



(51) International Patent Classification:
F25D 21/14 (2006.01)

(21) International Application Number:
PCT/EP2016/051806

(22) International Filing Date:
28 January 2016 (28.01.2016)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
A 2015/01086 30 January 2015 (30.01.2015) TR

(71) Applicant: **ARCELIK ANONIM SIRKETI** [TR/TR]; E5
Ankara Asfalti Uzeri, Tuzla, 34950 Istanbul (TR).

(72) Inventors: **TINAR, Egemen**; E5 Ankara Asfalti Uzeri,
Tuzla, 34950 Istanbul (TR). **APAYDIN, Tolga**; E5 Ankara
Asfalti Uzeri, Tuzla, 34950 Istanbul (TR). **KARAKAYA,
Erkan**; E5 Ankara Asfalti Uzeri, Tuzla, 34950 Istanbul
(TR). **OZCAN, Kemal**; E5 Ankara Asfalti Uzeri, Tuzla,
34950 Istanbul (TR). **KAYA, Unsal**; E5 Ankara Asfalti
Uzeri, Tuzla, 34950 Istanbul (TR).

(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY,
BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM,
DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT,
HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR,
KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG,
MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM,
PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC,
SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN,
TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

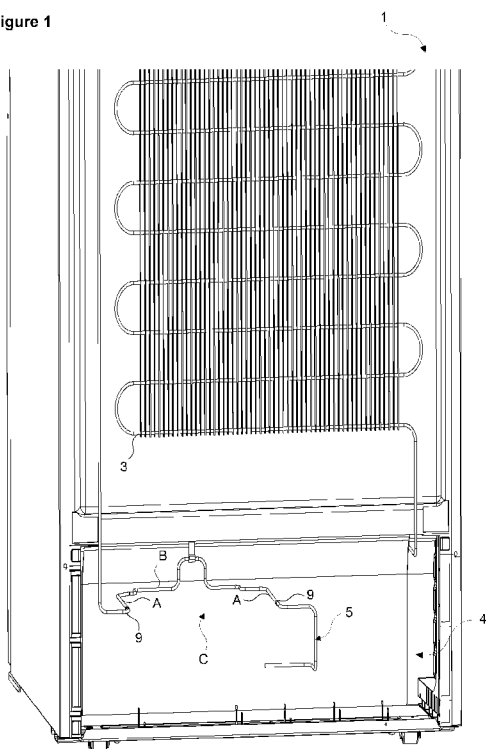
(84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,
GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ,
TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU,
TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE,
DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU,
LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK,
SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ,
GW, KM, ML, MR, NE, SN, TD, TG).

Published:

— with international search report (Art. 21(3))

(54) Title: A COOLING DEVICE COMPRISING AN EVAPORATION TRAY

Figure 1



(57) Abstract: The present invention relates to a cooling device (1), for ex-
ample a refrigerator or a freezer, comprising a body, a compressor (2) that
provides the realization of the refrigeration cycle, a condenser (3) that
condenses the refrigerant fluid, a compartment (4) wherein the compressor (2) is
disposed, an evaporation tray (7) that is disposed in the compartment (4) and
that provides the collection of the water melting during the defrost process to
be evaporated, a discharge hose (8) that extends from the body into the com-
partment (4) and that provides the transfer of the defrost water into the evap-
oration tray (7), and a refrigerant duct (5) that connects the compressor (2)
outlet and the condenser (3) inlet and that provides the transfer of the refri-
gerant fluid from the compressor (2) to the condenser (3).

Description**A COOLING DEVICE COMPRISING AN EVAPORATION TRAY**

- [0001] The present invention relates to a cooling device comprising an evaporation tray which enables evaporation of the defrost water.
- [0002] In cooling devices, for example refrigerators or freezers, the defrost process is performed in order to deice the frost formed on the refrigeration system. In the defrost process, a container named as the evaporation tray is used wherein the water is collected and evaporated. In the state of the art embodiments, the evaporation tray is placed on the compressor and the heat received from the compressor evaporates the water therein. The evaporation tray is produced so as to be properly seated on the upper side of the compressor and to take the shape of the compressor body so that noise is not generated due to vibrations of the compressor. In embodiments wherein the tray is mounted onto the compressor, the compressor-induced vibrations are transferred to the evaporation tray when the compressor is operated and the noise of the product increases due to these vibrations.
- [0003] In the state of the art Korean Patent Application No KR19990012724, in a refrigerator a water collection tray is explained that stores the defrost water and which is integrated to the stand in order to utilize the inner volume more.
- [0004] In the state of the art United States Patent Application No. US2007051122, a housing is provided on the compressor of a refrigeration device and the evaporation tray is mounted on this housing.
- [0005] The aim of the present invention is the realization of a cooling device wherein the evaporation efficiency is improved and the evaporation tray is enabled to be easily mounted/dismounted.
- [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 an evaporation tray that is positioned in the vicinity of the compressor without touching the compressor and that is carried by the refrigerant duct disposed between the compressor outlet and the condenser inlet and through which the refrigerant fluid flows.

- [0007] By means of the present invention, the evaporation tray can be easily mounted/dismounted, the sound power level of the cooling device decreases since no vibrations originating from the operation of the compressor are transferred to the evaporation tray and the defrost water evaporation efficiency is improved.
- [0008] With the special recumbent U shape of the refrigerant duct, the evaporation tray is positioned as it is hanged over the compressor. Thus, the evaporation tray benefits from the waste heat of the compressor with directly contacting the compressor.
- [0009] The refrigerant duct carries the evaporation tray while improving the evaporation efficiency of the water collected in the evaporation tray by means of the surface the duct contacts. Thus, the water in the evaporation tray is enabled to be evaporated by benefiting from both the compressor waste heat and the heat of the refrigerant fluid flowing through the refrigerant duct.
- [0010] By means of the present invention, the compressor and the evaporation tray do not directly contact each other. Therefore, the amount of vibration transfer between the compressor and the evaporation tray, which causes noise, is decreased. Consequently, the cooling device total sound power level is improved.
- [0011] Since the defrost water discharged from the interior of the cooling device is firstly transferred to the surface of the support member on the evaporation tray contacting the refrigerant duct, the evaporation efficiency of the discharged water is increased by benefiting from both the compressor waste heat and the heat of the refrigerant fluid carried by the refrigerant duct. Thus, the efficiency of the evaporation tray is also improved.
- [0012] A cooling device realized in order to attain the aim the object of the present invention is illustrated in the attached figures, where:
- [0013] Figure 1 – is the view of an embodiment of the present invention.
- [0014] Figure 2 – is the perspective view of the evaporation tray when mounted in place.
- [0015] Figure 3 – is another perspective view of the evaporation tray when mounted in place.

[0016] Figure 4 – is the front view of the evaporation tray when mounted in place.

[0017] Figure 5 – is the detailed view of an embodiment of the present invention.

[0018] Figure 6 – is the cross-sectional view of the evaporation tray.

[0019] Figure 7 – is the perspective view of the evaporation tray.

[0020] Figure 8 – is the top view of the evaporation tray.

[0021] The elements illustrated in the figures are numbered as follows:

1. Cooling device
2. Compressor
3. Condenser
4. Compartment
5. Refrigerant duct
6. Support member
7. Evaporation tray
8. Discharge hose
9. Dampening element
10. Reservoir

[0022] The cooling device (1) of the present invention, for example a refrigerator or a freezer, comprises a body (not shown in the figures), a compressor (2) that provides the realization of the refrigeration cycle, a condenser (3) that condenses the refrigerant fluid, a compartment (4) wherein the compressor (2) is disposed, an evaporation tray (7) that is disposed in the compartment (4) and that provides the collection of the water melting during the defrost process to be evaporated, a discharge hose (8) that extends from the body into the compartment (4) and that provides the transfer of the defrost water into the evaporation tray (7), and a refrigerant duct (5) that connects the compressor (2) outlet and the condenser (3) inlet and that provides the transfer of the refrigerant fluid from the compressor (2) to the condenser (3).

[0023] In the cooling device (1) of the present invention, the evaporation tray (7) is disposed in the vicinity of the compressor so as to not contact the compressor but to be affected from the waste heat of the compressor (2) and the evaporation tray (7) is carried by the refrigerant duct (5). Thus, the refrigerant duct (5) delivers the refrigerant fluid leaving the compressor (2)

to the condenser (3) while carrying the evaporation tray (7).

- [0024] In the cooling device (1) of the present invention, water from the ice melting at the end of the defrost process is received by the discharge hose (8) and then collected in the evaporation tray (7). The water in the evaporation tray (7) that is carried by the refrigerant duct (5) so as to be above the compressor, but without contacting the compressor (2) is evaporated by using the waste heat of the compressor (2).
- [0025] By means of the present invention, the evaporation tray (7) is prevented from directly contacting the compressor (2) and thus the vibrations originated from the compressor (2) when the compressor (2) is operated are prevented from affecting the evaporation tray (7), thereby decreasing the sound power level of the cooling device (1).
- [0026] In embodiment of the present invention, the cooling device (1) comprises the refrigerant duct (5) of which the portion remaining over the compressor (2) is bent as a recumbent U and a slot-shaped support member (6) that extends in the horizontal axis at least along the opposite two sides of the evaporation tray (7) and wherein the refrigerant duct (5) is seated. The support member (6) is disposed along at least three sides of the evaporation tray (7). In this embodiment of the present invention, the refrigerant duct (5) is bent in form of a U so as to be composed of two arms (A) extending in parallel, a base (B) connecting the two arms (A) and an opening (C) opposite to the base (B). In this embodiment of the present invention, the evaporation tray (7) is mounted onto the refrigerant duct (5) as explained hereinafter. While the evaporation tray (7) is passed through the opening (C), the support member (6) at both sides thereof engages with the arms (A) to be pushed into the compartment by sliding over the two arms (A) and when the base (B) is seated onto the support member (6) on the evaporation tray (7), the evaporation tray (7) is installed in its place in the compartment (4) so as to be above the compressor (2). When desired to be dismounted, the evaporation tray (7) is pulled. As a result of this movement, the evaporation tray (7) slides over the two arms (A) engaged with the support member (6) to reach the opening (C) and if the pulling movement continues, the support member (6) disengages from the

two arms (A), thus the evaporation tray (7) is taken out of the compartment (4). The refrigerant duct (5) carries the evaporation tray (7) while improving the evaporation efficiency of the water collected in the evaporation tray (7) by means of the support member (6) the duct (5) contacts. Thus, the water in the evaporation tray (7) is enabled to be evaporated by benefiting from both the compressor (2) waste heat and the heat of the refrigerant fluid flowing through the refrigerant duct (5) (Figure 1, Figure 2, Figure 3, Figure 4).

- [0027] By means of the support member (6) and the refrigerant duct (5) seated into the support member (6), the evaporation tray (7) is positioned over the compressor (2) without contacting the compressor (2) and can be dislodged by being pulled in the horizontal axis like a drawer and replaced by being pushed in the horizontal axis.
- [0028] The evaporation tray (7) is mounted over the refrigerant duct (5) so as to remain over the compressor (2) as if hanged over the compressor (2). Thus, the evaporation tray (7) is prevented from being affected from the vibrations of the compressor (2) by preventing the former from contacting the evaporation tray (7) and the waste heat emanating from compressor is efficiently used since the evaporation tray (7) is disposed at a position in the vicinity of the compressor (2).
- [0029] In an embodiment of the present invention, the refrigerant duct (5) is fixed onto the compartment (4) from at least one point. Thus, the evaporation tray (7) is enabled to be carried by the refrigerant duct (5) in a more secure manner.
- [0030] In another embodiment of the present invention, the cooling device (1) comprises one or more than one dampening element (9) that is disposed into the support member (6) and that is used for dampening the vibrations between the evaporation tray (7) and the refrigerant duct (5). In a version of this embodiment of the present invention, the dampening element (9) is placed along the support member (6). The dampening element (9) is produced preferably from rubber (Figure 5).
- [0031] In another embodiment of the present invention, the cooling device (1) comprises a reservoir (10) that is disposed in the evaporation tray (7), that

receives the defrost water transferred by the discharged hose (8) and that surrounds the slot-shaped support member (6) (Figure 6, Figure 7 and Figure 8). Thus, most of the heat of the hot refrigerant fluid that has left the compressor (2) to pass through the refrigerant duct (5) is transferred to the reservoir (10) that surrounds the support member (6) and wherein the defrost water is collected. Consequently, the evaporation efficiency is improved. Moreover, since more heat is drawn from the refrigerant fluid in this manner, the evaporation pressure decreases and energy consumption is improved.

[0032] By means of the present invention, the evaporation tray (7) is placed over the compressor (2) without contacting the compressor (2). Thus, the waste heat of the compressor (2) is utilized without transferring the vibrations originated from the operation of the compressor (2) to the evaporation tray (7).

Claims

1. A cooling device (1) **comprising** a body, a compressor (2) that provides the realization of the refrigeration cycle, a condenser (3) that condenses the refrigerant fluid, a compartment (4) wherein the compressor (2) is disposed, an evaporation tray (7) that is disposed in the compartment (4) and that provides the collection of the water melting during the defrost process to be evaporated, a discharge hose (8) that extends from the body into the compartment (4) and that provides the transfer of the defrost water into the evaporation tray (7), and a refrigerant duct (5) that connects the compressor (2) outlet and the condenser (3) inlet and that provides the transfer of the refrigerant fluid from the compressor (2) to the condenser (3), **characterized in that** the evaporation tray (7)
 - that is disposed in the vicinity of the compressor (2) so as to be affected from the waste heat of the compressor (2) without contacting the compressor (2) and
 - that is carried by the refrigerant duct (5).
2. A cooling device (1) as in Claim 1, **characterized in that** the evaporation tray (7) that is disposed over the compressor (2) as if hanged.
3. A cooling device (1) as in Claim 1, **characterized in that** the refrigerant duct (5) of which the portion remaining over the compressor (2) is bent as a recumbent U and a slot-shaped support member (6) that extends in the horizontal axis at least along the opposite two sides of the evaporation tray (7) and wherein the refrigerant duct (5) is seated.
4. A cooling device (1) as in Claim 3, **characterized in that** the support member (6) that is disposed along at least three sides of the evaporation tray (7).
5. A cooling device (1) as in Claim 3, **characterized in that** the refrigerant duct (5) that is bent in form of a U so as to be composed of two arms (A) extending in parallel, a base (B) connecting the two arms (A) and an opening (C) opposite to the base (B).
6. A cooling device (1) as in any one of the above claims, **characterized in that** the refrigerant duct (5) that is fixed onto the compartment (4) from at least one point.
7. A cooling device (1) as in Claim 6, **characterized in that** one or more than one

dampening element (9) that is disposed into the support member (6) and that is used for dampening the vibrations between the evaporation tray (7) and the refrigerant duct (5).

8. A cooling device (1) as in Claim 7, **characterized in that** the dampening element (9) that is disposed along the support member (6).
9. A cooling device (1) as in Claim 8, **characterized in that** the dampening element (9) that is produced from rubber.
10. A cooling device (1) as in Claim 3, **characterized in that** a reservoir (10) that is disposed in the evaporation tray (7), that receives the defrost water transferred by the discharged hose (8) and that surrounds the slot-shaped support member (6).

Figure 1

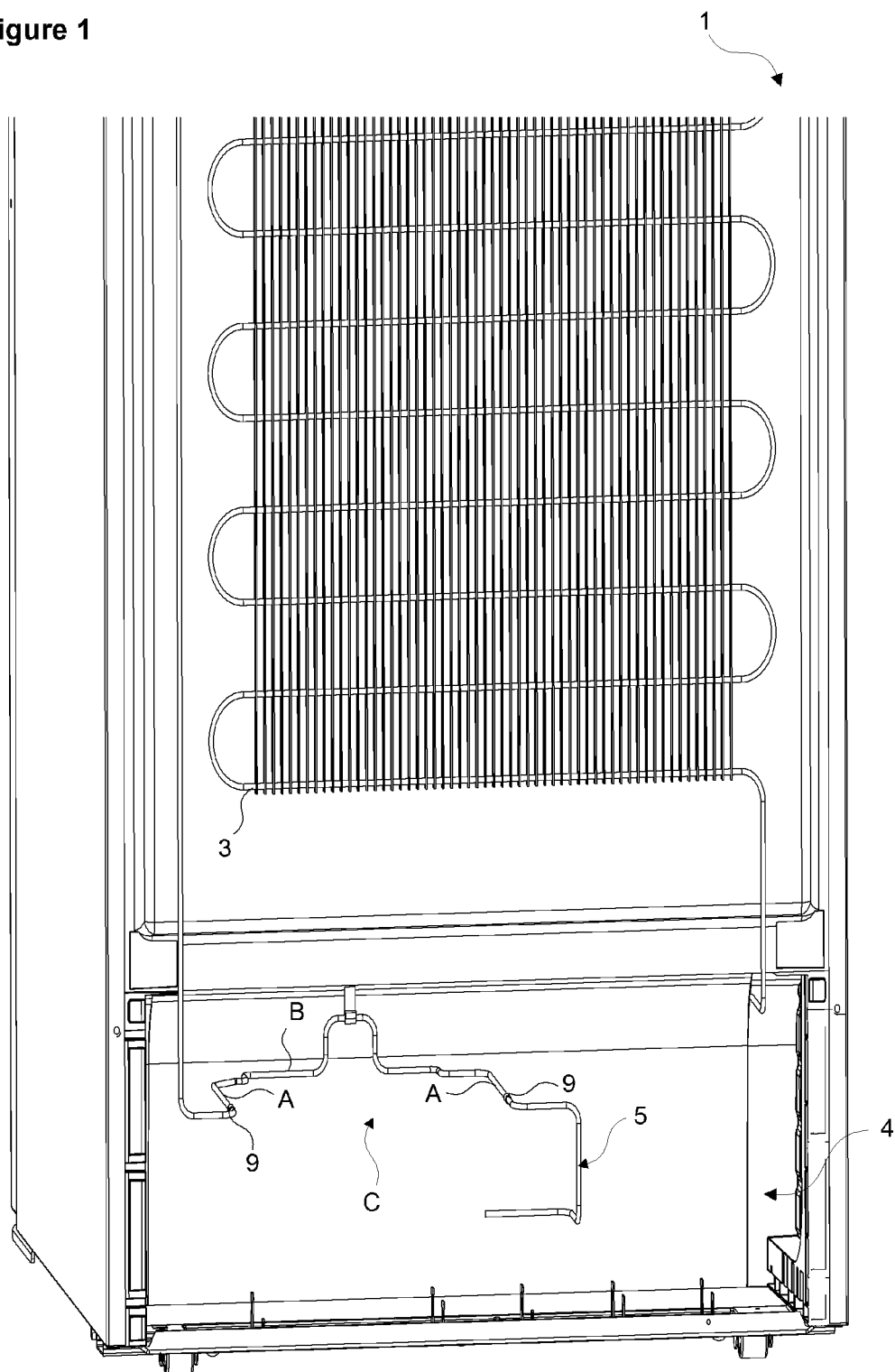


Figure 2

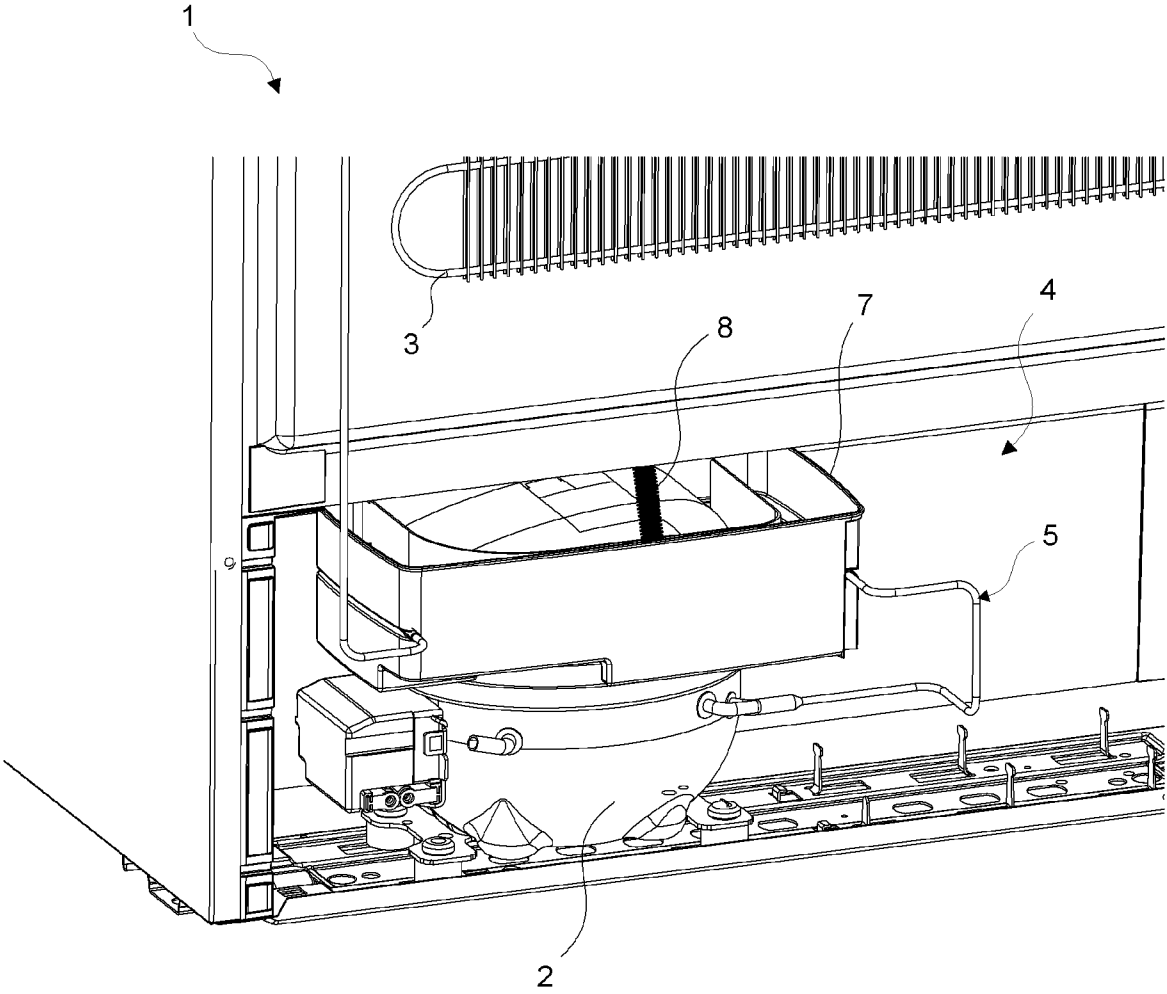


Figure 3

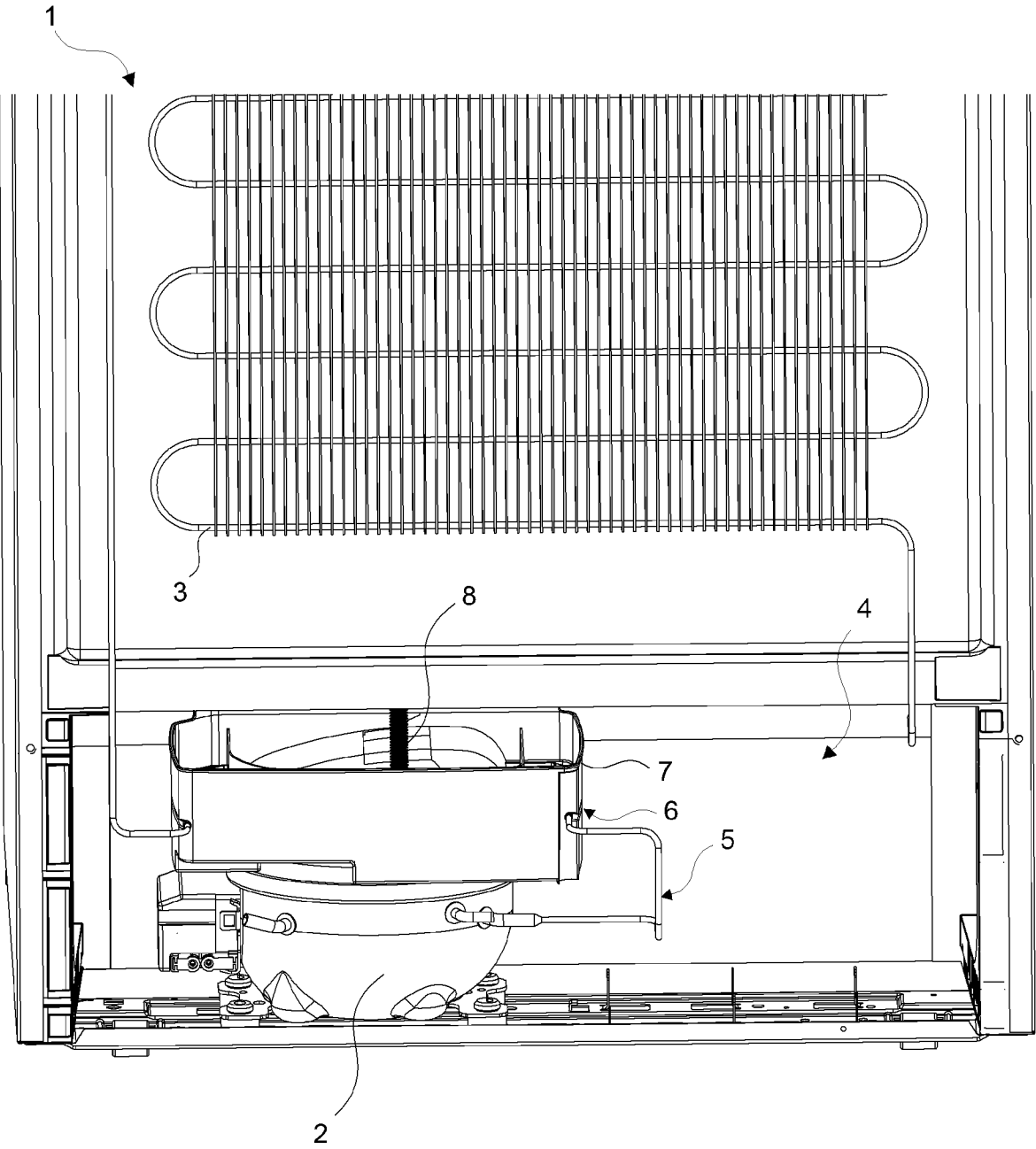
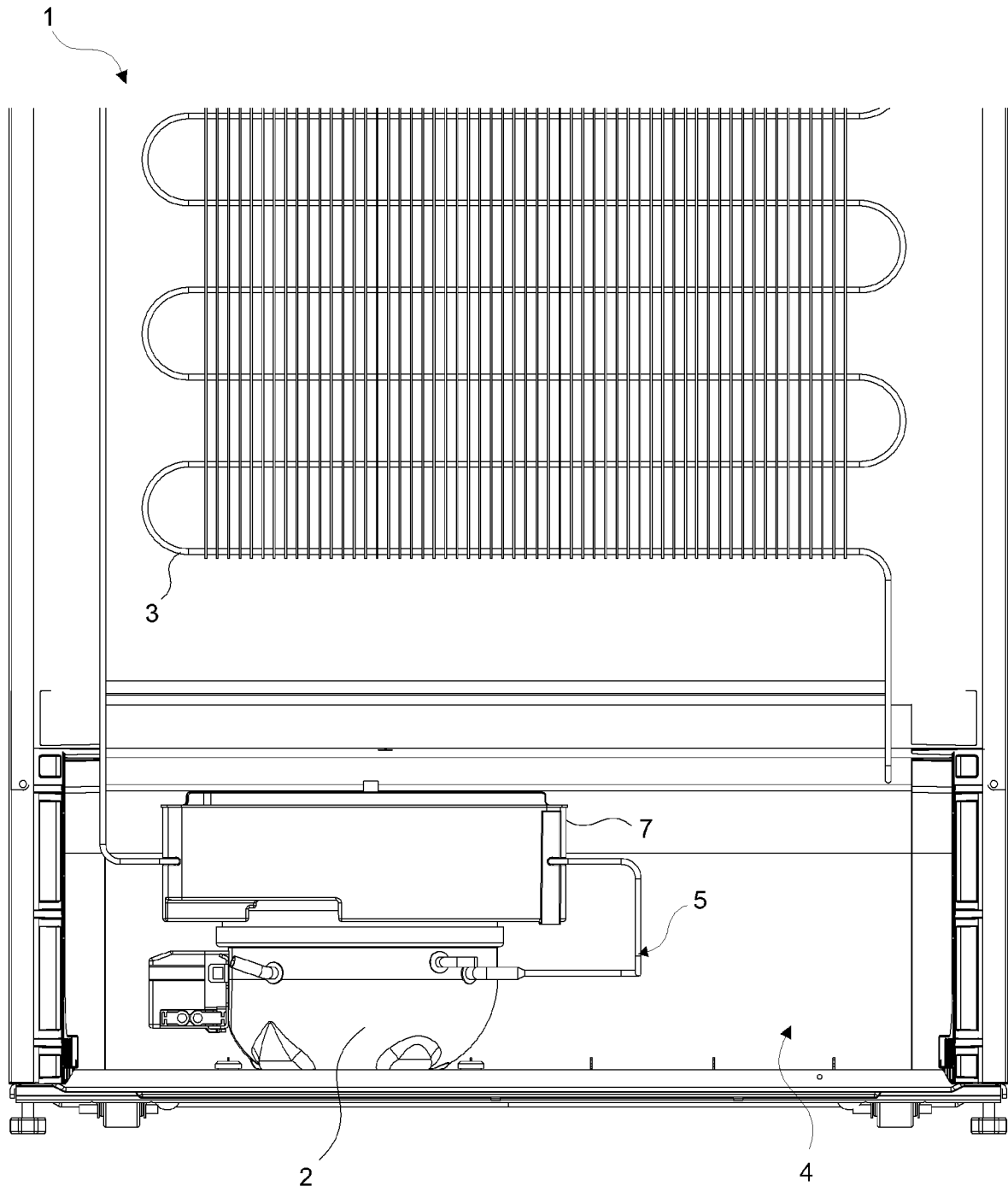


Figure 4



5/6

Figure 5

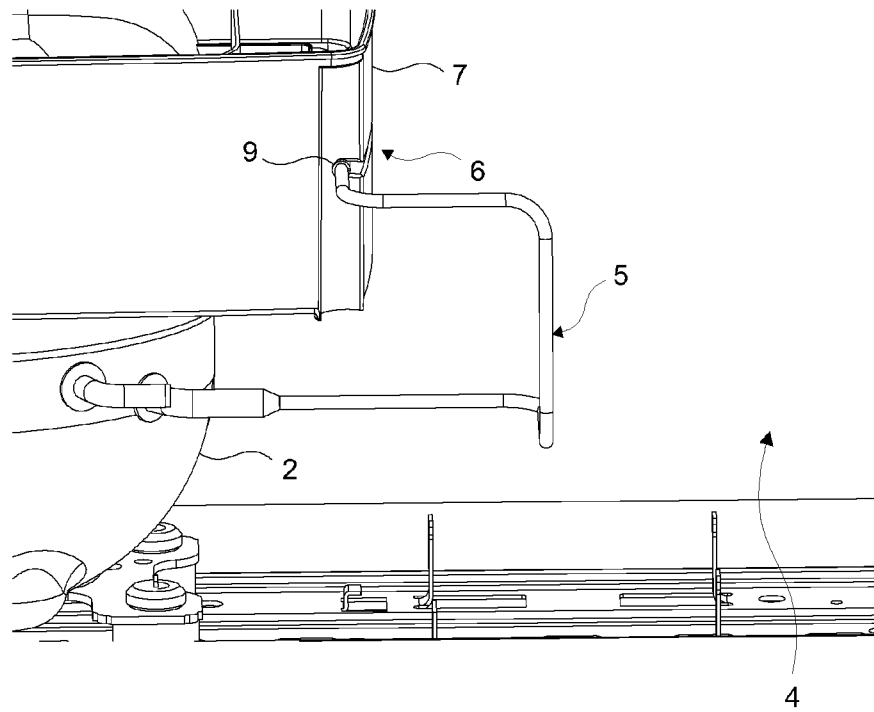


Figure 6

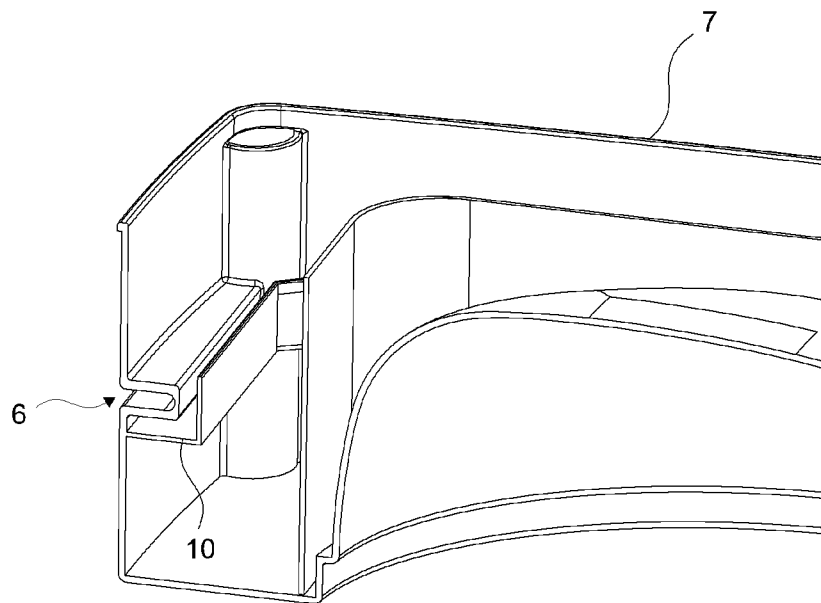


Figure 7

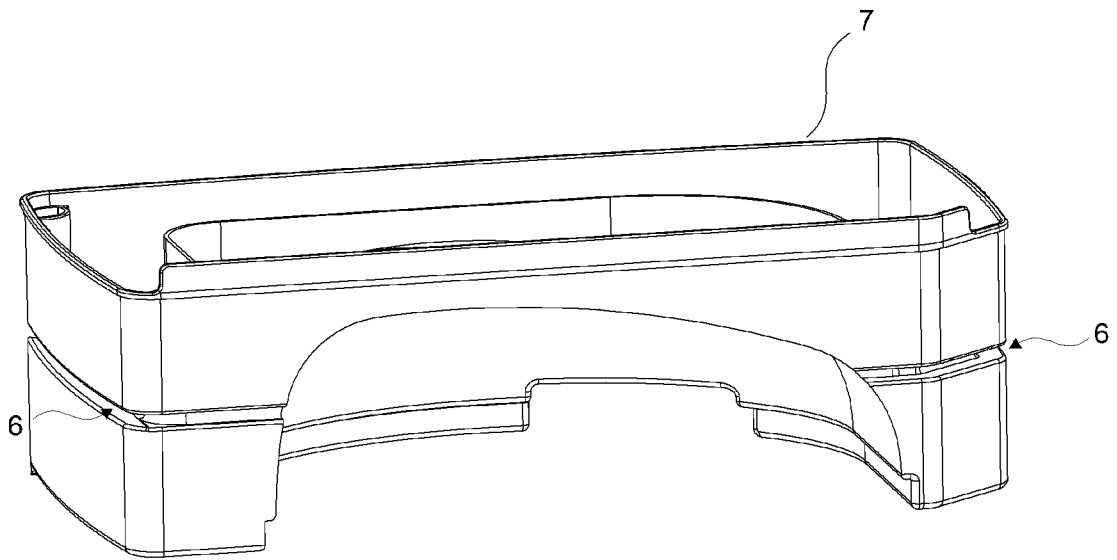
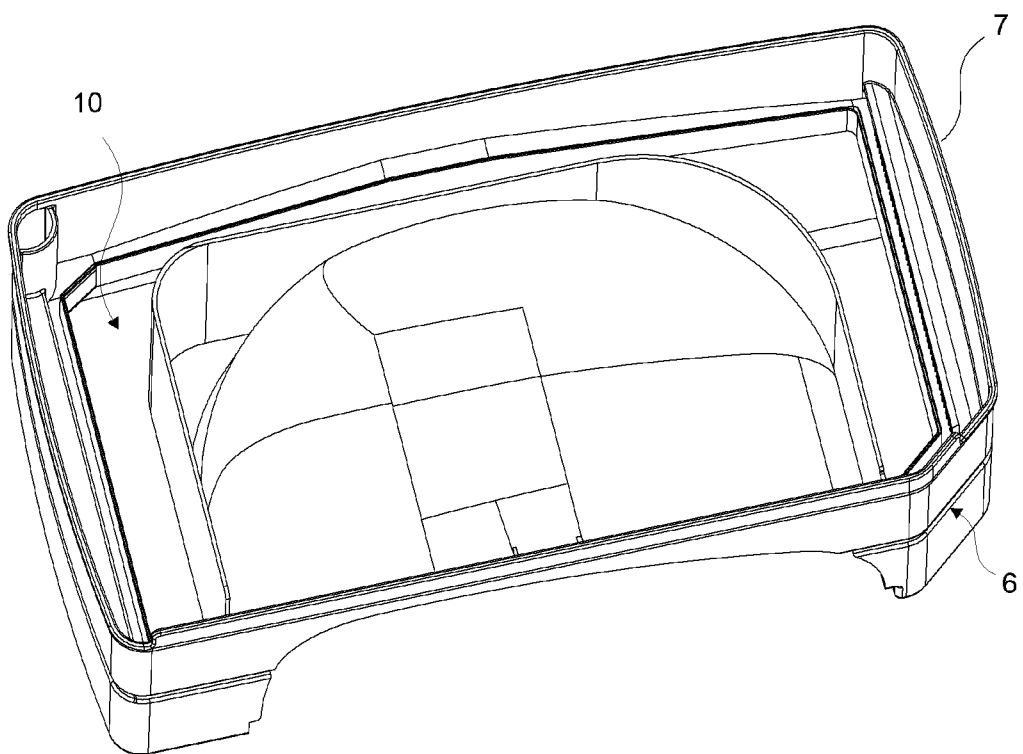


Figure 8



INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2016/051806

A. CLASSIFICATION OF SUBJECT MATTER
INV. F25D21/14
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 F25B

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	US 2 721 451 A (SCHUMACHER FRANK A) 25 October 1955 (1955-10-25)	1,2
Y	column 2, line 21; figures 1,3 column 3, line 1 - line 3 -----	3-10
X	US 2 667 042 A (ANDERSON FLORENCE B) 26 January 1954 (1954-01-26)	1
Y	figures 1,2 -----	3-6,10
Y	JP H11 183017 A (TOSHIBA CORP; TOSHIBA AVE KK) 6 July 1999 (1999-07-06) paragraphs [0019], [0030]; figures 2,5 -----	7-9
X	JP 2004 257718 A (FUJITSU GENERAL LTD) 16 September 2004 (2004-09-16) figures 1,2 ----- -/-	1,2



Further documents are listed in the continuation of Box C.



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

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

21 March 2016

Date of mailing of the international search report

01/04/2016

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

Kuljis, Bruno

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2016/051806

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 966 958 A (MAYNARD JAMES [US]) 19 October 1999 (1999-10-19) figures 3,7 -----	1,7-9

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2016/051806

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2721451	A	25-10-1955	NONE
US 2667042	A	26-01-1954	NONE
JP H11183017	A	06-07-1999	NONE
JP 2004257718	A	16-09-2004	NONE
US 5966958	A	19-10-1999	CA 2277647 A1 17-01-2000 US 5966958 A 19-10-1999