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(54) Moisture trap cartridge used inside the air ducts of refrigerators

(57) The invention relates to an air duct (4) which provides conveying the air inside the freezer cabinet of the household refrigerators (1) to the evaporator (3) by means of a fan (2) and comprising wire mesh cartridge (41) positioned inside the air duct (4), holes (411) through which the air passes and which are formed on said cartridge (41), and moisture trap material (412) positioned inside said cartridge (41), having a porous structure, adsorbing the moisture in the air.

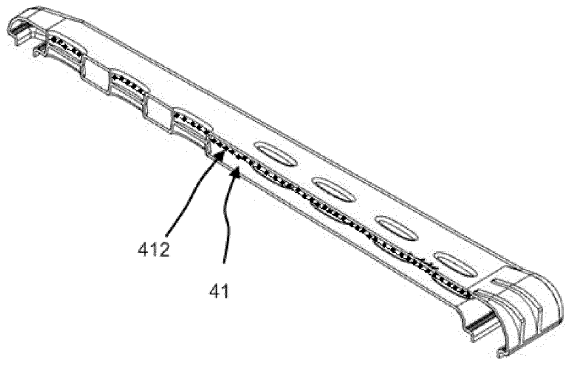

Fig. 4

PRIOR ART !!!

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Description

Technical Field

[0001] The invention relates to eliminating the drawbacks frequently encountered while keeping under control the moisture level in the household refrigerators and icing on the evaporator.

[0002] The invention particularly relates to reducing the moisture level inside the freezer cabinet and preventing the icing on the evaporator by means of placing the cartridge filled with moisture trap material inside the air duct in air circulation systems in the household refrigerators.

State of the Art

[0003] Nowadays, the refrigerators meeting domestic cooling needs are generally equipped with a vapor compression system. In some of these systems, the air inside the freezer cabinet is sucked by means of a duct and transferred to the evaporator inlet. Here, the heat in the air causes the refrigerant gas inside the evaporator to evaporate; and the air is cooled. The refrigerant gas evaporated inside the evaporator moves to the condenser and passes again to the liquid phase and discharges the heat thereon. The air cooled in the evaporator, on the other hand, is again transferred into the freezer cabinet. Thanks to the cycle processing in this way, cooling effect is achieved by continuously discharging the heat received from the freezer cabinet.

[0004] Said air in circulation is moist due to the effect of food and opening/closing of the doors, in the refrigerator. Said moisture freezes on the cold evaporator during the circulation and causes icing thereon. As a result of the icing, the air circulation on the evaporator is prevented and cooling function cannot be achieved efficiently. The Turkish Patent application No. 2000/03680 discloses a method which is resistant to moisture and prevents freezing and water accumulation on the aluminum foil refrigerator evaporators and condensers during the operation thereof; however, said method cannot eliminate the problem completely, but decreases the results thereof.

[0005] The icing mentioned above in the state of the art melts thanks to the resistors placed on the evaporator. However, in this situation, not only the energy consumption increases, but cooling performance of the refrigerator decreases, as well. Moreover, operation coordination of the evaporator and the resistor thereon becomes another technical problem. The Turkish Patent application No. 2001/02371 aims to solve this problem relating to coordination, yet a perfectly compatible optimum melting process cannot be achieved.

[0006] To conclude, an improvement in the related technical field is necessary due to the need for a system which keeps under control the moisture level in the household refrigerators and the icing on the evaporator, and to the insufficiency of the present solutions.

Objects of the Invention

[0007] Developed by being inspired by the present situations, the invention aims to solve the drawbacks mentioned above.

[0008] The present invention, which meets the aforementioned requirements, eliminates all the disadvantages and offers some advantages, relates to trapping the moisture inside the freezer cabinet and preventing the icing on the evaporator by means of placing the cartridge filled with moisture trap material inside the air duct in air circulation systems in the household refrigerators, to increasing the efficiency and life of the appliance, and to reducing the energy consumption.

[0009] The object of the invention is to reduce the moisture inside the freezer cabinet and to prolong the life of the food products.

[0010] Another object of the invention is to minimize the icing on the evaporator and to provide an easier flow of air circulation and less operation of the present resistors. Thus, energy consumption is reduced, as well.

[0011] Another object of the invention is to reduce the energy consumption as a result of utilizing fewer snow removing resistors due to the less icing on the evaporator.

[0012] The cartridge comprising moisture trap material according to the invention has a wire mesh structure similar to a sieve; therefore, holes are provided thereon. Said mesh structure provides air flow. Thanks to the moisture trap material comprised therein, more amount of moisture as much as possible is trapped due to the large moisture trapping surface area.

[0013] In an alternative embodiment of the invention, silicagel is used as the moisture trap material. Silica (silicon dioxide - SiO_2) is a chemical compound known for a long time and is available in the form of sand and quartz in nature. Today, silicagel is formed by the synthesis of silica with granular, glassy and porous forms. Thanks to the porous structures thereof, silicagel has wide surface areas, which means that high amount of moisture can be trapped thereon. Similar to other moisture trap materials, silicagel adsorbs the moisture of the food, herbal products, leather goods, chemical paint, and numerous things that can be damaged by moisture in our daily lives, and thus prevent damaging thereof. Furthermore, other porous materials (zeolite, activated carbon, etc.) functioning as a moisture trap can be utilized as an alternative in the invention.

[0014] In an alternative embodiment of the invention, moisture trap cartridges can have properties such as holding the elements having unpleasant smell and comprising ethylene, etc., which affect the operating performance of the refrigerator and are unwanted in air.

[0015] In order to achieve the objects above, an air duct, preventing the icing on the evaporator,

- where a wire mesh cartridge is positioned;
- which comprises holes through which the air will pass and which are formed on said cartridge,

- which comprises moisture trap material positioned inside said cartridge, having a porous structure, adsorbing and trapping the moisture in the air,

is developed.

[0016] The structural and characteristic properties and all the advantages of the invention will be understood more clearly with the below figures and the detailed description written with reference to these figure; therefore, the evaluation is required to be made by taking these figures and the detailed description into account.

Figures for a Better Understanding of the Invention

[0017] In order for the invention and the advantages thereof, together with the additional elements, to be understood in the best way, it is necessary to make the evaluation with the below described figures.

Figure 1 is the rear perspective view of the refrigerator comprising an air duct thereon.
Figure 2 is the general perspective view of the air duct comprising moisture trap cartridge therein.
Figure 3 is the cross-sectional perspective view of the moisture trap cartridge.
Figure 4 is the general cross-sectional perspective view of the cartridge comprising moisture trap material therein.
Figure 5 is the cross-sectional perspective view of the prior art.

[0018] Scaling of drawings is not absolutely required and details which are not needed for understanding the present invention might have been neglected. Furthermore, the elements which are at least substantially identical or have at least substantially identical functions are indicated with the same number.

Part References

[0019]

1	Refrigerator
2	Fan
3	Evaporator
4	Air duct
41	Moisture trap cartridge
411	Hole
412	Moisture trap material
5	Air suction nozzle
6	Air outlet nozzle

Detailed Description of the Invention

[0020] In this detailed description, the preferred embodiments of the household refrigerators (1) comprising air duct (4) where moisture trap cartridge (41) having moisture trap material (412) is positioned, are described only for a better understanding of the subject matter, without any limiting effects.

[0021] The moisture trap cartridge (43) according to the invention has a wire mesh structure similar to a sieve; therefore, holes (431) are provided thereon.

[0022] The air sucked from the freezer cabinet by means of a fan (2) is given to the air duct (4) over the air suction nozzle (5) of the air duct (4) in the household refrigerators (1). The air coming from the fan (2) moves towards the air outlet nozzle (6) inside the air duct (4). In the meantime, the air passes through the holes (411) on the cartridge (41) and some of the moisture in the air is trapped by the moisture trap material (412) inside moisture trap cartridge (41) according to the invention which is connected inside the air duct (4). The air advancing in the air duct (4) with reduced moisture is transferred from the air outlet nozzle (6) of the air duct (4) to the evaporator (3). The air met with the evaporator (3) is cooled, but as the moisture rate thereof is at the bottom level it is transferred to freezer cabinet of the refrigerator (1), without icing or freezing.

[0023] The moisture trap material (412) according to the invention is preferably made of silica material, as well as of zeolite or activated carbon material, or of other moisture trap materials known in the art.

[0024] The moisture trap material (412) according to the invention has a porous structure increasing the trapping surface area.

[0025] The moisture trap cartridge (41) according to the invention can be reused by drying the moisture trap material (412) therein having a porous structure or it can be replaced by a new one.

Claims

1. An air duct (4) which provides conveying of the air inside the freezer cabinet of the household refrigerators (1) to an evaporator (3) by means of a fan (2), **characterized by** comprising;

   - wire mesh cartridge (41) positioned inside said air duct (4),
   - holes (411) through which the air passes and which are formed on said cartridge (41),
   - moisture trap material (412) positioned inside said cartridge (41), having a porous structure, adsorbing the moisture in the air.

2. The air duct (4) according to Claim 1, **characterized in that** said moisture trap material (412) is silica, zeolite or activated carbon.

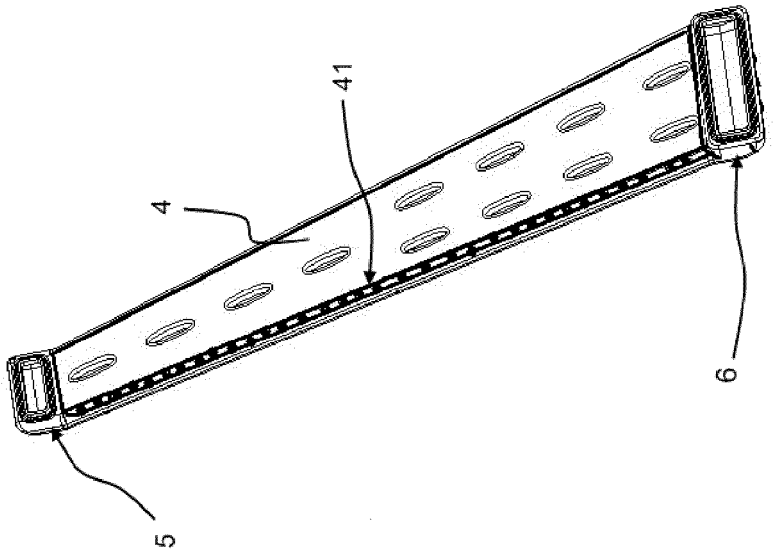

Fig. 2

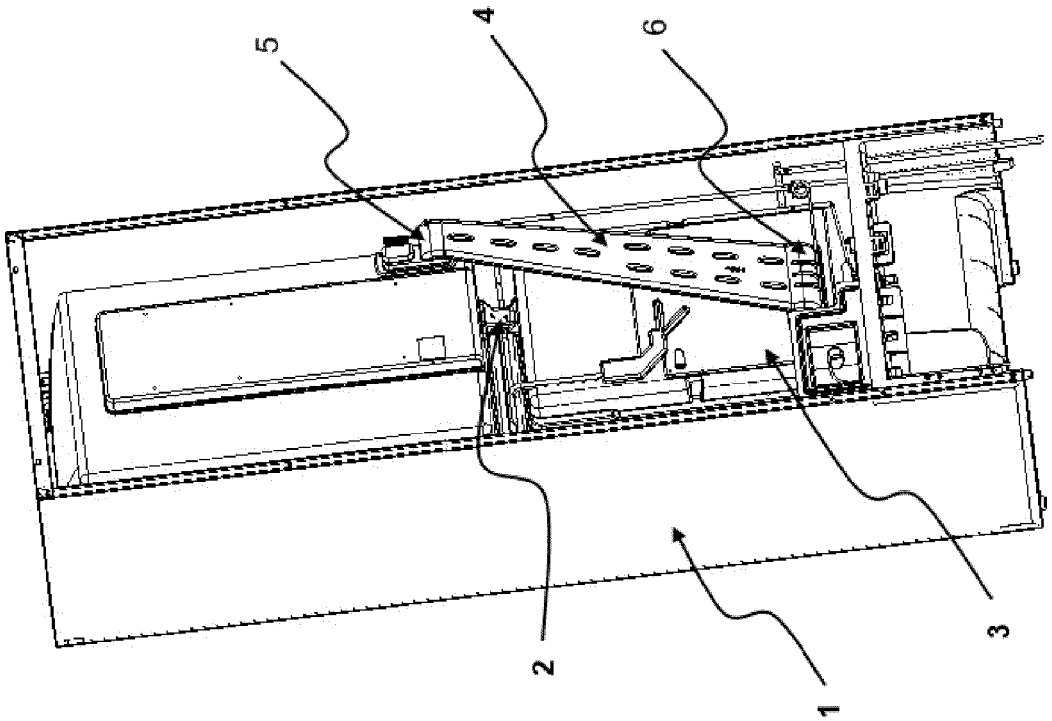

Fig. 1

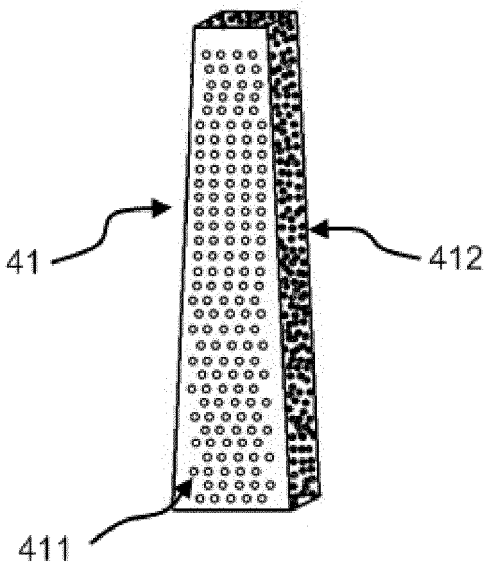

Fig. 3

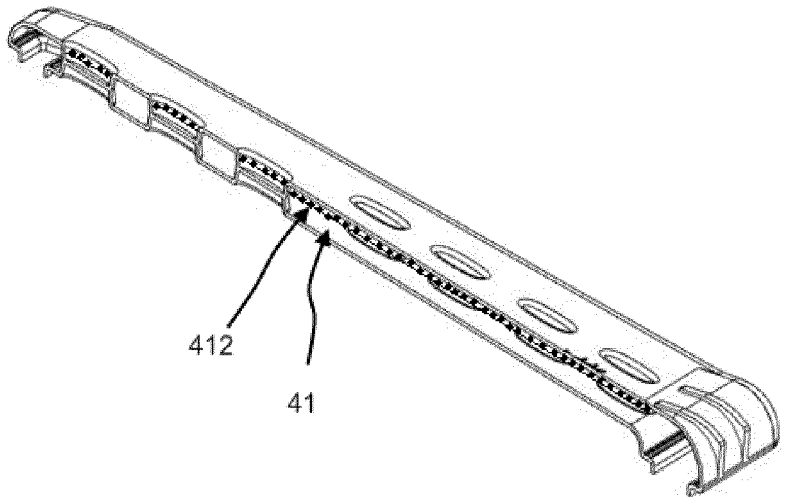

Fig. 4

PRIOR ART !!!

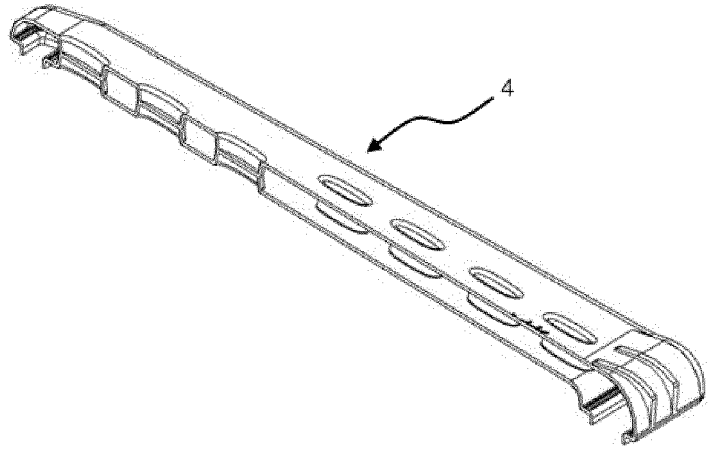

Fig. 5

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- TR 200003680 **[0004]**
- TR 200102371 **[0005]**