A COOLING DEVICE COMPRISING AN EVAPORATOR

The present invention relates to a cooling device (1) comprising a compartment (2) wherein foodstuffs to be cooled are placed, walls (3) that surround the compartment (2), a compressor (4) that compresses and circulates the refrigerant fluid in the refrigeration cycle and at least one evaporator (6) having at least one pipe (5) through which the refrigerant fluid passes, that provides the cooling of the compartment (2) and that is placed on the outside of the walls (3).
before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))
A COOLING DEVICE COMPRISING AN EVAPORATOR

[0001] The present invention relates to a cooling device comprising an evaporator.

[0002] In cooling devices, compartments wherein foodstuffs to be cooled are placed are cooled by means of the evaporators participating in the refrigeration cycle. The commonly-used double door cooling devices are generally composed of two compartments, the freezing compartment and the fresh food compartment. The evaporator, that is used for cooling the freezer compartment and that draws heat from the cabin by natural convection and conduction, is composed of pipes wrapped around the outside of the freezing compartment. However, at the bending points of the pipes the contact area between the pipe and the freezing compartment is reduced and this situation causes the efficiency of the evaporator to decrease. In the state of the art, there are different embodiments for increasing the contact area at the bending points of the circular pipes wrapped around the compartment walls. For example, the pipes with circular cross-sections wrapped around the compartment are shaped as a D. However, when pipes with rectangular cross-sections instead of circular cross-section are used, pipe diameters may be narrowed at the bending points due to narrow bending-point diameters or the contact between the pipe and the compartment deteriorates. The evaporator cannot be used efficiently due to the contact problem between the pipe with a rectangular cross-section and the compartment.

[0003] In the state of the art European Patent No. EP1831625, an evaporator is disclosed, comprising pipes that are wrapped around the freezing compartment walls in a refrigerator having two compartments, a refrigerating compartment and a freezing compartment.

[0004] The aim of the present invention is the realization of a cooking device comprising an evaporator of which the efficiency is improved by preventing the bending points of the pipes wrapped around the compartment from being damaged.

[0005] The cooling device realized in order to attain the aim of the present
invention, explicated in the first claim and the respective claims thereof comprises a compartment, walls that form the outer surface of the compartment, a compressor and an evaporator providing the circulation of the refrigerant fluid in the cooling device and having pipes wrapped around the compartment. The cooling device of the present invention furthermore comprises at least one semi-cylindrical bracket mounted onto the edges that form the adjacent walls. By means of the brackets as support units placed at the bending points of the pipes, the pipes are bent at a wider angle than the right angle, thus increasing the efficiency of the evaporator.

[0006] In an embodiment of the present invention, the bracket comprises two flaps that are configured in an inclined form so as to be placed onto two adjacent walls. The inclined form of the flaps prevents the pipes from being damaged while passing over the bracket from the wall or over the wall from the bracket.

[0007] In a derivative of this embodiment, the bracket comprises a semi-spherical body between the two flaps.

[0008] In an embodiment of the present invention, the cooling device comprises a fresh food compartment wherein fresh foodstuffs are stored, a freezing compartment wherein foodstuffs to be frozen are placed and an evaporator placed onto the freezing compartment.

[0009] In a derivative of this embodiment, the pipes are attached onto the walls by means of an aluminum strip. Since the aluminum strip has a higher thermal conductivity coefficient with respect to other adhesive strips, a highly-efficient heat transfer is provided between the pipe and the compartment.

[0010] In an embodiment of the present invention, the bracket is produced from a metal material. By means of the metal material, the heat transfer between the compartment and the refrigerant fluid is realized in an efficient manner.

[0011] In an embodiment of the present invention, the bracket comprises a phase changing material. The bracket helps the compartment temperature to be kept at a desired level by means of the phase changing material which is in solid state between the refrigerant fluid temperature and the compartment temperature.
In the cooling device of the present invention, by means of the bracket mounted on the edges of the compartment, the contact area between the compartment and the pipes is increased, thus the cooling device can be used more efficiently.

The model embodiments relating to a cooling device realized in order to attain the aim of the present invention are illustrated in the attached figures, where:

- Figure 1 - is the schematic view of a cooling device in an embodiment of the present invention.
- Figure 2 - is the perspective view of a compartment, brackets, walls and pipes.
- Figure 3 - is the front view of a compartment when the bracket is mounted onto the compartment.
- Figure 4 - is the view of detail A in Figure 3.
- Figure 5 - is the perspective view of a bracket.

The elements illustrated in the figures are numbered as follows:

1. Cooling device
2. Compartment
3. Wall
4. Compressor
5. Pipe
6. Evaporator
7. Bracket
8. Flap
9. Body
10. Fresh food compartment
11. Freezing compartment

The cooling device (1) comprises a compartment (2) wherein foodstuffs to be cooled are placed, walls (3) that surround the compartment (2), a compressor (4) that compresses and circulates the refrigerant fluid in the refrigeration cycle and at least one evaporator (6) having at least one pipe (5) through which the refrigerant fluid passes, that provides the cooling of the compartment (2) and that is placed on the outside of the walls (3).
The cooling device (1) of the present invention comprises at least one bracket (7) that extends over at least one of the edges (K) joining the walls (3) so as to protrude beyond the level of the walls (3) and that increases the radius (R) of the bending point of the pipe (5) passing thereover (Figure 2).

During the production process of the cooling device (1), the operator first places the brackets (7) onto the edges (K) over which the pipes (5) pass before mounting the pipes (5) onto the compartment (2). Afterwards, the operator wraps the pipes (5) over the outer surface of the walls (3). The bracket (7) is dome-shaped so as to widen the bending angle of the pipe (5) passing thereover when placed onto the compartment (2). By means of the bracket (7), the refrigerant fluid circulating inside the pipes (5) passes from the bending points of the pipes (5) without difficulty, thus increasing the efficiency of the evaporator (6) (Figure 3, Figure 4).

In an embodiment of the present invention, the bracket (7) comprises two inclined flaps (8) that at least partially extend over the walls (3) adjacent to the edge (K) whereon the bracket (7) is placed and enable the bracket (7) to be placed onto the compartment (2). The flaps (8) are seated onto the walls (3) that form the edge (K), thus the bracket (7) is easily mounted onto the compartment (2) (Figure 5).

In a derivative of this embodiment, the bracket (7) comprises two flaps (8), the thickness of which increases from the walls (3) towards the edge (K) when placed onto the compartment (2) and a curved body (9) situated between the flaps (8) and having the same thickness as the maximum thickness of the flaps (8). Thus, the pipe (5) is not damaged during the bending process (Figure 5).

In an embodiment of the present invention, the cooling device (1) comprises a fresh food compartment (10) and a freezing compartment (11) kept at different temperatures from each other and an evaporator (6) situated on the freezing compartment (11). Thus, the freezing compartment (11) can be cooled efficiently.

In a derivative of this embodiment, the cooling device (1) comprises the
evaporator (6) adhered onto the freezing compartment (11) by means of
an aluminum strip. The aluminum strip enables the pipes (5) to be
attached onto the walls (3) in a secure manner.

[0027] In an embodiment of the present invention, the cooking device (1)
comprises the bracket (7) produced from a metal alloy material. By means
of the thermal conductivity of the metal material being high, losses in heat
transfer between the refrigerant fluid and the compartment (2) are
minimized.

[0028] In an embodiment of the present invention, the bracket (7) comprises a
phase changing material. By means of the bracket (7) comprising a phase
changing material, foodstuffs in the compartment (2) can be stored for a
longer time when the connection between the cooling device (1) and the
power source is cut.

[0029] The bracket (7) placed onto the compartment (2) facilitates the passage of
the refrigerant fluid at the bending points of the pipes (5) passing
thereover, and thus increases the efficiency of the evaporator (6).
Claims

1. A cooling device (1) comprising
   - a compartment (2) wherein foodstuffs to be cooled are placed,
   - walls (3) that surround the compartment (2),
   - a compressor (4) that compresses and circulates the refrigerant fluid in the
     refrigeration cycle and
   - at least one evaporator (6) having at least one pipe (5) through which the
     refrigerant fluid passes, that provides the cooling of the compartment (2) and
     that is placed on the outside of the walls (3)

   characterized in that
   - at least one bracket (7) that extends over at least one of the edges (K) joining
     the walls (3) so as to protrude beyond the level of the walls (3) and that
     increases the radius (R) of the bending point of the pipe (5) passing thereover.

2. A cooling device (1) as in Claim 1, characterized in that the bracket (7)
   comprising two inclined flaps (8) that at least partially extend over the walls (3)
   adjacent to the edge (K) whereon the bracket (7) is placed and that enable the
   bracket (7) to be placed onto the compartment (2).

3. A cooling device (1) as in Claim 2, characterized in that the bracket (7)
   comprising two flaps (8), the thickness of which increases from the walls (3)
   towards the edge (K) when placed onto the compartment (2) and a curved
   body (9) situated between the flaps (8) and having the same thickness as the
   maximum thickness of the flaps (8).

4. A cooling device (1) as in any one of the above claims, characterized in that
   a fresh food compartment (10) and a freezing compartment (11) kept at different
   temperatures from each other and an evaporator (6) situated on the freezing
   compartment (11).

5. A cooling device (1) as in Claim 4, characterized in that the evaporator (6) that
   is adhered onto the freezing compartment (11) by means of an aluminum strip.

6. A cooling device (1) as in any one of the above claims, characterized in that
   the bracket (7) that is produced from a metal alloy material.

7. A cooling device (1) as in any one of the above claims, characterized in that
   the bracket (7) that comprises a phase changing material.
According to International Patent Classification (IPC) or to both national classification and IPC

**A. CLASSIFICATION OF SUBJECT MATTER**

INV. F25B39/02 F25D23/06
ADD.

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)

F25B F25D F28F

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

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

EPO-Internal, WPI Data

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

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☐ Further documents are listed in the continuation of Box C. ☑ See patent family annex.

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