

(19)



(11)

EP 2 432 364 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:
13.02.2013 Bulletin 2013/07

(51) Int Cl.:
A47L 15/42 (2006.01)

(21) Application number: **10718997.9**

(86) International application number:
PCT/EP2010/056566

(22) Date of filing: **12.05.2010**

(87) International publication number:
WO 2010/133497 (25.11.2010 Gazette 2010/47)

(54) **A BUILT-IN DISHWASHER WITH REDUCED NOISE**

EINBAUGESCHIRRSPÜLMASCHINE MIT GERÄUSCHDÄMPFUNG

LAVE-VAISSELLE ENCASTRÉ À BRUIT RÉDUIT

(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 SE SI SK SM TR**

(30) Priority: **22.05.2009 TR 200903970**

(43) Date of publication of application:
28.03.2012 Bulletin 2012/13

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Description

[0001] The present invention relates to a built-in dishwasher whereby the noises generated during washing are reduced.

[0002] In dishwashers, while the water pressurized by the pump is delivered over the items to be washed by the spray arms, the inner walls of the door and the tub are simultaneously impacted which generates undesired washing noises. In addition to the washing noise, the pump motors underneath the tub and moreover the fan used in drying cause noises originating from the structure and flow.

[0003] In dishwashers, especially in built-in dishwashers wherein a decorative wooden panel is mounted on the door, a toe kick range is provided between the lower part of the door and the floor that extends like a recess and whereto the lower end of the wooden panel is seated by rotating when the door is opened. The openings in the toe kick range behave as a noise discharge path and the noises generated during washing are discharged to the outside environment mostly from the toe kick range. In state of the art, noise insulation materials are used particularly in the toe kick range for reducing the noises discharged to the outside environment, however if the insulation materials placed in the toe kick range are not of sufficient thickness, then the discharge of noise to the outside can not be prevented, and if the thickness of the insulation materials is increased, this time the depth of the toe kick range is reduced whereby not allowing the door to be opened entirely.

[0004] In the state of the art, there are implementations wherein the noise discharge paths in the toe kick range are insulated from the outside environment thus preventing the noise from discharging to the outside environment. For example, in the United States of America patent application no. US 2008/0236637, a dishwasher is explained wherein the discharge of noise to the outside is reduced. In the dishwasher, in the toe kick range in the lower end of the door, a sound-insulation member manufactured of a flexible material is placed on the front side of the base whereon the tub is seated and the discharge of noise is prevented between the lower end of the door and the case, through a base front cover, and between the base and the floor.

[0005] The aim of the present invention is the realization of a built-in dishwasher wherein the noise discharged to the outside is reduced.

[0006] The built-in dishwasher realized in order to attain the aim of the present invention is defined in the claims.

[0007] The built-in dishwasher of the present invention, comprises a base for supporting the tub at a certain height from the floor, a toe kick range placed at the front side of the door and extending beneath the door by forming a recess toward the base between the lower edge of the door and the floor, a front cover forming the rear wall of the toe kick range and covering the front side of the base,

a support plate forming the upper wall of the toe kick range by being parallel to the floor such that an L shape is formed with the front cover whereon the front portion of the tub is seated, the vibration insulation layers each of different thicknesses and of different material features are covered on the front and lower surfaces of the front cover and the support plate facing the toe kick range and acoustic insulation layers are separately covered over the vibration insulation layers. The vibration insulation layers are directly in contact with the front cover and the support plate and the acoustic insulation layers are disposed on the toe kick range side.

[0008] The vibration insulation layers covered over the front cover and the support plate in the toe kick range as the first layer dampen the vibrations of the front cover and the support plate and the acoustic vibration layers covered over the vibration insulation layers as the second layer reduce the discharge of noise to the outside environment.

[0009] In an embodiment of the present invention, the total thickness of the vibration insulation layer and the acoustic vibration layer covered on the upper support plate is greater than the total thickness of the vibration insulation layer and the acoustic vibration layer covered on the front cover. Since the support plate in the toe kick range is disposed right under the tub, the water splash noises generated in the tub try to be discharged over the support plate to the outside environment and the noise is effectively prevented from discharging to the outside environment by the vibration insulation layer and the acoustic insulation layer with increased thickness covered over the support plate. The vibration insulation layer and the acoustic insulation layer covered on the front side of the front cover with a thickness less than the insulation layers covered on the support plate allows the lower edge of the door to move easily inside the toe kick range as the door is opened and thereby allows the door to be opened entirely.

[0010] In another embodiment of the present invention, bitumen is used as the vibration insulation layer material and felt is used as the acoustic insulation layer material.

[0011] In the dishwasher of the present invention, the washing noises discharged to the outside environment are reduced and the lower edge of the door can easily move inside the toe kick range during opening, closing of the door by means of the vibration insulation layers and the acoustic insulation layers of different thicknesses covered on the toe kick range.

[0012] The built-in dishwasher realized in order to attain the aim of the present invention is illustrated in the attached figures, where:

[0013] Figure 1 - is the schematic view of a built-in dishwasher.

[0014] Figure 2 - is the schematic view of detail D in Figure 1.

[0015] The elements illustrated in the figures are numbered as follows:

1. Built-in dishwasher
2. Tub
3. Base
4. Door
5. Toe kick range
6. Front cover
7. Support plate
8. 108. Vibration insulation layer
9. 109. Acoustic insulation layer

[0016] The built-in dishwasher (1) comprises a body, a tub (2) disposed inside the body and wherein items to be washed are placed, a frame shaped base (3) that is seated on the floor (F) by means of legs in order to support the tub (2) at a certain height from the floor (F), a door (4) providing the items to be washed to be loaded and unloaded, a toe kick range (5) situated at the front side of the base (3) and forming a recess toward the base (3) between the lower edge of the door (4) and the floor (F) by extending under the door (4), a front cover (6) disposed at the rear side of the toe kick range (5) which covers the front side of the base (3) by being vertical to the floor (F), a support plate (7) covering the upper side of the toe kick range (5) being parallel to the floor (F) such that an L shape is formed with the front cover (6) and whereon the front portion of the tub (2) is seated providing to support the tub (2).

[0017] The built-in dishwasher (1) of the present invention comprises:

[0018] - a vibration insulation layer (8) covered on the surface of the front cover (6) facing the toe kick range (5), having a thickness that allows the door (4) to be opened entirely by the lower edge of the door (4) being inserted inside the toe kick range (5), dampening the vibrations of the front cover (6) by being directly in contact with the front cover (6), an acoustic insulation layer (9) that is covered over the vibration insulation layer (8) and facing the toe kick range (5), and

[0019] - a second vibration insulation layer (108) covered on the surface of the support plate (7) facing the toe kick range (5), dampening the vibrations of the support plate (7) by being directly in contact with the support plate (7), having a different thickness than that of the first vibration insulation layer (8) and a second acoustic insulation layer (109) that is covered over the vibration insulation layer (108), and facing the toe kick range (5), having a different thickness than that of the first acoustic insulation layer (9).

[0020] The vibration insulation layers (8, 108) covered as the first layer over the front cover (6) and the support plate (7) situated at the toe kick range (5) dampen the vibrations of the front cover (6) and the support plate (7), the acoustic insulation layers (9, 109) covered on the vibration insulation layers (8) as the second layer reduce the discharge of noise to the outside environment.

[0021] In an embodiment of the present invention, the total thickness (A + B) of the vibration insulation layer (108) and the acoustic insulation layer (109) covered on

the support plate (7) is greater than the total thickness (A1+B1) of the vibration insulation layer (8) and the acoustic insulation layer (9) covered on the front cover (6) ((A+B) > (A1+B1)) (Figure 2). Since the support plate (7) is situated right under the tub (2) in the toe kick range (5), the water splash noises generated in the tub (2) try to disseminate to the outside environment through the support plate (7) and the noise is prevented from discharging to the outside environment by the vibration insulation layer (108) and the acoustic insulation layer (109) covered under the support plate (7) having a thickness of (A+B). Since the vibration insulation layer (108) and the acoustic insulation layer (109) covered under the support plate (7) will not obstruct the door (4) from opening, their thicknesses (A, B) can be easily increased. The vibration insulation layer (8) and the acoustic insulation layer (9) covered on the front side of the front cover (6) with a thickness of (A1+B1) allow the lower edge of the door (4) to move freely inside the toe kick range (5) as the door (4) is opened.

[0022] In another embodiment of the present invention, the vibration insulation layers (8, 108) are manufactured of bitumen and the acoustic insulation layers (109) are manufactured of felt.

[0023] In the built-in dishwasher (1) of the present invention, the washing noises discharged to the outside environment are reduced by the vibration insulation layers (8, 108) and the acoustic insulation layers (9, 109) with different thicknesses covered on the support plate (7) and the front cover (6) in the toe kick range (5) and the lower edge of the door (4) can move freely inside the toe kick range (5) while the door (4) is opened or closed.

[0024] It is to be understood that the present invention is not limited by the embodiments disclosed above and an expert in the technique can easily introduce different embodiments of the present invention. These should be considered within the scope of the protection postulated by the claims of the present invention.

Claims

1. A built-in dishwasher (1) comprising a tub (1) wherein items to be washed are placed, a base (3) in order to support the tub (2) at a certain height from the floor (F), a door (4) for loading and unloading the items to be washed, a toe kick range (5) situated at the front side of the base (3) and forming a recess toward the base (3) between the lower edge of the door (4) and the floor (F) by extending under the door (4), a front cover (6) disposed at the rear side of the toe kick range (5) which covers the front side of the base (3) by being vertical to the floor (F), a support plate (7) covering the upper side of the toe kick range (5) being parallel to the floor (F) such that an L shape is formed with the front cover (6) and whereon the front portion of the tub (2) is seated providing to support the tub (2), and **characterized by**

- a first vibration insulation layer (8) disposed on and covering the surface of the front cover (6) facing the toe kick range (5), having a thickness that allows the door (4) to be opened entirely by the lower edge of the door (4) being inserted inside the toe kick range (5), and dampening the vibrations of the front cover (6) by being directly in contact with the front cover (6),
 - a first acoustic insulation layer (9) that is disposed over and covers the first vibration insulation layer (8) and faces the toe kick range (5),
 - a second vibration insulation layer (108) disposed on and covering the support plate (7), dampening the vibrations of the support plate (7) by being directly in contact with the support plate (7), and having a different thickness than that of the first vibration insulation layer (8), and
 - a second acoustic insulation layer (109) that is disposed over and covers the second vibration insulation layer (108) and faces the toe kick range (5), having a different thickness than that of the first acoustic insulation layer (9).
2. A built-in dishwasher (1) as in Claim 1, **characterized in that** the total thickness of the second vibration insulation layer (108) and the second acoustic insulation layer (109) is greater than the total thickness of the first vibration insulation layer (8) and the first acoustic insulation layer (9).
3. A built-in dishwasher (1) as in Claim 1 or 2, **characterized by** the vibration insulation layers (8, 108) being manufactured of bitumen and the acoustic insulation layers (9, 109) being manufactured of felt.

Patentansprüche

1. Einbaugeschirrspüler (1), umfassend einen Spülbehälter (2), in den zu spülende Gegenstände gegeben werden, eine Basis (3) zum Tragen des Spülbehälters (2) in einer bestimmten Höhe über dem Boden (F), eine Tür (4) zum Beladen und Entladen der zu spülenden Gegenstände, einen Sockel (5), der auf der Vorderseite der Basis (3) ausgebildet ist und eine Vertiefung in Richtung der Basis (3) zwischen der Unterkante der Tür (4) und dem Boden (F) bildet, indem er sich unter der Tür (4) erstreckt, eine Vorderabdeckung (6), die auf der Rückseite des Sockels (5) angeordnet ist und die Vorderseite der Basis (3) abdeckt, indem sie vertikal zum Boden (F) ist, eine Trageplatte (7), die die Oberseite des Sockels (5) abdeckt, indem sie parallel zum Boden (F) ist, derart, dass sie mit der Vorderabdeckung (6) eine L-Form bildet, und auf der der Vorderabschnitt des Spülbehälters (2) sitzt, um den Spülbehälter (2) abzustützen, und **gekennzeichnet durch**

- eine erste Vibrationsdämpfungsschicht (8), die auf der dem Sockel (5) zugewandten Fläche der Vorderabdeckung (6) angeordnet ist und diese abdeckt, und eine Dicke aufweist, die es der Tür (4) ermöglicht, vollständig geöffnet zu werden, indem die Unterkante der Tür (4) in den Sockel (5) eingeführt wird, und die Vibrationen der Vorderabdeckung (6) dämpft, indem sie in direktem Kontakt mit der Vorderabdeckung (6) steht,
- eine erste Schalldämpfungsschicht (9), die über der Vibrationsdämpfungsschicht (8) angeordnet ist und diese abdeckt und dem Sockel (5) zugewandt ist,
- eine zweite Vibrationsdämpfungsschicht (108), die auf der Trageplatte (7) angeordnet ist und diese abdeckt und die Vibrationen der Trageplatte (7) dämpft, indem sie in direktem Kontakt mit der Trageplatte (7) steht und eine andere Dicke als die der ersten Vibrationsdämpfungsschicht (8) aufweist, und
- eine zweite Schalldämpfungsschicht (109), die über der zweiten Vibrationsdämpfungsschicht (108) angeordnet ist und diese abdeckt und dem Sockel (5) zugewandt ist und die eine andere Dicke als die erste Schalldämpfungsschicht (9) aufweist.

2. Einbaugeschirrspüler (1) nach Anspruch 1, **dadurch gekennzeichnet, dass** die Gesamtdicke der zweiten Vibrationsdämpfungsschicht (108) und der zweiten Schalldämpfungsschicht (109) größer als die Gesamtdicke der ersten Vibrationsdämpfungsschicht (8) und der ersten Schalldämpfungsschicht (9) ist.
3. Einbaugeschirrspüler (1) nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** die Vibrationsdämpfungsschichten (8, 108) aus Bitumen hergestellt sind und die Schalldämpfungsschichten (9, 109) aus Filz hergestellt sind.

Revendications

1. Un lave-vaisselle encastré (1) comprenant une cuve (2) où des objets à laver sont placés, une base (3) pour supporter la cuve (2) à une certaine hauteur à partir du plancher (F), une porte (4) pour le chargement et déchargement des objets à laver, une plinthe (5) située au côté avant de la base (3) et formant un évidement vers la base (3) entre le bord inférieur de la porte (4) et le plancher (F) en s'étendant en dessous de la porte (4), un couvercle avant (6) disposé au côté arrière de la plinthe (5) qui couvre le côté avant de la base (3) en étant verticale au plancher (F), une plaque de support (7) couvrant le côté supérieur de la plinthe (5) en étant parallèle au plancher (F) de telle sorte que une forme de L est formée avec

le couvercle avant (6) et sur laquelle la partie avant de la cuve (2) est placée, donc supportant la cuve (2), et **caractérisé par**

- une première couche d'isolation de vibrations (8) disposée sur et couvrant la surface du couvercle avant (6) en face de la plinthe (5), ayant une épaisseur qui permet à la porte (4) d'être ouverte entièrement par l'insertion du bord inférieur de la porte (4) dans la plinthe (5), et aussi affaiblissant les vibrations du couvercle avant (6) en étant directement en contact avec le couvercle avant (6), 5
 - une première couche d'isolation acoustique (9) qui est disposée sur et couvre la couche d'isolation de vibrations (8) et qui fait face à la plinthe (5), 10
 - une seconde couche d'isolation de vibrations (108) disposée sur et couvrant la plaque de support (7), affaiblissant les vibrations de la plaque de support (7) en étant directement en contact avec la plaque de support (7) et ayant une épaisseur différente de celle de la première couche d'isolation de vibrations (8), et 15
 - une seconde couche d'isolation acoustique (109) qui est disposée sur et couvre la seconde couche d'isolation de vibrations (108) et qui fait face à la plinthe (5), ayant une épaisseur différente de celle de la première couche d'isolation acoustique (9). 20
2. Un lave-vaisselle encastré (1) selon la Revendication 1, **caractérisé en ce que** l'épaisseur totale de la seconde couche d'isolation de vibrations (108) et la seconde couche d'isolation acoustique (109) est supérieure à l'épaisseur totale de la première couche d'isolation de vibrations (8) et la première couche d'isolation acoustique (9). 25
3. Un lave-vaisselle encastré (1) selon la Revendication 1 ou 2, **caractérisé par** les couches d'isolation de vibrations (8, 108) fabriquées en bitume et les couches d'isolation acoustiques (9, 109) fabriquées en feutre. 30

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Figure 1

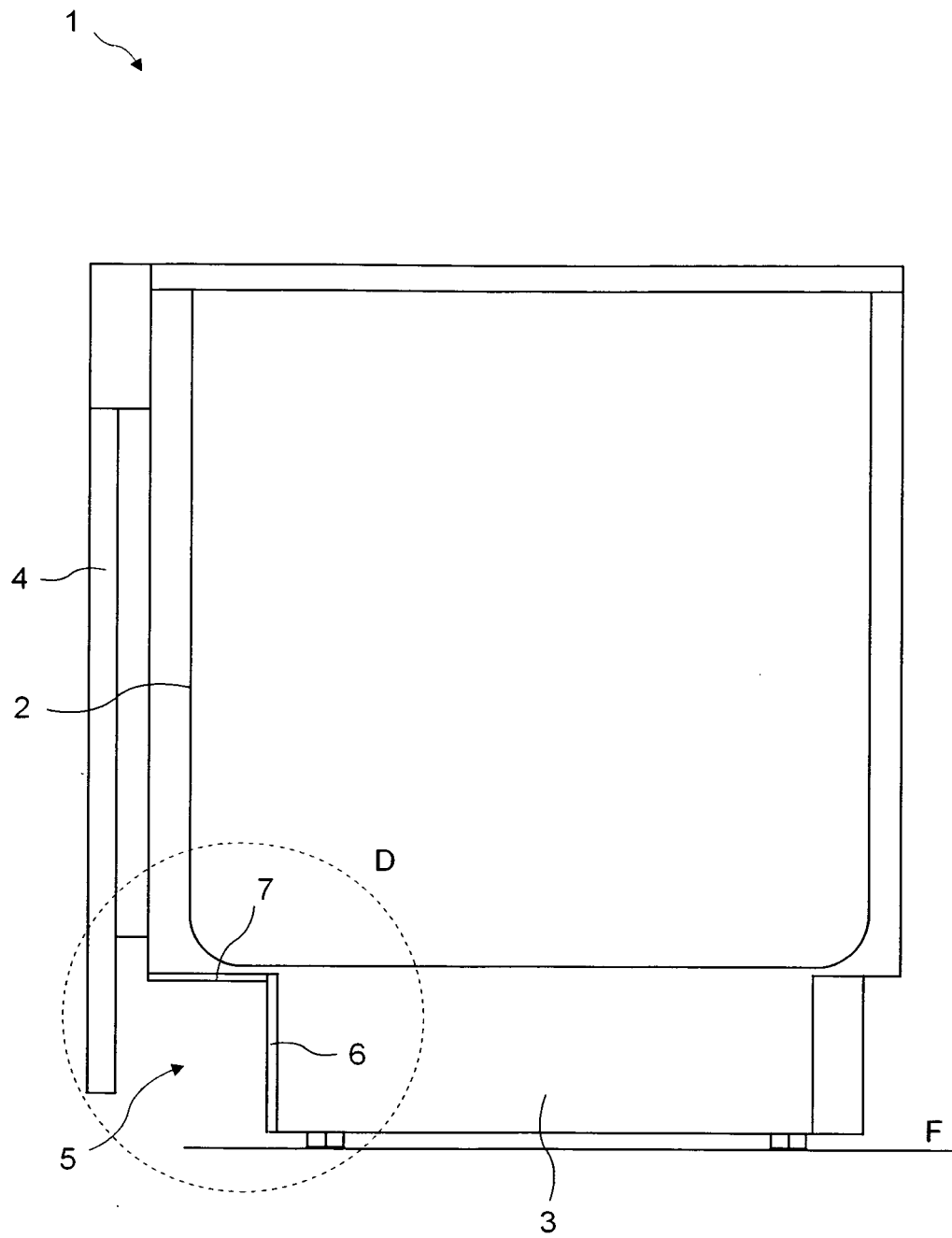
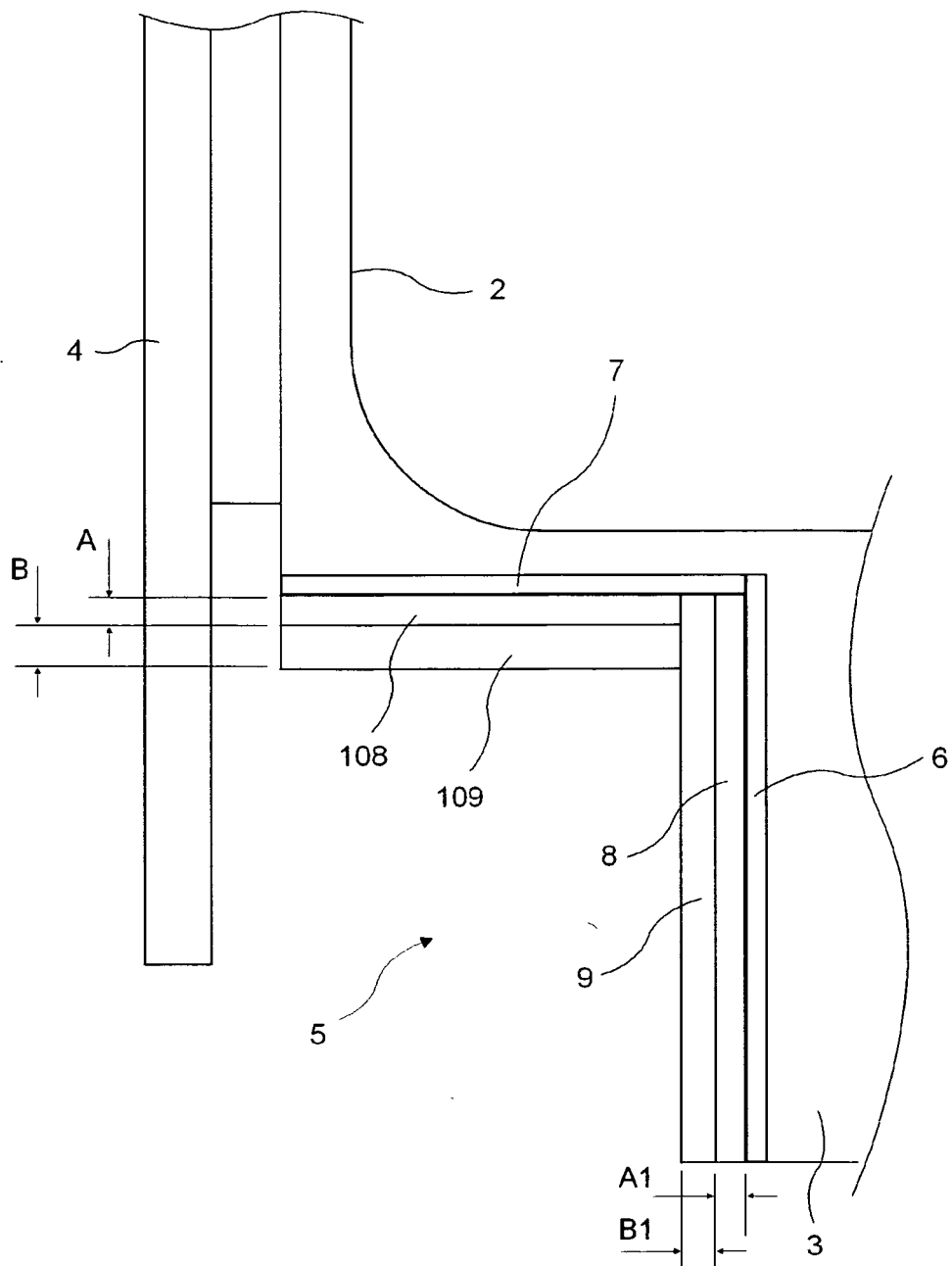


Figure 2



REFERENCES CITED IN THE DESCRIPTION

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