atmosphere, because the partition plate 15 is provided with the ice outlet 18 which is in communication with the portion of the inner cavity 14 which lies above the partition plate 15.

[0037] To prevent air within the freezing compartment 7 from escaping from the freezing compartment 7 through the ice transfer passage 29 or prevent outside air from entering into the freezing compartment 7 through the ice transfer passage 29, the dispenser 8 is equipped with a closure element 36 for opening or closing the ice transfer passage 29. Usually, the ice transfer passage 29 is closed by the closure element 36. When there is a need for dispensing ice, the ice transfer passage 29 is opened by means of the closure element 36 to allow the transfer of ice. The shape and dimension of the closure element 36 are substantially corresponded to that of the through hole 27, such that in the closed position the closure element closes the through hole 27 and thus closes the ice transfer passage 29. In this embodiment, the closure element 36 is connected to the second portion 25 of the dispenser casing 10 and is received in the inner cavity 14.

[0038] Under the influence of the freezing compartment 7, the temperature of the dispenser casing 10 is usually lower than room temperature/ambient temperature. When the difference between ambient temperature and the temperature of the dispenser casing 10 reaches dew point temperature, condensate drops will be generated on the dispenser casing 10. The condensation possibility is relatively high due to the fact that the second

portion 25 of the dispenser casing 10 is close to the ice discharge pipe 34 and forms a part of the ice transfer passage 29. For this end, the refrigerator 1 is provided with a heating unit 37 for increasing the surface temperature of the dispenser casing 10. As shown in Figure 2, the heating unit 37 is arranged between the dispenser casing 10 and the heat insulating layer 6.

[0039] Figure 4 is a schematic diagram of the heating unit 37 according to the invention. As shown in Figure 4, the heating unit 37 comprises a first heater 38 and a second heater 39 adjacent to the first heater 38, for supplying heat to the dispenser casing 10. The first heater 38 and the second heater 39 are preferably resistance heaters, i.e. performing heating by resistors.

[0040] In order to evenly transmit the heat generated by the first heater 38 and the second heater 39 to the dispenser casing 10, the heating unit 37 further comprises a first heat conducting element 40 for transmitting the heat generated by the first heater 38 and the second heater 39 to the dispenser casing 10. In this embodiment, the first heat conducting element 40 is an aluminum foil having a high heat conductivity.

[0041] The first heat conducting element 40 has a hole (not shown) which is corresponded to the through hole 27. The first heater 38 and the second heater 39 can be arranged according to the distribution characteristics of condensate drops on the dispenser casing 10. In this embodiment, the first heater 38 comprises a plurality of arc-shaped heating segments 35 arranged around the hole. The second heater 39 is arranged close to the first heater 38 and preferably comprises a portion located between heating segments 35 of the first heater 38. Preferably, this portion has a shape that corresponds to the heating segment 35.

[0042] After the first heater 38 and the second heater 39 are arranged in a predetermined pattern on one side of the first heat conducting element 40, the other side of the first heat conducting element 40 is closely attached to the inner side of the dispenser casing 10.

[0043] The heating unit 37 is adhered to the inner side of the dispenser casing 10 by means of adhesive means (not shown), with the hole of the first heat conducting element 40 being aligned with the through hole 27. The first heat conducting element 40, the first heater 38 and the second heater 39 all are flexible and deformable, such that the portion of the heating unit 37 located between line A and line B is arranged on the inclined wall 26, the portion thereof located above line A is bent and then is adhered to the top wall 32 of the dispenser casing, and the portion thereof located below line B is bent and then is connected to the upper end of the longitudinal wall 30. Thereby, in this embodiment, the first heater 38 is mainly arranged on the inclined wall 26 and the top wall 32 of the dispenser casing 10. The lower end portion of the first heater 38 extends to the upper end of the longitudinal wall 30. The heating segment 35 most close to the through hole 27 is arranged around the through hole 27. The major portion of the second heater 39 is arranged

on the inclined wall 26. The portion located below line B of the second heater extends to the upper end of the longitudinal wall 30 together with that of the first heater 38.

[0044] In this embodiment, the first heater 38 and the second heater 39 are disposed on a first region 51 and a second region 52 of the dispenser casing 10 respectively. The first region 51 is adjacent to the second region 52, but they do not overlap each other. The first region 51 comprises the majorities of the inclined wall 26 and the top wall 32 as well as the upper end portion of the longitudinal wall 30 which is close to the inclined wall 26. The second region 52 has an area smaller than the first region 51 and is surrounded by the first region 51.

[0045] Preferably, the power of the second heater 39 is lower than that of the first heater 38. Preferably, the power density of the second heater 39 is configured in such a way that the dispenser casing 10 is not subjected to overheating even if the second heater 39 is turned on for a long time or always turned on.

[0046] According to a preferred embodiment of the invention, the side of the longitudinal wall 30 which faces the heat insulating layer 6 is provided with a second heat conducting element 50, the upper end of which is connected to the first heater 38 and the second heater 39 or connected to the first heat conducting element 40. Thereby, the first and second heaters 38 and 39 and/or the first heat conducting element 40 serve as a heat source for the second heat conducting element 50.

[0047] Since the second heat conducting element 50 is of a high heat conductivity, the heat generated by the first and second heaters 38 and 39 is also transmitted to other portions of the longitudinal wall 30 that are not equipped with any heating element, such that the temperature of the whole longitudinal wall 30 can be increased so as to avoid the presence of condensate drops. Since the longitudinal wall 30 is located relatively distant from the ice transfer passage 29, such a configuration allows to avoid the presence of condensate drops on the longitudinal wall 30 without arranging any heater on the longitudinal wall 30 or merely by arranging a heater on the marginal region of the longitudinal wall 30 where is not easy to be touched by the user. Thus, energy consumption can be lowered. In addition, the situation that the user touches the high temperature region of the longitudinal wall 30 can be avoided.

[0048] Preferably, the second heat conducting element 50 comprises a metal foil of a high heat conductivity, such as aluminum foil. In a particularly preferable embodiment, the second heat conducting element 50 covers at least substantially most of the longitudinal wall 30. For example, the longitudinal wall 30 is entirely covered by the second heat conducting element 50. The second heat conducting element 50 is preferably adhered to the inner side of the longitudinal wall 30.

[0049] The first longitudinal sidewall 48 of the freezing compartment door 3 is located adjacent to the rotation axis of the freezing compartment door 3, so that the sec-

ond longitudinal sidewall 49 opposite to the first longitudinal sidewall 48 is located distant from the rotation axis of the freezing compartment door 3 and close to the door of the refrigerating compartment. According to a preferred embodiment of the invention, the freezing compartment door 3 is provided with a third heater 47 for supplying heat to the second longitudinal sidewall 49, so as to avoid the presence of condensate drops on the second longitudinal sidewall 49 due to the difference between surface temperature and the atmosphere temperature. In this embodiment, the third heater 47 is attached to the inner side of the second longitudinal sidewall 49. The third heater 47 is preferably a resistance heater, i.e. performing heating by resistors.

[0050] The second longitudinal sidewall 49 is provided with a third heat conducting element 54 attached to the inner side thereof. The third heat conducting element 54 is located between the third heater 47 and the inner surface of the second longitudinal sidewall 49 to evenly transmit the heat generated by the third heater 47 to the second longitudinal sidewall 49. Preferably, the third heat conducting element 54 is attached to the inner surface of the second longitudinal sidewall 49 by adhesive means (such as an adhesive tape).

[0051] It is most preferably to arrange the third heater 47 and/or the third heat conducting element 54 on a region of the second longitudinal sidewall 49 which is corresponded to the dispenser 8 in the longitudinal direction. Preferably, the third heater 47 at least partially overlaps the dispenser 8 in a transverse direction.

[0052] Figure 5 shows a structural schematic diagram of the refrigerator according to a preferred embodiment of the invention. Now a control method of the first heater 38 and the second heater 39 will be described with reference to Figure 5.

[0053] The refrigerator 1 comprises a control unit 41, and an input unit 43 and a display unit 44 coupled to the control unit 41 respectively, wherein the input unit 43 comprises the buttons or touch area 22 located on the control panel 20, and the display unit 44 comprises the display screen 21 located on the control panel 20. The control unit 41 comprises a microprocessor and a memory unit, such that some components of the refrigerator 1 such as the first heater 38 can be automatically controlled by means of a program stored in the memory unit.

[0054] The refrigerator 1 further comprises a sensing unit 42 for detecting at least one environmental parameter. The sensing unit 42 is coupled to the control unit 41 and feeds back the detected parameter to the control unit 41. In this embodiment, the sensing unit 42 comprises a temperature sensor for detecting ambient temperature. The sensing unit 42 controls the operation of the first heater 38, including turning on and turning off the first heater 38, based on the detected ambient temperature.

[0055] In a preferred embodiment, when the detected ambient temperature is lower than zero °C, the first heater 38 is turned off. When the detected ambient temperature is between 0 °C and 10 °C, the first heater 38 operates

at a first output power and/or operates at a duty cycle of lower than 0.3. When the detected ambient temperature is between 10 °C and 15 °C, the first heater 38 is turned on at a second output power, or the first heater 38 is turned on and off in an alternative manner at a second duty cycle (for example, 0.4). When the detected ambient temperature is between 15 °C and 25 °C, the first heater 38 is turned on at a third output power and/or operates at a predetermined third duty cycle (for example, 0.5).

[0056] In an alternative embodiment, the sensing unit 42 further comprises a humidity sensor for detecting ambient relative humidity. The control unit 41 controls the operations of the first heater 38 based on the detected ambient temperature, ambient relative humidity and other factors.

[0057] The second heater 39 is controlled independently of the first heater 38. According to the invention, the second heater 39 is turned on only in an auxiliary heating mode, which is only manually initiated by the user. Thus, the user can, according to the dewing phenomenon on the refrigerator 1, make an active decision as to whether the second heater 39 should be actuated to increase heat for removing or preventing dewing.

[0058] In a preferred embodiment, the auxiliary heating mode is actuated by means of switching means 45 arranged on the freezing compartment door 3. The switching means 45 is preferably arranged on the dispenser 8 or near the dispenser 8. Particularly preferably, the switching means 45 is arranged on the partition plate 15.

[0059] In an embodiment, the switching means 45 is electrically connected to the second heater 39, and the turning on and off states of the second heater 39 is determined by the switching on and off states of the switching means 45. Preferably, when the switching means 45 is in the switching off state and the refrigerator 1 operates in a normal mode, the first heater 38 is turned on or off based on an instruction from the control unit 41, and the second heater 39 is turned off. When the user operates the switching means 45 to switch on it, the refrigerator 1 actuates the auxiliary heating mode, the second heater 39 is turned on to supply extra heat to the dispenser casing 10, and at the same time the first heater 38 is turned on or off based on an instruction from the control unit 41.

[0060] The switching means 45 can be provided independently of the control unit 41. For example, there is no coupling between the switching means 45 and the microprocessor of the control unit 41. In an alternative embodiment, the switching means 45 is connected to the control unit 41. For example, the display unit 44 can display whether the refrigerator 1 is under the normal heating mode or the auxiliary heating mode, or the user can select the parameters displayed on the display unit 44 by means of the switching means 45 in order to initiate the auxiliary heating mode.

[0061] The second heater 39 can be turned off by manually switching off the switching means 45, so that the auxiliary heating mode is ended. In an alternative embodiment, the second heater 39 can also be automati-

cally turned off. For example, the control unit 41 is configured in such a manner of automatically turning off the second heater 39 after the second heater 39 has been turned on for a predetermined time, such as 15 minutes. This can be achieved by virtue of timing means connected to the control unit 41. The timing means is configured in such a way that it generates a signal when the second heater 39 has been turned on for a predetermined time, and then the second heater 39 is turned off based on this signal. Under the condition that the switching means 45 is not coupled with the microprocessor of the control unit 41, this can be achieved by timing means connected to the switching means 45 or timing means embedded the switching means 45.

[0062] In the embodiment shown in Figure 5, the control manner of the third heater 47 is the same as that of the first heater 38, that is, being automatically controlled by the control unit 41 based on detected parameters. In a preferred embodiment, the parameter comprises ambient temperature, ambient relative humidity and/or the temperature of the sidewall 49, such that the control unit 41 can control the third heater 47 based on the ambient temperature, the ambient relative humidity and/or the temperature of the sidewall 49, so as to for example determine whether or not the third heater 47 should be turned on, or determine the frequency of turning on and off or the duty cycle of the third heater 47.

Claims

1. A refrigerator (1) comprising a freezing compartment (7) and a door (3) for selectively opening or closing at least a part of the freezing compartment (7), wherein the door (3) comprises a foam insulating layer (6) and a sidewall (49) contacting the foam insulating layer (6), wherein the refrigerator further comprises a third heater (47) that is installed relative with the sidewall (49) to supply heat to the sidewall (49), a dispenser (8) located on the door (3), configured to dispense ice and comprising a dispenser casing (10) received between a door panel (13) and an inner lining (23), wherein the dispenser casing (10) comprises an inclined wall (26) having a through hole (27) which is configured as a part of an ice transfer passage (29), and a heating unit (37) for supplying heat to the dispenser casing (10), **characterized in that** the heating unit (37) comprises a first heater (38), a second heater (39) which is arranged close to the first heater (38), and a heat conducting element (40) formed by an aluminium foil on one side of which the first and second heaters (38, 39) are arranged, and the other side of which is closely attached to the inner side of the dispenser casing (10), and wherein the first heater (38) comprises a plurality of arc-shaped heating segments (35) arranged around a hole of the heat conducting element (40) corresponded to said through hole (27).

2. The refrigerator (1) of claim 1, **characterized in that** the third heater (47) is located on the inner side of the sidewall (49).
3. The refrigerator (1) of claim 1 or 2, **characterized in that** it further comprises adhesive means for attaching the third heater (47) to the inner side of the sidewall (49).
4. The refrigerator (1) of claim 1, 2 or 3, **characterized in that** it further comprises another heat conducting element (54) for transmitting the heat generated by the third heater (47) to the sidewall (49), said heat conducting element (54) being located between the inner surface of the sidewall (49) and the third heater (47).
5. The refrigerator (1) of any one of the preceding claims, **characterized in that** the door (3) is rotatable around a rotation axis parallel to a vertical axis, and the sidewall (49) is parallel to the rotation axis.
6. The refrigerator (1) of claim 5, **characterized in that** the sidewall (49) is located distant from the rotation axis.
7. The refrigerator (1) of any of the preceding claims, **characterized in that** the third heater (47) is at least partially overlapped with the dispenser (8) in its transverse direction.
8. The refrigerator (1) of any one of the preceding claims, **characterized in that** it further comprises a control unit (41) and a sensing unit (42) for detecting at least one parameter, wherein the third heater (47) is automatically controlled by the control unit (41) based on the parameter detected by the sensing unit (42).
9. The refrigerator (1) of claim 8, **characterized in that** the parameter comprises ambient temperature and/or ambient relative humidity and/or the temperature of the sidewall (49).

Patentansprüche

1. Kühlschrank (1) mit einem Gefrierfach (7) und einer Tür (3) zum gezielten Öffnen oder Schließen zumindest eines Teils des Gefrierfachs (7), wobei die Tür (3) eine Schaumdämmschicht (6) und eine die Schaumdämmschicht (6) berührende Seitenwand (49) umfasst, wobei der Kühlschrank ferner eine dritte Heizvorrichtung (47), die zusammen mit der Seitenwand (49) installiert ist und diese mit Wärme versorgt, einen an der Tür (3) befindlichen Spender (8), der so konfiguriert ist, dass er Eis ausgibt, und ein zwischen einer Türblende (13) und einer Innenaus-

kleidung (23) aufgenommenes Spendergehäuse (10) umfasst, wobei das Spendergehäuse (10) eine schräge Wand (26) mit einem Durchgangsloch (27) umfasst, das als Teil eines Eistransportkanals (29) konfiguriert ist, und eine Heizeinheit (37) zum Zuführen von Wärme zu dem Spendergehäuse (10) umfasst,

dadurch gekennzeichnet, dass die Heizeinheit (37) eine erste Heizvorrichtung (38), eine nahe bei der ersten Heizvorrichtung (38) angeordnete zweite Heizvorrichtung (39) und ein wärmeleitendes Element (40) umfasst, das von einer Aluminiumfolie gebildet wird, auf deren einer Seite die erste und die zweite Heizvorrichtung (38, 39) angeordnet sind und deren andere Seite eng an der Innenseite des Spendergehäuses (10) anliegt, und wobei die erste Heizvorrichtung (38) mehrere bogenförmige Heizsegmente (35) umfasst, die um ein dem Durchgangsloch (27) entsprechendes Loch des wärmeleitenden Elements (40) herum angeordnet sind.

2. Kühlschrank (1) nach Anspruch 1, **dadurch gekennzeichnet, dass** sich die dritte Heizvorrichtung (47) auf der Innenseite der Seitenwand (49) befindet.
3. Kühlschrank (1) nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** er ferner Haftmittel zum Anbringen der dritten Heizvorrichtung (47) an der Innenseite der Seitenwand (49) umfasst.
4. Kühlschrank (1) nach Anspruch 1, 2 oder 3, **dadurch gekennzeichnet, dass** er ferner ein weiteres wärmeleitendes Element (54) zum Übertragen der von der dritten Heizvorrichtung (47) erzeugten Wärme auf die Seitenwand (49) umfasst, wobei sich das wärmeleitende Element (54) zwischen der Innenfläche der Seitenwand (49) und der dritten Heizvorrichtung (47) befindet.
5. Kühlschrank (1) nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Tür (3) um eine zu einer vertikalen Achse parallel verlaufende Rotationsachse drehbar ist und die Seitenwand (49) parallel zu der Rotationsachse verläuft.
6. Kühlschrank (1) nach Anspruch 5, **dadurch gekennzeichnet, dass** die Seitenwand (49) von der Rotationsachse entfernt liegt.
7. Kühlschrank (1) nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** sich die dritte Heizvorrichtung (47) in ihrer Querrichtung zumindest teilweise mit dem Spender (8) überschneidet.
8. Kühlschrank (1) nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** er fer-

ner eine Steuereinheit (41) und eine Sensoreinheit (42) zum Erfassen mindestens eines Parameters umfasst, wobei die dritte Heizvorrichtung (47) auf der Grundlage des von der Sensoreinheit (42) erfassten Parameters von der Steuereinheit (41) automatisch gesteuert wird.

9. Kühlschrank (1) nach Anspruch 8, **dadurch gekennzeichnet, dass** der Parameter die Umgebungstemperatur und/oder die relative Umgebungsfuchtigkeit und/oder die Temperatur der Seitenwand (49) umfasst.

15 Revendications

1. Réfrigérateur (1) comprenant un compartiment de congélation (7) et une porte (3) pour l'ouverture ou la fermeture sélective d'au moins une partie du compartiment de congélation (7), dans lequel la porte (3) comprend une couche d'isolation en mousse (6) et une paroi latérale (49) en contact avec la couche d'isolation en mousse (6), dans lequel le réfrigérateur comprend en outre un troisième élément chauffant (47) installé corrélativement à la paroi latérale (49) afin de fournir de la chaleur à la paroi latérale (49), un distributeur (8) situé sur la porte (3), configuré afin de distribuer de la glace et comprenant un boîtier de distributeur (10) logé entre un panneau de porte (13) et un revêtement intérieur (23), dans lequel le boîtier de distributeur (10) comprend une paroi inclinée (26) possédant un orifice de passage (27) configuré comme faisant partie d'un passage de transfert de glace (29), et une unité de chauffage (37) pour fournir de la chaleur au boîtier de distributeur (10), **caractérisé en ce que** l'unité de chauffage (37) comprend un premier élément chauffant (38), un deuxième élément chauffant (39) disposé à proximité du premier élément chauffant (38) et un élément thermoconducteur (40) constitué par une feuille d'aluminium sur un côté de laquelle le premier et le deuxième élément chauffant (38, 39) sont disposés, et dont l'autre côté est étroitement fixé au côté intérieur du boîtier de distributeur (10), et dans lequel le premier élément chauffant (38) comprend une pluralité de segments chauffants arqués (35) disposés autour d'un orifice de l'élément thermoconducteur (40) correspondant audit orifice de passage (27).
2. Réfrigérateur (1) selon la revendication 1, **caractérisé en ce que** le troisième élément chauffant (47) est situé sur le côté intérieur de la paroi latérale (49).
3. Réfrigérateur (1) selon la revendication 1 ou 2, **caractérisé en ce qu'il** comprend en outre des moyens adhésifs pour fixer l'élément chauffant (47) au côté intérieur de la paroi latérale (49).

4. Réfrigérateur (1) selon la revendication 1, 2 ou 3, **caractérisé en ce qu'il** comprend en outre un autre élément thermoconducteur (54) pour transmettre la chaleur produite par le troisième élément chauffant (47) à la paroi latérale (49), ledit élément thermoconducteur (54) étant situé entre la surface intérieure de la paroi latérale (49) et le troisième élément chauffant (47). 5

5. Réfrigérateur (1) selon l'une quelconque des revendications précédentes, **caractérisé en ce que** la porte (3) est rotative autour d'un axe de rotation parallèle à l'axe vertical, et la paroi latérale (49) est parallèle à l'axe de rotation. 10
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6. Réfrigérateur (1) selon la revendication 5, **caractérisé en ce que** la paroi latérale (49) est située à distance de l'axe de rotation.

7. Réfrigérateur (1) selon l'une quelconque des revendications précédentes, **caractérisé en ce que** le troisième élément chauffant (47) est au moins partiellement chevauché par le distributeur (8) dans sa direction transverse. 20
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8. Réfrigérateur (1) selon l'une quelconque des revendications précédentes, **caractérisé en ce qu'il** comprend en outre une unité de commande (41) et une unité de détection (42) pour la détection d'au moins un paramètre, dans lequel le troisième élément chauffant (47) est automatiquement commandé par l'unité de commande (41) en fonction du paramètre détecté par l'unité de détection (42). 30

9. Réfrigérateur (1) selon la revendication 8, **caractérisé en ce que** le paramètre comprend la température ambiante et/ou l'humidité relative ambiante et/ou la température de la paroi latérale (49). 35
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50
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Fig. 1

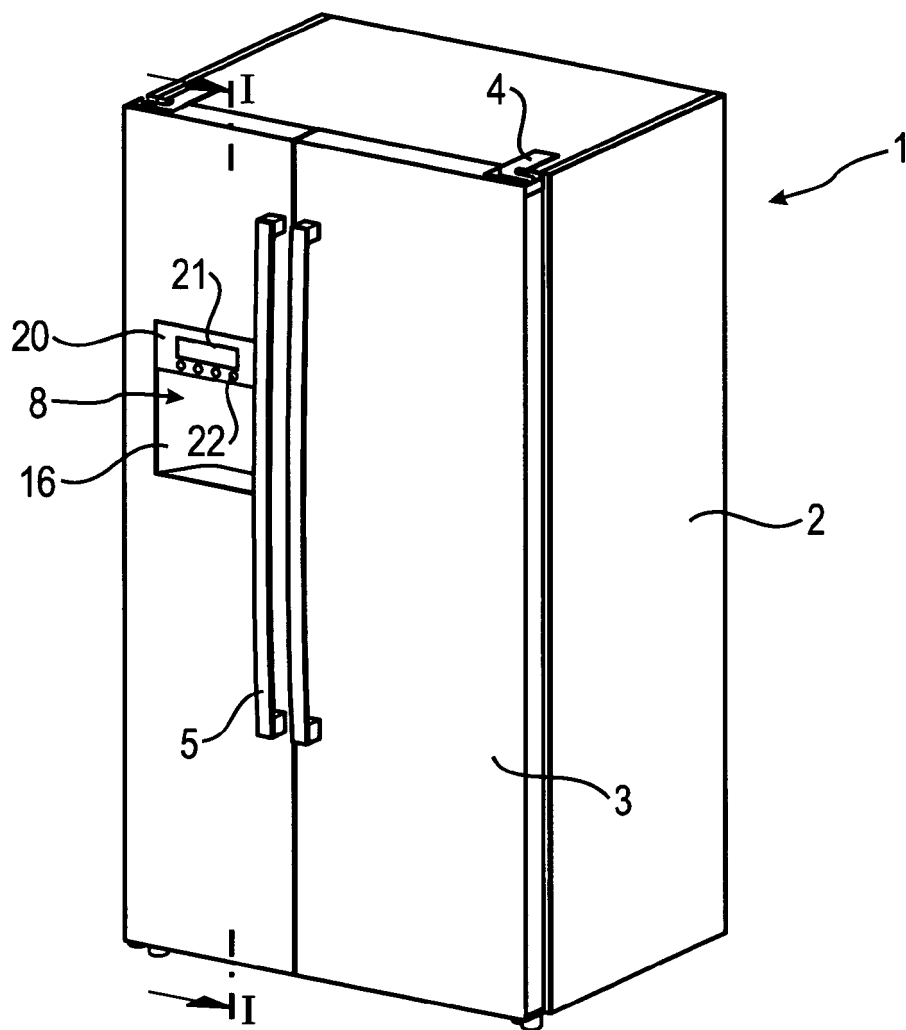


Fig.2

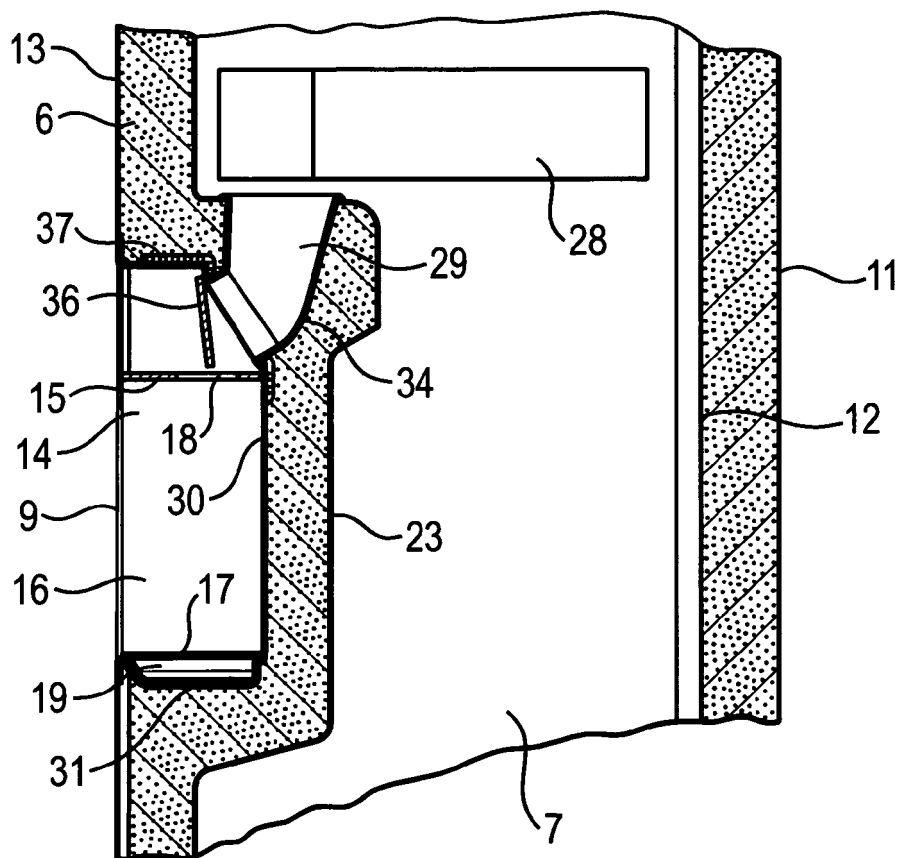


Fig. 3

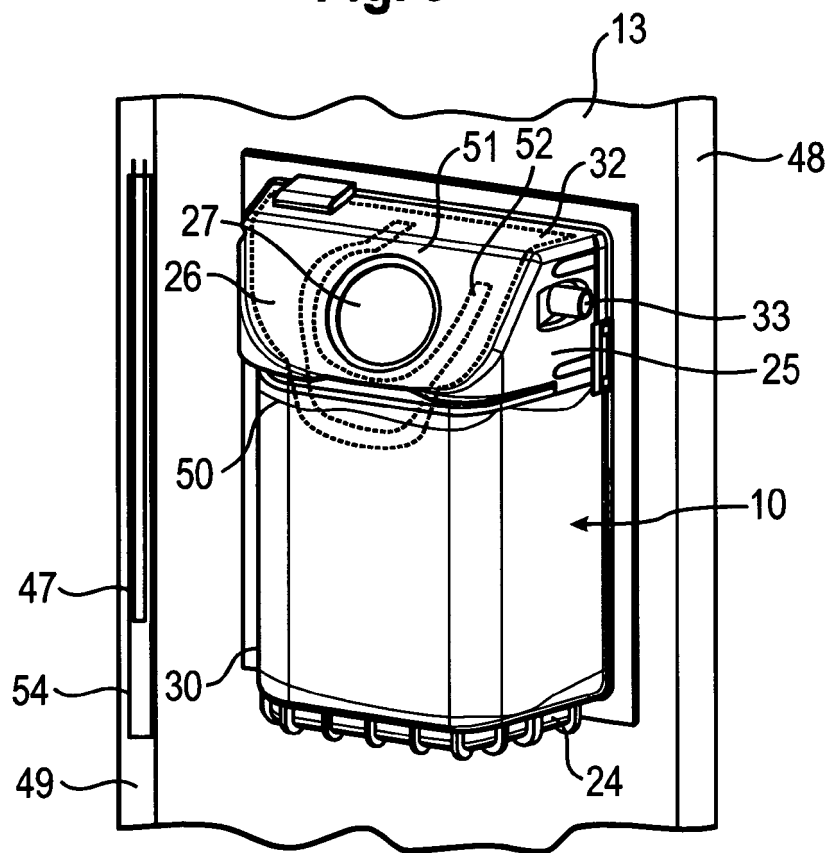


Fig. 4

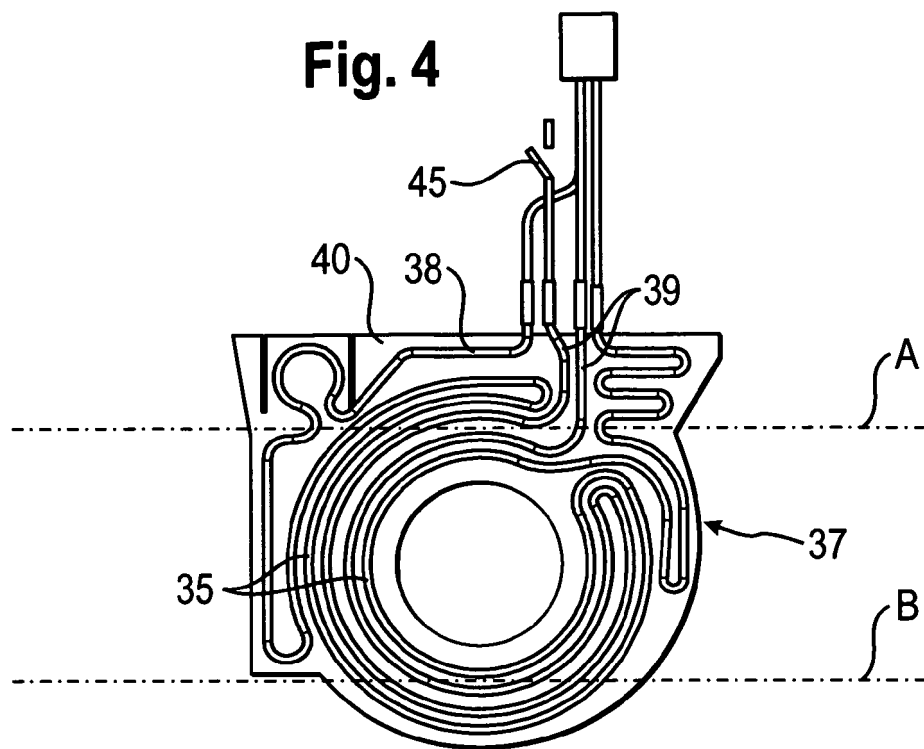
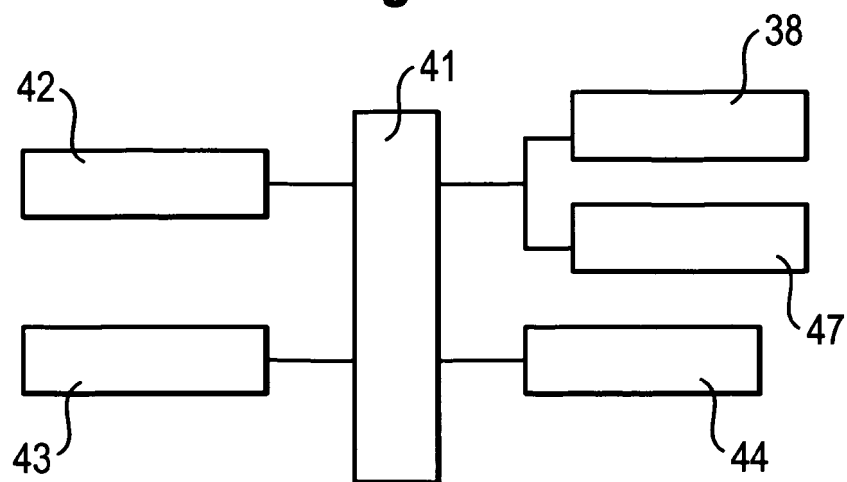


Fig. 5



REFERENCES CITED IN THE DESCRIPTION

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