



(11)

EP 3 502 603 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
26.06.2019 Bulletin 2019/26

(51) Int Cl.:
F25D 25/02 (2006.01) F25D 17/06 (2006.01)

(21) Application number: **18213782.8**

(22) Date of filing: **18.12.2018**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(30) Priority: **19.12.2017 CN 201721787894 U**

(71) Applicant: **Whirlpool (China) Co., Ltd.**
Hefei City, Anhui Province (CN)

(72) Inventors:
• **Liu, Dian**
21024 Biandronno - Frazione Cassinetta (IT)
• **Guo, Ce**
21024 Biandronno - Frazione Cassinetta (IT)
• **Liu, Zhicheng**
21024 Biandronno - Frazione Cassinetta (IT)

(74) Representative: **Spina, Alessandro**
Whirlpool EMEA SpA
Via Carlo Pisacane, 1
20016 Pero (MI) (IT)

(54) **DETACHABLE QUICK-FREEZING FOOD STORAGE CASE**

(57) A detachable quick-freezing food storage case is provided that includes a storage case body (1) and a quick-freezing fan assembly. The quick-freezing fan assembly comprises a quick-freezing fan support (2) and a quick-freezing fan (3). The quick-freezing fan support (2) includes an air inlet positioned proximate the quick-freezing fan (3). The storage case body (1) includes a return air inlet (4). The quick-freezing fan support (2) surrounds one of the air outlets (6) on a cold air duct

board (5) to form an air circulation path from the air outlet (6), through the air inlet, to the return air inlet (4). The storage case body (1) also includes a cover (7) fitting the storage case body (1). The quick-freezing fan (3) is connected to a main control panel (20), and the main control panel (20) is connected to a display control panel (30). The storage case (1) is also detachable, making it convenient for customers to use refrigerator space efficiently.

EP 3 502 603 A1

Description

BACKGROUND

[0001] The embodiments described herein relate to a detachable quick-freezing food storage case.

[0002] With the accelerating pace of life and ever-improving quality of life, refrigerators capable of quick-freezing food and thereby locking in moisture and nutrients in the food are gaining popularity among customers. Most refrigerators on the market thus are provided with a quick-freezing function, yet the temperature reduction effect is attained basically through prolonging the run time. There are certain shortcomings in this principle of operation. First, the extended time taken for cooling prevents moisture and nutrients of fresh food from being rapidly locked in, thus failing to ensure food quality. Secondly, the long run time results in excessive power consumption. Finally, rather than quick-freezing all the food in the refrigerator, customers want to quick-freeze only the fresh food just purchased.

SUMMARY

[0003] An objective of the present embodiments is to overcome the foregoing shortcomings and provide a detachable quick-freezing food storage case. The food storage case can lock in moisture and nutrients in fresh food in a timely manner. Moreover, the food storage case is detachable, making it convenient for customers to use refrigerator space efficiently.

[0004] To achieve the foregoing objective, a detachable quick-freezing food storage case is provided that adopts the following technical solutions. The storage case includes a storage case body fitting within a freezer compartment liner through a pull mechanism, and a quick-freezing fan assembly integrally assembled with a rear part of the storage case body. The quick-freezing fan assembly includes a quick-freezing fan support secured to the storage case body and a quick-freezing fan securely mounted on the quick-freezing fan support. The quick-freezing fan support includes an air inlet positioned in accordance with the quick-freezing fan. The storage case body includes a return air inlet. The quick-freezing fan support surrounds any one of the air outlets on a cold air duct board, to form an air circulation path from the air outlet, through the air inlet, to the return air inlet. The storage case body also includes a cover fitting the storage case body. The quick-freezing fan is connected to a main control panel. The main control panel is connected to a display control panel.

[0005] A slide rail is respectively disposed on two side surfaces of the storage case body. The freezer compartment liner includes guide rails fitting the slide rails.

[0006] A cross section of the quick-freezing fan support is in a shape of a right triangle. A surface on a leg side is attached to the cold air duct board, and a surface on a hypotenuse side is fitly secured to an oblique surface

of a rear part of the storage case body.

[0007] The main control panel is disposed on a top part of the refrigerator. The display control panel is disposed on a door body of the refrigerator.

[0008] As can be seen from the foregoing technical solutions, the present innovation pertains to a quick-freezing food storage case dedicated to quick-freezing food in a storage case by using the overall cold energy in a refrigerator. Moisture and nutrients in fresh food can thereby be locked in a timely manner. The storage case is also detachable, making it convenient for customers to use refrigerator space efficiently.

[0009] These and other features, advantages, and objects of the present device will be further understood and appreciated by those skilled in the art upon studying the following specification, claims, and appended drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] In the drawings:

FIG. 1 is a schematic structural diagram of a detachable quick-freezing food storage case;

FIG. 2 is a schematic structural diagram showing the detachable quick-freezing food storage case mounted on a cold air duct board;

FIG. 3 is a schematic exploded diagram of the structure of FIG. 2; and

FIG. 4 is a diagram showing the detachable quick-freezing food storage case used in a refrigerator.

DETAILED DESCRIPTION OF EMBODIMENTS

[0011] For purposes of description herein the terms "upper," "lower," "right," "left," "rear," "front," "vertical," "horizontal," and derivatives thereof shall relate to the device as oriented in FIG. 1. However, it is to be understood that the device may assume various alternative orientations and step sequences, except where expressly specified to the contrary. It is also to be understood that the specific devices and processes illustrated in the attached drawings and described in the following specification are simply exemplary embodiments of the inventive concepts defined in the appended claims. Hence, specific dimensions and other physical characteristics relating to the embodiments disclosed herein are not to be considered as limiting, unless the claims expressly state otherwise.

[0012] The present innovation is further described below with reference to the accompanying drawings.

[0013] A detachable quick-freezing food storage case as shown in FIGS. 1, 2, 3, and 4, wherein the detachable quick-freezing food storage case includes a storage case body 1 fitting a freezer compartment liner 10 through a pull mechanism, and a quick-freezing fan assembly integrally assembled with a rear part of the storage case body 1. The quick-freezing fan assembly includes a quick-freezing fan support 2 secured to the storage case

body 1 and a quick-freezing fan 3 securely mounted on the quick-freezing fan support 2. The quick-freezing fan support 2 includes an air inlet positioned in accordance with the quick-freezing fan 3. The storage case body 1 includes a return air inlet 4. The quick-freezing fan support 2 surrounds one of the air outlets 6 on a cold air duct board 5. That is, the quick-freezing fan support 2 covers one air outlet 6 on the cold air duct board 5 to form an air circulation path from the air outlet 6, through the air inlet, to the return air inlet 4. The air outlet 6 at the upper right corner of the cold air duct board 5 is selected in this embodiment. The storage case body 1 also includes a cover 7 fitting the storage case body. The quick-freezing fan 3 is connected to a main control panel 20. The main control panel 20 is connected to a display control panel 30.

[0014] Further, a slide rail 8 is respectively disposed on two side surfaces of the storage case body 1. The freezer compartment liner 10 includes guide rails 11 fitting the slide rails 8. When no food needs to be quickly frozen, the storage case body 1 can be taken out, making it convenient for customers to use refrigerator space efficiently.

[0015] Further, a cross section of the quick-freezing fan support 2 is in a shape of a right triangle. A surface of a leg side is attached to the cold air duct board 5. A surface on a hypotenuse side is fitly secured to an oblique surface of a rear part of the storage case body 1. Specifically, a projecting edge is disposed on two sides of the slope of the quick-freezing fan support 2; and a first positioning hole 21 is provided on each projecting edge. The rear part of the storage case body 1 includes second positioning holes 12 fitting the first positioning holes 21. The quick-freezing fan support 2 and the storage case body 1 are fixed together by using screws.

[0016] Further, the main control panel 20 is disposed on a top part of the refrigerator; and the display control panel 30 is disposed on a door body of the refrigerator.

[0017] Operating steps and principles related to the present utility model are as follows.

[0018] After the refrigerator is set to a quick-freezing function by using the display control panel 30, the main control panel 20 sends out a signal. In this case, an original freezing fan in the refrigerator runs at low speed, and an air outlet is kept at a positive pressure to prevent air backflow. The quick-freezing fan 3 in the storage case body 1 runs at a high speed, such that most cold energy absorbs cold air from the air outlet 6 on the cold air duct board 5 and delivers the cold air into the storage case body 1 to quickly freeze the food. Then, the return air is delivered to the freezer compartment through the return air inlet 4, and the return air goes back to an evaporator 9. To ensure the low temperature in other parts of the freezer compartment, the quick-freezing fan stops after running for a predetermined time period T (hours), after which the refrigerator automatically exits the quick-freezing function and resumes the normal mode. If food quick-freezing is required again, the quick-freezing function

needs to be enabled again by using the display control panel 30. If the refrigerator is in an off state when the quick-freezing function is being set, the refrigerator is first forcibly turned on through the main control panel. Next, the freezing fan is commanded to run at a low speed and the quick-freezing fan is commanded to run at high speed.

[0019] The above description is considered that of the illustrated embodiments only. Modifications of the device will occur to those skilled in the art and to those who make or use the device. Therefore, it is understood that the embodiments shown in the drawings and described above are merely for illustrative purposes and not intended to limit the scope of the device, which is defined by the following claims as interpreted according to the principles of patent law, including the Doctrine of Equivalents.

Claims

1. A refrigerator comprising a detachable quick-freezing food storage case, said quick-freezing food storage case comprising:

a storage case body (1) fitting a freezer compartment liner (10) through a pull mechanism; and

a quick-freezing fan assembly integrally assembled with a rear part of the storage case body (1),

wherein:

the quick-freezing fan assembly comprises a quick-freezing fan support (2) secured to the storage case body (1) and a quick-freezing fan (3) mounted on the quick-freezing fan support (2);

the quick-freezing fan support (2) includes an air inlet positioned in accordance with the quick-freezing fan (3);

the storage case body (1) includes a return air inlet (4);

the quick-freezing fan support (2) surrounds an air outlet (6) of said refrigerator on a cold air duct board (5) thereof thereby forming an air circulation path from said air outlet (6), through the air inlet of the quick-freezing fan support (2), to the return air inlet (4) of the same quick-freezing fan support (2);

wherein the storage case body (1) further includes a cover (7) fitting the storage case body (1); and

and wherein the quick-freezing fan (3) is connected to a main control panel (20) of the refrigerator, said main control panel (20) being connected to a display control panel (30) of the same refrigerator.

2. The refrigerator according to claim 1, wherein a slide rail (8) is respectively disposed on two side surfaces of the storage case body (1) of the storage case body (1), and wherein a freezer compartment liner (10) of the refrigerator includes guide rails (11) fitting said slide rails (8). 5
3. The refrigerator according to any one of claims 1 and 2, wherein a cross section of the quick-freezing fan support (2) of the quick-freezing fan assembly is in a shape of a right triangle; a surface on a leg side is attached to the cold air duct board (5) of the refrigerator; and a surface on a hypotenuse side is fitly secured to an oblique surface of the rear part of the storage case body (1) of the quick-freezing food storage case. 10 15
4. The refrigerator according to any one of claims 1-3, wherein the main control panel (20) is disposed on a top part of the same refrigerator and the display control panel (30) is disposed on a door body thereof. 20
5. The refrigerator according to any one of claims 1-4, wherein the quick-freezing fan support (2) of the quick-freezing fan assembly includes projecting edges each having a first positioning hole (21), wherein a rear part of the storage case body (1) of the quick-freezing food storage case includes second positioning holes (12) for aligning with the first positioning holes (21) for receiving screws to secure the quick-freezing fan support (2) to the storage case body (1). 25 30
6. The refrigerator according to any one of claims 1-5, wherein, when a quick-freezing function is selected using the display control panel (30), the main control panel (20) sends out a signal causing a freezing fan in the refrigerator to run at low speed. 35
7. The refrigerator according to claim 6, wherein said signal further causes the quick-freezing fan (3) of the detachable quick-freezing food storage case to run at a high speed. 40
8. The refrigerator according to any one of claims 1-7, wherein, when a quick-freezing function is selected using the display control panel (30), the main control panel (20) sends out a signal causing the quick-freezing fan (3) of the detachable quick-freezing food storage case to run at a high speed to deliver cold air into the storage case body (1) to quickly freeze food contained therein. 45 50
9. The refrigerator according to claim 8, wherein, when the quick-freezing fan (3) of the detachable quick-freezing food storage case runs at a high speed, return air from within its storage case body (1) is delivered to the freezer compartment of the refrigerator through the return air inlet (4) of the storage case body (1), and said return air goes back to an evaporator (9) of the refrigerator. 55
10. The refrigerator according to claim 9, wherein, to ensure a low temperature in other parts of the freezer compartment, the quick-freezing fan (3) of the detachable quick-freezing food storage case stops after running at high speed for a predetermined time period, after which the refrigerator automatically exits the quick-freezing function and resumes a normal mode.

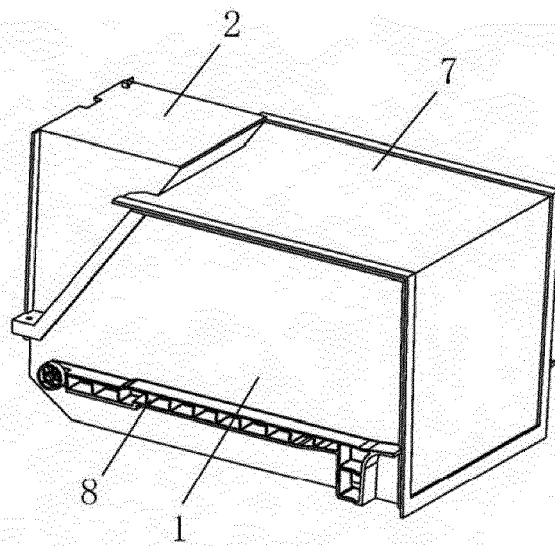


Fig. 1

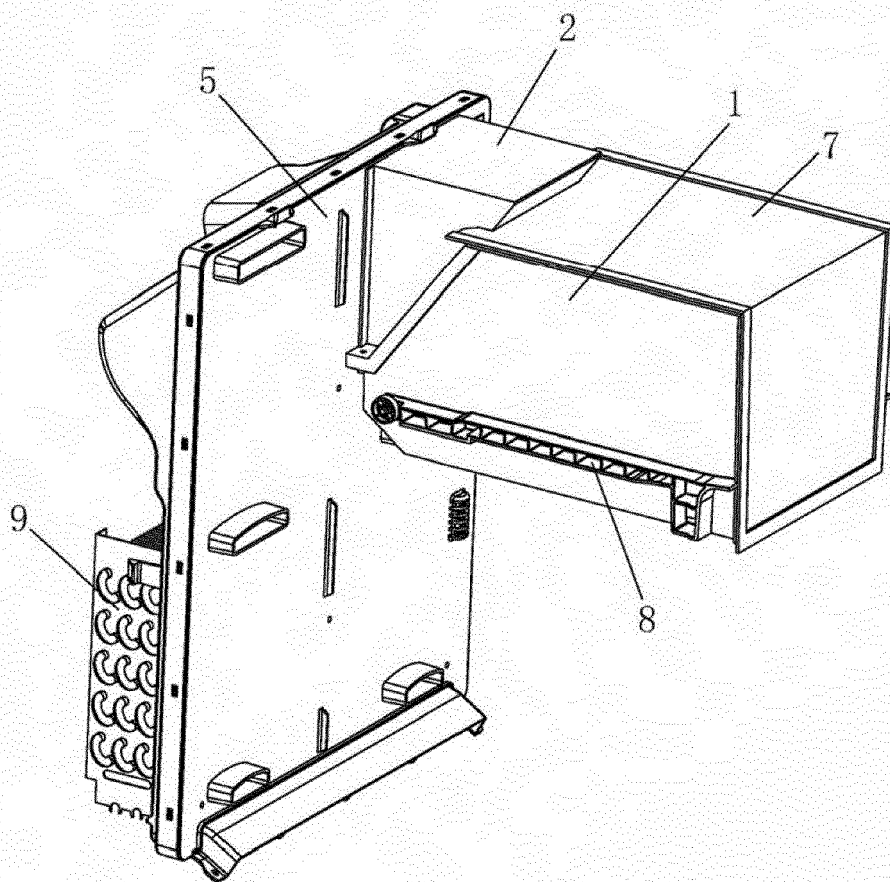


Fig. 2

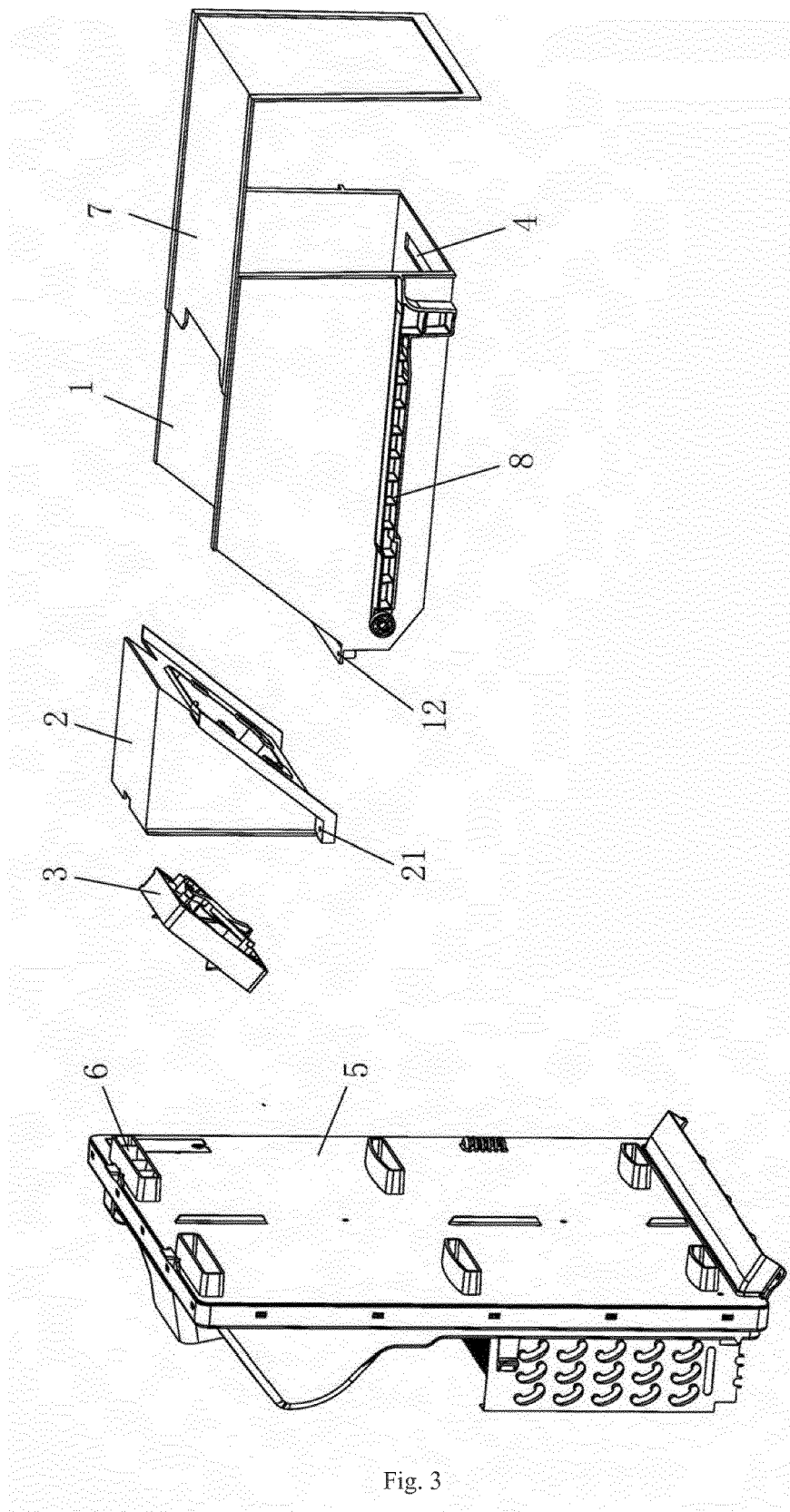


Fig. 3

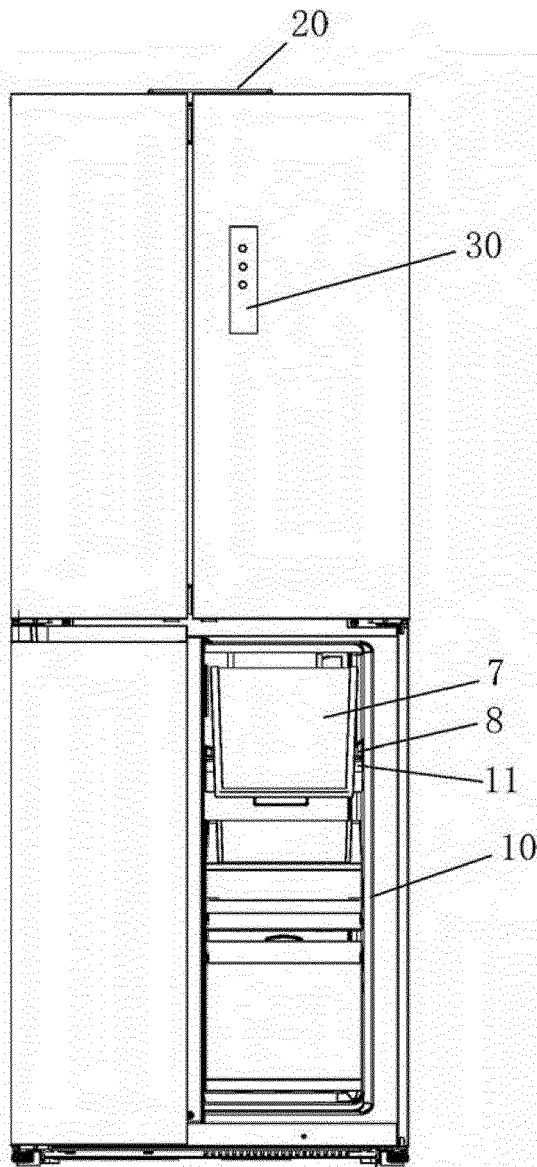


Fig. 4



EUROPEAN SEARCH REPORT

Application Number
EP 18 21 3782

5

10

15

20

25

30

35

40

45

50

55

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X A	US 2016/091242 A1 (SANTOS EDERSON ADRIANO DOS [BR] ET AL) 31 March 2016 (2016-03-31) * figures 1-10 *	1,2,4, 7-9 3,5,6,10	INV. F25D25/02 F25D17/06
X	EP 2 787 309 A2 (LG ELECTRONICS INC [KR]) 8 October 2014 (2014-10-08) * the whole document *	1	
X	WO 2007/119963 A1 (LG ELECTRONICS INC [KR]; KIM UNG-SU [KR]) 25 October 2007 (2007-10-25) * the whole document *	1	
X A	US 2008/156029 A1 (RITCHIE SHEENA LEIGH [US] ET AL) 3 July 2008 (2008-07-03) * the whole document *	1 2-10	
A	JP 2002 267318 A (TOSHIBA CORP) 18 September 2002 (2002-09-18) * the whole document *	1-10	
A	WO 2014/198153 A1 (HAIER GROUP CORP [CN]; HAIER ASIA INT CO LTD [JP] ET AL.) 18 December 2014 (2014-12-18) * the whole document *	1	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 10 April 2019	Examiner de Graaf, Jan Douwe
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			

EPO FORM 1503 03.82 (P04C01)

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

EP 18 21 3782

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

10-04-2019

10

15

20

25

30

35

40

45

50

55

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2016091242 A1	31-03-2016	BR 102014023977 A2	17-05-2016
		DE 102015116266 A1	31-03-2016
		US 2016091242 A1	31-03-2016
EP 2787309 A2	08-10-2014	CN 104101154 A	15-10-2014
		EP 2787309 A2	08-10-2014
		KR 20140119443 A	10-10-2014
		US 2014290303 A1	02-10-2014
WO 2007119963 A1	25-10-2007	AU 2007239271 A1	25-10-2007
		CN 101421569 A	29-04-2009
		EP 2010835 A1	07-01-2009
		KR 100756512 B1	10-09-2007
		US 2010154460 A1	24-06-2010
		WO 2007119963 A1	25-10-2007
US 2008156029 A1	03-07-2008	CA 2590432 A1	28-06-2008
		US 2008156029 A1	03-07-2008
JP 2002267318 A	18-09-2002	NONE	
WO 2014198153 A1	18-12-2014	CN 104412052 A	11-03-2015
		JP 2015001331 A	05-01-2015
		WO 2014198153 A1	18-12-2014