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(54) Refrigerator having vacuum system

(57) The invention provides a refrigerator having a vacuum system, including: a box body having a storage chamber, and a vacuum system set in the box body. The vacuum system includes: at least one vacuum container (17) accommodated in the storage chamber, a vacuum producing device (11, 12) for vacuumizing the vacuum container (17), a control device (14, 22) for controlling the vacuumizing processing, and a measurement device (16, 21) for measuring a pressure of the vacuum container (17) and sending a measurement result to the control device (14, 22), where, according to the present invention, the measurement device (16, 21) is fixed on the vacuum container (17)

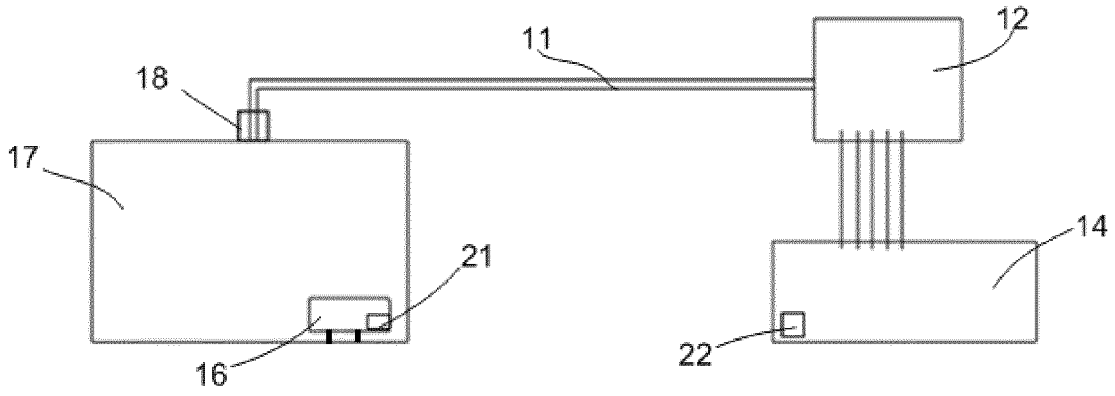

FIG. 3

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Description

BACKGROUND

Technical Field

[0001] The invention relates to a refrigerator, and more particularly, to a refrigerator having a vacuum system.

Related Art

[0002] The storage time of food depends on factors of a storage environment such as the temperature, the humidity, and the oxygen content. A storage environment having low oxygen content and few bacteria may prolong the storage time of food, for example, using a vacuum container in a refrigerating chamber of a refrigerator.

[0003] The prior art discloses a technical solution of using a vacuum system in a storage chamber of a refrigerator. The vacuum system includes a vacuum pump 1A; a motor (not shown) for driving the vacuum pump; a vacuum producing pipeline 3A; two two-position two-way valves 4A used as control devices for opening and closing the vacuum producing pipeline 3A. A contact 5A is additionally disposed between a vacuum container 7A and the vacuum producing pipeline 3A. A check valve 8A is disposed on the vacuum container 7A, and is used as an air charging device. Turning on and off of the two-position two-way valves 4A are used to control opening and closing of the vacuum producing pipeline 3A. After the vacuum container 7A is vacuumized, the two-position two-way valves 4A are used to maintain the pressure of the vacuum container. In addition, a measurement device 9A, such as a negative pressure sensor serving as a vacuum sensor, for measuring a pressure of the vacuum system is disposed on the vacuum container 7A. In the vacuum system, the measurement device is disposed on a pipeline connected to the vacuum container and the vacuum pump, a connection branch is added so that the risk of air leakage is increased, and the assembling is rather troublesome. In addition, a separated space is required to be arranged for disposition in the storage chamber out of the vacuum container.

SUMMARY

[0004] The invention is directed to providing a refrigerator having a vacuum system, so as to solve at least one problem in the prior art, thereby improving the vacuum performance of the refrigerator.

[0005] In order to achieve the above objective, the invention provides a refrigerator having a vacuum system, including a box body having a storage chamber and the vacuum system set in the box body. The vacuum system includes: at least one vacuum container accommodated in the storage chamber, and a vacuum producing device for vacuumizing the vacuum container. The vacuum system further includes a control device for controlling the vacuumizing processing, and a measurement device for measuring a pressure of the vacuum container and sending a measurement result to the control device, where the measurement device is fixed on the vacuum container.

[0006] The measurement device is disposed on the vacuum container, the measurement device directly measures the pressure in the vacuum container in real time, and sends the measurement result to the control device, so that the control device turns on or turns off the vacuum producing device in time, thereby achieving the objective of accurately controlling the pressure in the vacuum container, and improving the vacuum performance of the refrigerator.

[0007] Other independent features or features combined with other features that are considered as characteristics of the invention are described in the accompanying claims.

[0008] Optionally, the measurement device is embedded on a side wall of the vacuum container, so as to be convenient for mounting and using.

[0009] Optionally, the measurement device is connected to the control device through a data transmission line, transmits the measurement result directly through the data transmission line, so that the data transmission is stable; moreover, a box of the vacuum container may adopt a full-metal material, and has desirable pressure-resistant effect.

[0010] Optionally, the measurement device includes a wireless signal transmitter, and the control device includes a wireless signal receiver used in cooperation with the wireless signal transmitter. The measurement result of the measurement device is transmitted by using the wireless signal transmitter and the wireless signal receiver, so as to keep the integrity of the vacuum container, without reducing the sealing performance thereof due to data transmission; in addition, it is convenient for mounting.

[0011] Optionally, a box body of the vacuum container at least includes a wall partially made of a non-metal material, and because the box is totally enclosed, the non-metal material wall is beneficial for transmission of a wireless signal.

[0012] Optionally, the measurement device includes a sensor for measuring and monitoring a pressure in the vacuum container.

[0013] Optionally, the vacuum producing device includes a vacuum pump and a vacuum producing pipeline connected to the vacuum pump and the vacuum container.

[0014] Optionally, the vacuum producing pipeline is provided with a check valve, so as to maintain the pressure of the vacuum container by using the check valve.

[0015] Optionally, the control device includes a button mounted on the box body and used for activating the vacuum producing device.

[0016] Construction of the invention and other objectives and beneficial effects of the invention will be more

comprehensible through descriptions on preferred embodiments with accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] As a part of the specification for providing further understanding for the invention, the accompanying drawings diagrammatize specific implementation manners of the invention, so as to illustrate principles of the invention together with the specification, and where:

FIG. 1 is a schematic structural diagram of a vacuum system in the prior art;

FIG. 2 is a structural block diagram of a first embodiment of a vacuum system in a refrigerator having a vacuum system according to the invention; and

FIG. 3 is a structural block diagram of a second embodiment of a vacuum system in a refrigerator having a vacuum system according to the invention.

DETAILED DESCRIPTION

[0018] Typical embodiments of the invention are illustrated in detail, examples thereof are shown in the drawings, and the same reference numerals in the drawings represent the same components. The embodiments are described with reference to FIG. 2 and FIG. 3 to illustrate the invention.

[0019] A refrigerator disclosed in the invention includes a refrigeration cycle system, and a box body having a refrigerating chamber and a freezing chamber, where the box body is provided with a heat insulator. Because the structures of the refrigerator such as the box body, the refrigerating chamber and the freezing chamber are parts of the prior art, specific structures thereof are note repeated herein.

[0020] The box body of the refrigerator is provided with a vacuum system, the vacuum system includes a vacuum container 17 accommodated in the storage chamber of the refrigerator, and a vacuum producing device 11, 12 for vacuumizing the vacuum container 17. Stored food is placed in the vacuum container 17, and the vacuum producing device 11, 12 includes a vacuum pump 12 and a vacuum producing pipeline 11 connected to the vacuum pump 12 and the vacuum container 17. A valve 18 for opening and closing the vacuum producing pipeline 11 is disposed on the vacuum producing pipeline 11, and the valve 18 is a check valve 18. When the vacuum pump 12 operates, a pressure in the vacuum producing pipeline 11 is less than a pressure in the vacuum container 17, the valve 18 is opened, and the vacuum pump 12 vacuumizes the vacuum container 17; when the vacuum pump 12 stops operation, the pressure in the vacuum producing pipeline 11 is greater than or equal to the pressure in the vacuum container 17, the valve 18 is closed, and the pressure in the vacuum container 17 is maintained through the valve 18.

[0021] FIG. 2 is a first embodiment of the invention. The vacuum system further includes a control device 14 for controlling the vacuumizing processing, and a measurement device 16 for measuring a pressure of the vacuum container 17 and sending a measurement result to the control device 14, where the control device 14 is connected to the vacuum pump 12, and controls turning on and turning off of the vacuum pump 12.

[0022] The measurement device 16 is located on the vacuum container 17. Specifically, the measurement device 16 includes a sensor 16 for measuring the pressure in the vacuum container 17, such as a pressure sensor, and the measurement device 16 may be fixed on a bottom wall or side wall of the vacuum container 17.

[0023] In another embodiment, the measurement device 16 is embedded on a side wall of the vacuum container 17, being convenient for mounting and measuring of the pressure in the vacuum container 17. A hole is formed on the side wall of the vacuum container 17, and the hole is sealed by the measurement device 16. A detection end of the measurement device 16 faces the interior of the vacuum container 17, an output end of the measurement device 16 faces the exterior of the vacuum container 17, and the measurement result is transmitted to the control device 14 through a data transmission line 15 or through wireless transmission. In order to avoid air leakage, an element for sealing the hole, such as a rubber cover and foam glue, is further disposed on the vacuum container 17.

[0024] The measurement device 16 and the control device 14 are connected through the data transmission line 15, the measurement device 16 transmits, to the control device 14 in real time, measured data of the pressure on the vacuum container 17, and the control device 14 determines whether to automatically turn on or turn off the vacuum pump 12. The measurement result is transmitted directly through the data transmission line, so the data transmission is stable; moreover, the box of the vacuum container may adopt a full-metal material, and has desirable pressure-resistant effect.

[0025] In addition, the control device 14 further includes a button mounted on the box body and used for activating the vacuum producing device 11, 12, and therefore, the vacuum pump 12 may also be turned on manually.

[0026] The data transmission line 15 penetrates the box of the vacuum container 17 through the hole disposed on the vacuum container 17, and therefore, a seal element is disposed between the data transmission line 15 and the vacuum container 17 to prevent air leakage. The seal element may be silica gel or another flexible material capable of sealing a possible gap between the data transmission line 15 and the vacuum container 17.

[0027] FIG. 3 is a second embodiment of the invention. A measurement device 16, 21 is still fixed on the vacuum container 17, and the measurement device 16, 21, in addition to including the sensor 16 for measuring a pres-

sure in the vacuum container 17, further includes a wireless signal transmitter 21. The control device 14 is provided with a wireless signal receiver 22 used in cooperation with the wireless signal transmitter 21. Data of a pressure in the vacuum container 17 obtained by the sensor is transmitted through the wireless signal transmitter 21, received by the wireless signal receiver 22 and then transmitted to the control device 14, so that the control device 14 determines whether to automatically turn on or turn off the vacuum pump 12.

[0028] In order to avoid that the wireless signal is shielded in a full-metal enclosed environment, at least a part of the wall of the vacuum container 17 is non-metallic. For example, the vacuum container 17 includes a box and a cover, where the cover is made of plastics, or a certain side wall of the box is made of plastics, thereby not affecting the data transmission between the wireless signal transmitter 21 and the wireless signal receiver 22.

[0029] Compared with the second embodiment, the first embodiment has the advantage that the vacuum container 17 may be made of full-metal, so as to provide the box strength required by a vacuum environment to the maximum extent; moreover, data transmission through the data transmission line 15 is reliable and stable. Compared with the first embodiment, the second embodiment has the advantage that it is not required to open a hole on the vacuum container 17, that is, the phenomenon of possible air leakage caused by data transmission is avoided, and the air tightness is good; in addition, no data line needs to be inserted, thereby simplifying the mounting procedure.

Claims

1. A refrigerator having a vacuum system, comprising: a box body having a storage chamber and the vacuum system set in the box body, wherein the vacuum system comprises: at least one a vacuum container (17) accommodated in the storage chamber, a vacuum producing device (11, 12) for vacuumizing the vacuum container (17), a control device (14, 22) for controlling the vacuumizing processing, and a measurement device (16, 21) for measuring a pressure of the vacuum container (17) and sending a measurement result to the control device (14, 22); **characterized in that**: the measurement device (16, 21) is fixed on the vacuum container (17).

2. The refrigerator according to claim 1, **characterized in that**: the measurement device (16, 21) is embedded on a side wall of the vacuum container (17).

3. The refrigerator according to claim 1 or 2, **characterized in that**: the measurement device (16) is connected to the control device (14) through a data transmission line (15).

4. The refrigerator according to claim 1, **characterized in that**: the measurement device (16, 21) comprises a wireless signal transmitter (21), and the control device (14, 22) comprises a wireless signal receiver (22) used in cooperation with the wireless signal transmitter (21).

5. The refrigerator according to claim 1 or 4, **characterized in that**: a box body of the vacuum container (17) at least comprises a wall partially made of a non-metal material.

6. The refrigerator according to any one of claims 1 to 5, **characterized in that**: the measurement device (16, 21) comprises a sensor (16) for measuring an inner pressure of the vacuum container (17).

7. The refrigerator according to any one of claims 1 to 6, **characterized in that**: the vacuum producing device (11, 12) comprises a vacuum pump (12) and a vacuum producing pipeline (11) connected to the vacuum pump (12) and the vacuum container (17).

8. The refrigerator according to claim 7, **characterized in that**: the vacuum producing pipeline (11) is disposed with a check valve (18).

9. The refrigerator according to any one of claims 1 to 8, **characterized in that**: the control device (14, 22) comprises a button mounted on the box body and for activating the vacuum producing device (11, 12).

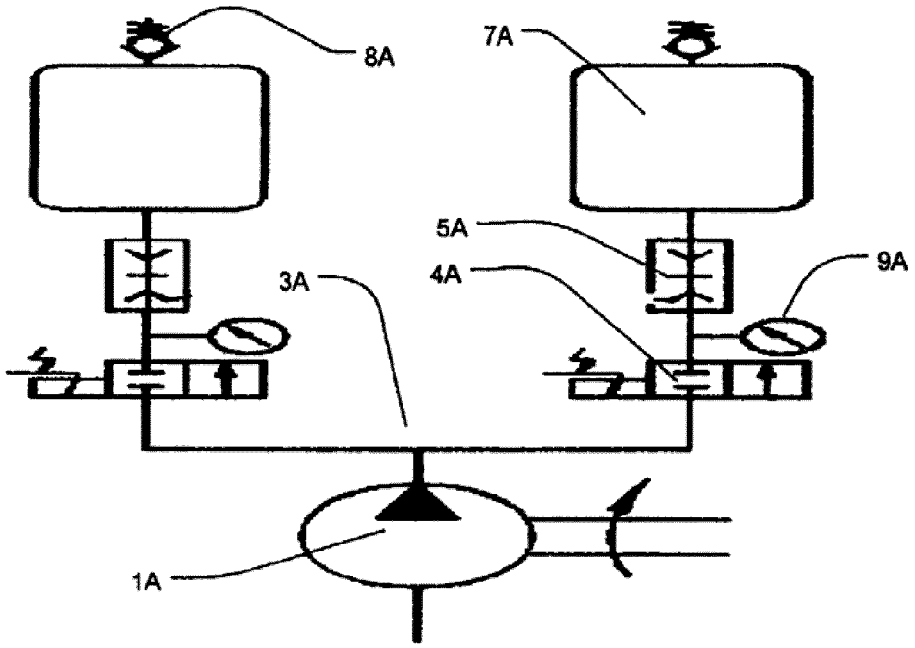

FIG. 1

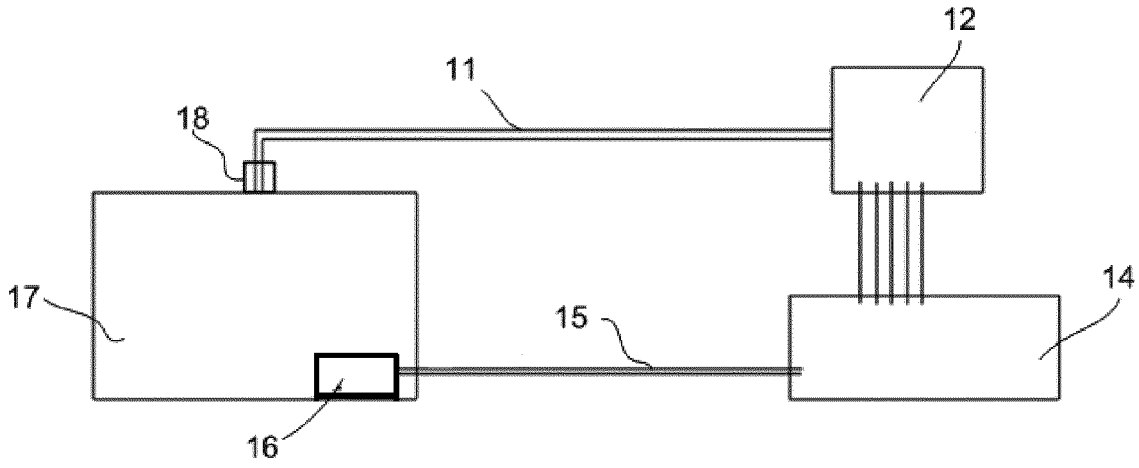

FIG. 2

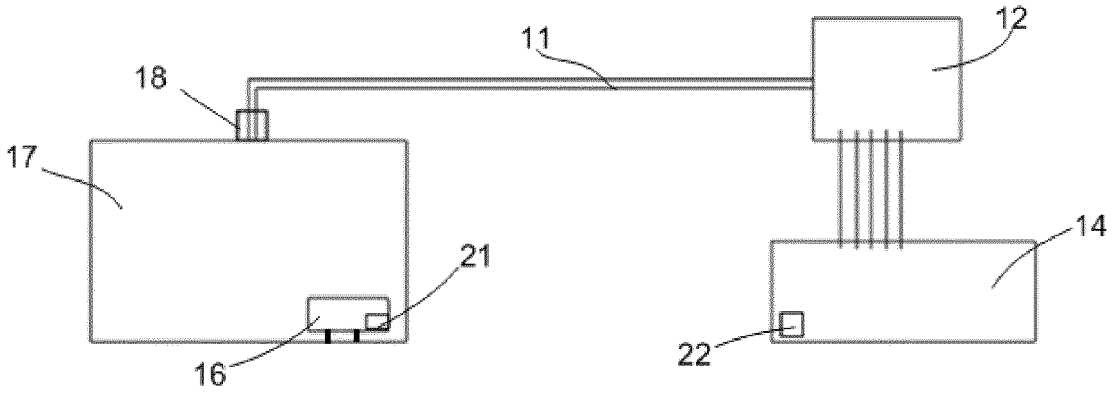

FIG. 3