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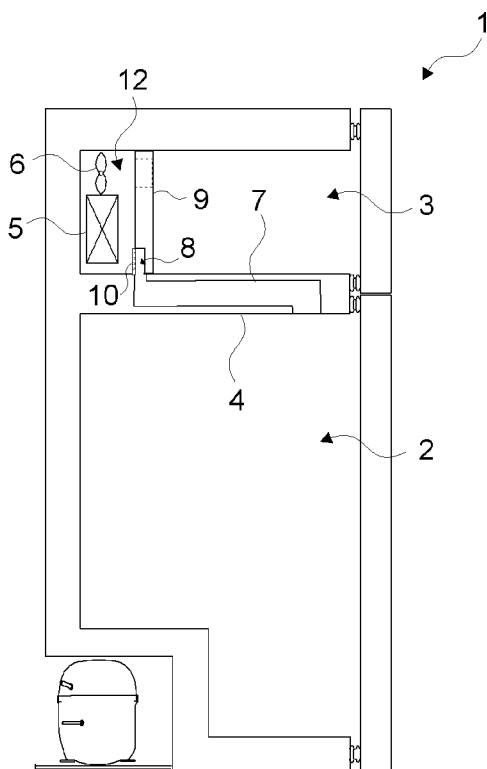
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(54) Title: A COOLING DEVICE



(57) Abstract: The cooling device (1) of the present invention comprises a freezer compartment (3) wherein the foods to be frozen are stored, a fresh food compartment (2) wherein foodstuff to be cooled are stored and kept at a higher temperature than the freezer compartment (3), an intermediary wall (4) that separates the two compartments (2 and 3), at least one evaporator (5) that cools the air circulated within the compartments (2 and 3), and one or more fans (6) that provides the air cooled by the evaporator (5) to be blown into the compartments (2 and 3).

WO 2007/138028 A2

Description

A COOLING DEVICE

- [0001] The present invention relates to a cooling device, the refrigerant efficiency of which is increased.
- [0002] In cooling devices, usually there are at least two compartments, one being the fresh food compartment and the other freezer compartment, which are kept at different temperatures from each other. The fresh food compartment is reserved for storing foodstuffs like fruit and vegetables and the temperature is kept around 5°C. In the freezer compartment with a temperature of around -18°C, the foods such as meat, fish etc. that have to be stored for a longer time are emplaced.
- [0003] Particularly the different types of food stored in the freezer compartment and the freezer and the fresh food compartment doors being opened and closed during the day affects the humidity rate contained in the air circulating in the compartments. In order to remove the moisture from air, the evaporator, being the coldest part of the cooling device, which is situated in the freezer compartment, is used. The evaporator provides to cool the warm air aspirated from the freezer compartment and at the same time to detain the moisture contained in the warm air.
- [0004] In this type of cooling devices, cooling of the compartments is achieved by different methods. According to one method, the air is cooled by passing over the evaporator by means of a fan, and then is circulated in the freezer compartment and the fresh food compartment. The air passes through the channel disposed in the intermediary compartment that separates the freezer and the fresh food compartments, with one end extending into the freezer compartment and the other end to the region wherein the evaporator is situated, then reaches the evaporator again.
- [0005] In the state of the art United States of America Patent no. US5819552, a cover is explained which separates the freezer compartment and the evaporator, providing the distribution of the cooled air in the compartment by means of channels.
- [0006] The orifice of the air channel that extends particularly to the region of the evaporator is clogged by frosting and freezing. The most important reason of clogging of the air channel orifice by frosting is the cold air migration. During the refrigerant cycle, the fan that stops when the compressor changes to the shut off position cannot transfer the air cooled along the evaporator into the freezer compartment and the cold air is directed (sinks) automatically by its own weight towards the air channel orifice. The cold air that moves towards the orifice of the air channel meets with the relatively

warmer and humid air inside the channel almost at the vicinity of the orifice. At the region where the cold and warm airs meet, the warm air leaves its moisture on the surfaces of the channel orifice and the vicinity thereof, causing the formation of frosting in these regions. In time the air channel is clogged by the build up of frost, delivery of cold air to the freezer compartment is interrupted since air flow is obstructed and the temperature of the freezer compartment goes up. Thus the cooling performance of the cooling device is adversely affected.

[0007] In the state of the art, in critical places where frosting is formed, heaters are used which are energized during the pause intervals of the compressor. These heaters which are disposed in places where the aspirated air meets with the cold air migration keeps the temperature of the mixture above 0°C to prevent frosting. However, the use of heaters increases the energy consumption of the cooling device.

[0008] The object of the present invention is to design a cooling device comprising an air channel wherein clogging resulting from frosting is prevented.

[0009] The cooling device designed to fulfill the objective of the present invention, explicated in the first claim and the other respective claims thereof, comprises an air channel, one end of which extends into the fresh food compartment and the other to region wherein the evaporator is situated and a cover having holes in various sizes and numbers thereon, disposed on the orifice of the air channel extending into the region of the evaporator, preventing frosting in the air channel by partially impeding the cold air that moves in the reverse direction during cold air migration from passing into air channel.

[0010] By using a cover, the air masses having two different temperatures and humidity levels are prevented from mixing together in the time interval during which the compressor is not operating. Since the orifice of the channel cannot be entirely closed, the outlet orifice of the channel is closed by a cover having holes thereon. Accordingly, the adverse effect of cold air migration is eliminated. When the fan operates, air flow through the holes on the cover is not prevented due to the high pressure formed. When the fan stops, the sinking cold air is prevented from reaching the channel orifice, entering the channel and meeting with the warm air to form frosting in the channel.

[0011] The cover is produced of styropor or a plastic material. By using the cover of the present invention, the cold and warm airs are enabled to meet not at the exit of the channel but over the evaporator.

[0012] By way of the present invention, the frosting that forms in the channels is prevented

without requiring the use of a heater and the cooling device is utilized more efficiently. By this means, the moist and warm air aspirated from the fresh food compartment, leaves its moisture not on the wall of the air channel but over the evaporator which serves as a dehumidifier. Furthermore, a substantial decrease in the energy requirement of the cooling device is achieved since there isn't frosting and clogging in the channels. Furthermore, it is fairly easy to implement the cover of the present invention on the air channel orifice, thus mounted can be done on the present cooling devices without requiring any modifications in design.

[0013] The cooling device designed to fulfill the objective of the present invention is illustrated in the attached figures, where:

[0014] Figure 1 – is the schematic view of a cooling device.

[0015] Figure 2 – is the schematic view of a cover.

[0016] Figure 3 – is the schematic view of a distribution cover.

[0017] The elements illustrated in the figures are numbered as follows:

1. Cooling device
2. Fresh food compartment
3. Freezer compartment
4. Intermediary wall
5. Evaporator
6. Fan
7. Channel
8. Orifice
9. Evaporator cover
10. Cover
11. Hole
12. Evaporator chamber

[0018] The cooling device (1) of the present invention comprises a freezer compartment (3) wherein the foods to be frozen are stored, a fresh food compartment (2) wherein the foodstuff to be cooled are stored and kept at a higher temperature than the freezer compartment (3), an intermediary wall (4) that separates the two compartments (2 and 3), at least one evaporator (5) that cools the air circulated within the compartments (2 and 3), one or more fans (6) that provides the air cooled by the evaporator (5) to be blown into the compartments (2 and 3), and an evaporator chamber (12) wherein the evaporator (5) and the fan (6) are disposed.

[0019] The cooling device (1) comprises a channel (7) disposed inside the intermediary

wall (4), through which the air aspirated from the fresh food compartment (2) flows, with one orifice (8) extending into the compartment (2) and the other orifice (8) extending to the evaporator chamber (12) and one or more covers (10) having holes (11) in various numbers and sizes thereon, disposed on the orifice (8) of the channel (7) extending into the evaporator chamber (12) and preventing the formation of frosting in the channel (7) by partially preventing the passage of cold air into the air channel (7) which moves in the reverse direction towards the base of the evaporator chamber (12) during cold air migration (Figure 1, Figure 2 and Figure 3).

[0020] The intermediary wall (4) is situated between the fresh food compartment (2) and the freezer compartment (3), and the channel (7) disposed inside the intermediary wall (4), provides the air circulation in the compartments (2 and 3). Therefore, one end of the channel (7) extends into the fresh food and/or the freezer compartment (2 and 3) and the other end extends into the evaporator chamber (12) housing the evaporator (5) and the fan (6).

[0021] The fan (6) is disposed over the evaporator (5) in the evaporator chamber (12). However, the orifice (8) of the channel (7) is either situated on the base of the evaporator chamber (12) or in the vicinity of the base. Consequently the air that enters from the channel (7) into the evaporator chamber (12) can contact with the whole surface of the evaporator (5).

[0022] When the fan (6) stops, since the cold air over the evaporator (5) cannot be conveyed to the compartment (2 or 3), it starts to sink slowly on the base of the evaporator chamber (12) or towards the orifice (8). Simultaneously, the air aspirated from the compartment (2) flows more easily through the holes (11) on the cover (10) since it is warmer and the mixing of the cold and warm airs in the air channel (7) is prevented, providing the meeting to take place in the evaporator chamber (12).

[0023] The warm and humid air aspirated from the fresh food compartment (2) passes through the air channel (7) and reaches the outlet orifice (8) of the air channel (7). The air that passes through the holes (11) on the cover (10) disposed over the outlet orifice (8) is cooled in the evaporator (5) and delivered back to the fresh food compartment (2). When the compressor stops during the refrigerant cycle, the fan (6) also stops depending on the operation of the compressor. Thus the air cooled by the evaporator (5) cannot be delivered into the freezer compartment (3). The air that cannot be distributed since the fan (6) is not operating thus cools further and moves in the reverse direction of the air flow that moves along the evaporator (5) when the fan (6) starts operating, sinking towards the base of the evaporator chamber (12) and reaches the

orifice (8) of the air channel (7). Simultaneously the humid and relatively warmer air in the fresh food compartment (2) passes through the air channel (7) and reaches the orifice (8) of the air channel (7). Since the air aspirated from the compartment (2) is relatively warmer, it passes through the holes (11) on the cover (10) more easily and the mixing of the airs with different temperatures and humidity levels in the air channel (7) or the orifice (8) thereof is partially prevented by means of the cover (10). The cover (10) does not prevent air flow by means of the holes (11) arranged on the cover (10) when the compressor and the fan (6) are operating. However, by means of the cover (10), when the fan (6) stops, the air that flows in the reverse direction due to cold air migration is at least partially prevented from reaching into the air channel (7). Consequently, mixing of the airs having different temperatures and humidity values resulting in the formation of frosting in the wall of the air channel (7) and impeding air flow by the clogging of the air channel (7) is prevented.

[0024] In another embodiment of the present invention, the cover (10) is disposed at a level below the level of the lowermost portion of the evaporator (5).

[0025] In another embodiment of the present invention, the cooling device (1) comprises an evaporator cover (9) that separates the evaporator chamber (12) and the freezer compartment (3). The evaporator cover (9) and the channel (7) are joined and the cover (10) is disposed over the evaporator cover (9) such that the channel orifice (8) is covered.

[0026] In another embodiment of the present invention, the cover (10) is produced together with the evaporator cover (9) as a single piece.

[0027] In yet another embodiment of the present invention, the cover (10) is made of styropor or plastic material.

[0028] By means of the present invention, frosting in the air channel (7) due resulting from cold air migration is prevented without requiring the use of a heater.

Claims

- [0001] A cooling device (1) comprising a freezer compartment (3) wherein the foods to be frozen are stored, a fresh food compartment (2) wherein foodstuff to be cooled are stored, kept at a higher temperature than the freezer compartment (3), an intermediary wall (4) that separates the two compartments (2 and 3), at least one evaporator (5) that cools the air circulated within the compartments (2 and 3), one or more fans (6) that provides the air cooled by the evaporator (5) to be blown into the compartments (2 and 3), an evaporator chamber (12) wherein the evaporator (5) and the fan (6) are disposed and a channel (7) disposed inside the intermediary wall (4), through which the air aspirated from the fresh food compartment (2) flows, with one orifice (8) extending into the compartment (2) and the other orifice (8) into the evaporator chamber (12) **and characterized by** one or more covers (10) having holes (11) in various numbers and sizes thereon, disposed on the orifice (8) of the channel (7) extending into the evaporator chamber (12) and preventing the formation of frosting in the channel (7) by partially preventing the passage of cold air into the air channel (7) which moves in the reverse direction towards the base of the evaporator chamber (12) during cold air migration.
- [0002] A cooling device (1) as in Claim 1, **characterized by** a cover (10) that is disposed at a level below the level of the lowest portion of the evaporator (5).
- [0003] A cooling device (1) as in any one of the above claims, **characterized by** an evaporator cover (9) that separates the evaporator chamber (12) and the freezer compartment (3) and a cover (10) that is disposed over the evaporator cover (9) such that the channel orifice (8) is covered.
- [0004] A cooling device (1) as in Claim 3, **characterized by** a cover (10) that is produced together with the evaporator cover (9) as a single piece.

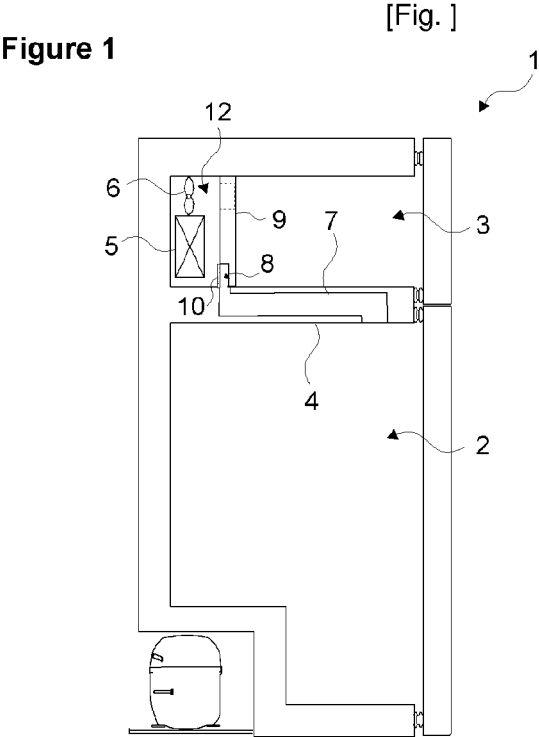


Figure 2

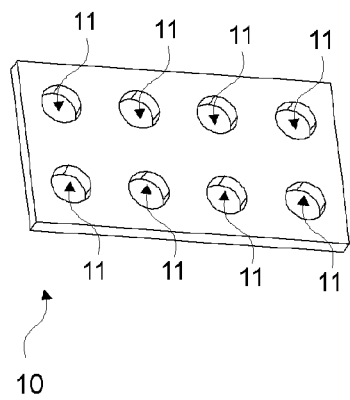


Figure 3

