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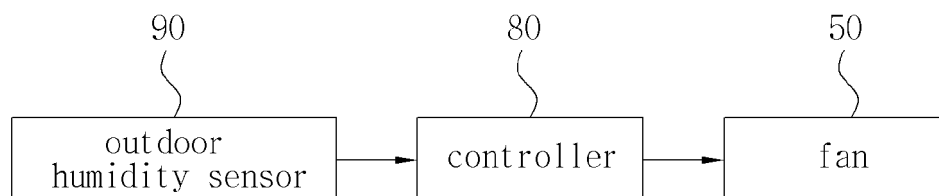
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(54) **Refrigerator having a dew prevention and/or control device and method for preventing formation of dew therein and/or thereon**

(57) A refrigerator having a dew prevention and/or control device and a method for preventing the formation of dew in and/or on the refrigerator includes a compressor (20) adapted to compress a refrigerant, a condenser (30) adapted to condense the refrigerant from the compressor, an evaporator (40) adapted to cool air existing therearound by evaporating the refrigerant that passes through the condenser, a pipe (70) between the condens-

er and the evaporator, configured to pass through the refrigerator body, humidity sensors and/or detectors (90) configured to determine a humidity around the refrigerator, and a controller (80) adapted to vary rotational speed of a fan (50) in accordance with the humidity determined by the humidity sensors and/or detectors, thereby efficiently preventing the formation of dew on or in the refrigerator.

【Fig. 2】



Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to a refrigerator, and more particularly, to a refrigerator having a dew prevention and/or control device and a method for preventing formation of dew in and/or on the refrigerator, wherein a hot pipe on the door gasket(s) or a cover plate of a refrigerator body can be maintained at an appropriate and/or predetermined temperature, thereby efficiently preventing the formation of dew around the door gaskets or the cover plate of the refrigerator body.

Background of the Related Art

[0002] Generally, a refrigerator is a household appliance adapted to maintain the inside of a cold storage space and/or a freezer at low temperatures by repeating a refrigeration cycle, in which a refrigerant is compressed, condensed, expanded and evaporated, thereby keeping the food stored therein fresh for a given period of time.

[0003] Accordingly, as shown in FIG. 1, the refrigerator is provided with a compressor 20 adapted to compress a refrigerant, a condenser 30 adapted to condense the refrigerant from the compressor 20 through the outside air (e.g., the air surrounding the refrigerator), and an evaporator 40 adapted to absorb the heat within the interior of the refrigerator by evaporating the refrigerant that passes through the condenser 30 at a low pressure.

[0004] Since the refrigerant passing through the condenser 30 is at a high temperature, the temperature of the condenser 30 decreases by use of a fan 50 to improve the efficiency of the refrigeration cycle.

[0005] Alternatively, when a significant temperature difference occurs around the door gaskets or a cover plate 60 that partitions a cold storage space and a freezer in the refrigerator body 10, dew is subsequently formed. Accordingly, a hot pipe 70 extends from the condenser 30 to prevent the formation of dew.

[0006] When the fan 50 dissipates the heat generated by the condenser 30, the temperature of the condenser 30 and the hot pipe 70 decreases, resulting in the formation of dew on the refrigerator body 10.

SUMMARY OF THE INVENTION

[0007] Accordingly, the present invention has been made in view of the above-mentioned problems occurring in the prior art, and it is an object of the present invention to provide a refrigerator having a dew prevention and/or control device and a method for preventing the formation of dew in and/or on the refrigerator, wherein a rotational speed (e.g., revolutions per minute or RPM) of a fan is controlled in accordance with the humidity around the

refrigerator to appropriately maintain the temperature of a hot pipe, thereby efficiently preventing the formation of dew on the door gaskets or the cover plate that partitions a cold storage space and a freezer.

5 [0008] To accomplish the above object(s), according to a first aspect of the present invention, a refrigerator for preventing formation of dew in a refrigerator body includes a compressor adapted to compress a refrigerant in a tube; a condenser adapted to condense the refrigerant from the compressor (e.g., using air surrounding the refrigerator); an evaporator adapted to cool air existing therearound by evaporating the refrigerant that passes through the condenser; a fan adapted to blow the refrigerant towards the condenser; a pipe between the condenser and the evaporator that passes through the refrigerator body; outside humidity sensors and/or detectors adapted to determine the outside humidity or a humidity that is around the refrigerator body; and a controller adapted to vary a rotational speed (e.g., revolutions per minute or RPM) of the fan in accordance with the outside humidity (e.g., determined by the outside humidity sensors and/or detectors), thus controlling a temperature of the pipe.

10 [0009] According to embodiment(s) of the present invention, the refrigerator further includes outside temperature sensors and/or detectors adapted to determine the temperature around the refrigerator body, allowing the rotational speed of the fan to be controlled in accordance with the temperature around the refrigerator body.

15 [0010] To accomplish the above object, according to a second aspect of the present invention, a method for preventing formation of dew in and/or on a refrigerator includes determining an outside humidity around a refrigerator body; and varying the rotational speed (e.g., RPM) of a fan in accordance with the outside humidity conditions, and controlling the temperature of a pipe (e.g., in the refrigerator body).

20 [0011] According to embodiment(s) of the present invention, if the outside humidity has a value that promotes the formation of dew, the rotational speed of the fan decreases, resulting in an increase in the temperature of the pipe.

25 [0012] According to embodiment(s) of the present invention, the method may further include determining the outside temperature around the refrigerator body to control the rotational speed of the fan in accordance with the outside humidity and/or conditions and the outside temperature and/or conditions.

BRIEF DESCRIPTION OF THE DRAWINGS

30 [0013] The above and other objects, features and advantages of the present invention will be apparent from the following detailed description of embodiments of the invention in conjunction with the accompanying drawings, in which:

35 [0014] FIG. 1 is a schematic view showing a refrigeration cycle of a conventional refrigerator.

[0015] FIG. 2 is a block diagram showing an exemplary dew prevention and/or control device in a refrigerator according to embodiment(s) of the present invention.

[0016] FIG. 3 is a flow chart showing an exemplary method for controlling and/or preventing a formation of dew in and/or on a refrigerator body according to embodiment(s) of the present invention.

[0017] FIG. 4 is a graph showing pipe temperatures with respect to the humidity around the refrigerator body according to embodiment(s) of the present invention.

DETAILED DESCRIPTION

[0018] Hereinafter, an explanation on a refrigerator having a dew prevention and/or control device and a method for preventing the formation of dew in and/or on the refrigerator according to embodiments of the present invention will be in detail given with reference to the accompanying drawing. It should be noted that the drawings are not necessarily to precise scale and may be exaggerated in thickness of lines or sizes of components for descriptive convenience and clarity only. Furthermore, the terms as used herein are defined by taking functions of the invention into account and can be changed according to the custom or intention of users or operators. Therefore, definition of the terms should be made according to the overall disclosures set forth herein.

[0019] As shown in FIG. 1, an exemplary refrigerator has a refrigeration cycle conducted by a compressor 20 adapted to compress a refrigerant, the condenser 30 adapted to condense the refrigerant from the compressor 20 using outside air (e.g., the air surrounding the refrigerator), and the evaporator 40 adapted to cool air existing therearound (e.g., surrounding the refrigerator) by evaporating the refrigerant that passes through the condenser 30.

[0020] In addition, a fan 50 is configured to blow the refrigerant towards the condenser 30 to decrease the temperature of the refrigerant passing through the condenser 30, and a pipe 70 (e.g., a hot pipe) is adapted to generate heat around a refrigerator body 10, thus preventing formation of dew in and/or on the refrigerator body 10. The pipe 70 runs under a cover plate 60 and/or under the outer surface of the exterior of the refrigerator, below or near the location(s) of the gasket(s) on the outer surface of the refrigerator.

[0021] As shown in FIG. 2, a dew prevention and/or control device in the refrigerator according to embodiments of the present invention may include a controller 80 adapted to control operations of the refrigerator and outside humidity sensors and/or detectors 90. The humidity sensors and/or detectors are adapted to determine the humidity in the conditions around the refrigerator body 10.

[0022] In more detail, the outside humidity sensors and/or detectors 90 serve to measure the humidity in the air around the refrigerator body 10. The outside humidity

sensors and/or detectors 90 are located around the doors and the cover plate, where the formation of dew readily occurs.

[0023] A method for preventing the formation of dew in and/or on the refrigerator will be explained with reference to FIG. 3.

[0024] When power is applied to the refrigerator, as shown in FIG. 3, the controller 80 determines the interior conditions and the air conditions outside the refrigerator, and each load condition is executed by an appropriate program operation.

[0025] In more detail, the temperature around the refrigerator body 10 is sensed, detected, or determined by the outside temperature sensors and/or detectors (not shown). The humidity around the refrigerator body 10 is sensed or determined by the outside humidity sensors and/or detectors 90.

[0026] The outside temperature and the outside humidity are inputted to the controller 80 by the outside temperature sensors and the outside humidity sensors 90.

[0027] Because the formation of dew is dependent upon humidity and current temperature, the outside temperature sensors are mounted, installed, and or used, accordingly. For example, if the refrigerator is in an environment where the outside air is maintained at a relatively constant temperature, only the outside humidity sensors 90 may be used.

[0028] The controller 80 controls the fan 50 in accordance with at least the outside humidity conditions inputted thereto.

[0029] As shown in FIG. 4, the rotational speed of the fan 50 with respect to the humidity around the refrigerator body 10 is inversely proportional to the temperature of the pipe 70.

[0030] For example, if the outside humidity has a predetermined or given value that promotes the formation of dew, the rotational speed of the fan 50 is decreased, thereby increasing the temperature of the pipe 70.

[0031] Hereinafter, an example for controlling the rotational speed of the fan 50 will be discussed with reference to FIG. 3.

[0032] If the outside humidity is less than 60% with respect to an arbitrary outside temperature, the rotational speed of the fan 50 is set to 100% of the potential and/or maximum rotational speed at a rated load using the controller 80.

[0033] When it is determined that the humidity around the refrigerator body 10 is equal to or greater than the humidity conditions that promote the formation of dew, the output of the fan 50 is maintained at a maximum degree, speed or rate. Even if the temperature of the pipe 70 decreases from or at the maximum rotational speed of the fan 50, the formation of dew will not be influenced or affected.

[0034] In addition, if the outside humidity is detected in a range between 60% and 70%, the rotational speed of the fan 50 may be set to 80% of the rotational speed

at the rated load using the controller 80. If the outside humidity is detected in the range between 70% and 80%, the rotational speed of the fan 50 may be set to 60% of the rotational speed at the rated load using the controller 80. Furthermore, if the outside humidity is detected in the range between 80% and 90%, the rotational speed of the fan 50 may be set to 40% of the maximum rotational speed at the rated load using the controller 80, and if the outside humidity is detected in the range between 90% and 100%, the rotational speed of the fan 50 may be set to 20% of the maximum rotational speed at the rated load using the controller 80.

[0035] Accordingly, as the humidity around the refrigerator body 10 increases, to prevent the formation of dew on the refrigerator body 10, the rotational speed of the fan 50 is decreased in accordance with the detected humidity conditions, thereby advantageously raising the temperature of the pipe 70.

[0036] The above-mentioned values are suggested as examples, but are not limited thereto, of various control operations in accordance with the humidity conditions around the refrigerator body 10, and thus control logic may be made in accordance with other various humidity conditions.

[0037] Since formation of dew is dependent upon humidity and temperature, according to embodiment(s) of the present invention, the rotational speed of the fan 50 is controlled by the humidity conditions around the refrigerator body 10 and the surrounding temperature conditions.

[0038] As mentioned above, the refrigerator having a dew prevention and/or control device and the method for preventing the formation of dew in and/or on the refrigerator according to embodiment(s) of the present invention are configured to set the rotational speed of the fan to an optimum rotational speed in accordance with the humidity conditions and the temperature conditions around the refrigerator body 10 to maintain the temperature of the pipe 70 at a temperature effective to prevent formation of dew on the refrigerator (e.g., near the gaskets) thereby efficiently preventing formation of dew on the door gaskets or the cover plate of the refrigerator body.

[0039] While the present invention has been described with reference to the particular illustrative embodiments, it is not to be restricted by the embodiments but only by the appended claims. It is to be appreciated that those skilled in the art can change or modify the embodiments without departing from the scope and spirit of the present invention.

Claims

1. A refrigerator for preventing formation of dew in a refrigerator, comprising:

a compressor adapted to compress a refrigerant;

ant;

a condenser adapted to condense the refrigerant from the compressor;

an evaporator adapted to cool air existing therearound by evaporating the refrigerant that passes through the condenser;

a fan adapted to blow the refrigerant towards the condenser;

a pipe between the condenser and the evaporator, configured to pass through the refrigerator body;

humidity sensors and/or detectors adapted to determine a humidity around the refrigerator; and

a controller adapted to vary a rotational speed of the fan in accordance with the humidity determined by the humidity sensors and/or detectors.

2. The refrigerator according to claim 1, further comprising one or more temperature sensors and/or detectors adapted to determine a temperature around the refrigerator, and the controller controls the rotational speed of the fan in accordance with the temperature around the refrigerator.

3. The refrigerator according to claim 1, wherein the pipe is configured to carry refrigerant to the condenser, and the controller controls the temperature of the pipe by blowing air over the condenser using the fan.

4. The refrigerator according to claim 1, wherein the rotational speed of the fan is proportional to the temperature of the pipe and inversely proportional to the humidity around the refrigerator.

5. The refrigerator according to claim 1, wherein the humidity sensor and/or detector determines that the humidity around the refrigerator is greater than humidity conditions that promote formation of dew, and an output of the fan is maintained at a maximum rotational rate.

6. The refrigerator according to claim 1, wherein when the humidity sensors and/or detectors determine that the humidity is less than 60%, the rotational speed of the fan is 100% of the maximum rotational speed at a rated load.

7. The refrigerator according to claim 1, wherein when the humidity sensors and/or detectors determine that the humidity is in a range between 60% and 70%, the rotational speed of the fan is 80% of the maximum rotational speed at the rated load.

8. The refrigerator according to claim 1, wherein when the humidity sensors and/or detectors determine that the humidity is in a range between 70% and 80%,

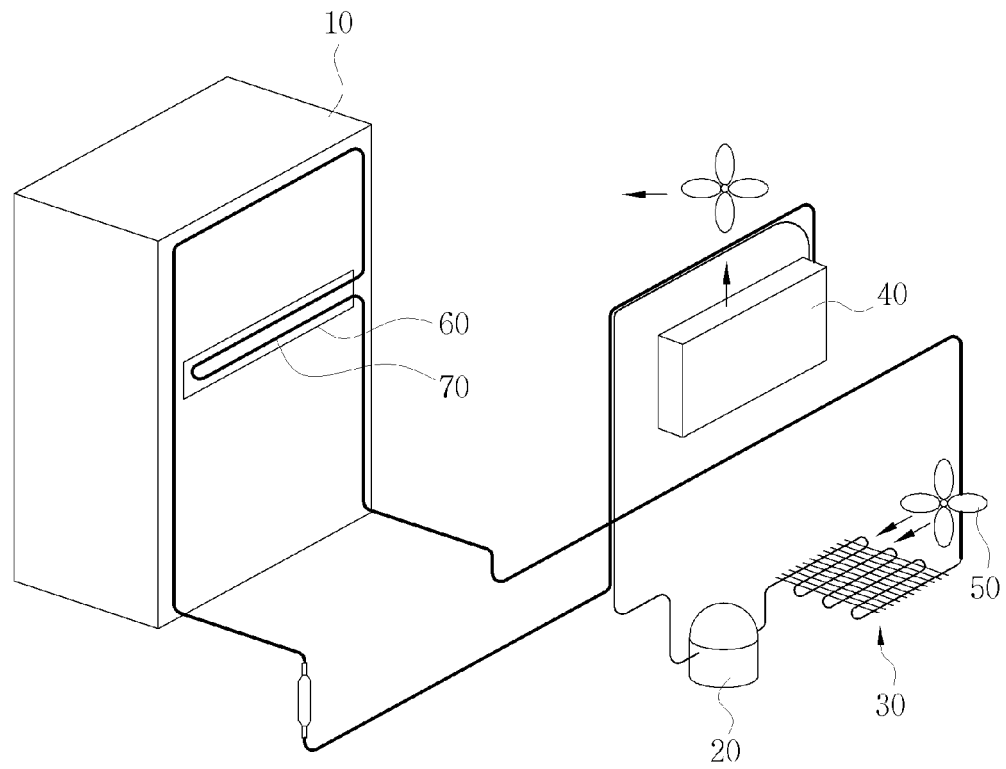
the rotational speed of the fan is 60% of the maximum rotational speed at the rated load.

9. The refrigerator according to claim 1, wherein when the humidity sensors and/or detectors determine that the humidity is in a range between 80% and 90%, the rotational speed of the fan is 40% of the maximum rotational speed at the rated load. 5
10. The refrigerator according to claim 1, wherein when the humidity sensors and/or detectors determine that the humidity is in a range between 90% and 100%, the rotational speed of the fan is 20% of the maximum rotational speed at the rated load. 10
11. A method for preventing formation of dew in and/or on a refrigerator, the method comprising: 15
- determining a humidity around the refrigerator; 20
- varying a rotational speed of a fan in the refrigerator in accordance with the determined humidity; and
- controlling a temperature of a pipe in the refrigerator. 25
12. The method according to claim 11, wherein the humidity promotes dew formation, and the method further comprises decreasing the rotational speed of the fan and/or increasing the temperature of the pipe. 30
13. The method according to claim 11, further comprising determining a temperature around the refrigerator, and controlling the rotational speed of the fan in accordance with the humidity and the temperature. 35
14. The method according to claim 11, wherein the rotational speed of the fan proportional to the temperature of the pipe and inversely proportional to the humidity around the refrigerator body. 40
15. The method according to claim 11, further comprising maintaining a rotational speed of the fan at a maximum rotational speed when the humidity around the refrigerator is greater than the humidity that promotes the formation of dew. 45

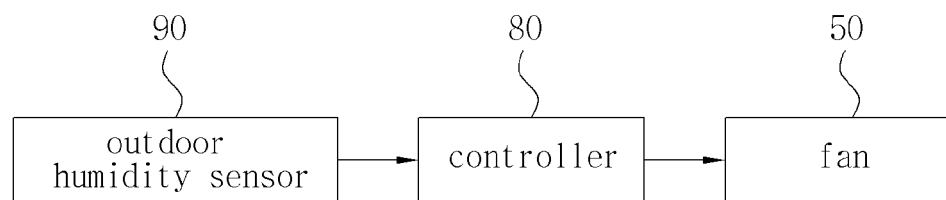
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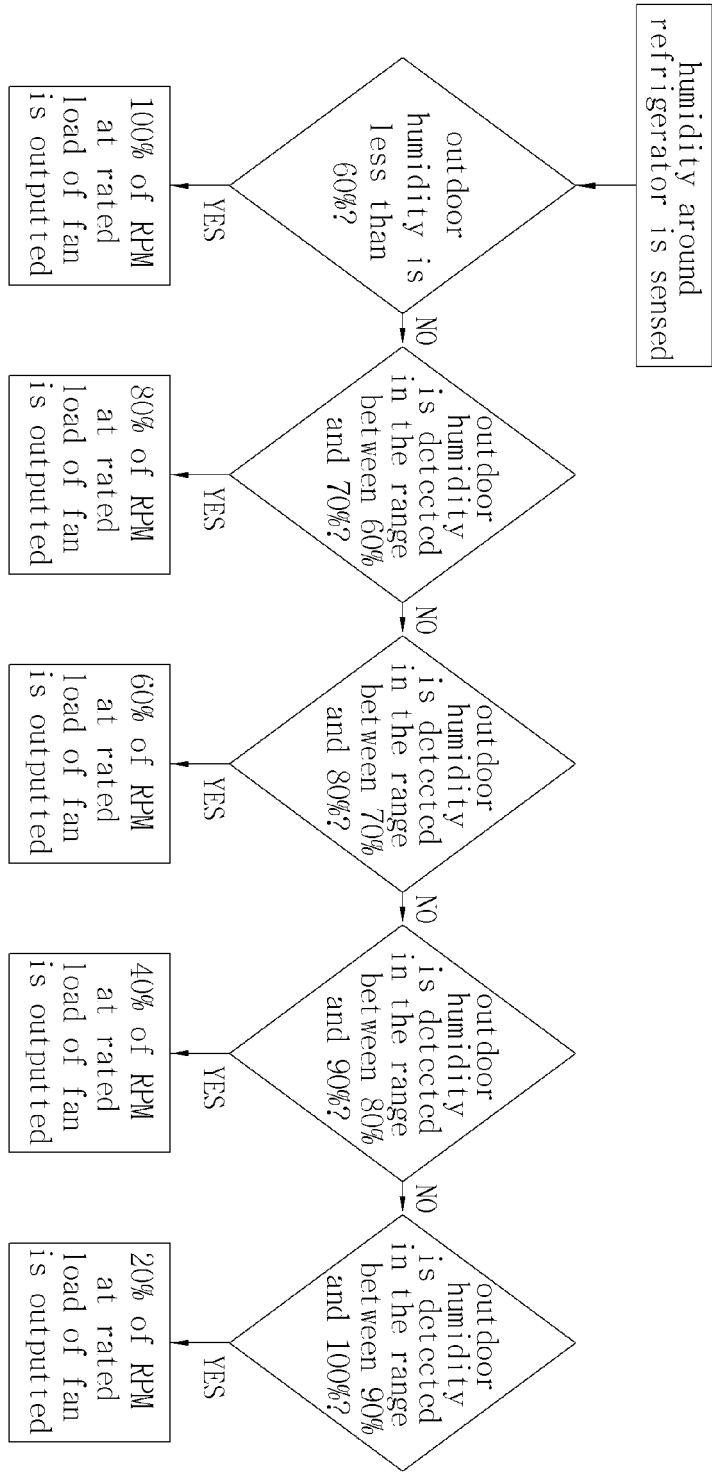
【Fig. 1】



【Fig. 2】



【Fig. 3】



【Fig. 4】

