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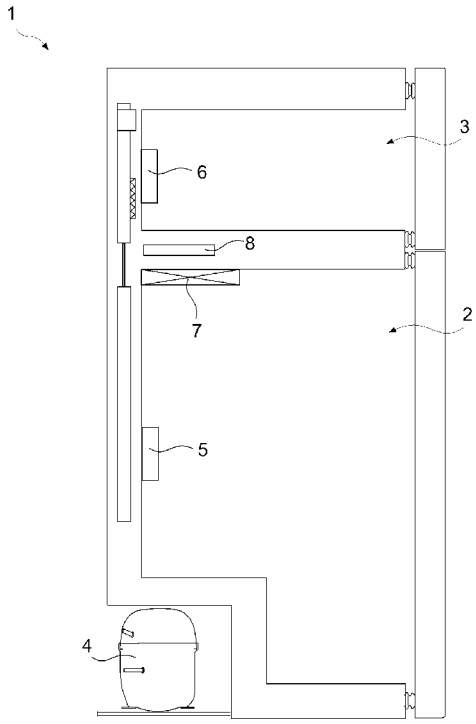
(54) **Title**: A COOLING DEVICE WITH TWO COMPARTMENTS

Figure 1



(57) **Abstract**: The present invention relates to a cooling device (1) comprising a fresh food compartment (2) wherein the foodstuff is placed to be cooled, a freezing compartment (3) wherein the foodstuff is placed to be frozen, kept at temperatures lower than that of the fresh food compartment (2), a compressor (4) compressing and circulating the refrigerant in the refrigeration cycle, a fresh food compartment temperature sensor (5) measuring the fresh food compartment (2) temperature, a freezing compartment temperature sensor (6) measuring the freezing compartment (3) temperature, a fan (7) providing the air circulation in the fresh food compartment (2) and a control unit (8) that determines the cut-in and cut-out times of the compressor (4) and the fan (7) by controlling the data received from the temperature sensors (6, 7).

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Description

A COOLING DEVICE WITH TWO COMPARTMENTS

[0001] The present invention relates to a cooling device comprising a fresh food compartment and a freezing compartment.

[0002] Domestic type cooling devices generally consist of two separate compartments, a fresh food compartment and a freezing compartment, that are kept at different temperatures. The fresh food compartment is utilized preferably for storing fresh food and the freezing compartment for storing frozen food.

[0003] In the state of the art, in the cooling devices having two compartments at different temperatures from each other, the refrigeration process is performed by means of evaporators disposed in the compartments, connected to each other in series or in parallel instead of forced air circulation. Besides, both refrigeration circuits are connected to a single compressor. For the compressor cut-in condition, the fresh food compartment temperature is taken as reference in some cooling devices and the freezing compartment is taken as reference in others. In such embodiments, while one of the compartments is tried to be kept at a desired temperature interval, excessive heating or excessive cooling problems are observed in the other compartment. In cooling devices wherein both compartment temperatures are taken as reference, the compressor cannot be used efficiently and energy consumption increases.

[0004] In the state of the art Japanese Patent Application No. JP10185395, a cooling device is described, wherein the fan disposed in the fresh food compartment is operated at certain temperature intervals in order to keep the fresh food compartment temperature constant when the freezing compartment temperature is used as the cut-in condition.

[0005] The aim of the present invention is the realization of a cooling device wherein energy consumption is reduced and the cooling efficiency is improved.

[0006] In the cooling device realized in order to attain the aim of the present invention, explicated in the first claim and the respective claims thereof, a control unit that controls the activation and the deactivation of the

compressor and the fan is disposed.

[0007] In order to cut in the compressor, the fresh food compartment temperature and/or the freezing compartment temperature should reach respectively the fresh food compartment temperature predetermined by the producer whereat the compressor is cut in and/or the freezing compartment temperature predetermined by the producer whereat the compressor is cut in. In order to cut out the compressor, the fresh food compartment temperature and/or the freezing compartment temperature should reach respectively the fresh food compartment temperature predetermined by the producer wherein the compressor is cut out and/or the freezing compartment temperature predetermined by the producer wherein the compressor is cut out. The fan disposed in the fresh food compartment used to propel the air cuts in and cuts out respectively at the fresh food compartment temperature whereat the compressor is cut in and at the fresh food compartment temperature whereat the compressor is cut out. When the compressor is cut in according to the freezing compartment temperature, the fan does not operate since the fresh food compartment temperature is below the fresh food compartment temperature whereat the compressor is cut in. When the compressor cools the freezing compartment and brings the freezing compartment temperature to the freezing compartment temperature whereat the compressor is cut out, the fan is cut in even if the cut-in condition is not still met and operates until the fresh food compartment temperature reaches the fresh food compartment temperature whereat the compressor is cut out. When the fresh food compartment temperature reaches the fresh food compartment temperature whereat the compressor is cut out, the compressor and the fan are cut out.

[0008] The cooling device realized in order to attain the aim of the present invention is illustrated in the attached figures, where:

[0009] Figure 1 – is the schematic view of a cooling device.

[0010] The elements illustrated in the figures are numbered as follows:

1. Cooling device
2. Fresh food compartment

3. Freezing compartment
4. Compressor
5. Fresh food compartment temperature sensor
6. Freezing compartment temperature sensor
7. Fan
8. Control unit

[0011] The cooling device (1) of the present invention comprises a fresh food compartment (2) wherein the foodstuff is placed to be cooled, a freezing compartment (3) wherein the foodstuff is placed to be frozen, kept at temperatures lower than that of the fresh food compartment (2), a compressor (4) compressing and circulating the refrigerant in the refrigeration cycle, a fresh food compartment temperature sensor (5) measuring the fresh food compartment (2) temperature, a freezing compartment temperature sensor (6) measuring the freezing compartment (3) temperature and a fan (7) providing air circulation in the fresh food compartment (2) (Figure 1).

[0012] The following symbols are used for explicating the cooling device (1) of the present invention:

[0013] T_R: the fresh food compartment temperature detected by the fresh food compartment temperature sensor (5)

[0014] $T_{Rcut\text{-}in}$: the fresh food compartment temperature predetermined by the producer, whereat the compressor (4) is cut in by the control unit (8).

[0015] $T_{Rcut\text{-}out}$: the fresh food compartment temperature predetermined by the producer, whereat the compressor (4) is cut out by the control unit (8).

[0016] T_F : the freezing compartment temperature detected by the freezing compartment temperature sensor (6)

[0017] $T_{Fcut\text{-}in}$: the freezing compartment temperature predetermined by the producer, whereat the compressor (4) is cut in by the control unit (8).

[0018] $T_{Fcut\text{-}out}$: the freezing compartment temperature predetermined by the producer, whereat the compressor (4) is cut out by the control unit (8).

[0019] The cooling device (1) of the present invention furthermore comprises a control unit (8)

- that, when the compressor (4) is deactivated, compares the fresh food

temperature (T_R) and the freezing compartment temperature (T_F) respectively with the fresh food compartment temperature ($T_{Rcut\text{-}in}$) whereat the compressor (4) is cut in and with the freezing compartment temperature ($T_{Fcut\text{-}in}$) whereat the compressor (4) is cut in and that cuts in the compressor (4) when at least one of the fresh food compartment temperature (T_R) and the freezing compartment temperature (T_F) reaches respectively the fresh food compartment temperature ($T_{Rcut\text{-}in}$) whereat the compressor (4) is cut in and with the freezing compartment temperature ($T_{Fcut\text{-}in}$) whereat the compressor (4) is cut in,

- that, when the compressor (4) is activated, compares the fresh food temperature (T_R) and the freezing compartment temperature (T_F) respectively with the fresh food compartment temperature ($T_{Rcut\text{-}out}$) whereat the compressor (4) is cut out and with the freezing compartment temperature ($T_{Fcut\text{-}out}$) whereat the compressor (4) is cut out and that cuts out the compressor (4) when both of the fresh food compartment temperature (T_R) and the freezing compartment temperature (T_F) reach respectively the fresh food compartment temperature ($T_{Rcut\text{-}out}$) whereat the compressor (4) is cut out and with the freezing compartment temperature ($T_{Fcut\text{-}out}$) whereat the compressor (4) is cut out,
- that compares the fresh food compartment temperature (T_R) with the fresh food compartment temperature ($T_{Rcut\text{-}in}$) whereat the compressor (4) is cut in and cuts in the fan (7) when the fresh food compartment temperature (T_R) reaches the fresh food compartment temperature ($T_{Rcut\text{-}in}$) whereat the compressor (4) is cut in,
- that compares the fresh food compartment temperature (T_R) with the fresh food compartment temperature ($T_{Rcut\text{-}out}$) whereat the compressor (4) is cut out and cuts out the fan (7) when the fresh food compartment temperature (T_R) reaches the fresh food compartment temperature ($T_{Rcut\text{-}out}$) whereat the compressor (4) is cut out.

[0020] In the cooling device (1) of the present invention, the control unit (8) cuts in the fan (7) when the freezing compartment temperature (T_F) reaches the freezing compartment temperature ($T_{Fcut\text{-}out}$) whereat the compressor (4)

is cut out, even if the fresh food compartment temperature (T_R) does not reach the fresh food compartment temperature ($T_{Rcut\text{-}in}$) whereat the compressor (4) is cut in, if the compressor (4) is cut in since the freezing compartment temperature (T_F) has reached the freezing compartment temperature ($T_{Fcut\text{-}in}$) whereat the compressor (4) is cut in.

[0021] If the compressor (4) is cut in when the freezing compartment temperature (T_F) reaches the freezing compartment temperature ($T_{Fcut\text{-}in}$) whereat the compressor (4) is cut in, the fan (7) is not cut in since the fresh food compartment temperature (T_R) is between the fresh food compartment temperature ($T_{Rcut\text{-}in}$) whereat the compressor (4) is cut in and the fresh food compartment temperature ($T_{Rcut\text{-}out}$) whereat the compressor (4) is cut out. While the compressor (4) operates and cools the freezing compartment (3), the fresh food compartment temperature (T_R) does not decrease to the fresh food compartment temperature ($T_{Rcut\text{-}in}$) whereat the compressor (4) is cut in and the fan (7) is not operated. By means of the fan (7) being cut in when the freezing compartment temperature (T_F) reaches the freezing compartment temperature ($T_{Fcut\text{-}out}$) whereat the compressor (4) is cut out, the period whereby the fresh food compartment temperature (T_R) reaches the fresh food compartment temperature ($T_{Rcut\text{-}out}$) whereat the compressor (4) is cut out is shortened and thus the compressor (4) is operated less, thereby providing energy savings.

[0022] By means of the present invention, the compartments (2, 3) of the cooling device (1) are more effectively cooled and energy saving is provided by operating the compressor (4) less.

[0023] It is to be understood that the present invention is not limited to the embodiments disclosed above and a person skilled in the art can easily introduce different embodiments. These should be considered within the scope of the protection postulated by the claims of the present invention.

Claims

1. A cooling device (1) comprising

a fresh food compartment (2) wherein the foodstuff is placed to be cooled, a freezing compartment (3) wherein the foodstuff is placed to be frozen, kept at temperatures lower than that of the fresh food compartment (2), a compressor (4) compressing and circulating the refrigerant in the refrigeration cycle, a fresh food compartment temperature sensor (5) measuring the fresh food compartment (2) temperature, a freezing compartment temperature sensor (6) measuring the freezing compartment (3) temperature, a fan (7) providing the air circulation in the fresh food compartment (2) and a control unit (8)

- that, when the compressor (4) is deactivated, compares the fresh food temperature (T_R) and the freezing compartment temperature (T_F) respectively with the fresh food compartment temperature ($T_{Rcut\text{-}in}$) whereat the compressor (4) is cut in and with the freezing compartment temperature ($T_{Fcut\text{-}in}$) whereat the compressor (4) is cut in and that cuts in the compressor (4) when at least one of the fresh food compartment temperature (T_R) and the freezing compartment temperature (T_F) reaches respectively the fresh food compartment temperature ($T_{Rcut\text{-}in}$) whereat the compressor (4) is cut in and with the freezing compartment temperature ($T_{Fcut\text{-}in}$) whereat the compressor (4) is cut in,

- that, when the compressor (4) is activated, compares the fresh food temperature (T_R) and the freezing compartment temperature (T_F) respectively with the fresh food compartment temperature ($T_{Rcut\text{-}out}$) whereat the compressor (4) is cut out and with the freezing compartment temperature ($T_{Fcut\text{-}out}$) whereat the compressor (4) is cut out and that cuts out the compressor (4) when both of the fresh food compartment temperature (T_R) and the freezing compartment temperature (T_F) reach respectively the fresh food compartment temperature ($T_{Rcut\text{-}out}$) whereat the compressor (4) is cut out and with the freezing compartment temperature ($T_{Fcut\text{-}out}$) whereat the compressor (4) is cut out,

- that compares the fresh food compartment temperature (T_R) with the fresh food compartment temperature ($T_{Rcut\text{-}in}$) whereat the compressor (4) is cut in and cuts in the fan (7) when the fresh food compartment temperature (T_R)

reaches the fresh food compartment temperature ($T_{Rcut-in}$) whereat the compressor (4) is cut in,

- that compares the fresh food compartment temperature (T_R) with the fresh food compartment temperature ($T_{Rcut-out}$) whereat the compressor (4) is cut out and cuts out the fan (7) when the fresh food compartment temperature (T_R) reaches the fresh food compartment temperature ($T_{Rcut-out}$) whereat the compressor (4) is cut out.

characterized by the control unit (8) that cuts in the fan (7) when the freezing compartment temperature (T_F) reaches the freezing compartment temperature ($T_{Fcut-out}$) whereat the compressor (4) is cut out, even if the fresh food compartment temperature (T_R) does not reach the fresh food compartment temperature ($T_{Rcut-in}$) whereat the compressor (4) is cut in, if the compressor (4) is cut in since the freezing compartment temperature (T_F) has reached the freezing compartment temperature ($T_{Fcut-in}$) whereat the compressor (4) is cut in.

Figure 1