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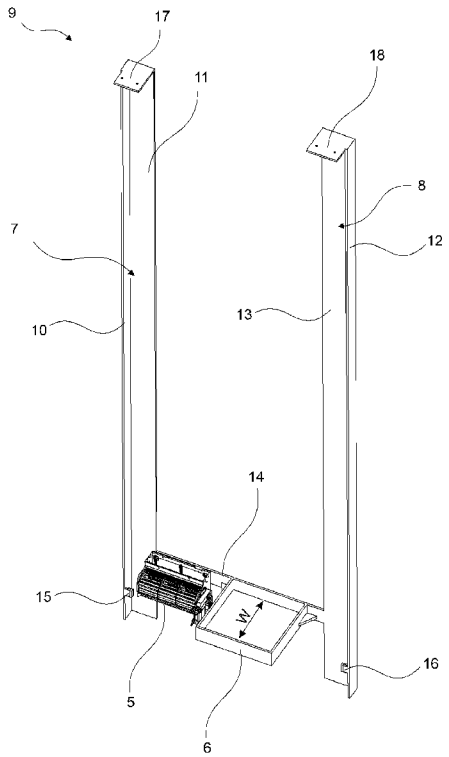
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[Continued on next page]

(54) Title: A COOLING DEVICE COMPRISING AN AIR GUIDING APPARATUS

Figure 2



(57) Abstract: The present invention relates to a cooling device (1) comprising a body (2), a compressor (3) that enables the refrigerant fluid to be compressed and circulated in the refrigeration cycle, a condenser (4) that provides the refrigerant fluid leaving the compressor (3) to be condensed and changed into liquid phase, a fan (5) enabling the condenser (4) to be cooled and an evaporator tray (6) that provides the collection and evaporation of the defrost water formed on the surface of the evaporator that enabling the environment where it is located to be cooled.

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Description

A COOLING DEVICE COMPRISING AN AIR GUIDING APPARATUS

[0001] The present invention relates to a cooling device comprising an air guiding apparatus that enables the air coming from the fan to be carried the condenser.

[0002] In the refrigerant cycle realized in cooling devices, for example in refrigerators or freezers, the heat absorbed from the interior of the cooling device is discharged to the outer environment by means of the condenser. In conventional refrigerators, the static type condenser that functions with the natural heat convection principle is preferred and in no-frost refrigerators, the coil type condenser that operates with enforced heat convection principle is preferred. In condensers that operate with forced heat convection principle, the condenser is cooled by means of the fan. However, some portion of the air delivered to the condenser by the fan is dispersed to the exterior environment without contacting the condenser. In this situation, the condenser cannot be cooled as required and this causes the efficiency of the refrigerant cycle to be decreased.

[0003] In the state of the art International Patent Application No. WO2008040724, a cooling device is disclosed, wherein the air that is received into the machine room by being sucked from the outer environment by means of a fan is delivered onto a condenser casing which is composed of telescopic bodies and wherein the condenser is situated.

[0004] In the state of the art United States Patent document No. US5592829, the fan disposed between the compressor and the coil shaped condenser sucks the ambient air from over the condenser and directs it onto the compressor.

[0005] The aim of the present invention is the realization of a cooling device comprising a condenser which is enabled to be efficiently cooled with the air blown by the fan.

[0006] The cooling device realized in order to attain the aim of the present invention, explicated in the first claim and the respective claims thereof, comprises a body, a compressor enabling the refrigerant cycle to be performed, a condenser that is formed by bending a pipe in serpentine

shape and that enables the refrigerant fluid leaving the compressor as superheated vapor to be changed into liquid phase by condensing, a fan enabling the condenser to be cooled, an evaporator tray that provides the collection and the evaporation of the defrost water accumulated in a defrost cycle on the surface of the evaporator enabling the fresh food compartment to be cooled.

[0007] The cooling device of the present invention comprises an air guiding apparatus that has a first channel and a second channel and that extends on the left and right sides of the condenser along the rear wall of the body. The air guiding apparatus enables the cool air delivered from the fan onto the condenser to be carried from the lower part of the condenser upwards to the upper part of the condenser by contacting the condenser. Thus, the cool air is enabled to contact the entirety of the condenser and the condenser is enabled to be cooled effectively as a result of the heat transfer realized between the cool air and the condenser.

[0008] In an embodiment of the present invention, the air guiding apparatus comprises a first upright member that extends outwards from the rear wall of the body, an L shaped first channel having a first arm that extends from the first upright member onto the condenser, a second upright member that extends outwards from the rear wall of the body, and an L shaped second channel having a second arm that extends from the second upright member onto the condenser. The air, that is directed outwards from the right and left side of the condenser by means of the L shape of the first air channel and the second air channel, is again delivered onto the condenser after impacting the first air channel and the second air channel from their open surfaces facing the condenser. Thus, the air that is discharged outside without being carried over the condenser is also enabled to be used in cooling the condenser. In this embodiment, the lengths of the first upright member and the second upright member are at least as much as the minimum distance between the rear side of the cooling device and the wall, predetermined by the producer, that is required for realizing the refrigerant cycle with the desired performance. Thus, the first upright member and the second upright member furthermore function as a

stopper, preventing the contact of the condenser with a hard surface and also enabling the minimum distance at the rear of the cooling device predetermined by the producer to be maintained.

[0009] In another embodiment of the present invention, the air guiding apparatus comprises a beam that is disposed between the first channel and the second channel, whereon the fan and the evaporator tray are placed. The beam is positioned between the compressor and the condenser in the vertical direction. Thus, when the air guiding apparatus is placed in the cooling device, the fan is disposed under the condenser so as to deliver cooling air onto the condenser and the evaporator tray is disposed on the compressor, thus the water in the evaporator tray is evaporated with the heat of the compressor.

[0010] In another embodiment of the present invention, the air guiding apparatus comprises a first extension that is disposed on the first upright member and that extends parallel to the rear wall of the body and a second extension that is disposed on the second upright member and that extends parallel to the rear wall of the body. The air guiding apparatus is mounted to the cooling device by being screwed to the rear wall of the body.

[0011] In another embodiment of the present invention, the air guiding apparatus comprises a first tab arranged at the end of the first channel that is close to the ceiling of the body and a second tab arranged at the end of the second channel that is close to the ceiling of the body. When the air guiding apparatus is mounted to the cooling device, the first upright member and the second upright member bear against the rear wall of the body and the first tab and the second tab are seated on the ceiling of the body. The air guiding apparatus is mounted to the cooling device by being screwed by means of at least one screw hole arranged on each of the first tab and the second tab and can be easily dismounted in case of any malfunction.

[0012] In another embodiment of the present invention, the cooling device comprises the evaporator tray having a depth that is equal to the lengths of the first upright member and the second upright member. Thus, when the air guiding apparatus is mounted to the cooling device, the evaporator tray rests against the rear wall of the body, entirely covering over the

compressor and the heat discharged from the compressor is enabled to be transmitted to the evaporator tray before being dispersed in the environment.

[0013] In another embodiment of the present invention, the air guiding apparatus is produced as a single piece together with the evaporator tray. Thus, the air guiding apparatus is enabled to be easily mounted to the cooling device after the fan is mounted thereon.

[0014] By means of the present invention, the amount of cooling air delivered from the fan onto the condenser is increased by means of the air guiding apparatus and hence the efficiency of the refrigerant cycle is improved by enabling the condenser to be cooled better. Furthermore, the fan and the evaporator tray are easily enabled to be placed at proper positions by means of the air guiding apparatus.

[0015] The cooling device realized in order to attain the aim of the present invention is illustrated in the attached figures, where:

[0016] Figure 1 – is the schematic view of a cooling device in the prior art.

[0017] Figure 2 – is the perspective view of the air guiding apparatus in an embodiment of the present invention.

[0018] The elements illustrated in the figures are numbered as follows:

1. Cooling device
2. Body
3. Compressor
4. Condenser
5. Fan
6. Evaporator tray
7. First channel
8. Second channel
9. Air guiding apparatus
10. First upright member
11. First arm
12. Second upright member
13. Second arm
14. Beam

15. First extension
16. Second extension
17. First tab
18. Second tab

[0019] The cooling device (1) comprises a body (2), a compressor (3) that enables the refrigerant fluid to be compressed and circulated in the refrigeration cycle, a condenser (4) that provides the refrigerant fluid leaving the compressor (3) to be condensed and changed into liquid phase, a fan (5) enabling the condenser (4) to be cooled and an evaporator tray (6) that provides the collection and evaporation of the defrost water formed on the surface of the evaporator that enabling the environment where it is located to be cooled.

[0020] The cooling device (1) of the present invention comprises an air guiding apparatus (9) that has a first channel (7) and a second channel (8) and that extends on the left and right sides of the condenser (4) along the rear wall of the body (2).

[0021] By means of the first air channel (7) and the second air channel (8) positioned at two sides of the condenser (4), the cool air delivered from the fan (5) onto the condenser (4) is enabled to be carried inside the first air channel (7) and the second air channel (8) along the length of the condenser (4). Thus, the cool air that moves over the condenser (4) is prevented from escaping from the sides of the condenser (4) and enabled to be guided over the condenser (4) again and the amount of cool air contacting with the condenser (4) is increased.

[0022] In an embodiment of the present invention, the air guiding apparatus (9) comprises a first upright member (10) that extends outwards from the rear wall of the body (2), an L shaped first channel (7) having a first arm (11) that extends from the first upright member (10) onto the condenser (4), and a second upright member (12) that extends outwards from the rear wall of the body (2) and an L shaped second channel (8) having a second arm (13) that extends from the second upright member (12) onto the condenser (4). When the air guiding apparatus (9) is placed on the body (2), the first channel (7), the surface of which facing the condenser (4) is

open, is formed between the first upright member (10), the first arm (11) and the rear wall of the body (2), and the second channel (8), the surface of which facing the condenser (4) is open, is formed between the second upright member (12), the second arm (13) and the rear wall of the body (2). Thus, the air that moves in the first channel (7) and the second channel (8) is enabled to be guided only onto the condenser (4).

[0023] In another embodiment of the present invention, the air guiding apparatus (9) comprises a beam (14) that is disposed between the first channel (7) and the second channel (8), whereon the fan (5) and the evaporator tray (6) are placed. Thus, during assembly, the air guiding apparatus (9) is grouped together with the evaporator tray (6), and subsequently the resulting group is grouped with the fan (5), and a group composed of the air guiding apparatus (9), the evaporator tray (6) and the fan (5) is obtained and is mounted to the cooling device (1).

[0024] In another embodiment of the present invention, the air guiding apparatus (9) comprises a first extension (15) that is disposed on the first upright member (10) and that extends parallel to the rear wall of the body (2), and a second extension (16) that is disposed on the second upright member (12) and that extends parallel to the rear wall of the body (2). In this embodiment, the first extension (15) and the second extension (16) each comprise at least one screw hole. The air guiding apparatus (9) is mounted to the cooling device (1) by being screwed to the rear wall of the body (2).

[0025] In another embodiment of the present invention, the air guiding apparatus (9) comprises a first tab (17) arranged at the end of the first channel (7) that is close to the ceiling of the body (2) and a second tab (18) arranged at the end of the second channel (8) that is close to the ceiling of the body (2). The air guiding apparatus (9) is enabled to be aligned in the vertical direction on the body (2) by placing the first tab (17) and the second tab (18) on the ceiling of the body (2). In this embodiment, the first tab (17) and the second tab (18) each comprise at least one screw hole. The air guiding apparatus (9) is placed into the cooling device (1) by being screwed to the ceiling of the body (2) and a strong connection is

maintained between the air guiding apparatus (9) and the cooling device (1) by means of the screw that is fitted into the screw hole.

[0026] In another embodiment of the present invention, the cooling device (1) comprises the evaporator tray (6) having a depth (W) that is equal to the lengths of the first upright member (10) and the second upright member (12). Thus, when the air guiding apparatus (9) is placed into the cooling device (1), the evaporator tray (6) disposed on the compressor (3) rests against the rear wall of the body (2), covering the compressor (3) entirely and enables the heat transfer surface between the compressor (3) and the evaporator tray (6) to be increased.

[0027] In another embodiment of the present invention, the air guiding apparatus (9) is produced as a single piece together with the evaporator tray (6). Thus, the produced evaporator tray (6) is enabled to be easily mounted to the cooling device (1) together with the air guiding apparatus (9).

[0028] In the cooling device (1) of the present invention, the cooling performance of the fan (5) is improved by enabling almost all of the air directed by the fan (5) to be carried onto the condenser (4) by means of the air guiding apparatus (9) and the efficiency of the refrigerant cycle is increased.

Claims

1. A cooling device (1) **comprising** a body (2), a compressor (3) that enables the refrigerant fluid to be compressed and circulated in the refrigeration cycle, a condenser (4) that provides the refrigerant fluid leaving the compressor (3) to be condensed and changed into liquid phase, a fan (5) enabling the condenser (4) to be cooled and an evaporator tray (6) that provides the collection and evaporation of the defrost water formed on the surface of the evaporator that enabling the environment where it is located to be cooled, **characterized by** an air guiding apparatus (9) that has a first channel (7) and a second channel (8) and that extends on the left and right sides of the condenser (4) along the rear wall of the body (2).
2. A cooling device (1) as in Claim 1, **characterized by** a first upright member (10) that extends outwards from the rear wall of the body (2), an L shaped first channel (7) having a first arm (11) that extends from the first upright member (10) onto the condenser (4), a second upright member (12) that extends outwards from the rear wall of the body (2) and an L shaped second channel (8) having a second arm (13) that extends from the second upright member (12) onto the condenser (4).
3. A cooling device (1) as in any one of the above claims, **characterized by** the air guiding apparatus (9) having a beam (14) that is disposed between the first channel (7) and the second channel (8), whereon the fan (5) and the evaporator tray (6) are placed.
4. A cooling device (1) as in Claim 2, **characterized by** a first extension (15) that is disposed on the first upright member (10) and that extends parallel to the rear wall of the body (2) and a second extension (16) that is disposed on the second upright member (12) and that extends parallel to the rear wall of the body (2).
5. A cooling device (1) as in any one of the Claims 1 to 4, **characterized by** a first tab (17) arranged at the end of the first channel (7) that is close to the ceiling of the body (2) and a second tab (18) arranged at the end of the second channel (8) that is close to the ceiling of the body (2).
6. A cooling device (1) as in any one of the Claims 2 or 4, **characterized by** the evaporator tray (6) having a depth (W) that is equal to the lengths of the first

upright member (10) and the second upright member (12).

7. A cooling device (1) as in any one of the above claims, **characterized by** the air guiding apparatus (9) that is produced as a single piece with the evaporator tray (6).

Figure 1

(PRIOR ART)

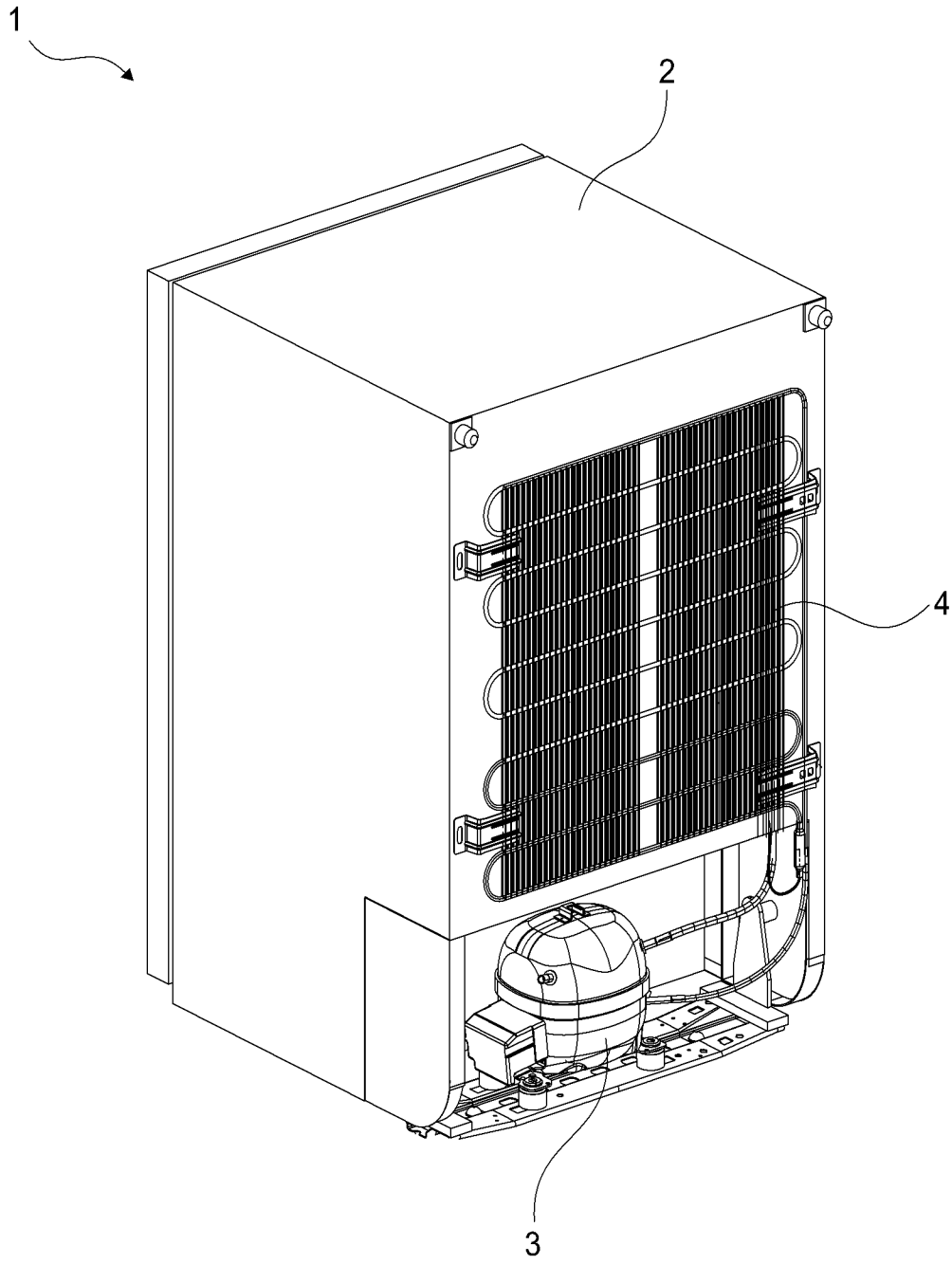
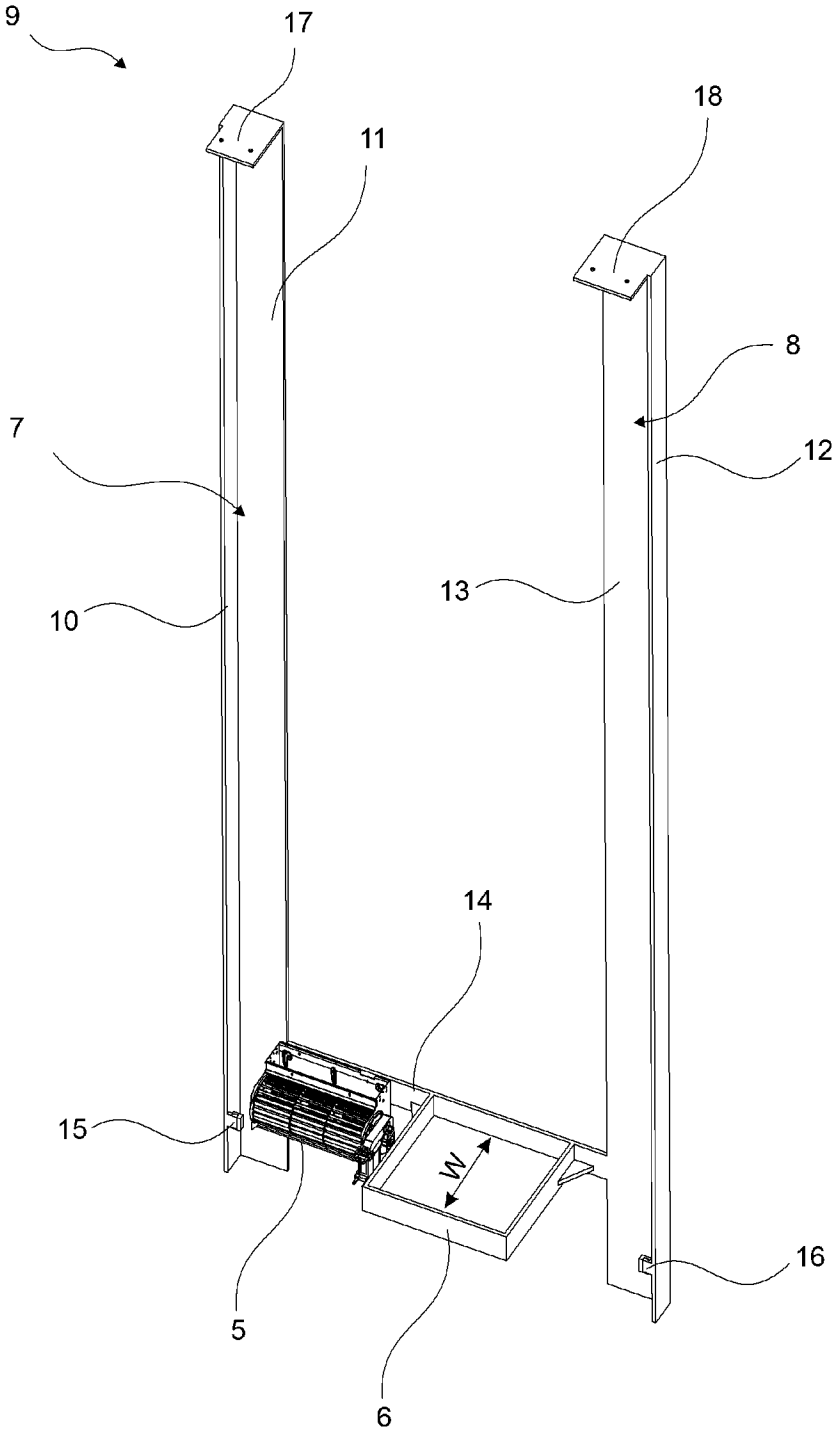


Figure 2



INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2015/074842

A. CLASSIFICATION OF SUBJECT MATTER
INV. F25D17/08 F25D23/00
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
F25D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	US 2012/144856 A1 (SHERLOCK RUSSELL J [CA]) 14 June 2012 (2012-06-14) abstract; figures 5-8 paragraph [0074]	1-3,6 4,5,7
Y A	JP S56 15973 U (NOT KNWON) 12 February 1981 (1981-02-12) figures 1-2	4,5 1
Y A	DE 37 35 551 C1 (LOH KG RITTAL WERK) 15 December 1988 (1988-12-15) abstract; claim 3; figure 1 column 3, line 59 - line 63	7 1
A	JP S56 72176 U (NOT KNOWN) 13 June 1981 (1981-06-13) the whole document	1-7

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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Date of the actual completion of the international search	Date of mailing of the international search report
17 December 2015	04/01/2016

Name and mailing address of the ISA/	Authorized officer
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INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2015/074842

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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