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(54) **A refrigerator**

(57) The invention is a no-frost refrigerator which comprises freezer and cooler sections (5,6), fan motor and propeller (1) providing the air flow, evaporator which provides cold air by providing the heat transfer from the air in the refrigerator to the cooler gas and it also comprises freezer section air suction channel (3), where the air that is heated after cooling the said freezer section (5), is sucked again and drawn back to the evaporator (2) by fan motor and propeller (1) for being cooled and cooler section air suction channel (4), where the air that is heated after cooling the said cooler section (6), is sucked again and drawn back to the evaporator (2) by fan motor and propeller (1) for being cooled, both of which are used for conveying the air in the said freezer and cooler sections (5,6) to the evaporator (2) and which are positioned one under the other in a parallel manner. The freezer and cooler section air suction channels (3,4) are provided in the partition block (7) made of EPS material.

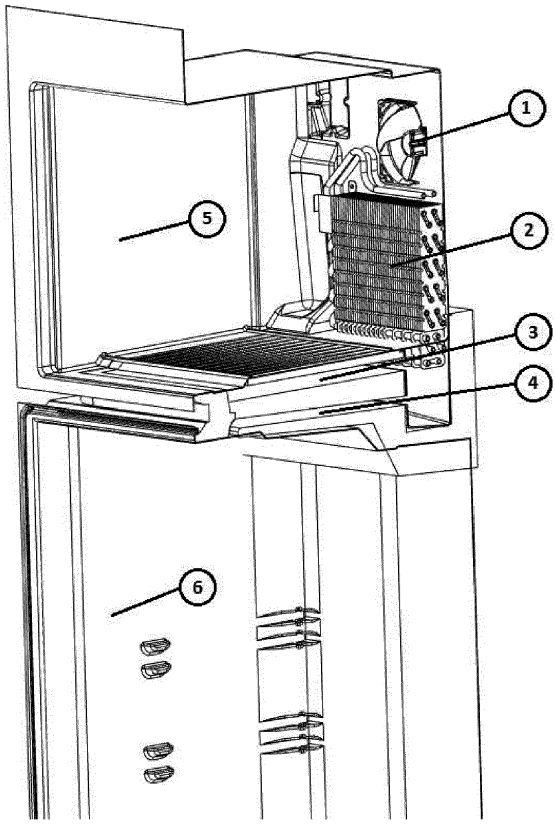

Figure 2

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Description

Technical Field

[0001] The invention is related to refrigerators.

[0002] The invention is especially related to air sucking channels for conveying the air present in the cooler and freezer sections of no-frost refrigerators to the evaporator.

Prior Art

[0003] Today, there are refrigerators with different dimensions intended for different purposes. The system in the no-frost refrigerators, which are among the prior art refrigerators, is shown in figure 3, 4 and 5. No frost refrigerators comprise heating resistances provided around the evaporator, air channels which provide the air flow over the evaporator and fan(s). By melting the snow accumulated on the evaporator periodically, the resistances provide a more efficiently working refrigerator and also eliminate the need for melting the ice by the user. Water arising from the ice melting on the evaporator flows into a reservoir on the compressor and evaporates with the heat of compressor or evaporates with the heat of the condenser pipe in a water collection cup through which the condenser pipes pass. The damper located between the air channels is shut down when the need for cooling in the cooler section ends and the cooled air is pumped just into the freezer section. The air flow provided by the fan is conveyed to the freezer and cooler sections at specific temperatures via air channels. Food is preserved below -12°C in the freezer section while they are preserved over the freezing temperature in the cooler section, ready for consumption. The deficiency of this embodiment is that; when the cooled air is transferred only to the freezer section, the air which is needed to be cooled can not pass in such a way to use all the surfaces where the heat transfer is accomplished over the evaporator. Since the air is pulled from the direction, where the pressure gradient is lowest, to the fan, the entire evaporator surface can not be used as it can be seen in Figure 5. This situation decreases the cooling efficiency.

[0004] Besides that, a second disadvantage that is shown in figure 6 is that, the air return channels of the freezer and cooler sections are close to the both parts. This condition leads to a heat transfer arising due to the temperature difference between the cooler and the freezer. The air in the cooler section and in the suction channel is warmer than the air in the freezer section and its suction channel. Considering the limits in the usage volume and the material costs, the determined wall thicknesses can not prevent the heat transfer between the channels and the volumes cooled. In the figure below, the heat transfer is shown with the arrow sign.

[0005] The patent numbered WO 2001/046630 and titled "Cooler such as no-frost refrigerator or freezer" is related to a cooler that has a usage section and a flat panel type evaporator located upright behind an air transfer channel at the rear wall of the usage section wherein this evaporator is aerated by an aerator provided in the air transfer channel. The disadvantage of the conventional coolers is the icing of the aeration wheel and the need for long air channels and that is why serious cooling losses occur in the usage areas of the cooler and refrigerator sections. In order to overcome these disadvantages, it is proposed to locate the evaporator to the region close to the ceiling of the cooler section and to locate the aerator -provided under the evaporator- in the air current at the suction side.

[0006] The invention numbered EP1250557B1, titled "Refrigerator with a cooling part, a cold store and deep freezer" explains a refrigerator comprising a cooling section, a cold store and a deep freezer which are separated from each other with party walls and with at least a door or a lid. It comprises a cold air channel located at the cooler section and a cold air ventilator which sucks the cool air from the cooler section at the circulation place of it and its exit opens to a cold store, at the party wall and/or the door that separates the cooler section which has just one evaporator a part of which is placed into the deep-freezer and the its other part is located in the cold air channel from the cold store sections, there are coves and intervals provided, it also comprises an environmental heat sensor and a controller or adjustment mechanism which adjusts the working duration and/or revolution speed of the cold air fan according to the environmental temperature measured by the environmental heat sensor.

[0007] Patent no TR 2007/06596, titled "Protecting the food by vacuuming the air in the refrigerator sections" explains a refrigerator which comprises air sucking and pumping motors connected to each section which can empty the air present in the refrigerator and can also fill the same sections with air and electronic timers connected to each motor which adjust the duration for the motor for sucking and pumping the air in the refrigerator sections and shut down the motor by cutting the electricity of the motor at the end of the duration. Additionally, behind the refrigerator doors, at the edges where the door hinges are located, triggers belonging to each refrigerator section door are provided for actuating the motors. While the refrigerator door is shut, edge of the door presses on this trigger and the air suction and pumping motor starts to suck the air. When we shut the doors of the refrigerator sections, the air of the sections into which the air is entered is sucked out of the refrigerator by the virtue of a motor connected to each section and a pipe connected to each motor. There are also buttons (one at each) provided near the handles of each refrigerator section doors which actuate the suction and pumping motors by being pressed by finger. When we press this button with our finger, the air suction and pumping motor starts to pump the air. When we press the button of the section that we want to open, the air taken from the outside of the refrigerator is filled into the section by the virtue of an air suction

and pumping motor connected to this section and a pipe connected to this motor, entering into the section from the outside of the refrigerator. The electric cables within which the electric current flows connect these motors, electronic timer circuits, triggers and motor actuation buttons into eachother.

[0008] Consequently, the need for air suction channels used for transferring the air present in the cooler and freezer sections of no-frost refrigerators to the evaporator and the deficiency of the current solutions made it compulsory to make an improvement in the prior art.

Object of the Invention

[0009] To abolish the disadvantages of the prior art, an object of the invention is to locate the suction channels not side by side, but one on the top of the other, in a parallel fashion.

[0010] Another object of the invention is to have the width of suction channels equal to the width of evaporator.

[0011] Another object of the invention is to make the air that is sucked from the suction channels pass through all the surfaces of the evaporator in such a way to accomplish the heat transfer, in cases when the damper canalizes all the air flow to the freezer section. Thus, the decline of the cooling efficiency in the prior art is prevented.

[0012] Another object of the invention is to prevent the heat transfer between the suction channels and the sections due to the heat transfer surfaces formed by freezer suction channels with the freezer section and the cooler suction channels with the cooler section. The heat transfer between two air channels is prevented thanks to the EPS block forming the air channels.

[0013] In order to obtain the advantages mentioned above, the invention is a no-frost refrigerator which comprises freezer and cooler sections, cold air flow fan, evaporator which provides cold air by providing the heat transfer from the air in the refrigerator to the cooler gas and it also comprises freezer section air return channel, where the air that is heated after cooling the said freezer section, is sucked again and drawn back to the evaporator by fan for being cooled and cooler section air return channel, where the air that is heated after cooling the said cooler section, is sucked again and drawn back to the evaporator by fan for being cooled, both of which are used for conveying the air in the said freezer and cooler sections (5,6) to the evaporator (2) and which are positioned one under the other in a parallel manner.

[0014] The structural and characteristic features of the invention as well as all advantages of it will be better understood in the detailed description provided by use and reference to the figures given below, and for that reason the assessment should be made based on the said figures and detailed description.

Description of the Figures

[0015]

Figure 1 is the general front of the refrigerator subject to the invention,
Figure 2 is the cross-section perspective view of the refrigerator subject to the invention,
Figure 3, 4, 5, 6 are the views of prior art.

Reference Numbers

[0016]

1. Fan motor and propeller
2. Evaporator
3. Freezer section air suction channel
4. Cooler section air suction channel
5. Freezer section
6. Cooler section
7. Partition block forming the air channels made of EPS material.

Detailed Description of the Invention

[0017] As it can be seen in figure 1 and 2, the invention is related to air suction channels (3,4) used for conveying the air present in the cooler and freezer sections (5, 6) of no-frost refrigerators to the evaporator (2).

[0018] The refrigerator subject to the invention comprises a freezer section (5) where the food is kept frozen and a cooler section (6) where the food is kept at low temperatures, ready to be eaten.

[0019] In no-frost refrigerators, whose general front view is given in Figure 1 and whose perspective side view is given in Figure 2, the cold air flow is provided by the fan motor and the propeller (1). The air cooled by flowing over the evaporator (2) is transferred to the cooler and freezer sections (5,6). The said evaporator (2) is a kind of heat exchanger used in cooling cycle and it provides the heat transfer from the air in the refrigerator to the cooler gas. The air heated by the heat exchange accomplished with the foods kept in the refrigerator is sucked into the evaporator (2) via three different air channels (3,4) for being cooled.

[0020] The invention is especially related to the positioning and the geometry of the said air suction channels (3,4) within the refrigerator in a way to increase the cooling capacity and efficiency.

[0021] An air suction channel (3) is provided within the partition block (7) made of EPS material where the air that is heated after cooling the said freezer section (5) is sucked again and drawn back to the evaporator (2) by fan motor and propeller (1) for being cooled again.

[0022] On the other hand, the cooler section air suction channel (4) is provided within the partition block (7) made of EPS material where the air that is heated after cooling the said cooler section (6) is sucked again and drawn

back to the evaporator (2) by fan motor and propeller (1) for being cooled again.

[0023] In the working principle of no-frost refrigerators subject to the invention, the fan motor and the propeller (1) suck the heated air from the cooler (6) and the freezer sections (5) to the evaporator (2) via the freezer section air suction channel (4) and the cooler section air suction channel (6). The air cooled by the virtue of heat transfer realized on the surface of the evaporator (2) is sent back to the sections (5,6). A damper, which adjusts the flow rate of air that will be sent to the two separate sections, is provided. When the damper is completely closed at the air channel (4) that is extending to the cooler section (6), all the flow is conveyed to the freezer section (5).

[0024] Unlike the prior art products, the air suction channels (3,4) subject to the invention are designed in such a way to take advantage of all the surfaces of the evaporator (2) in both the open or the closed damper positions Additionally, the heat transfer between the freezer and the cooler sections (5, 6) is prevented thanks to the suction channels available in the present products.

Claims

1. The invention is a no-frost refrigerator comprising freezer and cooler sections (5,6), fan motor and propeller (1) providing the air flow, evaporator (2) providing cold air by transferring the heat from the air in the refrigerator to the cooler gas, **characterized in that**, it comprises,
   both of which are used for conveying the air in the said freezer and cooler sections (5,6) to the evaporator (2) and which are positioned one under the other in a parallel manner;
   freezer section air suction channel (3) where the air that is heated after cooling the said freezer section (5) is sucked again and drawn back to the evaporator (2) by fan motor and propeller (1) for being cooled again,
   cooler section air suction channel (4) where the air that is heated after cooling the said cooler section (6) is sucked again and drawn back to the evaporator (2) by fan motor and propeller (1) for being cooled again,
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2. Air suction channels (3, 4) according to Claim 1, **characterized in that**, their width is equal to the width of the said evaporator (2).

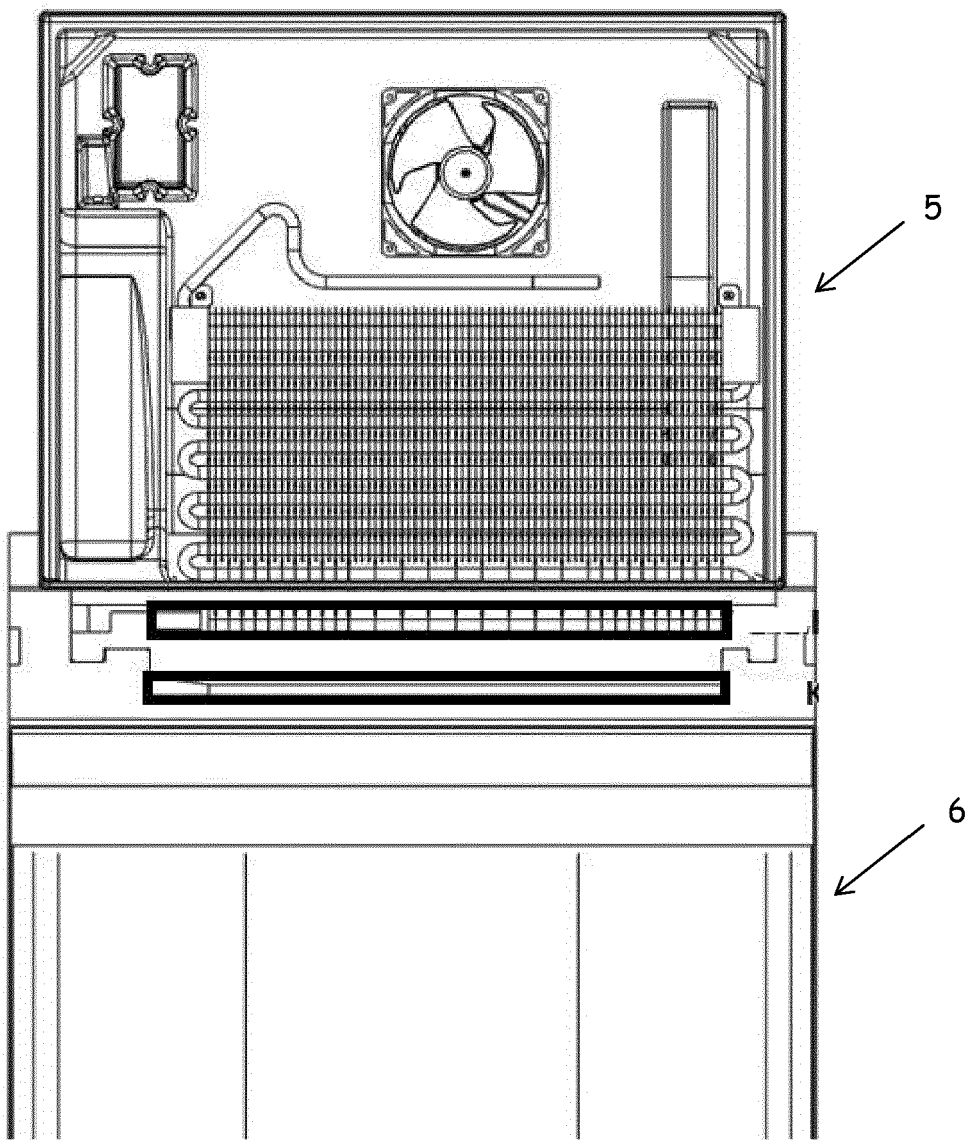

Figure 1

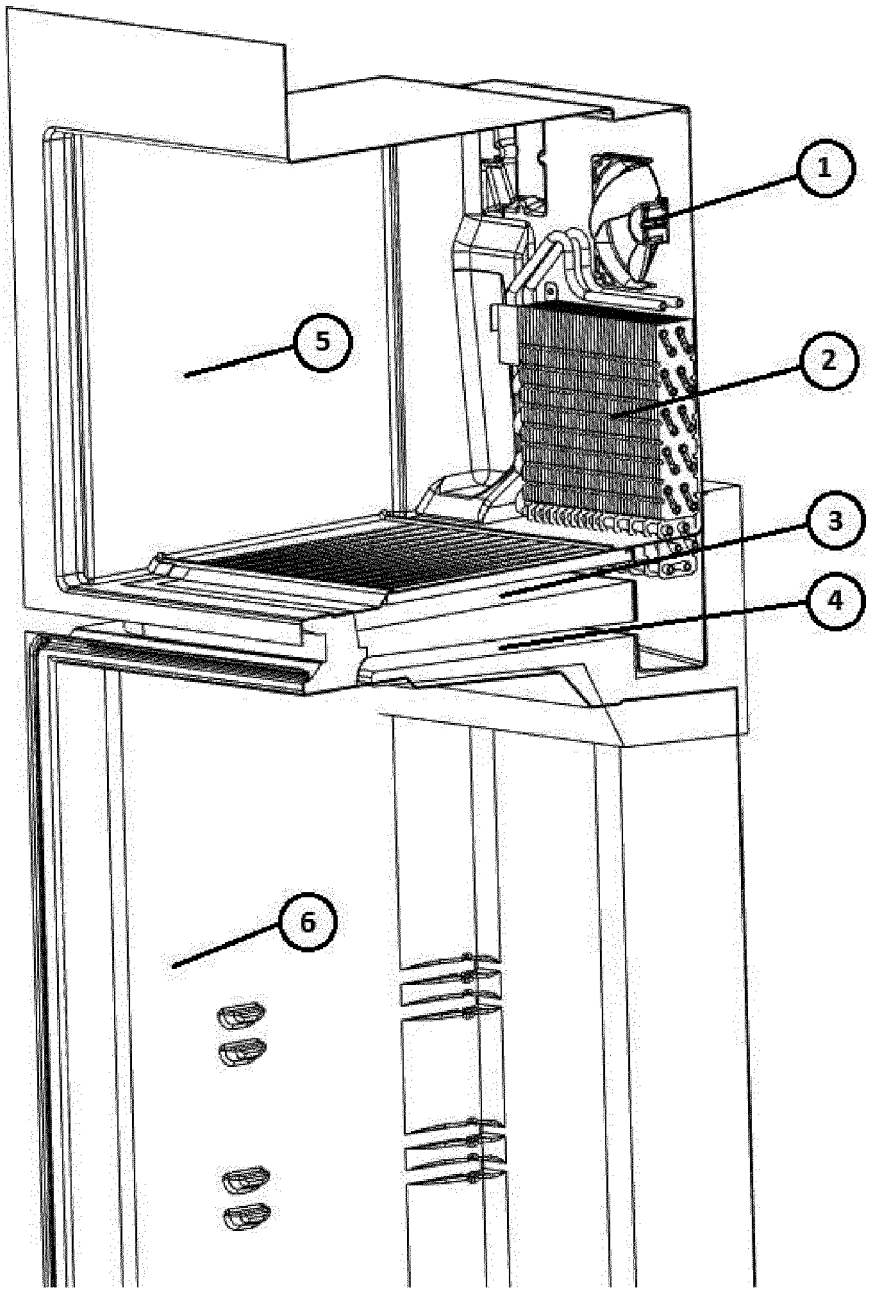

Figure 2

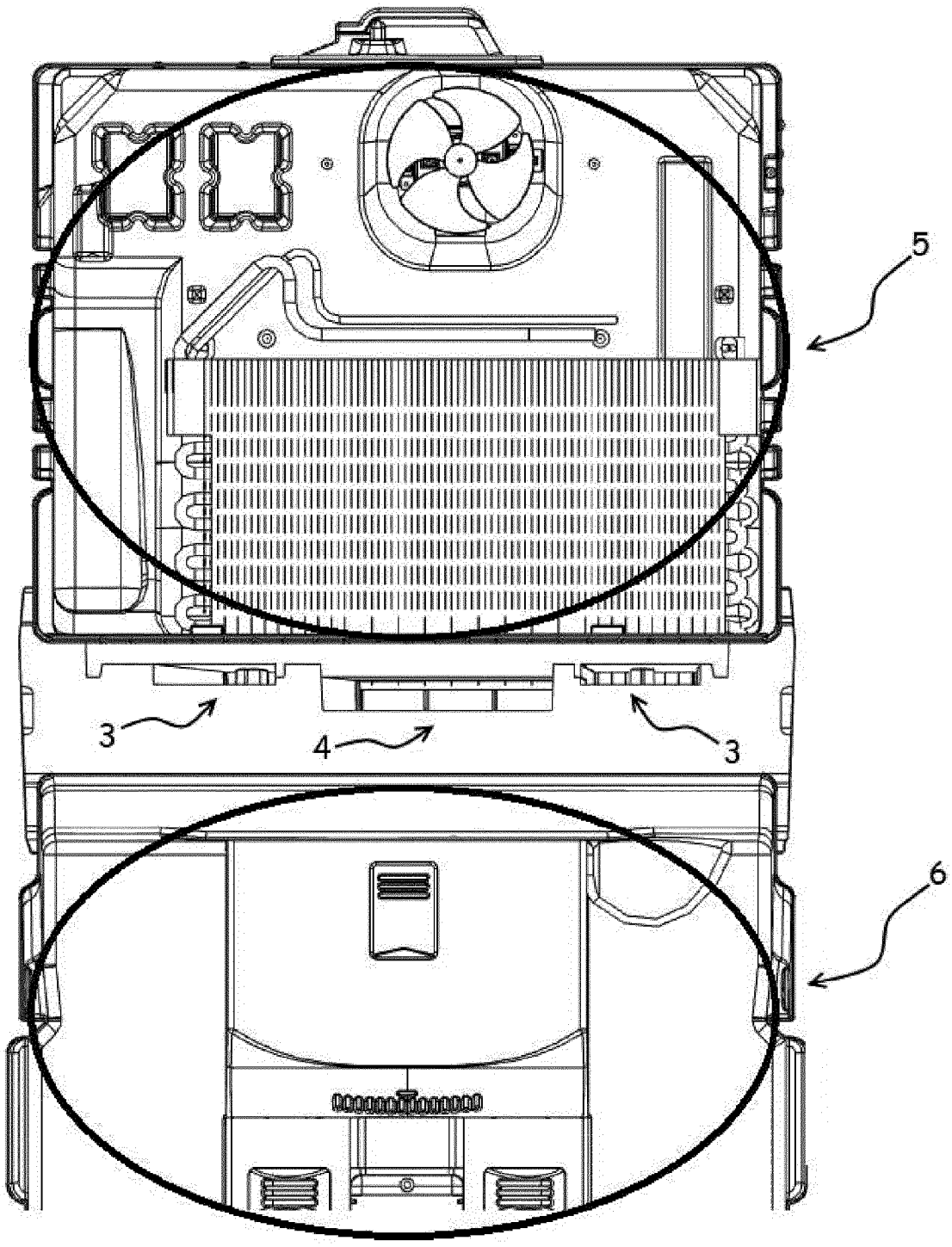

Figure 3

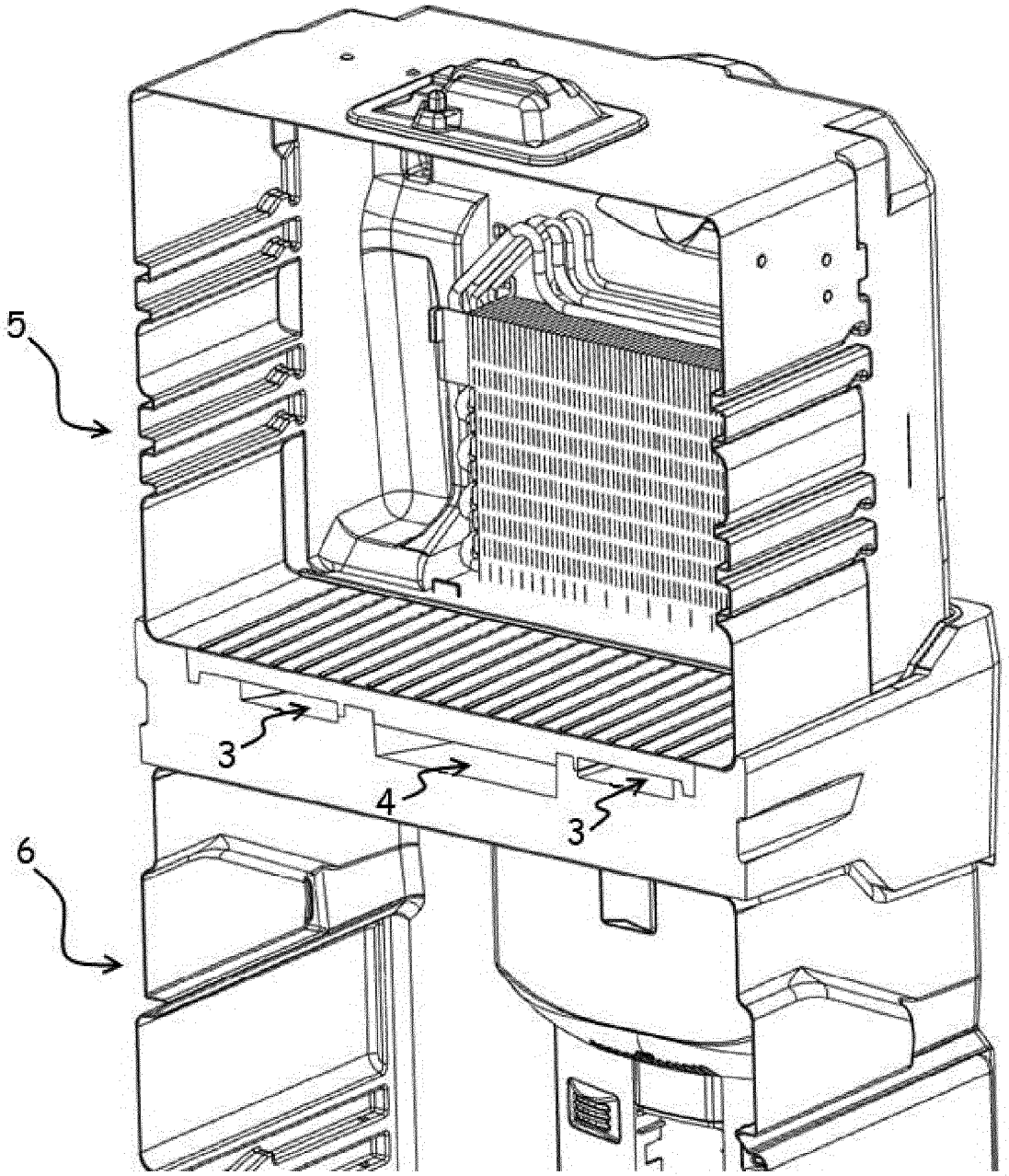

Figure 4

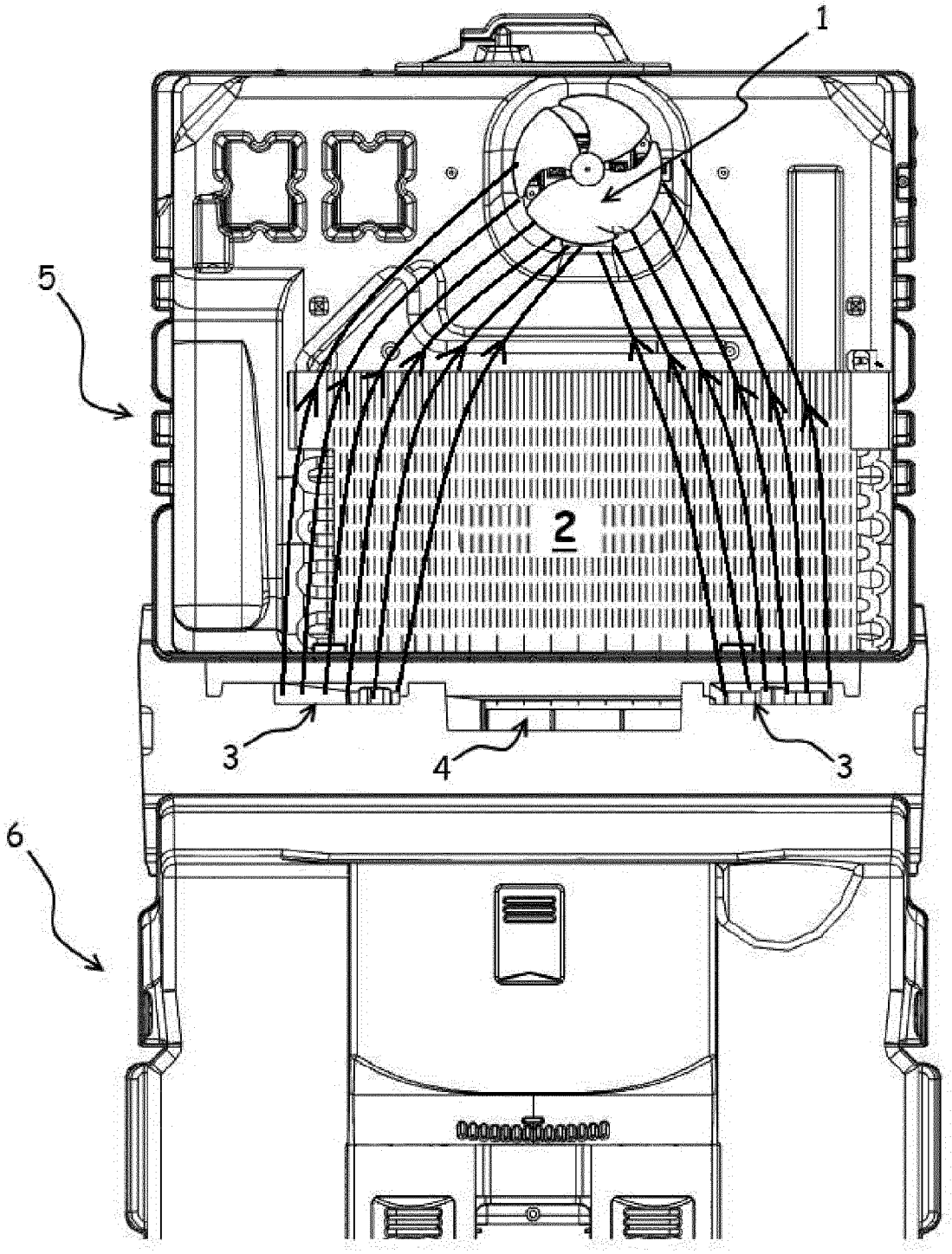

Figure 5

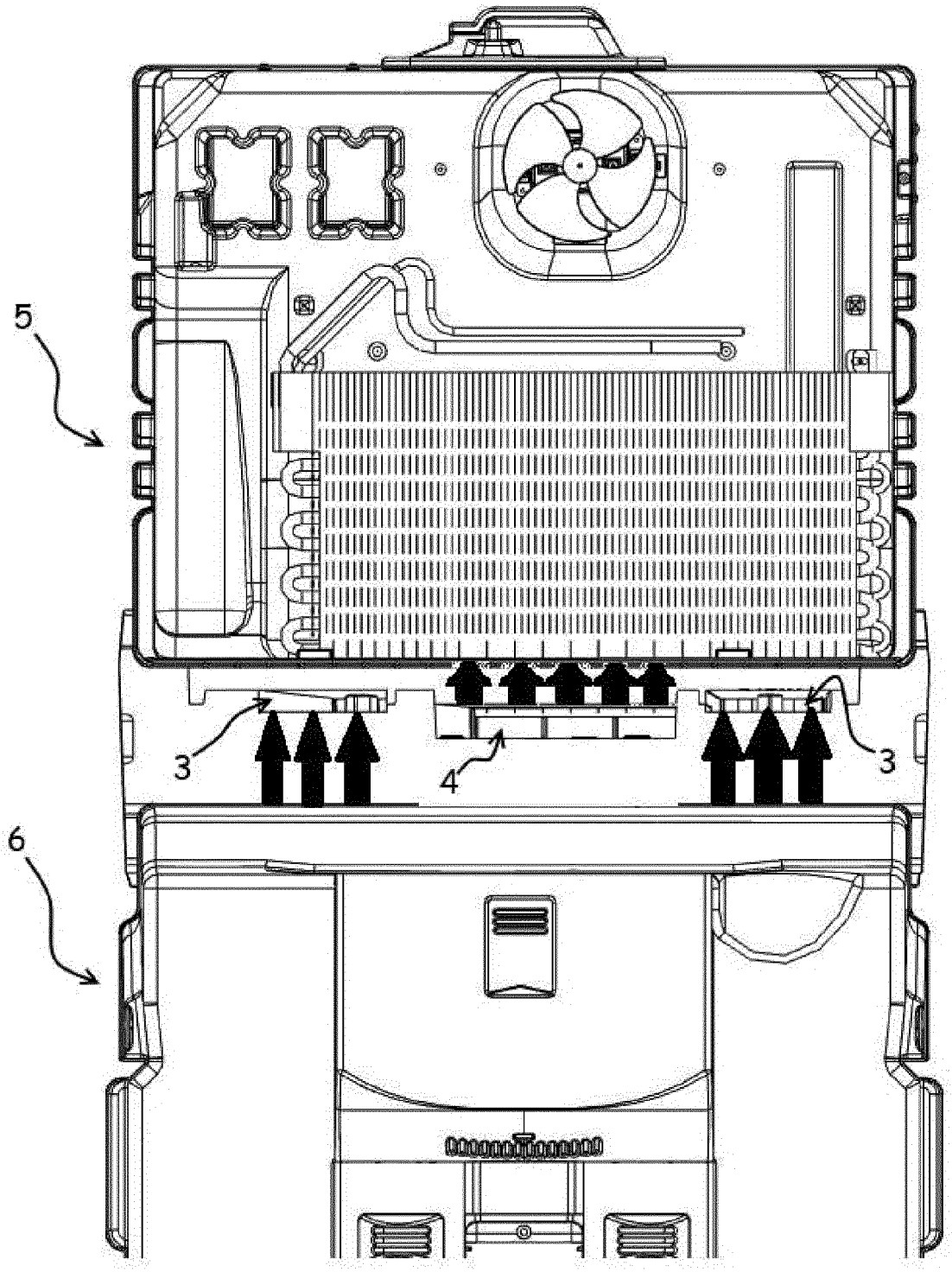

Figure 6

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- WO 2001046630 A **[0005]**
- EP 1250557 B1 **[0006]**
- TR 200706596 **[0007]**