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(54) **A COOLING DEVICE COMPRISING AN INSULATION MATERIAL THAT IS PROVIDED TO BE DISTRIBUTED HOMOGENEOUSLY IN THE INSULATION VOLUME**

KÜHLVORRICHTUNG MIT EINEM ISOLIERMATERIAL ZUR HOMOGENEN VERTEILUNG IN EINEM ISOLATIONSVOLUMEN

DISPOSITIF DE REFROIDISSEMENT COMPRENANT UN MATÉRIAU D'ISOLATION QUI EST DISPOSÉ DE FAÇON À ÊTRE RÉPARTI DE FAÇON HOMOGÈNE DANS LE VOLUME D'ISOLATION

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Description

[0001] The present invention relates to a cooling device comprising an insulation material that is provided to be distributed homogeneously in the insulation volume.

[0002] In cooling devices, especially in refrigerators and freezers, an insulation material is filled between the inner and outer walls of the body in order to provide heat insulation between the inner volume and the outer environment. Due to its chemical structure, the insulation material, that is preferably polyurethane, expands and solidifies once it is filled into the body of the cooling device. During this solidification, gaps occur in the insulation material. At the ceiling that is the section the insulation material reaches last, these gaps occur more frequently and cause the sheet metal of the cooling device to collapse towards the section with gaps. These collapses are considered as malfunction by the user and this situation both increases maintenance costs and also distorts the quality perception of the user. In some embodiments, quick-solidifying polyurethane is used as the insulation material in order to speed up the body-insulation process and this causes an increase in the number of the gaps. When slow-solidifying polyurethane is used in order to prevent collapses on the surface of the body, the production slows down and efficiency decreases.

[0003] In the state of the art Japanese Patent Application No. JP9303947, a cooling device is described, wherein the insulation material is provided to be homogeneously distributed by means of the plates placed to the inner side of the inner wall of the body, contacting the insulation material. In this embodiment, a solidified epoxy layer and an intermediary resin layer are disposed between the inner wall and the insulation material.

[0004] In the state of the art Japanese Patent Application No. JP9303947, a heat insulation wall is described, wherein the top is left open, and after the insulation material is filled therein and pressed by means of a pressing means, the top is closed. In an embodiment of this invention, the heat insulation wall is the refrigerator door.

[0005] In DE 10 2008 043 284 A1 a cooling device according to the preamble of claim 1 is disclosed. In this prior art document, an element is inserted in the opening for injection of insulation material in order to achieve a homogenous filling of the insulation volume with the insulation material.

[0006] In DE19923382A1 a cooling device according to the preamble of claim 1 is disclosed.

[0007] The aim of the present invention is the realization of a cooling device wherein the gaps in the insulation material filled into the insulation volume are eliminated.

[0008] The cooling device realized in order to attain the aim of the present invention, is defined in independent claim 1. The insulation material is preferably polyurethane. The insulation material filled into the insulation volume through an opening arranged on the outer wall splits into smaller pieces by passing through the holes on the regulating members and thus the number of air gaps occurring during the solidification of the insulation material is decreased.

[0009] In an embodiment not according to the present invention, the regulating member is placed to the inner side of the inner wall, contacting the insulation material. Thus, formation of collapses on the outer surfaces of the inner wall facing the inner volume of the cooling device, is prevented.

[0010] In another embodiment not according to the present invention, the regulating member extends along the surface it is covered on, almost parallel to the inner wall and the outer wall.

[0011] In another embodiment not according to the present invention, the regulating member is net-shaped. In this embodiment, the regulating member can be easily shaped and is formed in compliance with the structure of the wall where it will be placed. The regulating member can be stored in rolls, can be shaped and used according to the geometry of the section where it will be used. Thus, storing costs are decreased. Moreover, since it is not needed to use different molds for different sections of the body, saving in mold costs is provided.

[0012] In another embodiment not according to the present invention, the regulating member is placed to the ceiling. Thus, the insulation material that starts solidifying before reaching the ceiling, is provided to flow in small pieces upon reaching the ceiling and big gaps that start being formed break into pieces. Thus, the frequently-encountered problem of the collapsing of the ceiling is prevented.

[0013] In a derivative of this embodiment, the regulating member is placed into an intermediary wall that separates the body into compartments.

[0014] In another embodiment not according to the present invention, the regulating member is placed into a door providing access into the body. In this embodiment, the regulating member is placed between the inner wall and the outer wall and provides the insulation material to be homogeneously distributed inside the door, thus providing the surface of the door to be smooth.

[0015] According to the present invention, two regulating members are placed at intervals between the inner wall and the outer wall so as to be parallel to each other. One of the regulating members is closer to the inner wall, and the other to the outer wall. In a derivative of this embodiment, the holes on the regulating member that is closer to the inner wall are smaller than the holes on the regulating member that is closer to the outer wall. Thus, the flow of the insulation material is regulated gradually, and gap-formation is provided to be minimized.

[0016] By means of the present invention, air gaps occurring during the solidification of the insulation material are eliminated and the inner wall is prevented from collapsing towards these gaps. Thus, malfunction-occurrence rate and maintenance costs are decreased, and the quality perception of the user is improved. Moreover, production efficiency is improved since quick-solidifying

insulation material can be used.

[0017] A cooling device not belonging to the present invention is illustrated in the attached figures, where:

Figure 1 - is the perspective view of a cooling device.
Figure 2 - is the perspective view of the inner wall and the regulating member.
Figure 3 - is the schematic view of the body.

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

1. Cooling device
2. Body
3. Inner wall
4. Outer wall
5. Insulation volume
6. Insulation material
7. Regulating member
8. Intermediary wall
9. Door

[0019] The cooling device (1) comprises a body (2) having an inner wall (3), an outer wall (4), an insulation volume (5) between the inner wall (3) and the outer wall (4) and an insulation material (6) filled into the insulation volume (5) (Figure 1, Figure 3).

[0020] While the inner wall (3) and the outer wall (4) is being joint during the production, an opening (O) is arranged so that the insulation material (6) can be filled into the insulation volume (5). The insulation material (6) that is filled preferably through a single opening (O), reaches almost every section of the insulation volume (5) thanks to its fluid structure. When filled into the insulation volume (5), the insulation material (6) that is composed of more than one chemical substance enters into exothermic reaction and solidifies as expanding. Thus, the interior volume of the cooling device (1) is provided to be insulated from the outer environment conditions and the durability of the body (2) is increased.

[0021] The cooling device (1) comprises at least one perforated regulating member (7) that is placed into the insulation volume (5) and that prevents the formation of gaps by regulating the flow of the insulation material (6). Upon contacting the regulating member (7) while being filled into the insulation volume (5), the insulation material (6) splits into smaller pieces by passing through the holes of the regulating member (7). Thus, the number of gaps being formed during the solidification is minimized, and the inner wall (3) is prevented from collapsing towards the outer wall (4) in course of time. This provides the malfunction-occurrence rate to decrease and the quality perception to increase. Moreover, by means of eliminating the gaps being formed during the solidification of the insulation material (6), quick-solidifying insulation material (6) can be used, and this shortens the production time, thereby increasing efficiency.

[0022] In an embodiment not according to the present invention, the regulating member (7) is placed on the face of the inner wall (3) facing the insulation volume (5). After the regulating member (7) is fastened onto the inner wall (3) from its edges, the insulation material (6) is filled into the insulation volume (5) through the opening (O) preferably arranged on the outer wall (4). Thus, the insulation material (6) is provided to be solidified at the section just above the inner wall (3) without formation of gaps, and collapses on the inner surface of the cooling device (1) are prevented.

[0023] In another embodiment not according to the present invention, the regulating member (7) is placed into the insulation volume (5) so as to be almost parallel to the inner wall (3) and the outer wall (4).

[0024] In another embodiment not according to the present invention, the regulating member (7) is net-shaped. Thus, the regulating member (7) can be easily shaped depending on the geometry of the surface it will be used. Thus, mold and logistic costs are decreased since it is not needed to produce and store regulating members (7) with different shapes for different sections of the body (2). Moreover, thanks to the low-cost and high availability of the net-shaped regulating member (7), cost advantage and production flexibility are provided (Figure 2).

[0025] In another embodiment not according to the present invention, the regulating member (7) is placed at the ceiling (T) section of the inner wall (3), throughout the ceiling (T). In this embodiment, the regulating member (7) is fastened to the ceiling (T) section of the inner wall (3) from its edges so as to cover the entire ceiling (T). Thus, the insulation material (6) is provided to be homogeneously distributed at the ceiling (T) where the insulation material (6) filled through the opening (O) located at the bottom of the body (2) reaches last, and possible collapses are prevented (Figure 2).

[0026] In another embodiment not according to the present invention, the body (2) comprises at least one intermediary wall (8) that divides the body into compartments and the regulating member (7) is placed into the intermediary wall (8). The insulation material (6) is homogeneously distributed over the surfaces of the intermediary wall (8) covered with the regulating member (7) and a smooth appearance is obtained (Figure 3). In a derivative of this embodiment, one regulating member (7) is disposed on each of the faces of the intermediary wall (8) facing both compartments.

[0027] In another embodiment not according to the present invention, the body (2) comprises at least one door (9) providing access therein and the regulating member (7) is placed into the door (9). Thus, the insulation material (6) is provided to be homogeneously distributed inside the door (9) and outer appearance is improved by preventing the occurrence of collapses on the surface of the door (9) (Figure 3).

[0028] In another embodiment not according to the present invention, the cooling device (1) comprises two regulating members (7) that are positioned to be spaced

apart from each other. The regulating members (7) are placed into the insulation volume (5) so as to be parallel to each other.

[0029] In the cooling device of the present invention, polyurethane is preferably used as the insulation material.

[0030] By means of the present invention, the inner wall contacting the insulation material is prevented from collapsing towards the outer wall due to the gaps that may occur because of the quick-solidification of the insulation material. Thus, the outer appearance of the cooling device is improved and the number of malfunction-records that may occur due to the collapses on the surface is provided to be decreased. Moreover, since it becomes possible to use quick-solidifying insulation material, per-product production time is decreased, thereby increasing the production efficiency.

Claims

1. A cooling device (1) **comprising** a body (2) having an inner wall (3), an outer wall (4), an insulation volume (5) between the inner wall (3) and the outer wall (4), an insulation material (6) filled into the insulation volume (5), and at least one perforated regulating member (7) that is placed into the insulation volume (5) for preventing the formation of gaps by regulating the flow of the insulation material (6) during it being filled into the insulation volume (5), wherein said regulating member (7) has a plurality of holes and is configured and is placed into the insulation volume (5) in such a manner that insulation material (6) during it being filled into the insulation volume (5) splits into smaller pieces by passing through said holes of the regulating member (7), wherein two regulating members (7) are placed at intervals between the inner wall (3) and the outer wall (4) so as to be parallel to each other, wherein one of the regulating members (7) is closer to the inner wall (3), and the other to the outer wall (4), and **characterised in that** the holes on the regulating member (7) that is closer to the inner wall (3) are smaller than the holes on the regulating member (7) that is closer to the outer wall (4).

Patentansprüche

1. Ein Kühlgerät (1) umfasst einen Körper (2), der eine Innenwand (3), eine Außenwand (4), ein Isolationsvolumen (5) zwischen der Innenwand (3) und der Außenwand (4), ein in das Isolationsvolumen (5) eingefülltes Isolationsmaterial (6) und mindestens ein in das Isolationsvolumen (5) eingebrachtes, perforiertes Regulierungselement (7) zur Verhinderung der Bildung von Lücken durch Regulierung des Flusses des Isolationsmaterials (6) während des Einfüllens in das Isolationsvolumen (5) aufweist, wobei das Regulierelement (7) mehrere Löcher aufweist und so konfiguriert ist und in dem Isoliervolumen (5) angeordnet ist, dass sich das Isoliermaterial (6) während des Einfüllens in das Isoliervolumen (5) in kleinere Stücke aufteilt, indem es durch die Löcher des Regulierelements (7) hindurchgeht, wobei zwei Regulierungselemente (7) in Abständen zwischen der Innenwand (3) und der Außenwand (4) so angeordnet sind, dass sie parallel zueinander sind, wobei eines der Regulierungselemente (7) näher an der Innenwand (3) und das andere näher an der Außenwand (4) ist, **gekennzeichnet ist es dadurch,** dass die Löcher auf dem Regulierungselement (7), das näher an der Innenwand (3) liegt, kleiner sind als die Löcher auf dem Regulierungselement (7), das näher an der Außenwand (4) liegt.

Revendications

1. Un dispositif de refroidissement (1) comprenant un corps (2) avec une paroi intérieure (3), une paroi extérieure (4), un volume d'isolation (5) entre la paroi intérieure (3) et la paroi extérieure (4), un matériau d'isolation (6) rempli dans le volume d'isolation (5), et au moins un élément de régulation perforé (7) qui est placé dans le volume d'isolation (5) pour empêcher la formation d'espaces vides en régulant le flux du matériau d'isolation (6) pendant qu'il est rempli dans le volume d'isolation (5), dans lequel cet élément de régulation (7) possède une pluralité de trous et est configuré et placé dans le volume d'isolation (5) de manière à ce que le matériau d'isolation (6), lors de son remplissage dans le volume d'isolation (5), se divise en morceaux plus petits en passant à travers les trous de l'élément de régulation (7), dans lequel deux éléments de régulation (7) sont placés à intervalles entre la paroi intérieure (3) et la paroi extérieure (4) de manière à être parallèles l'un à l'autre, dans lequel l'un des éléments de régulation (7) est plus proche de la paroi intérieure (3) et l'autre de la paroi extérieure (4), **et caractérisé en ce que** les trous sur l'élément de régulation (7) qui est plus proche de la paroi intérieure (3) sont plus petits que les trous sur l'élément de régulation (7) qui est plus proche de la paroi extérieure (4).

Figure 1

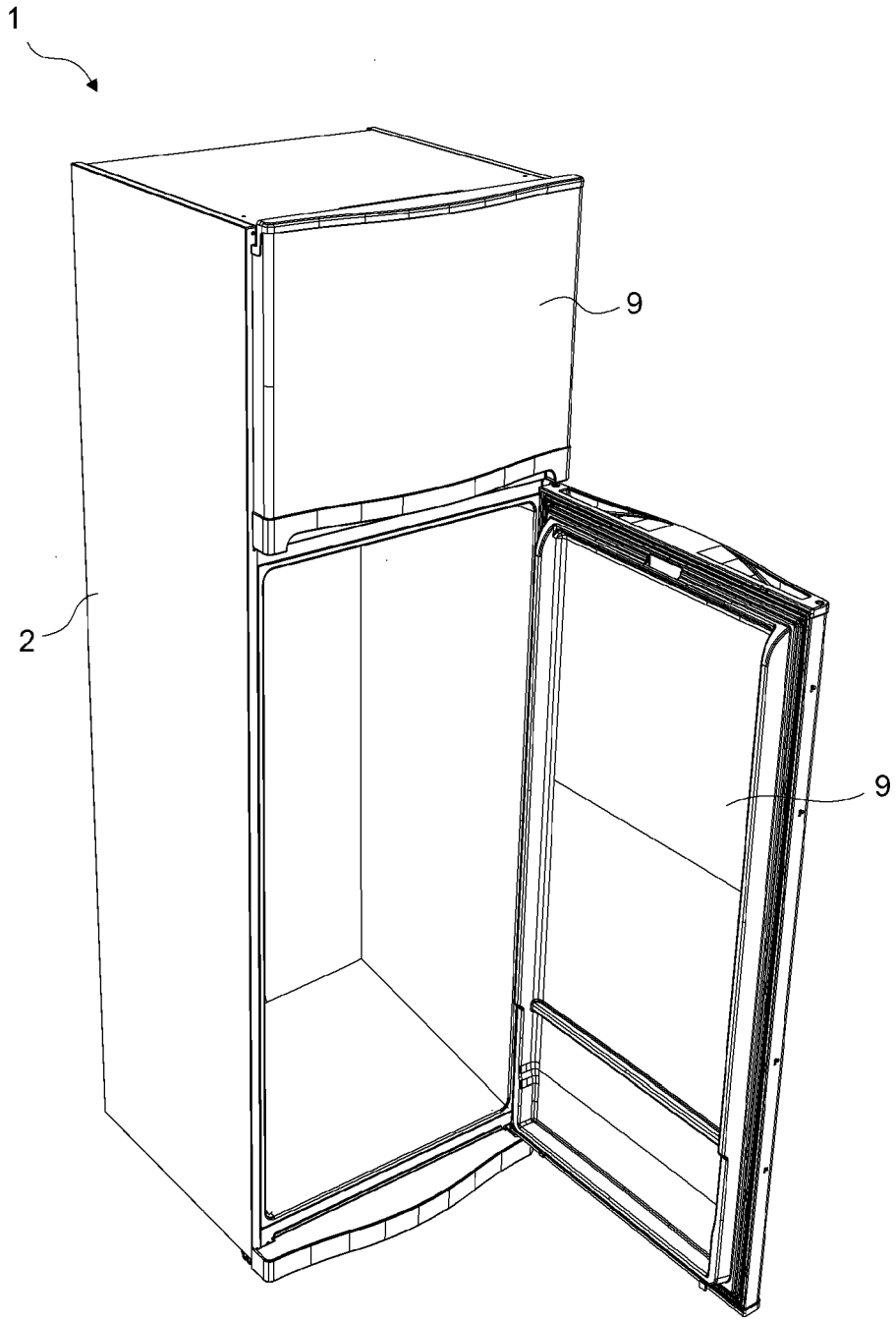


Figure 2

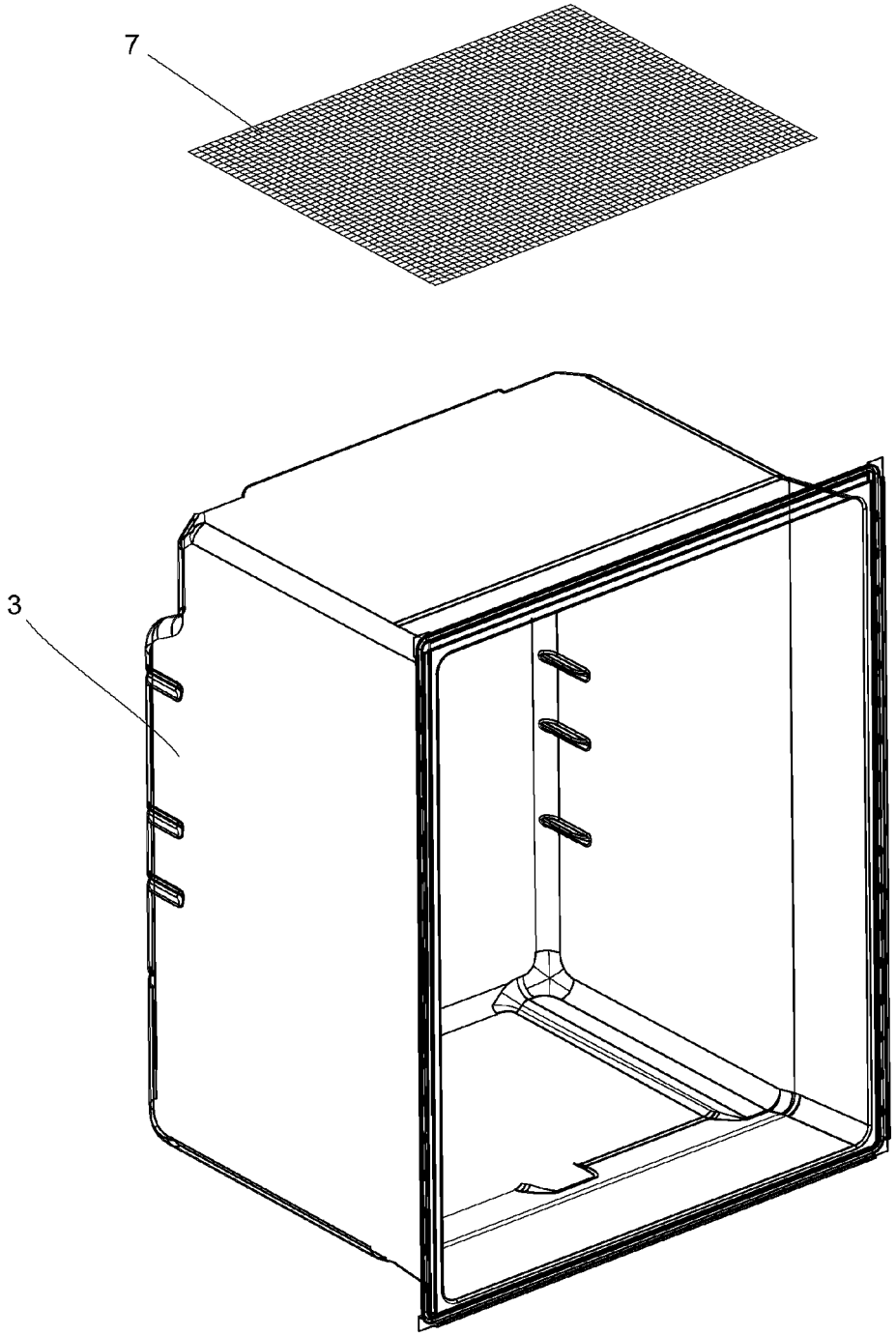
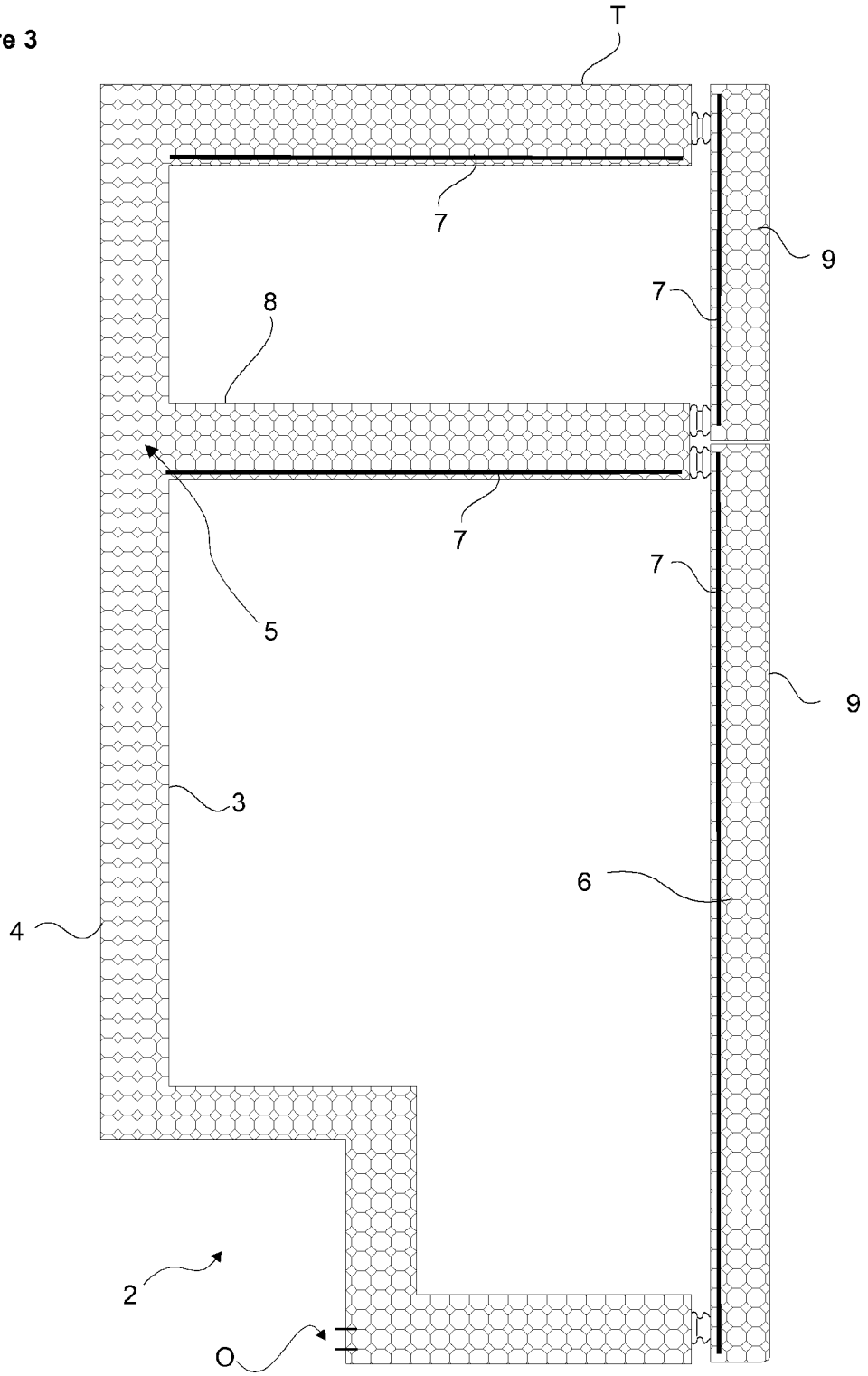


Figure 3



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