



- (51) International Patent Classification:
F25D 23/04 (2006.01)
- (21) International Application Number:
PCT/EP2017/057838
- (22) International Filing Date:
3 April 2017 (03.04.2017)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
A 2016/04334 4 April 2016 (04.04.2016) TR
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(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, DJ, 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, KH, KN,
KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA,
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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.

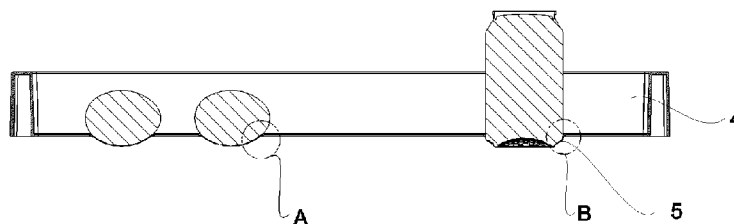
(84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,
GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ,
TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU,
TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE,
DK, EE, ES, FI, FR, GB, GR, HR, HU, 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 A DOOR SHELF

Figure 3



(57) Abstract: The present invention relates to a cooling device (1) comprising a body (2), a door (3) that provides access into the body (2) and at least one door shelf (4) that can be disposed onto the inner surface of the door (3) and that is suitable for placing the food items to be stored therein.



Description**A COOLING DEVICE COMPRISING A DOOR SHELF**

- [0001] The present invention relates to a cooling device comprising at least one door shelf.
- [0002] In cooling devices, door shelves are used, that are disposed on the inner surface of the door and that enable the food items to be stored. The food items with round or similar geometry are arbitrarily placed onto the said shelves or retaining mechanisms such as bottle and can holders that are produced by special molding techniques are used. Opening the door fast causes the food items to tumble and fall depending on their shapes and generates undesired noises. The retaining mechanisms utilized to prevent this situation are specific to the type of the food item, and both occupy too much space on the door shelf and increase the costs.
- [0003] The design criteria proposing that the door shelves and the body shelves are not provided at the same level so as not to block the air circulation results in limitations in production. The fact that the bottom surfaces of the door shelves are not air-permeable limits the air circulation. In order to overcome this problem, regional holes are bored at the bottom of the door shelves, but significant results cannot be achieved.
- [0004] In the state of the art German Patent Application No. DE102011075101, a netting structure is disclosed, that is used for storing food items and attached to the underside of the body shelves.
- [0005] In the state of the art unexamined Japanese Patent Application No. JP2003227681, a netting structure is disclosed, that is attached to the underside of the grill-type body shelf.
- [0006] The aim of the present invention is the realization of a cooling device wherein the food items that are placed onto the door shelf are prevented from tumbling and falling, thus creating unpleasant noises and wherein the cool air circulation through the door shelves is improved even when the door is closed.
- [0007] 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 door that provides access into the body. The door shelf that is

disposed onto the inner surface of the door comprises a flexible base. By means of the flexible base structure, the door shelf stretches so as to take the shape of the item to a certain extent when the said item is placed thereon. Thus, the items are prevented from tumbling, falling and getting damaged, when the door is opened fast. Similarly, as the flexible base minimizes movements inside the shelf and when the door is opened/closed, the items are prevented from hitting the door shelf and from generating any noise.

[0008] In an embodiment of the present invention, the bases of the shelves of the cooling device are perforated. By means of the perforated structure, the air circulation inside the cooling device is improved and the problem concerning the levels of the body shelves and the door shelves, arising from the design criteria that is applied to all cooling devices is solved. The perforations can be produced in circular or elliptical shape. In addition, by means of the perforated base, saving in materials is provided, thus decreasing the costs.

[0009] In an embodiment of the present invention, the door shelves have netting-shaped bases. Thus, the items that are placed onto the netting are enabled to tumble in a minimal amount and the items that extend higher than the lateral height of the door shelf are prevented from falling off the shelf. Furthermore, by means of the netting-shaped base, saving in materials is provided, thus decreasing the costs. Another advantageous effect provided by the netting structure is that, the items placed into the upper shelf comprising the netting structure, when the distance between two door shelves is long, optimally use the space between two door shelves, thereby providing maximum utilization of the interior volume of the cooling device. Furthermore, the netting structure creates minimum resistance against the air flow, thus improves the cooling performance.

[0010] In an embodiment of the present invention, the base is flexible and produced from a material that stretches in proportion to the weight of the item placed thereon such that the angle between the base and the horizontal axis of the shelf does not exceed the predetermined angle. Thanks to the flexible structure that does not stretch more than the angle

predetermined by the producer, in case the user loads the door shelf with more items than the door shelf can support, the base is prevented from stretching too much so as to get damaged and hitting the items on the door shelf therebelow.

- [0011] In an embodiment of the present invention, the cooling device comprises circular or ellipsoid holes, enabling the cool air to be efficiently delivered to the other side of shelf. The inner parts of the circular or ellipsoid holes are spiral-shaped. By means of the said holes, the resistance acting on the air while passing through the base is minimized, thus improving the cooling performance of the cooling device, reducing the operation times of the cooling device and decreasing the energy consumption.
- [0012] In an embodiment of the present invention, the cooling device comprises the base in the form of a netting produced from latex. Thus, the life span of the door shelf is increased and ease of production is provided. Another advantageous effect of the base produced from latex is that, as a result of the flexible structure of latex, the base retains the items on the shelf surface by surrounding the base of the item that is placed thereon, thus preventing the items from moving when the cooling device door is opened/closed.
- [0013] By means of the present invention, in the cooling devices, the production and the mounting of the base are facilitated. Another aim of the present invention is to improve the air circulation inside the cooling device and to eliminate the problem concerning the level of the body shelves and the doors shelves arising from the design criteria that is applied to all cooling devices. Yet another aim of the present invention is to prevent the items from tumbling, falling and getting damaged when the door is opened fast. By means of the flexible and perforated base structure of the door shelf, the air circulation inside the cooling device is improved and the items placed onto the door shelf are prevented from getting damaged.
- [0014] A cooling device realized in order to attain the aim the object of the present invention is illustrated in the attached figures, where:
- [0015] Figure 1 – is the perspective view of the cooling device when the door is open in an embodiment of the present invention.

- [0016] Figure 2 – is a top view of the door shelf when the shelf is full in an embodiment of the present invention,
- [0017] Figure 3 - is the front view of the door shelf when the shelf is full.
- [0018] Figure 4 – is the bottom view of the door shelf.
- [0019] Figure 5 – is the view of detail A in Figure 3.
- [0020] Figure 6 – is the view of detail B in Figure 3.
- [0021] The elements illustrated in the figures are numbered as follows:
1. Cooling device
 2. Body
 3. Door
 4. Door shelf
 5. Base
- [0022] The cooling device (1) comprises
- a body (2),
 - a door (3) that provides access into the body (2), and
 - at least one shelf (4) that can be disposed onto the inner surface of the door (3) and that is suitable for placing the items to be stored therein
- [0023] (Figure 1).
- [0024] The cooling device (1) of the present invention comprises the door shelf (4) having a base (5) that can stretch so as to at least partially grip the items such as cans and bottles placed therein(Figure 1).
- [0025] The flexible base (5) that forms the bottom surface of the door shelf (4) of the cooling device (1) takes the shape of the items placed into the door shelf (4) and the items are prevented from moving when the door (3) is opened/closed. Thus, when the door (3) is opened/closed fast, the items are prevented from tumbling, toppling down or getting damaged inside the shelf (4), and the items that are taller than the lateral height of the door shelf (4) are prevented from falling off the door shelf (4).
- [0026] In an embodiment of the present invention, the cooling device (1) comprises the base (5) in perforated form. The perforations of the door shelf (4) enables the air circulation inside the cooling device (1) to be carried out without being hindered and thus, the problem concerning the levels of the body shelves and the door shelves (4) arising from the design

criteria that is applied to all cooling devices (1) is solved. In order not to hinder the air circulation inside the cooling device (1), the body shelves and the door shelves (4) are mounted at different levels. Disposing the door shelf (4) and the body shelf at different levels according to the design criteria deteriorates the cold air circulation inside the cooling device (1), prolongs the start-stop duration of the cooling device (1) and decreases the cooling performance of the cooling device (1). The perforated structure of the door shelf (4) base (5) allows the cool air to pass through the door shelf (4) and reach other regions and thus, enables the cooling performance of the cooling device (1) to be improved. (Figure 2, Figure 4).

[0027] In an embodiment of the present invention, the cooling device (1) comprises the base (5) in the form of a netting. By means of the netting structure extending freely downwards from the bottom surface of the door shelf (4), the items placed onto the door shelf (4) remain on the lower part of the netting and are prevented from moving when the door (3) is opened/closed. Similarly, the perforated structure of the base (5) allows the cool air to pass through the door shelf (4) and reach other regions and thus, enables the cooling performance of the cooling device (1) to be improved, and the problem concerning the levels of the body shelves and the door shelves (4), arising from the design criteria that is applied to all cooling devices (1) is solved.

[0028] In an embodiment of the present invention, the cooling device (1) comprises the base (5) produced from a material that stretches in proportion to the weight of the item placed thereon such that the angle between the base (5) and the horizontal axis of the door shelf (4) does not exceed a value predetermined by the producer. By means of the flexible structure of the base (5), the base (5) takes the shape of the items placed thereon and thus, the movement of the items is minimized and the interior volume of the cooling device (1) can be used most efficiently.

[0029] In an embodiment of the present invention, the cooling device (1) comprises the door shelf (4) that has spiral perforations that enable the cool air to be transferred to the other side of the door shelf (4) optimally. By means of the recesses and protrusions arranged on the inner walls of

the perforations and forming spirals, the cool air creates vortices while passes through the perforations and the vortices minimizes the air resistance acting on the cool air, thus shortening the operation duration of the cooling device (1) and improving the performance thereof while decreasing the energy consumption of the cooling device (1).

[0030] In an embodiment of the present invention, the cooling device (1) comprises the base (5) that is produced from latex. The high thermal storage capacity of the base (5) produced from latex improves the performance of the cooling device (1). Similarly, the items that are stored in the door shelf (4) are prevented from being subjected to the outer environment temperature and from being spoiled as a result of the temperature fluctuations when the door (3) is opened.

[0031] By means of the present invention, in the cooling devices (1), by means of the flexible structure of the base (5), the items stored in the door shelf (4) are prevented from tumbling, toppling down and creating undesired noises as a result of the movement of the door (3). Another advantageous effect of the present invention is that, in the cooling devices (1), the design criteria proposing that the door shelves (4) and the body shelves should not be at the same level so as not to prevent the air circulation is obviated by means of the perforated structure of the base (5).

Claims

1. A cooling device (1) **comprising**
 - a body (2);
 - a door (3) that provides access into the body (2), and
 - at least one door shelf (4) that can be disposed onto the inner wall of the door (3) and that is suitable for placing the items to be stored therein,
characterized by the door shelf (4) having a base (5) that can stretch so as to at least partially grip the items such as cans and bottles placed therein.
2. A cooling device (1) as in Claim 1, **characterized by** the base (5) that is perforated.
3. A cooling device (1) as in any one of the above claims, **characterized by** the base (5) that is in the form of a netting.
4. A cooling device (1) as in any one of the above claims, **characterized by** the base (5) produced from a material that stretches in proportion to the weight of the item placed thereon such that the angle between the base (5) and the horizontal axis of the shelf (4) does not exceed a value predetermined by the producer.
5. A cooling device (1) as in any one of the above claims, **characterized by** the door shelf (4) that has holes in spiral form enabling the cool air that comes from one surface of the door shelf (4) to be efficiently delivered to the other side of the door shelf (4).
6. A cooling device (1) as in any one of the above claims, **characterized by** the base (5) that is produced from latex.

Figure 1

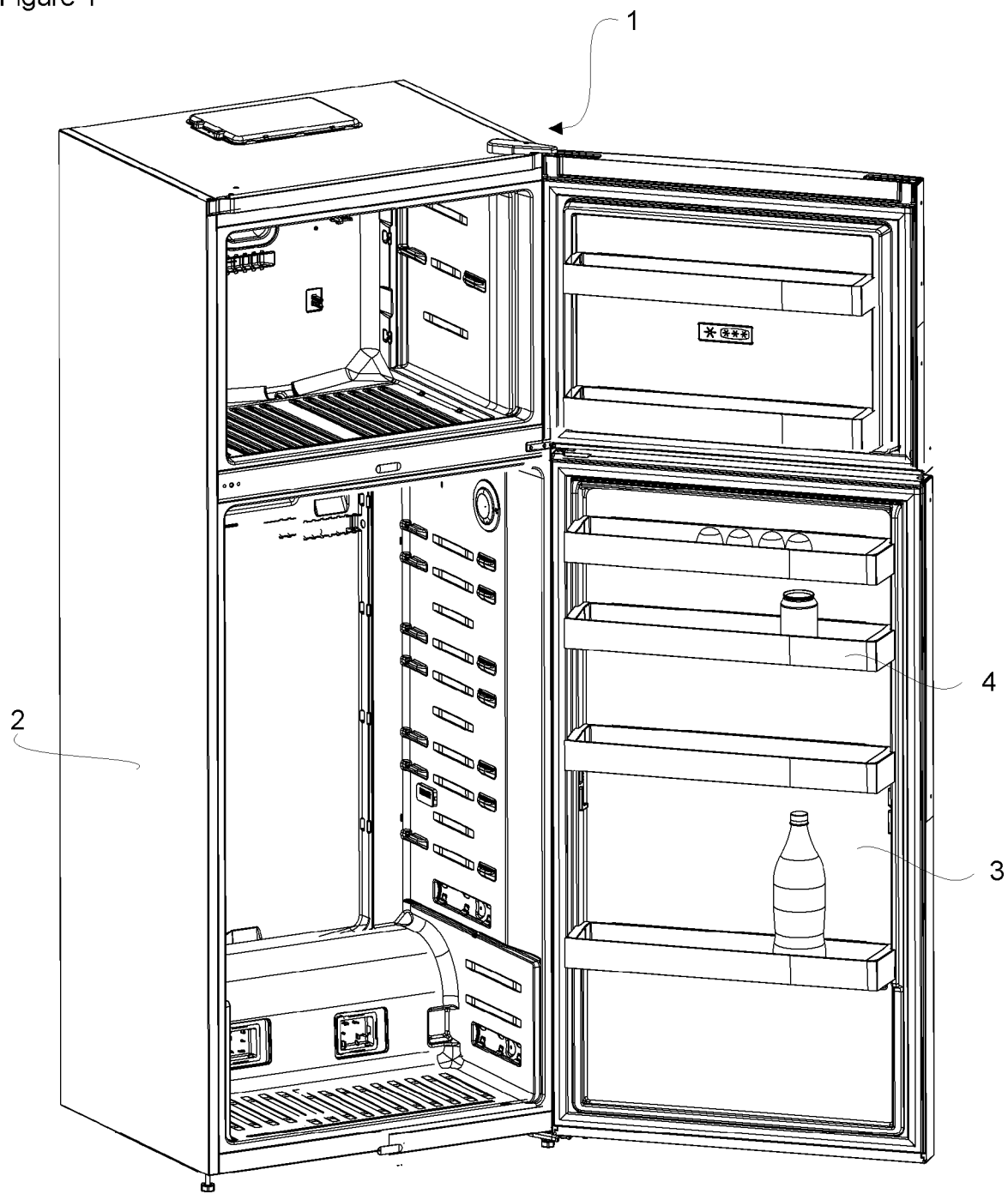


Figure 2

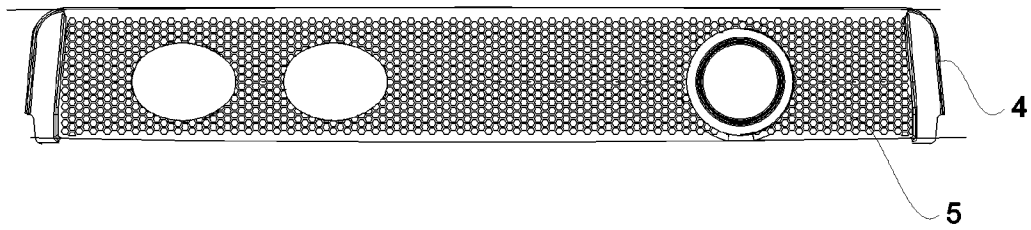


Figure 3

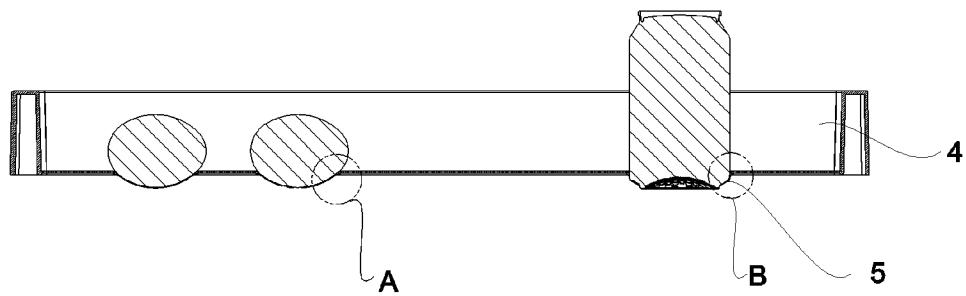


Figure 4

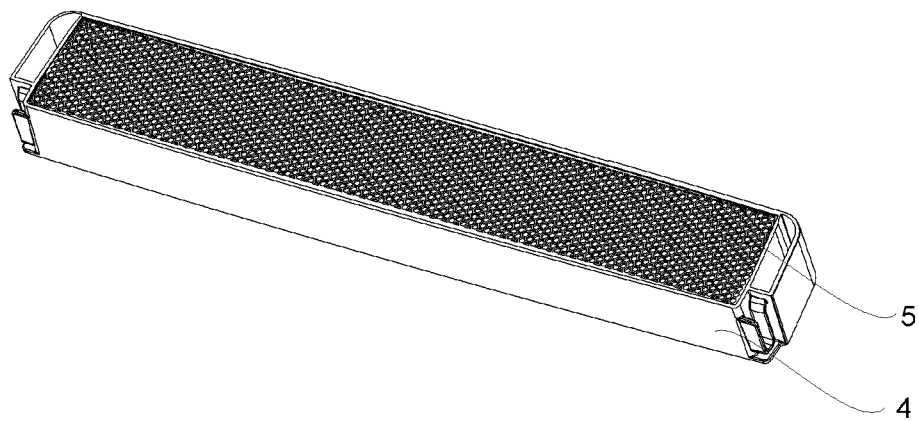


Figure 5

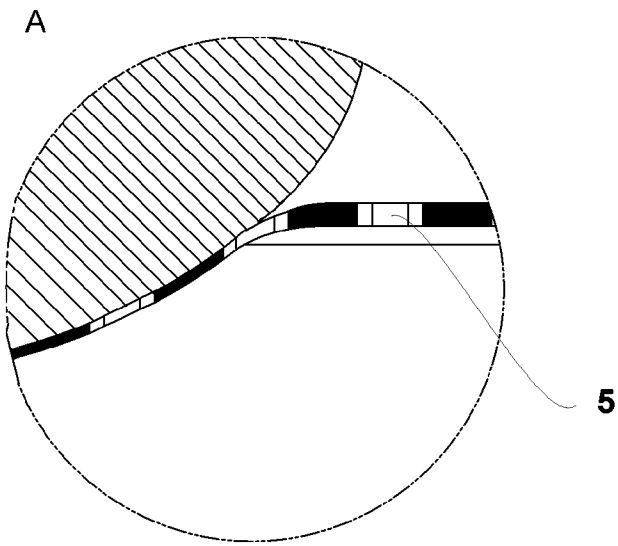
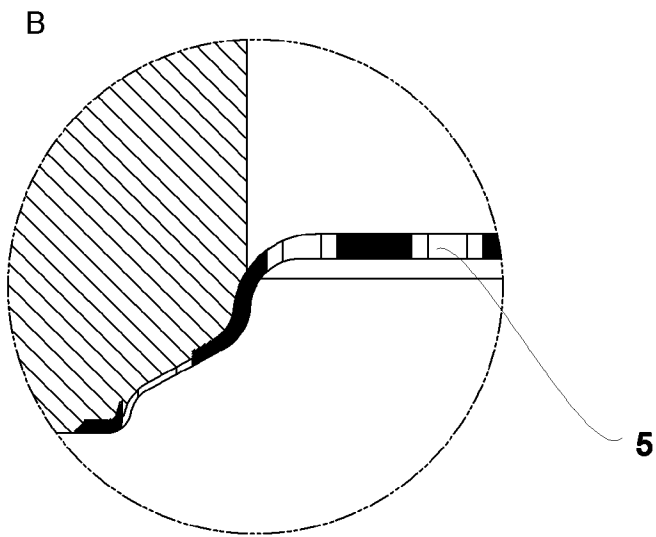


Figure 6



INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2017/057838

A. CLASSIFICATION OF SUBJECT MATTER
INV. F25D23/04
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	DE 10 2009 027628 A1 (BSH BOSCH SIEMENS HAUSGERAETE [DE]) 13 January 2011 (2011-01-13)	1,4,6
Y	abstract; figures 1-2 paragraphs [0008], [0021], [0029], [0030]	3
X	DE 10 2011 006863 A1 (BSH BOSCH SIEMENS HAUSGERAETE [DE]) 11 October 2012 (2012-10-11) abstract; figures 1-4 paragraph [0031] - paragraph [0036]	1,2,4,6
X	JP S64 5089 U (NOT KNOWN) 12 January 1989 (1989-01-12) the whole document	1,2,4,6
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Further documents are listed in the continuation of Box C.



See patent family annex.

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Date of the actual completion of the international search

29 June 2017

Date of mailing of the international search report

06/07/2017

Name and mailing address of the ISA/

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INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2017/057838

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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Y	DE 10 2011 075101 A1 (BSH BOSCH SIEMENS HAUSGERAETE [DE]) 8 November 2012 (2012-11-08)	3
A	abstract; figures 1-3 -----	1
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2017/057838

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