Refrigerator Having Temperature Transition Room

The present disclosure relates to a refrigerator having a temperature changing room, including a body including a freezer and a separate cold room; doors adapted to open and close the freezer and the cold room; and the temperature changing room in the cold room to maintain a low temperature state to keep an item stored therein fresh, wherein a rear surface of the temperature changing room communicates with a rear surface of an inner case of the body in contact with the temperature changing room, and the temperature changing room has a cool air supplier adapted to supply cool air directly to an interior thereof from an evaporator behind the rear surface of the inner case of the body through a communicating structure thereof.
The present invention relates to a refrigerator having a temperature changing room, and more particularly, to a refrigerator having a temperature changing room that is capable of receiving cool air directly from an evaporator to allow the cool air to reach the set temperature of the temperature changing room and that is capable of gently supplying the cool air for a given period of time even after the operation of a compressor stops.

[Technical Field]

[0001] The present invention relates to a refrigerator having a temperature changing room, and more particularly, to a refrigerator having a temperature changing room that is capable of receiving cool air directly from an evaporator to allow the cool air to reach the set temperature of the temperature changing room and that is capable of gently supplying the cool air for a given period of time even after the operation of a compressor stops.

[Background Art]

[0002] Generally, a refrigerator is a household appliance adapted to maintain the inside of a cold room and a freezer to low temperatures through the repetition of 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] The refrigerator generally includes a body having a freezer and a cold room therein to keep the food stored therein at low temperatures and doors on the front surface of the body adapted to turn to open and close the freezer and the cold room.

[0004] Recently, the refrigerator is provided with a temperature changing room in which the storage items (for example, fish, meat and the like) can be kept in more fresh state for a long period of time.

[0005] That is, the temperature changing room maintains a lower temperature than the cold room and higher temperature than the freezer.

[0006] Accordingly, the temperature changing room is in the cold room of the body of the refrigerator and receives cool air from the freezer to maintain an appropriate low temperature according to the set temperature.

[0007] Hereinafter, an explanation of a refrigerator having a temperature changing room in a conventional practice will be given with reference to FIGS. 1a and 1b.

[0008] As shown, the refrigerator having a temperature changing room in the conventional practice includes a body 10 in which a freezer and a separate cold room are on one side and the other side thereof and doors 20 that are provided to open and close the freezer and the cold room; and the temperature changing room 30 in the cold room of the body 10 of the refrigerator.

[0009] Further, a partition that separates the freezer and the cold room from the body 10 of the refrigerator has a temperature changing room 30 fresh for a long period of time. By the way, the refrigerator having a temperature changing room in the conventional practice is configured to supply cool air in the freezer to the temperature changing room 30, thereby causing the items stored in the temperature changing room 30 to be contaminated with the smell of the items stored in the freezer.

[0011] Further, an amount of power consumed for the activation of the compressor circulating the refrigerant is excessively increased so as to always maintain the set temperature of the temperature changing room 30 to a constant temperature.

[0012] In the conventional practice, in addition, after the compressor stops operating, cool air is not supplied to the temperature changing room 30 anymore, thereby failing to keep the items stored in the temperature changing room 30 fresh for a long period of time.

[Disclosure]

[Technical Problem]

[0013] 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 temperature changing room that is capable of receiving cool air directly from an evaporator to allow the cool air to reach the set temperature of the temperature changing room rapidly and that is capable of gently supplying the cool air for a given period of time even after the compressor stops operating.

[Technical Solution]

[0014] To accomplish the above object, according to the present invention, there is provided a refrigerator having a temperature changing room, including a body including a freezer and a separate cold room; doors adapted to open and close the freezer and the cold room; and the temperature changing room in the cold room to maintain a low temperature state to keep an item stored therein fresh, wherein a rear surface of the temperature changing room communicates with a rear surface of an inner case of the body in contact with the temperature changing room, and the refrigerator has a cool air supplier adapted to supply cool air directly to an interior thereof from an evaporator behind the rear surface of the inner case of the body through a communicating structure thereof.

[0015] According to the present invention, preferably, the cool air supplier includes a first through-hole in the rear surface of the temperature changing room; a second through-hole in the rear surface of the inner case of the body that communicates with the first through-hole; and a cool air supplying fan adapted to supply the cool air from the evaporator to the second through-hole.

[0016] According to the present invention, preferably, the cool air supplier further comprises a damper in the first through-hole or the second through-hole to control an amount of cool air introduced thereinto, and the cool air supplying fan is between the damper and the evaporator.

[0017] According to the present invention, preferably, the first through-hole extends into the second through-
According to the present invention, preferably, the second through-hole hole 312 and is coupled to an inner peripheral surface of the second through-hole.

[0018] According to the present invention, preferably, the temperature changing room has a temperature sensor therein, to check an internal temperature of the temperature changing room in real time, and the temperature sensor is electrically connected to the damper.

[0019] According to the present invention, preferably, the refrigerator further includes an additional control damper in the body to control the supply of the cool air from the evaporator to the cold room or the freezer.

[0020] According to the present invention, preferably, the control damper is above the evaporator and closes a space housing the evaporator when a compressor stops operating.

[0021] According to the present invention, preferably, when the compressor operates again, the initial cool air generated by the evaporator is first supplied to the temperature changing room.

[0022] According to the present invention, preferably, the temperature changing room is in a lower portion of the body.

[Advantageous Effects]

[0023] According to the present invention, the temperature changing room is configured with a cool air supplier that receives cool air directly from an evaporator behind the rear surface of the inner case in the refrigerator body, thereby completely preventing the items stored in the temperature changing room from being contaminated with a peculiar smell from the freezer, and thereby allowing the cool air to rapidly reach the set temperature of the temperature changing room.

[0024] Further, the control damper is additionally mounted on the cool air duct behind the rear surface of the inner case of the body of the refrigerator to control the supply of the cool air generated from the evaporator to the cold room or the freezer, so that the cool air generated from the evaporator is first supplied to the temperature changing room and then supplied to the freezer and the cold room, and even if the operation of the compressor stops, the cool air needed in the temperature changing room can be supplied by using the cool air accumulated around the evaporator.

[Description of Drawings]

[0025] FIGS. 1a and 1b are front and enlarged views showing a refrigerator having a temperature changing room in a conventional practice.

FIG. 2 is a side sectional view showing a refrigerator having a temperature changing room according to the present invention.

FIG. 3 is a partially enlarged view showing the temperature changing room and the cool air supplier of the temperature changing room and the cool air supplier of FIG. 2 and the body of the refrigerator.

[0026] Hereinafter, an explanation of a refrigerator having a temperature changing room according to the present invention will be given in detail with reference to the attached drawings.

[0027] According to the present invention, as shown in FIGS. 2 to 4, a refrigerator having a temperature changing room generally includes a body 100 including a freezer and a separate cold room, doors 200 adapted to open and close the freezer and the cold room, and the temperature changing room 300 in the cold room to maintain a low temperature state to keep an item stored therein fresh.

[0028] The body 100 of the refrigerator has a storage room 101 to store food therein, and the storage room 101 is divided in up and down directions or in left and right rights by a partition, thereby defining the freezer and the cold room.

[0029] Further, the body 100 of the refrigerator includes a cool air duct 102 and a machine room 103, respectively behind and below the rear surface 170 of the inner case thereof. An evaporator 110 is mounted in the cool air duct 102 to generate cool air therefrom, and the machine room 103 has components of the refrigeration cycle such as a compressor 120, a condenser (not shown) and the like mounted therein.

[0030] The doors 200 of the refrigerator serve to selectively open and close the storage room 101 of the body 100.

[0031] Of course, handles should be mounted on the doors 200 to easily conduct the opening and closing operations of the doors 200.

[0032] On the other hand, the body 100 of the refrigerator has the temperature changing room 300 in which an item stored therein can be stored for a long period of time in a more fresh state in accordance with the characteristics of the item.

[0033] The temperature changing room 300 is in the cold room of the body 100 and maintains a lower temperature than the cold room and higher temperature than the freezer.

[0034] In this case, the temperature changing room 300 is configured to receive the cool air directly from the evaporator 110 mounted behind the rear surface 170 of the inner case of the body 100 of the refrigerator.

[0035] Accordingly, the rear surface of the temperature changing room 300 communicates with and contacts the rear surface 170 of the inner case of the body 100 of the refrigerator, and further, the refrigerator includes a cool air supplier 310 adapted to receive cool air directly from the evaporator 110 mounted behind the rear surface 170 of the inner case of the body 100.
That is, the temperature changing room 300 receives the cool air directly from the evaporator 110 using the cool air supplier 310, thereby preventing the items stored in the temperature changing room 300 from being contaminated with the smell of the items stored in the freezer due to the introduction of cool air into the temperature changing room 300 together with the smell of the items stored in the freezer, during the process bypassing the freezer, and further allowing the cool air to rapidly reach the set temperature of the temperature changing room 300.

In more detail, the cool air supplier 310 includes a first through-hole 311 in the rear surface of the temperature changing room 300, a second through-hole 312 in the rear surface of the inner case of the body 100 of the refrigerator, and a cool air supplying fan 314 adapted to supply the cool air from the evaporator 110 to the second through-hole 312.

Especially, a damper 313 is disposed in the first through-hole 311 or the second through-hole 312 to control an amount of cool air introduced thereinto, in this case, the cool air supplying fan 314 is mounted between the damper 313 and the evaporator 110.

The cool air supplying fan 314 is simply coupled to the rear wall of the body 100 of the refrigerator forming the cool air duct 102.

The first through-hole 311 extends into the second through-hole 312 and is coupled to the inner peripheral surface of the second through-hole 312. Accordingly, if the temperature changing room 300 and the rear surface 170 of the inner case of the body 100 of the refrigerator are coupled to each other, the first through-hole 311 can be rigidly coupled to the second through-hole 312, without any leakage of the cool air through them.

Further, a temperature sensor 320 is mounted on the inside of the temperature changing room 300, for example, on an inner wall surface thereof, to check the internal temperature of the temperature changing room 300 in real time, and the temperature sensor 320 is electrically connected to the damper 313.

That is, the temperature sensor 320 and the damper 313 are electrically connected to each other, and therefore, the opening and closing angle of the damper 313 can vary in accordance with the set temperature of the temperature changing room 300.

For example, if the internal temperature of the temperature changing room 300 is drastically raised, the damper 313 completely opens to lower the internal temperature of the temperature changing room 300, and conversely, if the internal temperature of the temperature changing room 300 is maintained at the set temperature or lower than the set temperature, the damper 313 closes. Accordingly, the damper 313 has a well-known electrically operating configuration.

Further, the temperature changing room 300 is in the lower portion of the body 100 of the refrigerator, thereby sending cool air indirectly to a vegetable bin in the lower portion of the body 100 of the refrigerator.

That is, the control damper 330 is adapted to first supply the cool air from the evaporator 110 to the temperature changing room 300, and after a given period of time passes, to supply the cool air to the freezer and the cold room of the body 100 of the refrigerator.

In this case, the control damper 330 is mounted on one side wall of the cool air duct 102 and has a hinge-operating structure that is capable of turning through electrical operation.

The control damper 330 is mounted above the evaporator 110 and closes a part of the space in the cool air duct 102 in which the evaporator 110 is disposed when the compressor 120 stops operating.

After the operation of the compressor 120 stops, the part of the space in the cool air duct 102 including the evaporator 110 is closed, so that even if the compressor 120 stops operating, the cool air needed in the temperature changing room 300 is supplied using the cold air accumulated around the evaporator 110.

The temperature changing room 300 according to the present invention is configured with the cool air supplier 310 that receives cool air directly from the evaporator 110 behind the rear surface 170 of the inner case of the body 100 of the refrigerator, thereby completely preventing the items stored in the temperature changing room 300 from being contaminated with a peculiar smell from the freezer, and thereby allowing the cool air to rapidly lower the temperature of the temperature changing room 300 to the set temperature.

Further, the additional control damper 330 is mounted in the cool air duct 102 behind the rear surface 170 of the inner case of the body 100 of the refrigerator to control the supply of the cool air from the evaporator 110 to the cold room or the freezer, so that the cool air from the evaporator 110 is first supplied to the temperature changing room 300 and then to the freezer and the cold room, and even if the compressor 120 stops operating, the cool air needed in the temperature changing room 300 can be supplied using the cold air accumulated around the evaporator 110.

While the present invention has been described with reference to 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 having a temperature changing room,
comprising:

a body including a freezer and a separate cold room;
doors adapted to open and close the freezer and the cold room; and
the temperature changing room in the cold room to maintain a low temperature state to keep an item stored therein fresh,
wherein a rear surface of the temperature changing room communicates with a rear surface of an inner case of the body in contact with the temperature changing room, and the refrigerator has a cool air supplier adapted to supply cool air directly to an interior thereof from an evaporator behind the rear surface of the inner case of the body through a communicating structure thereof.

2. The refrigerator according to claim 1, wherein the cool air supplier comprises:

a first through-hole in the rear surface of the temperature changing room;
a second through-hole in the rear surface of the inner case of the body, in communication with the first through-hole; and
a cool air supplying fan adapted to supply the cool air from the evaporator to the second through-hole.

3. The refrigerator according to claim 2, wherein the cool air supplier further comprises a damper in the first through-hole or the second through-hole to control an amount of cool air introduced thereinto, and the cool air supplying fan is between the damper and the evaporator.

4. The refrigerator according to claim 3, wherein the first through-hole extends into the second through-hole and is coupled to an inner peripheral surface of the second through-hole.

5. The refrigerator according to claim 3, wherein the temperature changing room has a temperature sensor therein to check an internal temperature of the temperature changing room in real time, and the temperature sensor is electrically connected to the damper.

6. The refrigerator according to any one of claims 1 to 5, further comprising an additional control damper in the body to control a supply of cool air from the evaporator to the cold room or the freezer.

7. The refrigerator according to claim 6, wherein the control damper is above the evaporator and closes a space including the evaporator when a compressor stops operating.

8. The refrigerator according to claim 7, wherein when the compressor operates again, initial cool air generated by the evaporator is first supplied to the temperature changing room.

9. The refrigerator according to any one of claims 1 to 5, wherein the temperature changing room is in a lower portion of the body.
**INTERNATIONAL SEARCH REPORT**

**International application No.**

PCT/KR2013/002768

### A. CLASSIFICATION OF SUBJECT MATTER

**F25D 23/12(2006.01)J, F25D 17/08(2006.01)J, F25D 29/00(2006.01)J**

According to International Patent Classification (IPC) or to both national classification and IPC

### B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

F25D 23/12; F25D 17/08; F25D 11/02; F25D 23/00; F25D 29/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean Utility models and applications for Utility models: IPC as above

Japanese Utility models and applications for Utility models: IPC as above

Electronic database consulted during the international search (name of database and, where practicable, search terms used)

eKOMPASS (KIPO internal) & Keywords: refrigerator, temperature conversion room, fan, damper, through hole

### C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category*</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>JP 11-270956 A (MATSUSHITA REFRIG CO., LTD.) 05 October 1999 See columns [0015]-[0025] and figures 1, 2.</td>
<td>1-9</td>
</tr>
<tr>
<td>A</td>
<td>JP 2009-030934 A (MITSUBISHI ELECTRIC CORP.) 12 February 2009 See paragraphs [0095], [0096] and figures 2, 3.</td>
<td>1-9</td>
</tr>
</tbody>
</table>

* Special categories of cited documents:
  - "A" document defining the general state of the art which is not considered to be of particular relevance
  - "E" earlier application or patent that published on or after the international filing date
  - "L" document which may throw doubts on priority claims(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
  - "O" document referring to an oral disclosure, use, exhibition or other means
  - "P" document published prior to the international filing date but later than the priority date claimed

\[
\text{Date of the actual completion of the international search} \\
25 JUNE 2013 (25.06.2013)
\]

\[
\text{Date of mailing of the international search report} \\
26 JUNE 2013 (26.06.2013)
\]

Name and mailing address of the ISA/KR

Korean Intellectual Property Office
Government Complex Daedeun, 185 Sanjeong-daero, Daedeun 302-701,
Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

Telephone No.
<table>
<thead>
<tr>
<th>Patent document cited in search report</th>
<th>Publication date</th>
<th>Patent family member</th>
<th>Publication date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>CN 101358798 B</td>
<td>08.06.2011</td>
</tr>
<tr>
<td></td>
<td></td>
<td>JP 04565972 B2</td>
<td>08.12.2010</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SG 149781 A1</td>
<td>27.02.2009</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TW 200922296 A</td>
<td>01.06.2009</td>
</tr>
<tr>
<td>KR 10-2003-0026106 A</td>
<td>31.03.2003</td>
<td>NONE</td>
<td></td>
</tr>
</tbody>
</table>