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## (54) Flap arrangement for cooling devices

(57) The cooling device (A) of the invention, which is used for storing food stuff, comprises at least one cooling compartment (1) and freezing compartment (2); a single cooling system adjusting the compartment (1, 2) temperatures; at least one temperature sensor (3) that measures cooling compartment temperature; a control unit regulating the operation of the cooling system, which is associated with the cooling system and said sensor. The device (A) also comprises at least one temperature sensor (4) which measures external ambient temperature of the device and is associated with the control unit; at least one flap arrangement (8) associated with the control unit, which allows air intake into the cooling compartment (1) in accordance with the value measured by said sensor (4).

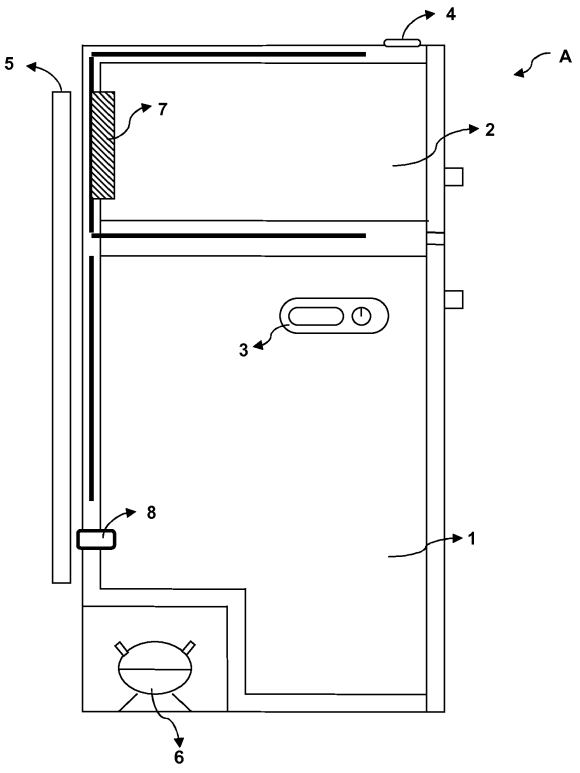


Figure – 1

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## Description

### Technical Field

**[0001]** This invention relates to cooling devices having more than one storage compartment for food stuff and to the adjustment of compartment temperatures in these cooling devices.

### Prior Art

**[0002]** As is known, the cooling devices used for storing food stuff are usually provided with more than one storage compartment. Bringing the temperatures of such compartments, which perform cooling and freezing depending on the cooling capacity of the device, to a desired level and maintaining temperatures at this level is crucial for storing food stuff. In devices which have cooling and freezing compartments, for instance, the device internal temperature is sensed by temperature sensors in cooling compartment, and cooling system of the device adjusts its own operation accordingly. However; in the case that these cooling devices are used at low ambient temperatures, cooling compartment temperature may reach the desired level too quickly whereas freezing compartment occasionally cannot reach the desired temperature. This poses a serious problem for cooling devices having only one cooling system, in which individual temperature of more than one compartment is adjusted by this single system. The published patent application of the prior art EP1344998 discloses a cooling device in which freezing compartment temperature and cooling compartment temperature are adjusted by a single cooling system. In said cooling device, an electric heater located in cooling compartment is activated, if needed, in order to reduce the device internal temperature to a desired level; the increase in compartment temperature is sensed by the thermostat in this compartment and the cooling system is reactivated to reduce the freezing compartment temperature rapidly.

### Brief Description of the Invention

**[0003]** The cooling device of the invention, which is used for storing food stuff, comprises at least one cooling compartment and freezing compartment; a single cooling system adjusting the compartment temperatures; at least one temperature sensor that measures cooling compartment temperature; a control unit regulating the operation of the cooling system, which is associated with the cooling system and said sensor. The device also comprises at least one temperature sensor which measures external ambient temperature of the device and is associated with the control unit; at least one flap arrangement associated with the control unit, which allows air intake into the cooling compartment in accordance with the value measured by said sensor.

### Objective of the Invention

**[0004]** The aim of this invention is to provide a system used for storing foodstuff, which adjusts compartment temperatures in cooling devices wherein single cooling system cools more than one compartment.

**[0005]** Another aim of this invention is to provide a system which brings the compartment temperatures to desired levels in the case that said cooler is operated at low ambient temperatures.

**[0006]** Another aim of this invention is to provide a flap arrangement which allows air intake from the external environment into the compartment in order to adjust the cooling compartment temperature in said cooling device.

**[0007]** Another aim of this invention is to provide a cooling device which is easy-to-produce, cost effective and reliable.

### Description of Drawings

**[0008]** An exemplary view of the cooler of the invention is illustrated in the annexed figures wherein:

Figure 1 is a general view of the cooling device of the invention.

**[0009]** The parts in the figures are individually enumerated and corresponding meanings of reference numbers are as follows:

| | |
|---|---|
| Cooling device | (A) |
| Cooling compartment | (1) |
| Freezing compartment | (2) |
| Temperature sensor | (3) |
| Temperature sensor | (4) |
| Condenser | (5) |
| Compressor | (6) |
| Evaporator | (7) |
| Flap arrangement | (8) |

### Disclosure of Invention

**[0010]** The cooling device (A) of the invention, used for storing food stuff, is characterized by its ability to adjust temperatures of more than one compartment (1, 2) by means of a single cooling system. The device (A) of the invention, provided with at least one cooling compartment and freezing compartment (1, 2), operates such that freezing compartment (2) temperature is lower than the cooling compartment (1) temperature. The device (A) is provided with at least one temperature sensor (3) which senses cooling compartment (1) temperature and is located in this compartment. The device control unit (not shown in the figures), which this sensor (3) is connected to, runs the cooling system of the device (A) until the cooling compartment temperature is reduced down to

the desired level according to the value measured by the sensor (3) and stops the cooling system when the desired level is attained.

**[0011]** The cooling system of the device (A) may be a cooling system employing such units as compressor (6), condenser (5) and evaporator (7); the cooling system may also be a thermoelectric system (e.g. a peltier element, not shown though), as well. The cooling system, operation time and capacity of which are adjusted by the control unit of the device (A), cools both the freezing compartment (2) and the cooling compartment (1) simultaneously. When the cooling compartment (1) temperature is reduced down to the desired level, the cooling system goes off and freezing compartment (2) is no further cooled. In the case that said cooling device (A) operates at low ambient temperature, the cooling compartment (1) temperature may quickly drop down to the desired level. However, there are some cases where the freezing compartment (2) could not be brought to desired temperature in such short time. For this reason, the cooling system of the device (A) must be restarted. To this end, restart of the device (A) is regulated depending on low ambient temperature by using at least one temperature sensor (4) which measures device (A) external temperature. Accordingly, the control unit actuates at least one flap arrangement (8) which allows air intake from the external environment into the cooling compartment (1) upon receiving data from the sensor that measures ambient temperature. The flap arrangement (8) comprises a collapsible cover (not shown) the operation of which is regulated by the control unit.

**[0012]** Upon opening of the cover, ambient air (which is warmer than the air in the device (A)) enters into the cooling compartment. In this manner, an increase in cooling compartment temperature occurs. When the control unit is notified of this situation by internal temperature sensor (3), the cooling system is restarted. This is adjusted according to the difference between the values measured by internal temperature sensor (3) and external temperature sensor (4). This difference between values may vary depending on device manufacturers and/or devices (A).

**[0013]** The device (A) of the invention is also characterized in that the flap arrangement (8) is close to the condenser (5). Thus, it is ensured, by making use of the heat of the condenser (5), that the air entering into the cooling compartment (1) is warmer than the ambient temperature. Consequently, the cooling system is activated sooner by rapid heating of the cooling compartment (1).

**[0014]** The device (A) of the invention is further characterized by its flap arrangements (8) and external temperature sensors (4) which may be added to currently used cooling devices (A) having a wide area of use, and by its easy and cheap production as well as simple structure.

## Claims

1. A cooling device (A) for food stuff comprising at least one cooling compartment (1) and freezing compartment (2); a single cooling system which adjusts temperatures of all compartments; at least one temperature sensor (3) measuring the cooling compartment (1) temperature; a control unit which is associated with the cooling system and with said sensor (3) and which regulates operation of the cooling system **characterized in that** the device (A) comprises

   - at least one temperature sensor (4) measuring external ambient temperature, associated with the control unit (4);
   - at least one flap arrangement (8) associated with the control unit, which allows air intake into the cooling compartment (1) according to the value measured by said sensor (4).

2. A cooling device (A) according to Claim 1 **characterized in that** the flap arrangement (8) comprises a collapsible cover.

3. A cooling device (A) according to Claim 1 **characterized in that** the cooling system is a thermoelectric cooling system.

4. A cooling device (A) according to Claim 1 **characterized in that** the cooling system comprises a compressor unit (6), a condenser unit (5) and an evaporator unit (7).

5. A cooling device (A) according to Claim 4 **characterized in that** the flap arrangement (8) is close to the condenser (5).

6. A cooling device (A) according to Claim 1 **characterized by** opening the flap arrangement (8), in the case that low external ambient temperature is detected, and allowing warm air into the cooling compartment (1) upon the measurement by the sensor (4) **and by** restarting the cooling system of the control unit according to the value measured by the sensor (3).

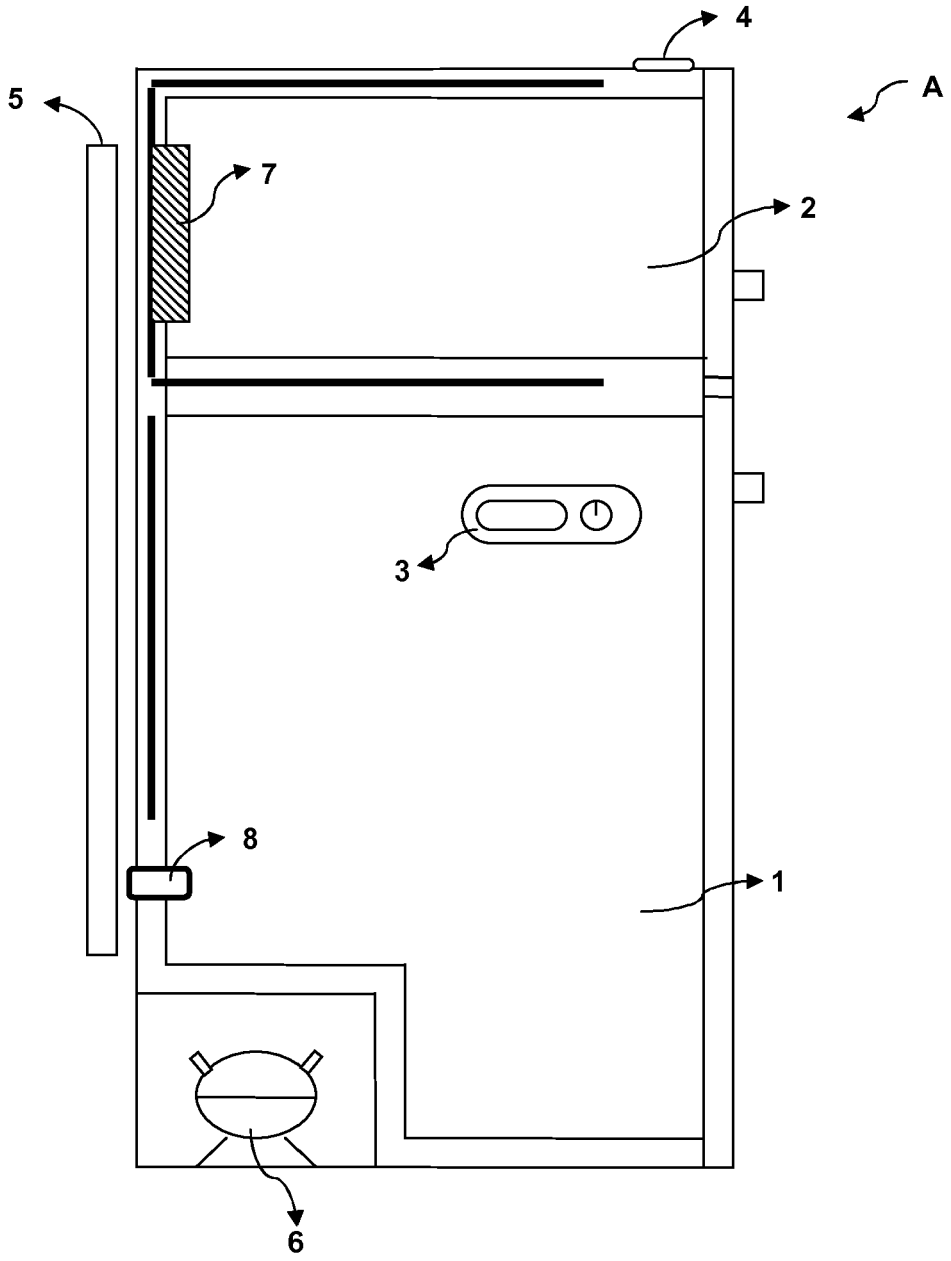


Figure – 1

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# EUROPEAN SEARCH REPORT

Application Number
EP 11 15 7182

## DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (IPC) |
|---|---|---|---|
| X | EP 0 298 349 A2 (ZANUSSI A SPA INDUSTRIE [IT]) 11 January 1989 (1989-01-11)<br>* column 3, line 33 - column 5, line 17; figure 1 * | 1,4 | INV.<br>F25D29/00<br>F25D17/06<br>F25D17/04 |
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| A | DE 203 01 828 U1 (GRAETER RALPH [DE]; GRAETER PETRA [DE])<br>5 June 2003 (2003-06-05)<br>* the whole document * | 1-6 | |
| A | US 5 524 447 A (SHIM JAE-EOK [KR])<br>11 June 1996 (1996-06-11)<br>* column 3, line 57 - column 9, paragraph 39; figures 1-3 * | 1-6 | |
| | | | TECHNICAL FIELDS SEARCHED (IPC)<br>F25D |

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| Munich | 14 June 2011 | Lucic, Anita |

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
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E : earlier patent document, but published on, or after the filing date
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L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

## ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 11 15 7182

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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14-06-2011

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EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

## REFERENCES CITED IN THE DESCRIPTION

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