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(54) **REFRIGERATION APPLIANCE**

(57) A refrigeration appliance, particularly freezer, comprising a cabinet defining an inner cavity (C) closable by a door, and in which said cavity (C) communicates with the ambient by means of a conduit (10), wherein

such conduit (10) comprises a portion (10c) placed in a zone at a temperature slightly above 0°C so that humidity in such portion (10c) of the conduit (10) can condense and be removed.

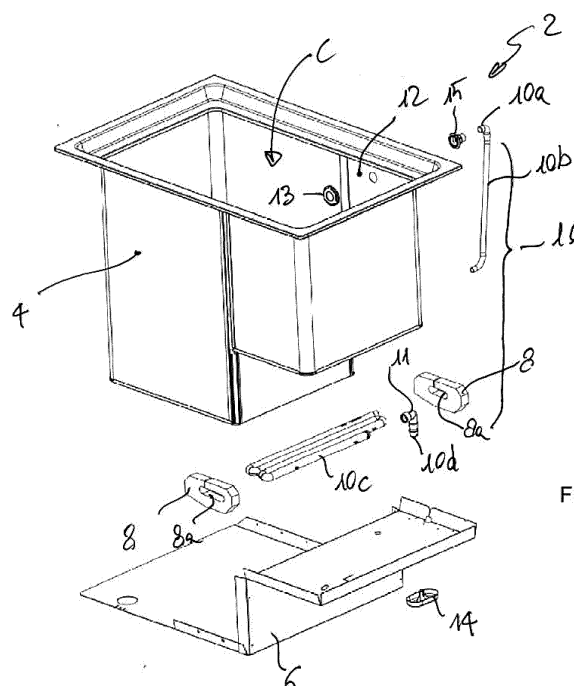


FIGURE 1

EP 3 364 135 A1

Description

[0001] The present invention relates to a refrigeration appliance comprising a cabinet defining at least an inner cavity which can be closed by door and in which said cavity communicates with the ambient by means of a conduit.

[0002] With the term refrigeration appliance we mean every refrigerator in which the temperature for storing food is kept close to a certain target, including "freezers" in which such target temperature is close to -18°C (i.e. chest freezers, upright freezers, or portions of so called "combi" refrigerators having a freezer compartment). In this kind of domestic appliances, when the so called "no frost" technology is not used (where an internal evaporator with a fan create thermal exchange avoiding frost formation on the inner liner), it is well known the problem of frost formation on the inside walls, particularly in the region adjacent the opening which is closed by the door. This frost derives from the humidity contained in the ambient air which is sucked into the cavity past the sealing which is normally arranged around the edge of the door.

[0003] EP 2520882 discloses an internal and dedicated humidity container placed on an end of the conduit inside the freezer cavity which is quickly removable for eliminating the frost from the container.

[0004] EP 1845321 discloses a freezer with a special grid with salt inside where humidity can be absorbed during normal opening/closing of the door. In a similar known solution a filter is placed inside the conduit to absorb humidity in order to postpone defrosting operation.

[0005] A solution is also known from EP 494587 in which an external flexible container communicates with the cavity. Such solution, which in theory should prevent or reduce the formation of frost on the inner liner of the freezer, has shown quite low performances in terms of frost reduction.

[0006] It is an object of the present invention to provide a refrigeration appliance which solves the above technical problem in a better way, without any intervention of the user in order to remove frost.

[0007] Such object is obtained thanks to the features listed in the appended claims.

[0008] This invention is based on a system integrated inside the foam insulated cabinet or the door: the air that normally flows inside the product when the compressor of the refrigerator/freezer is turned on (air flow between gasket and cabinet frame causing ice formation) passes through this system. The temperature condition of this system is suitable to condense the humidity in the air. In this way the air that flow inside the cabinet is at least partially dried.

[0009] By creating a proper inclination of the system the condensed humidity can be collected by gravity (e.g.: in the condensation tray in compressor compartment).

[0010] The main advantage of the system according to the present invention is that it doesn't require heating system to avoid the clogging due to the fact that it works

collecting air humidity by condensation (and not as ice/frost).

[0011] In the simplest embodiment of the invention the system is formed by a portion of the conduit which puts the cavity into communication with the outside ambient. Of course there can also be a plurality of conduits or the conduit can be shaped in a serpentine way in order to increase the heat exchange surface.

[0012] Further advantages and features according to the present invention will be clear from the following detailed description of an embodiment of the invention, with reference to the attached drawings in which:

- figure 1 is a perspective exploded view of a chest freezer according to the invention where the insulation foam and the outside walls of the freezer have been removed for sake of clarity;
- figures 2 and 3 are perspective view of the chest freezer of figure 1 in two different working conditions.

[0013] With reference to figure 1, a chest freezer 2 according to the invention presents a inner liner 4 defining a cavity C, an insulation foam (not shown), and an outer liner 6 whose only the bottom part is shown in figure 1. Other usual components of the chest freezer 2 (door, compressor, condenser, evaporator are present but they are not shown in the drawings for sake of clarity.

[0014] According to the invention, the chest freezer 2 presents an air conduit 10 of polymeric material made of different pieces assembled together, and having a first end 10a on a side wall 12 of the cavity C and in communication there to. Such first end 10a is fastened to the wall 12 by means of a flange 13 and counter-flange 15. The conduit 10 further comprises a first portion 10b, for instance a corrugated tube, substantially parallel to the side wall 12 of the cavity C and a second portion 10c shaped as a coil/serpentine whose end 10d is placed above a condensation tray 14 placed in a compressor compartment of the chest freezer. The second portion 10c of the conduit may be produced for instance by blow-molding or by injection molding; in the second case it may be made in two shells attached together. For maintaining the second portion of the conduit 10c at a proper distance from the inner liner 4, two spacers 8 made of expanded polymeric material are provided with apertures 8a in which ends of the flat second portion 10c of the conduit are inserted. The end 10d of the second portion 10c of the conduit 10 is provided on an L-shaped pipe portion 11 attached to the coil-shaped portion 10c. Figure 2 refers to a working condition where the compressor is switched on. In this condition air flows through the conduit 10 towards the cavity C. According to the working condition of figure 2, air is entering the end 10d of the conduit and by flowing into the coil-shaped second portion 10c the humidity contained therein condensates and can flow by gravity from the end 10d into the tray 14 thanks to a proper inclination or shape of the second portion 10c of the conduit 10. At the same time dried air can flow in the

first portion 10b of the conduit 10 and enter the cavity C.

[0015] According to the working condition of figure 3, which refers to a situation when the compressor is switched off, dry air can flow in a reverse direction from the cavity C to the ambient, therefore facilitating the flow of humid air present in the second portion 10c out of the conduit 10.

[0016] The technical solution according to the invention takes advantage of the natural "breathing" of the cavity, making air flow into the cavity through a specific conduit, after being dried by a sort of heat exchanger which exploits the temperature in the compressor's area. The position of the second portion 10c of the conduit 10 is chosen so that the temperature condition of this system is suitable to condense the humidity in the air, i.e. it is slightly above 0°C. This position can be easily chosen depending on the thickness of the insulation (not shown), on the average temperature of the inner liner 4 and on the average ambient temperature. The condensed water which drips out from the conduit 10 to the tray 14 is evaporated thanks to heat in the compressor compartment.

[0017] Even if the above description refers to a chest freezer, it is clear that the same solution can be used for upright (vertical) freezer as well. Moreover, even if the above description refers to a freezer in which the temperature is adjusted by turning on and off the compressor, the same solution can be applied also to freezers which have a variable speed compressor. The conduit 10 has been disclosed in the example as embedded within the foam insulation of the cabinet, but it can be housed in the cabinet as well, particularly in case the conduit is associated to a refrigerator.

Claims

1. Refrigeration appliance, particularly freezer, comprising a cabinet defining an inner cavity (C) closable by a door, and in which said cavity (C) communicates with the ambient by means of a conduit (10), **characterized in that** such conduit (10) comprises a portion (10c) placed in a zone at a temperature so that humidity in such portion (10c) of the conduit (10) can condense and be removed.

2. Refrigeration appliance according to claim 1, wherein such conduit (10) is contained within a thermal insulation of the freezer or within the cabinet.

3. Refrigeration appliance according to claim 1 or 2, wherein the temperature of said portion (10c) is slightly above 0°C and suitable to condense the humidity in the air.

4. Refrigeration appliance according to any of the preceding claims, wherein said portion (10c) of the conduit (10) is comprised between the bottom of the cavity (C) and a zone where a compressor is placed.

5. Refrigeration appliance according to claim 4, wherein an open end (10d) of the conduit (10) is placed above a tray (14) adjacent the compressor so that condensed water can drip into said tray (14).

6. Refrigeration appliance according to any of the preceding claims, wherein said portion (10c) of the conduit (10) is shaped as a serpentine or the like in order to maximize its heat exchange surface.

7. Refrigeration appliance according to claim 6, wherein said portion (10c) of the conduit (10) is maintained at a proper distance from an inner liner (4) defining such cavity (C) by means of at least one spacer (8).

8. Refrigeration appliance according to claim 6 or 7, wherein said portion (10c) of the conduit (10) presents a predetermined inclination so that humidity condensed therein can be removed by gravity.

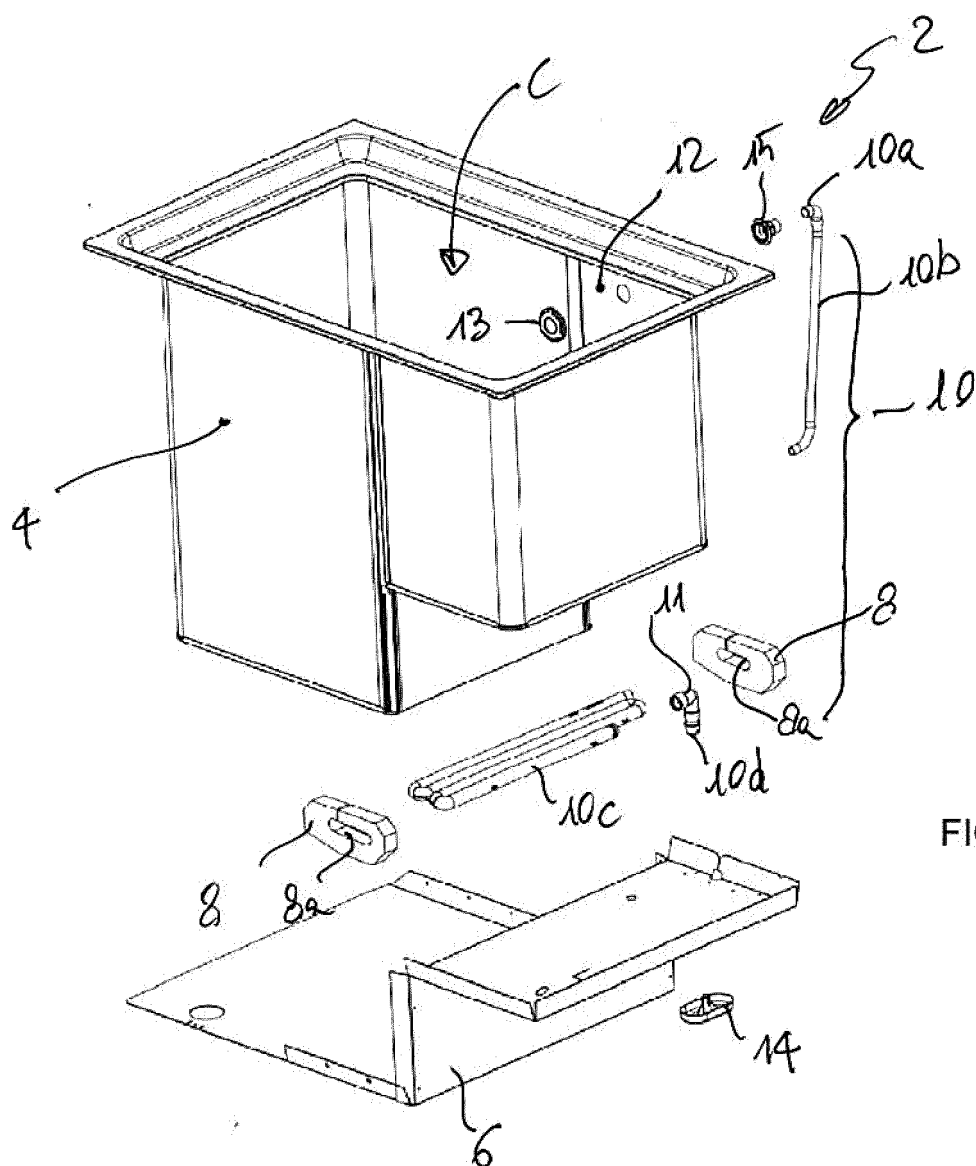


FIGURE 1

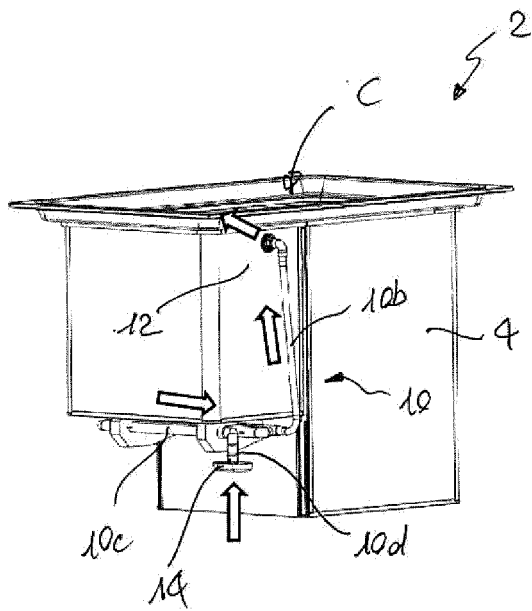


FIGURE 2

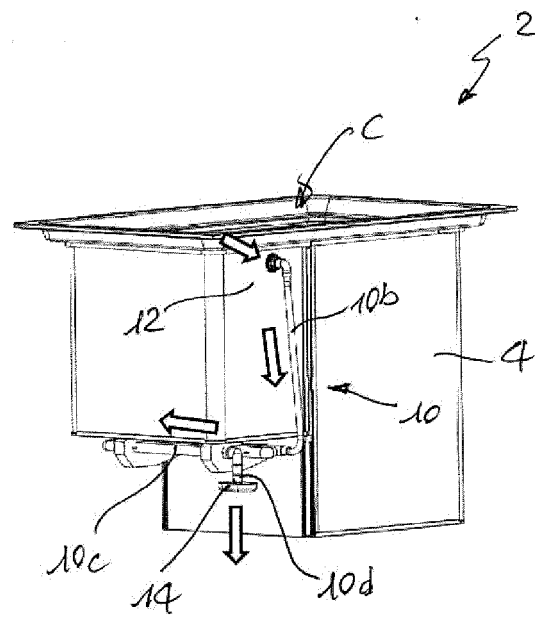


FIGURE 3



EUROPEAN SEARCH REPORT

Application Number
EP 17 15 6529

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2009/151383 A1 (BECKER WOLFGANG [DE] ET AL) 18 June 2009 (2009-06-18) * paragraphs [0013], [0014]; figure 1 *	1-3,5-8	INV. F25D17/04 F25D21/04
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			TECHNICAL FIELDS SEARCHED (IPC)
			F25D
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 26 April 2017	Examiner Canköy, Necdet
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 17 15 6529

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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26-04-2017

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- EP 2520882 A [0003]
- EP 1845321 A [0004]
- EP 494587 A [0005]