(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 563 100 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
08.06.2022 Bulletin 2022/23

(21) Application number: **16822475.6**

(22) Date of filing: **28.12.2016**

(51) International Patent Classification (IPC):
F25D 23/06 *(2006.01)*

(52) Cooperative Patent Classification (CPC):
F25D 23/064; F25D 2201/10

(86) International application number:
PCT/EP2016/082771

(87) International publication number:
WO 2018/121858 (05.07.2018 Gazette 2018/27)

(54) A COOLING DEVICE COMPRISING A BODY WITH IMPROVED STRUCTURAL ALIGNMENT

KÜHLGERÄT UMFASSEN EINEN KÖRPER MIT VERBESSERTER STRUKTURELLE AUSRICHTUNG

DISPOSITIF DE REFROIDISSEMENT COMPRENANT UN CORPS AVEC ALIGNEMENT STRUCTURAL AMÉLIORÉ

(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

(43) Date of publication of application:
06.11.2019 Bulletin 2019/45

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Description

[0001] The present invention relates to a cooling device, the structural alignment of which is improved.

[0002] In cooling devices, especially in refrigerators and freezers, an insulating material, that is generally closed-cell rigid polyurethane, is filled between the liner and the outer case of the body in order to provide heat insulation between the inner volume and the outer environment. One or more of the walls of the outer case, and preferably usually the back outer wall, can be made of a semi-rigid papery material, such as a cardboard, which provides light weight together with optimal insulation and acoustical properties.

[0003] In the state of the art, the international patent application n. WO2000/35321 and the Japanese application n. JP2012220157A describe for instance cooling devices comprising one or more of the walls of the outer case of the body made of a papery material. Patent applications WO2013/060629, EP2402689, and EP2952841 disclose cooling devices comprising raised elements in their back walls.

[0004] Generally, during the production process, the liner and the outer case of the body are placed in a mold and the insulating material, such as polyurethane, is injected as a liquid between them while in the mold, and over a short period of time expands to fill the space between liner and outer case. Due to the injection technic used to fill the intermediate volume between the liner and the outer case of the body, the liquid insulating material is not homogeneously distributed in such volume. The body is usually demolded before the complete curing and cooling of the insulating material has occurred, so that the latter continues cooling after the body has been demolded. Due to the initial inhomogeneous distribution of the insulating material in the intermediate volume, differential pressure forces act on the liner and on the outer case of the body and irregular contracting of the foamed mass or local collapsing of the cellular structure of the foam can occur which can lead to deformation in particular of the walls of the outer case made of papery material.

[0005] This entails problems in the structure of the body and more specifically a poor structural alignment of the body due to the deformation of the walls of the outer case made of papery material, which causes misalignments on the body, on the accessories mounted on the body and on the door subsequently mounted on the body. These misalignments may provoke an early wearing of the accessories mounted on the body, such as for instance hinges, and are particularly problematic for double door or multi door refrigerators, wherein a perfect matching of the doors defining the front wall of the refrigerator is required.

[0006] Such misalignments and the consequences deriving from them adversely affect the overall satisfaction on the final user.

[0007] The aim of the present invention is the realization of a cooling device comprising a body which structural alignment is increased.

[0008] The cooling device realized in order to attain the aim of the present invention is defined in the first claim and the respective claims thereof.

[0009] In an embodiment the protrusions/recesses are obtained by pressing the papery material board, in an easy and quick manner.

[0010] The protrusions/recesses are arranged substantially on the whole surface of the back wall, so as to increase the mechanical resistance of the whole back wall.

[0011] The protrusions/recesses extend along both vertical and horizontal parallel directions defining concentric closed shapes spaced apart from one another on the outer surface of the back wall.

[0012] In an embodiment, the back wall comprises a raised central plateau wherein the thickness of the back wall is advantageously increased and which can be obtained by means of blow molding.

[0013] In a version of this embodiment the thickness increase of the back wall on the central plateau is comprised between 5 mm and 25 mm and preferably it is comprised between 10 mm and 20 mm. In a further version of this embodiment, the protrusions/recesses have a thickness and/or a depth which is substantially equivalent to half the thickness of the central plateau.

[0014] According to an embodiment, the cooling device of the invention is a refrigerator and in particular it is a double door refrigerator, while according to a further embodiment it is a multi-door refrigerator.

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

Figure 1 - is a front perspective view of a cooling device according to the invention with the door removed, i.e. of the body of the cooling device.

Figure 2 - is a cross-sectional view of the body of Figure 1, taken along the vertical longitudinal median plane.

Figure 3 - is a rear perspective views from below of the body of Figure 1 according to an embodiment.

Figure 4 - is a rear perspective views from below of the back wall of the outer case of the body of Figure 3.

Figure 5 - is a rear view of the back wall of Figure 4.

Figures 6 and 7 - are respectively a cross-sectional view of the back wall of Figure 4 taken along line VI-VI of Figure 5 and an enlarged detail of it.

Figures 8 and 9 - are respectively a cross-sectional view of the back wall of Figure 4 taken along line VIII-VIII of Figure 6 and an enlarged detail of it.

Figures 10 and 11 - are rear perspective views from below of the body of Figure 1 according to two unclaimed embodiments.

[0016] The elements illustrated in the figures are numbered as follows:

1. Cooling device
2. Body
3. Liner
4. Outer case
5. Back wall
6. Intermediate volume
7. Insulation material
8. Outer surface
9. Protrusions
10. Recesses
11. Central plateau

[0017] The cooling device 1 comprises a body 2 that has a liner 3 and an outer case 4 comprising a back wall 5 made of a semi-rigid papery material such as a paperboard or a cardboard.

[0018] The liner 3 and the outer case 4 define between them an intermediate volume 6 filled with an insulation material 7, such as for instance polyurethane foam.

[0019] According to the present invention, the back wall 5 of the outer case 4 has an outer surface 8 and it comprises a plurality of protrusions 9 and/or recesses 10 arranged on the outer surface 8. The protrusions 9 and/or the recesses 10 increase the stiffness of the back wall 5, which therefore does not deform due to the transformations of the insulation material placed in the intermediate volume 6 during the production process of the body 2 of the cooling device 1. This ensures a better structural alignment of the body 2, so that no additional working phases, like a re-alignment phase, are required during the production of the body 2, thus diminishing the production time and cost.

[0020] In the attached figures and in the following a cooling device 1 having only the back wall 5 of the outer case 4 made of a papery material is described. However, the outer case 4 may comprise also further walls, such as for instance the lateral walls, made of a papery material and provided with protrusions 9 and/or recesses 10 according to the present invention, without departing from the scope of protection of the present invention.

[0021] Preferably both protrusions 9 and recesses 10 are provided on the outer surface 8 of the back wall 5.

[0022] The protrusions 9 and/or recesses 10 provided on the back wall 5 contribute also to improve the acoustical properties of the body 2 of the cooling device 1, diminishing the vibrations and hence the noise produced by the cooling device 1.

[0023] According to an embodiment, the protrusions 9 and/or recesses 10 are obtained on the outer surface 8 of the back wall 5 by pressing. This allows to easily obtain a back wall 5 with variable thickness, thus defining the desired protrusions 9 and/or recesses 10 on its outer surface 8.

[0024] The protrusions 9 and/or the recesses 10 are arranged substantially on the whole outer surface 8 of the back wall 5.

[0025] The protrusions 9 and/or recesses 10 define a plurality concentric closed shapes, spaced apart from one another.

[0026] The above mentioned arrangements of the protrusions 9 and/or recesses 10 on the outer surface 8 of the back wall 5 ensure a substantially even stiffness of the back wall 5 along its whole vertical and horizontal extension, thus avoiding the presence of weak areas on the back wall 5 which could collapse and deform during the production process of the cooling device 1.

[0027] According to an embodiment illustrated in the attached figures, the back wall 5 comprises a raised central plateau 11 and the protrusions 9 and/or recesses 10 are provided on the outer surface 8 of the back wall 5 on the raised central plateau 11.

[0028] In particular, the thickness of the back wall 5 is increased on the central plateau 11. In a version of this embodiment, the thickness increase of the back wall 5 on the central plateau 11 is comprised between 5 mm and 25 mm, and preferably is comprised between 10 mm and 20 mm. The presence of the central plateau 11 having in particular an increased thickness contributes to improve the stiffness of the back wall 5.

[0029] In an embodiment, the protrusions 9 and/or recesses 10 have a thickness and/or a depth substantially equivalent to half of the thickness of the central plateau 11. This ensures that optimal mechanical characteristics are conferred to every part of the back wall 5, without having portions of the back wall 5 having too little thickness that could result in a weakening of the back wall 5 while at the same time not increasing excessively the amount of space occupied by the body 2.

[0030] According to an embodiment, the raised central plateau 11 is obtained on the outer surface 8 of the back wall 5 by means of blow molding.

[0031] In an embodiment, the cooling device 1 above described is a refrigerator. In particular, the cooling device 1 above described is a double door refrigerator and in a further embodiment it is a multi-door refrigerator. As previously specified, in fact, having a back wall 5 with mechanical characteristics that avoid possible deformations of the back wall 5 itself and, consequently, of the body 2 is particularly important in case of double or multi

door refrigerators where misalignments on the body 2 would result immediately apparent due to a poor matching of the doors on the front of the refrigerators, thus diminishing the user satisfaction and possibly affecting the overall cooling performances of the refrigerator.

[0032] By means of the present invention, adequate stiffness is provided to the back wall 5 of the body 2 of the cooling device 1 and, more in general, to the walls of the outer case 4 made of a papery material, thus avoiding possible deformations of such walls during the production process of the cooling device 1 and hence misalignments on the body 2 that could lead to an early wear of the accessories of the cooling device 1, to poor aesthetical appearance of the cooling device and, more in general, to a poor overall satisfaction of the user.

Claims

1. A cooling device (1) **comprising** a body (2) having a liner (3), an outer case (4) comprising a back wall (5) made of a papery material, an intermediate volume (6) between the liner (3) and the outer case (4) and an insulation material (7) filled into the intermediate volume (6), wherein the back wall (5) of the outer case (4) comprises an outer surface (8) and plurality of protrusions (9) and/or recesses (10) arranged on the outer surface (8); **characterized in that** the protrusions (9) and/or recesses (10) are arranged substantially on the whole outer surface of the back wall (5), defining a plurality of concentric closed shapes spaced apart from one another on the outer surface (8) of the back wall (5).

2. A cooling device (1) as in Claim 1, **characterized in that** the protrusions (9) and/or recesses (10) are obtained on the outer surface (8) of the back wall (5) by pressing.

3. A cooling device (1) as in any one of the above claims, **characterized in that** the back wall (5) comprises a raised central plateau (11) and the protrusions (9) and/or recesses (10) are provided on the outer surface (8) of the back wall (5) on the raised central plateau (11).

4. A cooling device (1) as in Claim 3, **characterized in that** the thickness of the back wall (5) is increased on the central plateau (11).

5. A cooling device (1) as in Claim 4, **characterized in that** the thickness increase of the back wall (5) on the central plateau (11) is comprised between 5 mm and 25 mm.

6. A cooling device (1) as in Claim 4 or 5, **characterized in that** the protrusions (9) and/or recesses (10) have a thickness and/or a depth substantially equivalent to half of the thickness of the central plateau (11).

7. A cooling device (1) as in any one of the above claims, **characterized in that** it is a refrigerator.

8. A cooling device (1) as in any one of the above claims, **characterized in that** it is a double door refrigerator.

9. A cooling device (1) as in any one of the Claims 1 to 7, **characterized in that** it is a multi-door refrigerator.

Patentansprüche

1. Ein Kühlgerät (1) **umfasst** einen Körper (2) mit einer Auskleidung (3), eine Außengehäuse (4), die eine Rückwand (5) aus einem papierartigen Material umfasst, ein Zwischenvolumen (6) zwischen der Auskleidung (3) und dem Außengehäuse (4) und eine in das Zwischenvolumen (6) eingefüllte Isolationsmaterial (7), wobei die Rückwand (5) des Außengehäuses (4) eine Außenfläche (8) und mehrere Vorsprünge (9) und/oder Vertiefungen (10) umfasst, die auf der Außenfläche (8) angeordnet sind; **gekennzeichnet ist er durch** die Vorsprünge (9) und /oder Vertiefungen (10), die im Wesentlichen auf der gesamten Außenfläche der Rückwand (5) angeordnet sind und eine Vielzahl von konzentrischen geschlossenen Formen definieren, die voneinander beabstandet auf der Außenfläche (8) der Rückwand (5) sind.

2. Ein Kühlgerät (1), wie in Anspruch 1 aufgeführt, **ist dadurch gekennzeichnet, dass** die Vorsprünge (9) und/oder Vertiefungen (10) auf der Außenfläche (8) der Rückwand (5) durch Pressen erhalten sind.

3. Ein Kühlgerät (1), wie in einem der vorherigen Ansprüchen aufgeführt, **ist dadurch gekennzeichnet, dass** die Rückwand (5) ein erhöhtes Mittelplateau (11) aufweist, wobei die Vorsprünge (9) und/oder Vertiefungen (10) an der Außenfläche (8) der Rückwand (5) auf dem erhöhten Mittelplateau (11) vorgesehen sind.

4. Ein Kühlgerät (1), wie in Anspruch 3 aufgeführt, **ist dadurch gekennzeichnet, dass** die Dicke der Rückwand (5) auf dem Mittelplateau (11) erhöht ist.

5. Ein Kühlgerät (1), wie in Anspruch 4 aufgeführt, **ist dadurch gekennzeichnet, dass** die Dickenzunahme der Rückwand (5) auf dem Mittelplateau (11) zwischen 5 mm und 25 mm liegt.

6. Ein Kühlgerät (1), wie in Anspruch 4 oder 5 aufgeführt, **ist dadurch gekennzeichnet, dass** die Vorsprünge (9) und/oder Vertiefungen (10) eine Dicke

und/oder eine Tiefe haben, die im Wesentlichen gleich der Hälfte der Dicke des zentralen Plateaus (11) ist.

7. Ein Kühlgerät (1), wie in einem der vorherigen Ansprüchen aufgeführt, **ist dadurch gekennzeichnet, dass** es ein Kühlschrank ist.

8. Ein Kühlgerät (1), wie in einem der vorherigen Ansprüchen aufgeführt, **ist dadurch gekennzeichnet, dass** es ein Doppeltürkühlschrank ist.

9. Ein Kühlgerät (1), wie in den Ansprüchen 1 bis 7 aufgeführt, **ist dadurch gekennzeichnet, dass** es ein mehrtüriger Kühlschrank ist.

Revendications

1. Un appareil de refroidissement (1) **comprenant** un corps (2) ayant un revêtement (3), un boîtier extérieur (4) comprenant une paroi arrière (5) faite d'un matériau en papier, un volume intermédiaire (6) entre le revêtement (3) et le boîtier extérieur (4) et un matériau isolant (7) placé dans le volume intermédiaire (6), dans lequel la paroi arrière (5) du boîtier extérieur (4) comprend une surface extérieure (8) et une pluralité de saillies (9) et/ou d'évidements (10) disposés sur la surface extérieure (8) ; **est caractérisé en ce que** les saillies (9) et/ou les évidements (10) sont disposés sensiblement sur toute la surface extérieure de la paroi arrière (5), définissant une pluralité de formes fermées concentriques espacées les unes des autres sur la surface extérieure (8) de la paroi arrière (5).

2. Un appareil de refroidissement (1) selon la déclaration 1, **est caractérisé en ce que** les saillies (9) et/ou les évidements (10) sont obtenus sur la surface extérieure (8) de la paroi arrière (5) par pressage de la paroi arrière (5).

3. Un appareil de refroidissement (1) selon l'une quelconque des déclarations précédentes, **est caractérisé en ce que** la paroi arrière (5) comprend un plateau central relevé (11) et les saillies (9) et/ou les évidements (10) sont prévus sur la surface extérieure (8) de la paroi arrière (5) sur le plateau central relevé (11).

4. Un appareil de refroidissement (1) selon la déclaration 3, **est caractérisé en ce que** l'épaisseur de la paroi arrière (5) est augmentée sur le plateau central (11).

5. Un appareil de refroidissement (1) selon la déclaration 4, **est caractérisé en ce que** l'augmentation d'épaisseur de la paroi arrière (5) sur le plateau central (11) est comprise entre 5 mm et 25 mm

6. Un appareil de refroidissement (1) selon la déclaration 4 ou 5, est **caractérisé en ce que** les saillies (9) et/ou les évidements (10) ont une épaisseur et/ou une profondeur sensiblement équivalente à la moitié de l'épaisseur du plateau central (11).

7. Un appareil de refroidissement (1) selon l'une quelconque des déclarations précédentes, **est caractérisé en ce qu'il** s'agit d'un réfrigérateur.

8. Un appareil de refroidissement (1) selon l'une quelconque des déclarations précédentes, **est caractérisé en ce qu'il** s'agit d'un réfrigérateur à double porte.

9. Un appareil de refroidissement (1) selon l'une quelconque des déclarations 1 à 7, **est caractérisé en ce qu'il** s'agit d'un réfrigérateur à portes multiples.

Figure 1

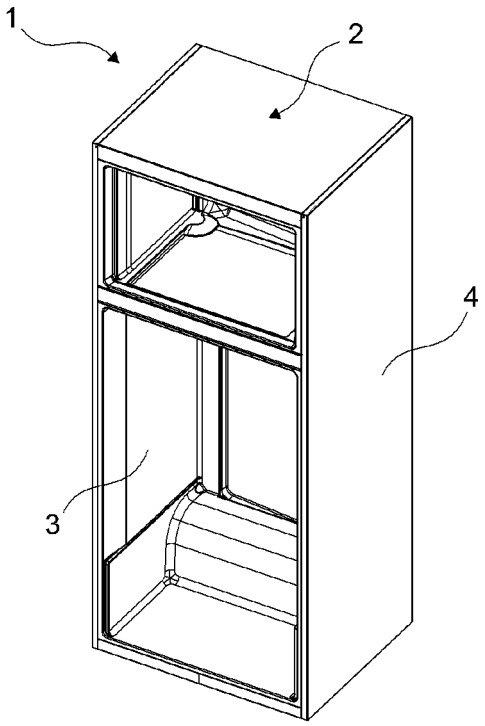


Figure 2

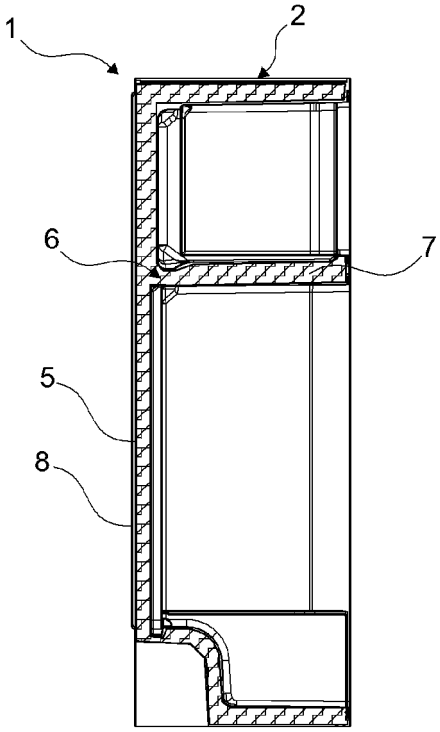


Figure 3

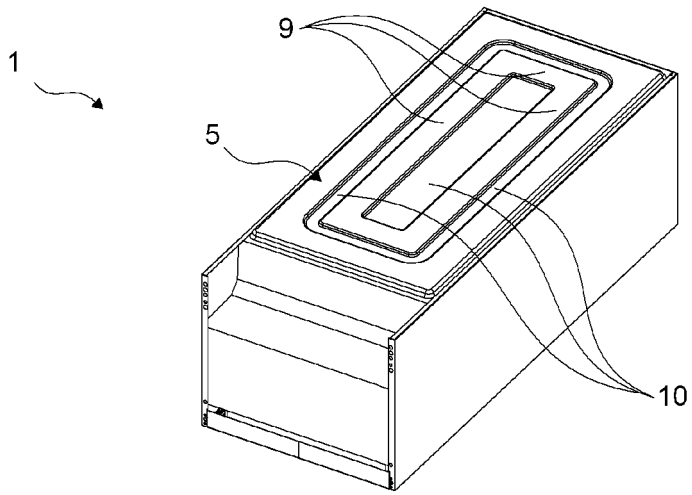


Figure 4

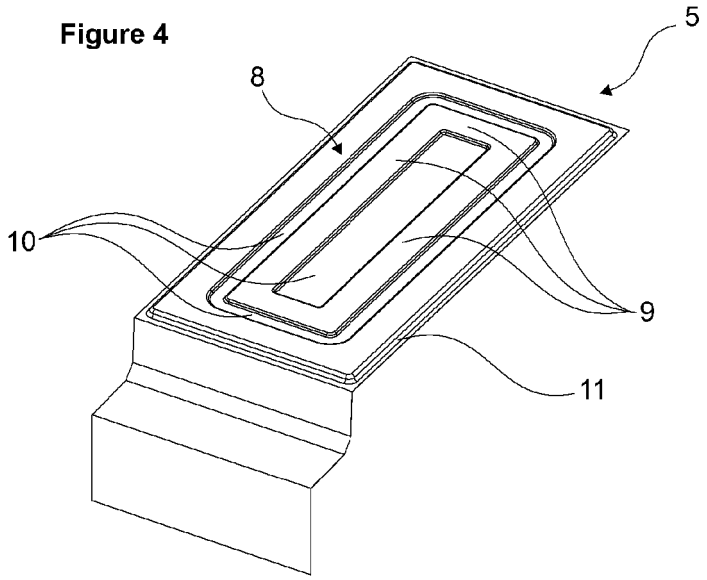


Figure 5

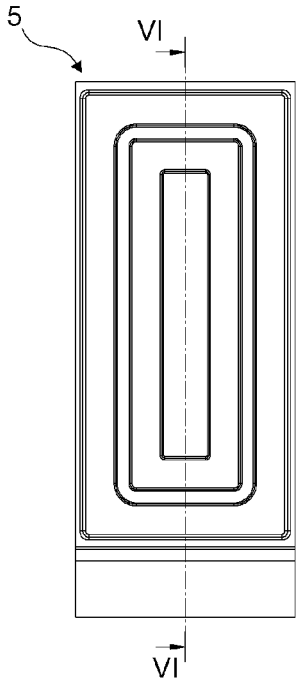


Figure 6

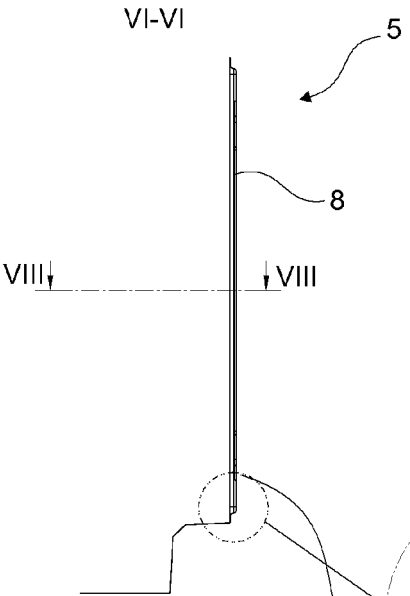


Figure 7

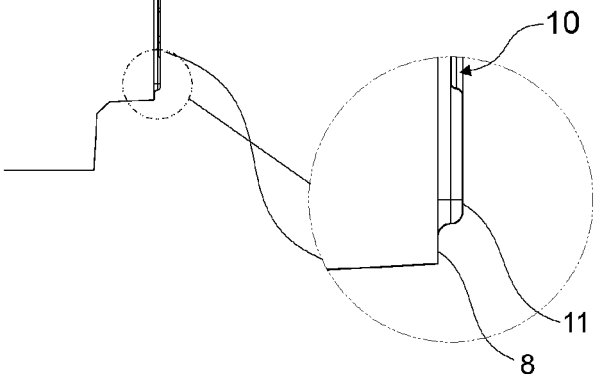


Figure 8

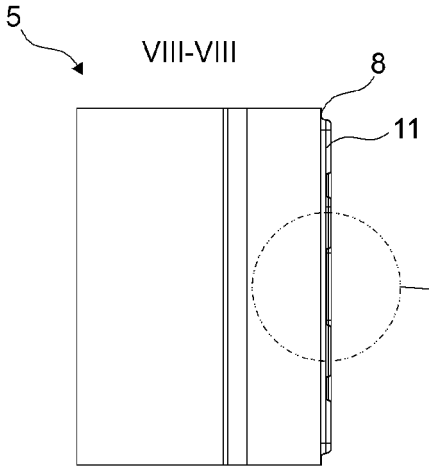


Figure 9

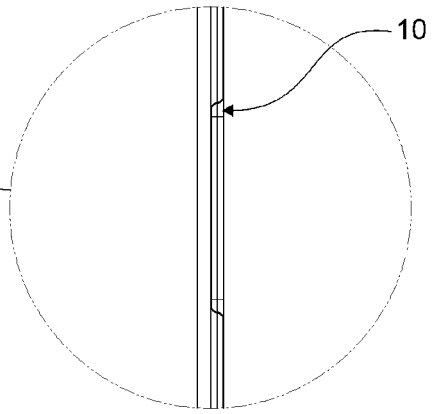


Figure 10

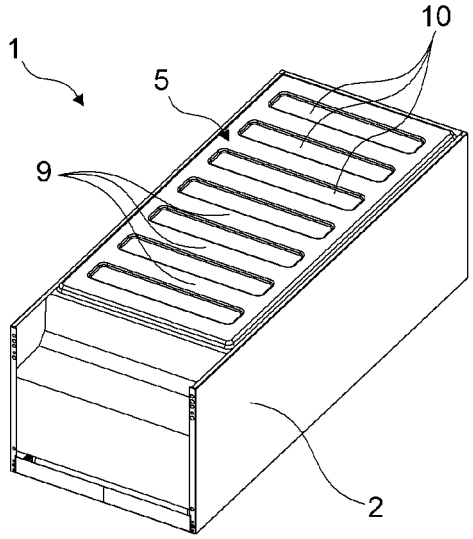
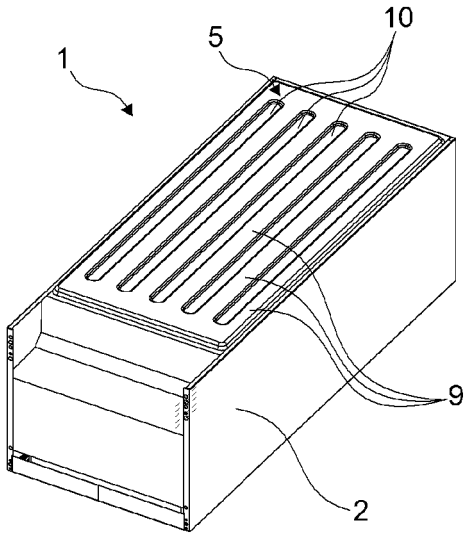


Figure 11



REFERENCES CITED IN THE DESCRIPTION

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