



EUROPEAN PATENT APPLICATION

(43) Date of publication:
03.01.2024 Bulletin 2024/01

(51) International Patent Classification (IPC):
A47L 15/42^(2006.01)

(21) Application number: **23176352.5**

(52) Cooperative Patent Classification (CPC):
A47L 15/4291; A47L 15/4251

(22) Date of filing: **31.05.2023**

(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 ME MK MT NL
NO PL PT RO RS SE SI SK SM TR**
Designated Extension States:
BA
Designated Validation States:
KH MA MD TN

(71) Applicant: **Arçelik Anonim Sirketi**
34445 Istanbul (TR)

(72) Inventors:
• **AYDINTUG, Cetin**
34445 Istanbul (TR)
• **BALIKCI, Ilhan**
34445 Istanbul (TR)
• **POYRAZ, Onur**
34445 Istanbul (TR)
• **SEREN, Erdogan Mert**
34445 Istanbul (TR)

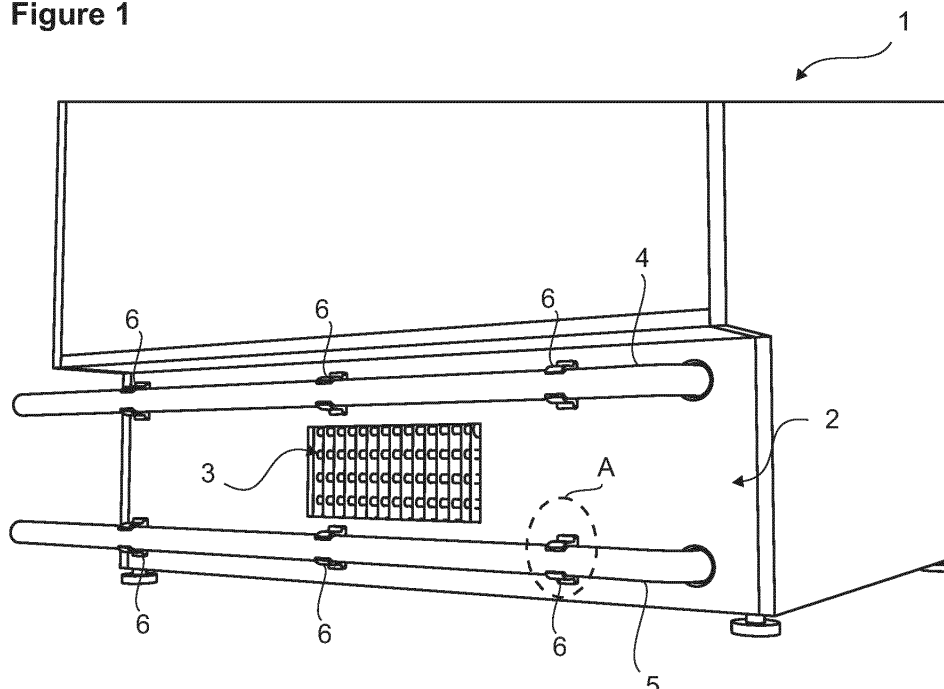
(30) Priority: **30.06.2022 TR 202210865**

(54) **A HEAT PUMP DISHWASHER**

(57) The present invention relates to a dishwasher (1), which is a heat pump dishwasher (1), and comprising a washing tub; an evaporator; a rear wall (2); an opening (3) which aligns with the part of the rear wall (2) whereon the evaporator is disposed; an inlet hose (4); a discharge hose (5); and at least one hose holder (6) for each of the inlet and discharge hoses (4 and 5), fixed onto the rear wall (2) and enabling the inlet and discharge hoses (4 and 5) onto the rear wall (2) such that the opening (3)

remains between the inlet hose and the discharge hose (4 and 5). Thus, the inlet and discharge hoses (4 and 5) are prevented from covering the opening (3), creating an obstacle in front of the opening (3) and decreasing the air passage cross-sectional area of the opening (3). Thus, the flow rate of the air discharged out of the dishwasher (1) is prevented from being adversely affected, and the efficiency of the heat pump, hence of the dishwasher (1) is increased.

Figure 1



Description

[0001] The present invention relates to a heat pump dishwasher wherein the exhaust air is effectively discharged.

[0002] In dishwashers, the use of hot water for the washing process improves the washing performance. In conventional dishwashers, the heating of the washing water is performed by means of a heater. In heat pump dishwashers, the washing water is heated by using the heat pump system. In this case, energy saving is provided compared to conventional dishwashers. The basic components of the heat pump system are compressor, evaporator, condenser, capillary tube and fan.

[0003] In the heat pump dishwasher, when the heat pump is active, the compressor pressurizes the refrigerant fluid and directs the same to the condenser. The condenser condenses the refrigerant fluid and heats the water which is in direct contact with the condenser. At the condenser outlet, the refrigerant fluid enters the capillary tube. While passing through the capillary tube, the refrigerant fluid loses pressure, expands and enters the evaporator. While passing through the evaporator pipes, the refrigerant fluid draws heat from the ambient air directed thereon, evaporates and cools the surrounding air. The cooled air is blown out of the dishwasher after the evaporator. The ambient air is sucked by means of a fan and passed over the evaporator. Thus, the ambient heat is drawn onto the heat pump and used to heat the water. The faster the air is sucked in at a high flow rate and the faster the same is discharged from the dishwasher at a higher flow rate, the higher the operating efficiency of the heat pump, hence the water heating efficiency of the dishwasher becomes. During the discharge of the cooled exhaust air from the dishwasher, the air is discharged from the cabinet opening to the environment. This opening is provided on the left or right side of the dishwasher. The water intake hose outlet and the water discharge hose outlet of the dishwasher are provided on the left or right side of the dishwasher rear wall. Said hoses move between the rear wall of the dishwasher and the cabinet and come out of the opening. An obstacle encountered during the discharge of the cold exhaust air reduces the efficiency of the heat pump. In particular, the water inlet hose and the water discharge hose remaining between the adjacent wall of the cabinet or the environment wherein the dishwasher is placed and the rear wall of the dishwasher create an obstacle against the air flow line while discharging the exhaust air.

[0004] In the state of the art German Patent Application No. DE102019100004, the formation of an air flow path is disclosed, by means of a sealing member which is provided on the air outlet between a heat pump dishwasher and the cabinet, which is provided between the rear wall of the dishwasher and the wall of the cabinet.

[0005] In the state of the art European Patent No. EP3427628, a dishwasher is disclosed, comprising a base, and a fan and an evaporator provided an air duct

extending from said base. In this embodiment, the air duct extends from the front of the dishwasher to the back thereof and an air opening is provided at the back side.

[0006] Another state of the art embodiment is disclosed in the European Patent No. EP2777474. In this embodiment, a heat pump dishwasher is disclosed, wherein the air sucked through the air inlet is guided towards the evaporator by passing through an opening with guiding surfaces and a dust holder.

[0007] The aim of the present invention is the realization of a heat pump dishwasher wherein the exhaust air is effectively discharged.

[0008] The dishwasher realized in order to attain the aim of the present invention, explicated in the first claim and the respective claims thereof, is a heat pump dishwasher, and comprises a washing tub; an evaporator; a rear wall; an opening which aligns with the part of the rear wall whereon the evaporator is disposed; a water inlet hose; a water discharge hose; and at least one hose holder for each of the water inlet and discharge hoses, fixed onto the rear wall and enabling the water inlet and discharge hoses onto the rear wall such that the opening remains between the water inlet hose and the water discharge hose. Thus, the water inlet and discharge hoses are prevented from covering the opening, creating an obstacle in front of the opening and decreasing the air passage cross-sectional area of the opening. Thus, the flow rate of the air discharged out of the dishwasher is prevented from being adversely affected, and the efficiency of the heat pump, hence of the dishwasher is increased.

[0009] In an embodiment of the present invention, the dishwasher comprises the C-shaped hose holder. In this embodiment, the hose holder comprises an orifice through which the hose passes, a housing wherein the hose is fitted after passing through the orifice, and a fixing member which is provided on the outside of the housing and which enables the hose holder to be fixed to the rear wall. The hose is passed through the orifice to be fitted into the housing in the hose holder fixed to the rear wall of the dishwasher by means of the fixing member. As the hose passes through the orifice, the two opposite edges of the orifice are stretched, and by means of this stretching, the hose is easily fitted into the housing. After the hose passes through the orifice, the orifice moves back and returns to the initial position, and the hose fitted into the housing is prevented from being detached from the housing by itself. It is possible to remove the hose by stretching the orifice. In this embodiment of the present invention, the dishwasher comprises at least two hose holders for the water inlet and discharge hoses on the same line, enabling the hoses to extend parallel to each other at the top and bottom of the opening.

[0010] In another embodiment of the present invention, the dishwasher comprises two channels as the hose holder which are arranged above and below the opening such that the opening remains therebetween, which extend parallel to each other along the rear wall, such that

one receives the water inlet hose and the other receives the discharge hose. In a version of this embodiment of the present invention, the dishwasher comprises at least one fixing member in the form of a clamp which passes over the hose in the channel and which is fixed with fixing elements to the rear wall so as to prevent the hose placed in the channel from being detached from the channel. In another version, the fixing member is flat. In this embodiment, the hose is entirely embedded into the channel. In this embodiment of the present invention, the fixing member is fixed to the rear wall from two ends thereof such that the hose placed into the channel remains therebetween. In another version, the fixing member is fixed to the rear wall from a single end thereof while the other end has a jointed structure so as to rotate around the end fixed to the rear wall. Thus, the hose can be quickly and easily fitted into the channel and detached from the channel.

[0011] In another embodiment of the present invention, the dishwasher comprises hook-and-loop fasteners as the hose holder. In this embodiment of the present invention, one surface of the hook-and-loop fasteners is fixed to the rear wall such that the hose remains therebetween, and after the hose is placed onto the rear wall, the other surface of the hook-and-loop fasteners is brought onto the first surface over the hose to fix the same.

[0012] By means of the present invention, the water inlet and discharge hoses are positioned efficiently so as not to block the air outlet such that the air leaving the evaporator has a high flow rate. Since there is no obstacle in front of the cold exhaust air to prevent the same from being discharged through the air outlet, unwanted cooling in the dishwasher is avoided and the efficiency of the heat pump is increased by preventing the drying performance from being adversely affected. Thus, the washing time of the dishwasher is decreased.

[0013] A dishwasher realized in order to attain the aim of the present invention is illustrated in the attached figures, where:

Figure 1 - is the rear view of a dishwasher.

Figure 2 - is the view of the detail A of Figure 1.

Figure 3 - is the view of the embodiment of the clamp-shaped hose holder.

Figure 4 - is the view of detail B in Figure 3.

Figure 5 - is the view of the embodiment of the channel and the fixing member.

Figure 6 - is the view of the another version of the embodiment of the channel and the fixing member.

Figure 7 - is the view of yet another version of the em-

bodiment of the channel and the fixing member.

Figure 8 - is the view of another version of the present invention.

Figure 9 - is the view of another embodiment of the hose holder.

[0014] The elements illustrated in the figures are numbered as follows:

1. Dishwasher
2. Rear wall
3. Opening
4. Inlet hose
5. Discharge hose
6. Hose holder
7. Orifice
8. Housing
9. Base
10. Step
11. Holder
12. Channel
13. Fixing member

[0015] The dishwasher (1) of the present invention is a heat pump dishwasher (1), and comprises a washing tub; an evaporator; a rear wall (2); an opening (3) which aligns with the part of the rear wall (2) whereon the evaporator is disposed; an inlet hose (4); a discharge hose (5); and at least one hose holder (6) for each of the inlet and discharge hoses (4 and 5), fixed onto the rear wall (2) and enabling the inlet and discharge hoses (4 and 5) onto the rear wall (2) such that the opening (3) remains between the inlet hose and the discharge hose (4 and 5). Thus, the inlet and discharge hoses (4 and 5) are prevented from covering the opening (3), creating an obstacle in front of the opening (3) and decreasing the air passage cross-sectional area of the opening (3). Thus, the flow rate of the air discharged out of the dishwasher (1) is prevented from being adversely affected, and the efficiency of the heat pump, hence of the dishwasher (1) is increased.

[0016] In an embodiment of the present invention, the dishwasher (1) comprises the C-shaped hose holder (6).

In this embodiment, the hose holder (6) comprises an orifice (7) through which the inlet and discharge hoses (4 and 5) pass, a housing (8) wherein the inlet and discharge hoses (4 and 5) are fitted after passing through the orifice (7), and a base (9) which is positioned outside the housing (8) and which enables the hose holder (6) to be fixed to the rear wall (2). The inlet and discharge hoses (4 and 5) are passed through the orifice (7) to be fitted into the housing (8) in the hose holder (6) fixed to the rear wall (2) of the dishwasher (1) by means of the base (9). As the inlet and discharge hoses (4 and 5) pass through the orifice (7), the two opposite edges of the orifice (7) are stretched, and by means of this stretching, the inlet and discharge hoses (4 and 5) are easily fitted into the housing (8). After the inlet and discharge hoses (4 and 5) pass through the orifice (7), the orifice (7) moves back and returns to the initial position, and the inlet and discharge hoses (4 and 5) fitted into the housing (8) are prevented from being detached from the housing (8) by themselves. It is possible to remove the inlet and discharge hoses (4 and 5) by stretching the orifice (7). In this embodiment of the present invention, the dishwasher (1) comprises at least two, preferably three hose holders (6) for each of the inlet hose (4) and the discharge hose (5) on the same line, enabling the inlet and discharge hoses (4 and 5) to extend parallel to each other at the top and bottom of the opening (3) (Figure 1 and Figure 2).

[0017] In another embodiment of the present invention, the hose holder (6) comprises a clamp-shaped step (10) which is fixed to the rear wall (2) and which supports the inlet and discharge hoses (4 and 5) from bottom, and a holder (11) which is disposed onto the step (10) and which covers the inlet and discharge hoses (4 and 5) from above to be fixed to the step (10) (Figure 3 and Figure 4).

[0018] In another embodiment of the present invention, the hose holder (6) comprises two channels (12) which are arranged above and below the opening (3) such that the opening (3) remains therebetween, which extend parallel to each other along the rear wall (2), such that one receives the inlet hose (4) and the other receives the discharge hose (5). In a version of this embodiment of the present invention, the dishwasher (1) comprises at least one fixing member (13) preferably in the form of a clamp which passes over the inlet and discharge hoses (4 and 5) in the channel (12) and which is fixed with fixing elements to the rear wall (2) so as to prevent the inlet and discharge hoses (4 and 5) placed in the channel (12) from being detached from the channel (12) (Figure 5). In another version of the present invention, the fixing member (13) is flat and in the form of a plate. In this embodiment, the inlet and discharge hoses (4 and 5) are completely embedded into the channel (12). In this embodiment of the present invention, the fixing member (13) is fixed to the rear wall (2) from two ends thereof such that the inlet and discharge hoses (4 and 5) placed into the channel (12) remain therebetween (Figure 6). In another version, the fixing member (13) is fixed to the rear wall

(2) from a single end thereof while the other end has a jointed structure so as to rotate around the end fixed to the rear wall (2). Thus, the inlet and discharge hoses (4 and 5) can be quickly and easily fitted into the channel (12) and detached from the channel (12). In this version of this embodiment, the fixing member (13) above the opening (3) is fixed to the rear wall (2) at the top by means of fixing elements while the fixing member (13) below the opening (3) is fixed to the rear wall (2) at the bottom (Figure 7). In another embodiment of the present invention, in order to enable the inlet and discharge hoses (4 and 5) to be properly fitted into the channel (12) and prevent the same from being detached from the channel (12) unintentionally, the dishwasher (1) comprises the C-shaped fixing member (13) disposed in the channel (12) (Figure 8).

[0019] In another embodiment of the present invention, the hose holder (6) comprises hook-and-loop fasteners. In this embodiment of the present invention, one surface of the hook-and-loop fasteners is fixed to the rear wall (2), the other surface is passed over the inlet and discharge hoses (4 and 5) to be brought onto the first surface after the inlet and discharge hoses (4 and 5) are placed onto the rear wall (2) such that the inlet and discharge hoses (4 and 5) remain therebetween (Figure 9).

[0020] By means of the present invention, the inlet and discharge hoses (4 and 5) are positioned efficiently so as not to block the air outlet such that the air leaving the evaporator has a high flow rate. Since there is no obstacle in front of the cold exhaust air to prevent the same from being discharged through the air outlet, unwanted cooling in the dishwasher (1) is avoided and the efficiency of the heat pump is increased by preventing the drying performance from being adversely affected. Thus, the washing time of the dishwasher (1) is decreased.

Claims

1. A heat pump dishwasher (1) **comprising** a washing tub; an evaporator; a rear wall (2); an opening (3) which aligns with the part of the rear wall (2) whereon the evaporator is disposed; an inlet hose (4); and a discharge hose (5); **characterized by** at least one hose holder (6) for each of the inlet and discharge hoses (4 and 5), fixed onto the rear wall (2) and enabling the inlet and discharge hoses (4 and 5) to be placed onto the rear wall (2) such that the opening (3) remains between the inlet hose and the discharge hose (4 and 5).
2. A dishwasher (1) as in Claim 1, **characterized by** the C-shaped hose holder (6).
3. A dishwasher (1) as in Claim 2, **characterized by** the hose holder (6) comprising an orifice (7) through which the inlet and discharge hoses (4 and 5) pass, a housing (8) wherein the inlet and discharge hoses

(4 and 5) are fitted after passing through the orifice (7), and a base (9) which is positioned outside the housing (8) and which enables the hose holder (6) to be fixed to the rear wall (2).

4. A dishwasher (1) as in Claim 1, **characterized by** the hose holder (6) comprising a clamp-shaped step (10) which is fixed to the rear wall (2) and which supports the inlet and discharge hoses (4 and 5) from bottom, and a holder (11) which is disposed onto the step (10) and which covers the inlet and discharge hoses (4 and 5) from above to be fixed to the step (10).

5
10
5. A dishwasher (1) as in Claim 1, **characterized by** the hose holder (6) comprising two channels (12) which are arranged above and below the opening (3) such that the opening (3) remains therebetween, which extend parallel to each other along the rear wall (2), such that one receives the inlet hose (4) and the other receives the discharge hose (5).

15
20
6. A dishwasher (1) as in Claim 5, **characterized by** at least one fixing member (13) which passes over the inlet and discharge hoses (4 and 5) in the channel (12) and which is fixed with fixing elements to the rear wall (2) so as to prevent the inlet and discharge hoses (4 and 5) placed in the channel (12) from being detached from the channel (12).

25
30
7. A dishwasher (1) as in Claim 6, **characterized by** the clamp-shaped fixing member (13).

35
8. A dishwasher (1) as in Claim 6, **characterized by** the plate-shaped flat fixing member (13).

40
9. A dishwasher (1) as in any one of Claims 6 to 8, **characterized by** the fixing member (13) which is fixed to the rear wall (2) from two ends thereof such that the inlet and discharge hoses (4 and 5) placed into the channel (12) remain therebetween.

45
10. A dishwasher (1) as in Claim 6, **characterized by** the fixing member (13) which is fixed to the rear wall (2) from a single end thereof while the other end has a jointed structure so as to rotate around the end fixed to the rear wall (2).

50
11. A dishwasher (1) as in Claim 6, **characterized by** the C-shaped fixing member (13) which is provided in the channel (12).

55
12. A dishwasher (1) as in any one of the above claims, **characterized by** at least two hose holders (6) for each of the inlet hose (4) and the discharge hose (5) on the same line, enabling the inlet and discharge hoses (4 and 5) to extend parallel to each other at the top and bottom of the opening (3).

60

Figure 1

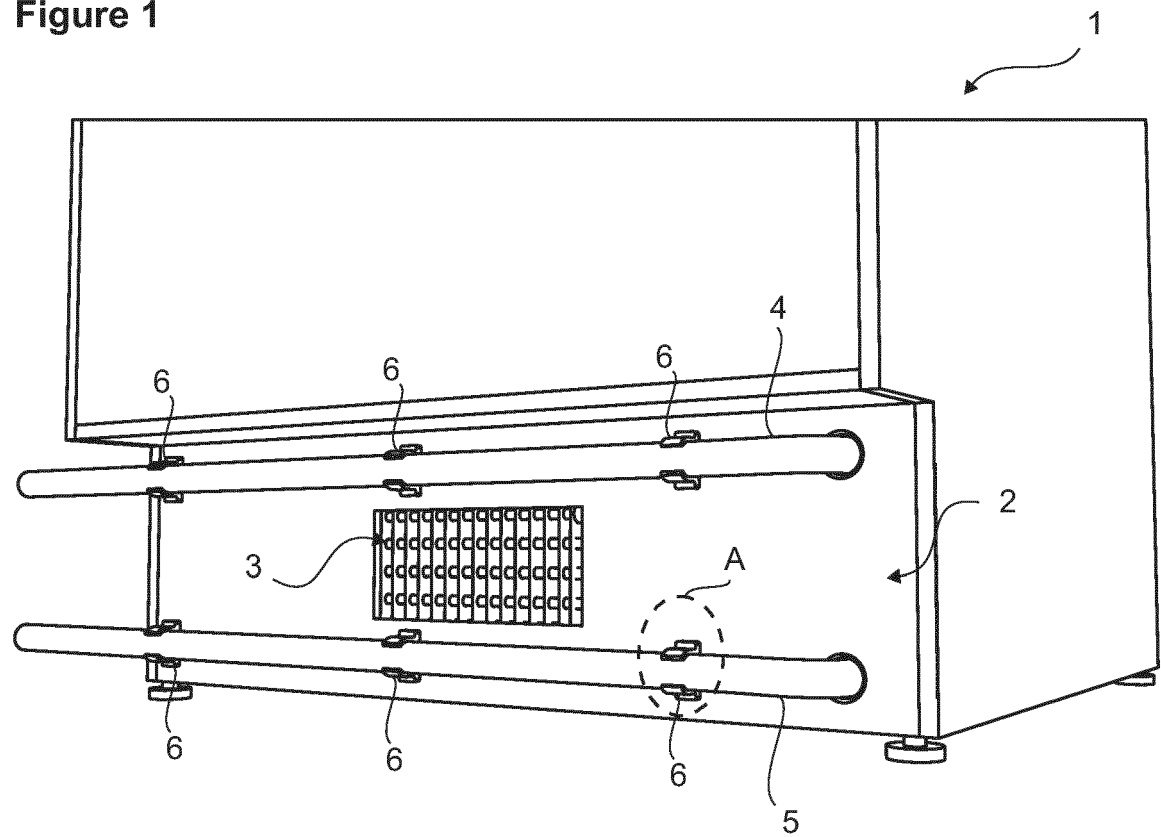


Figure 2

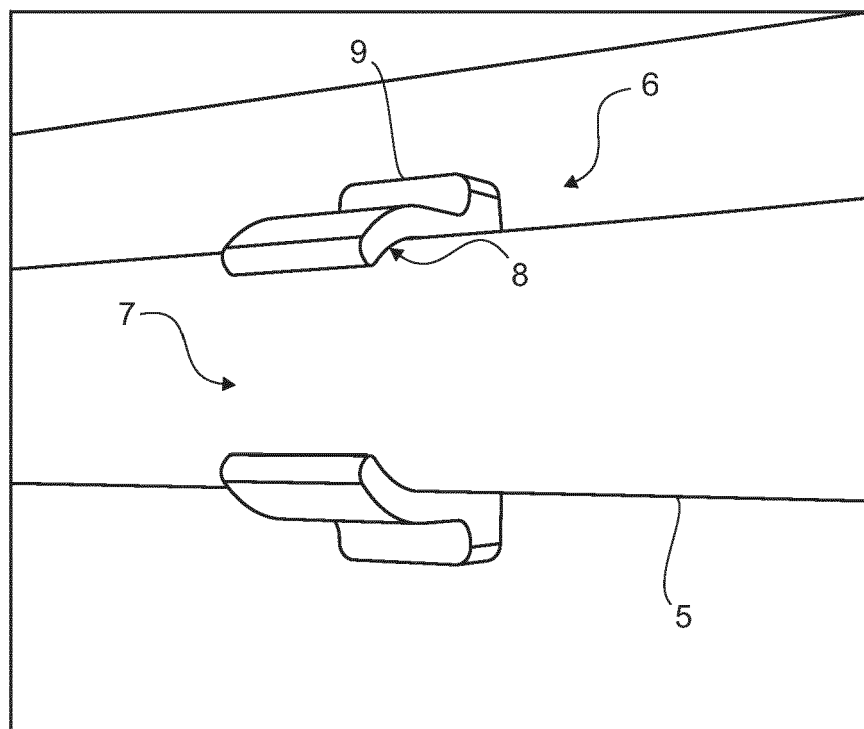


Figure 3

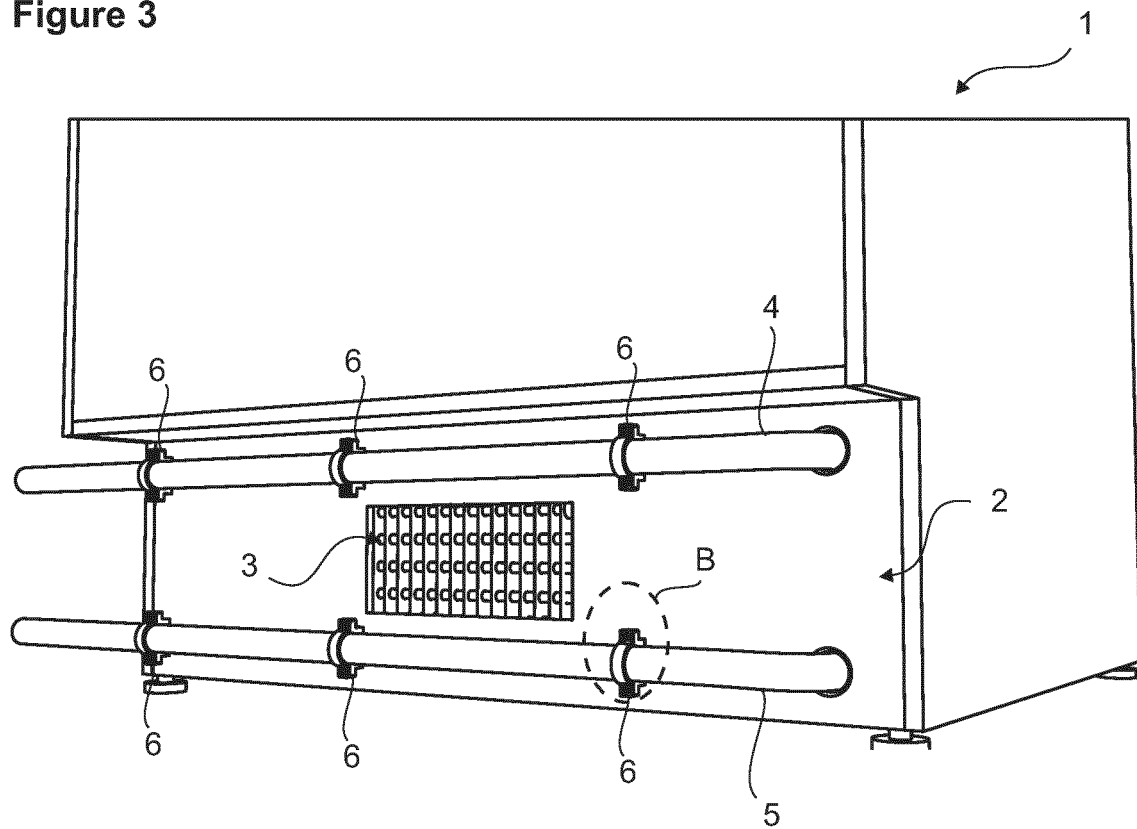


Figure 4

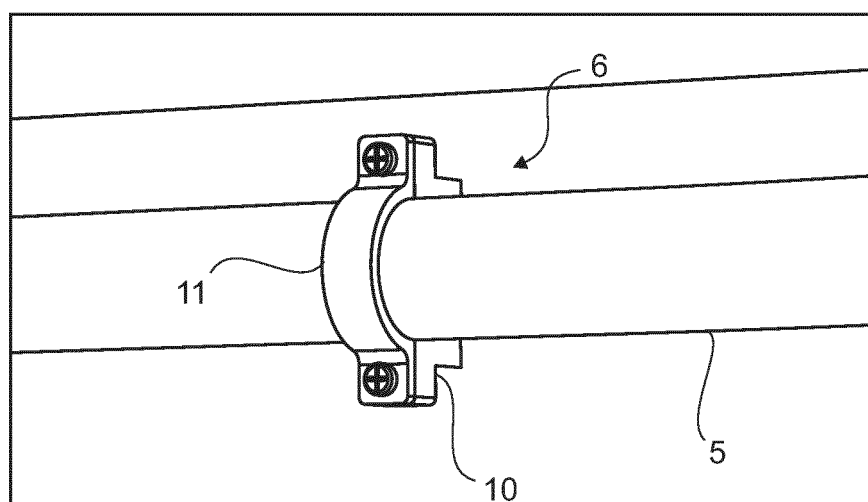


Figure 5

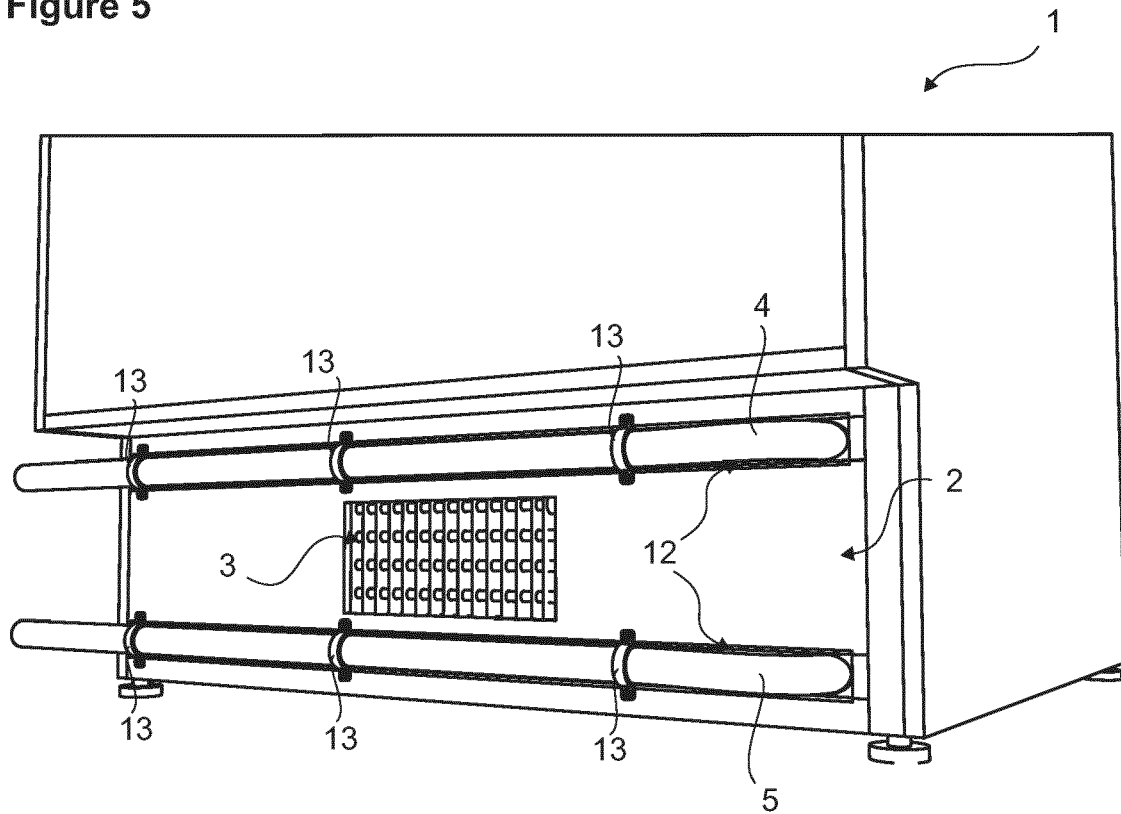


Figure 6

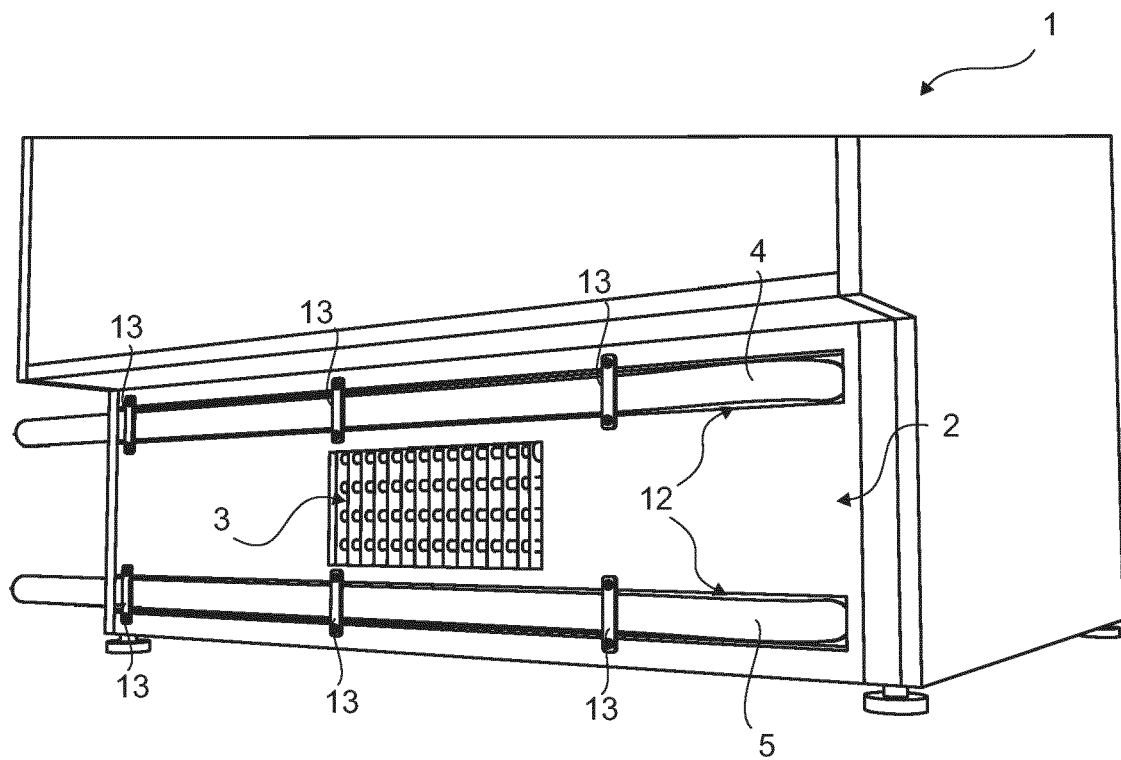


Figure 7

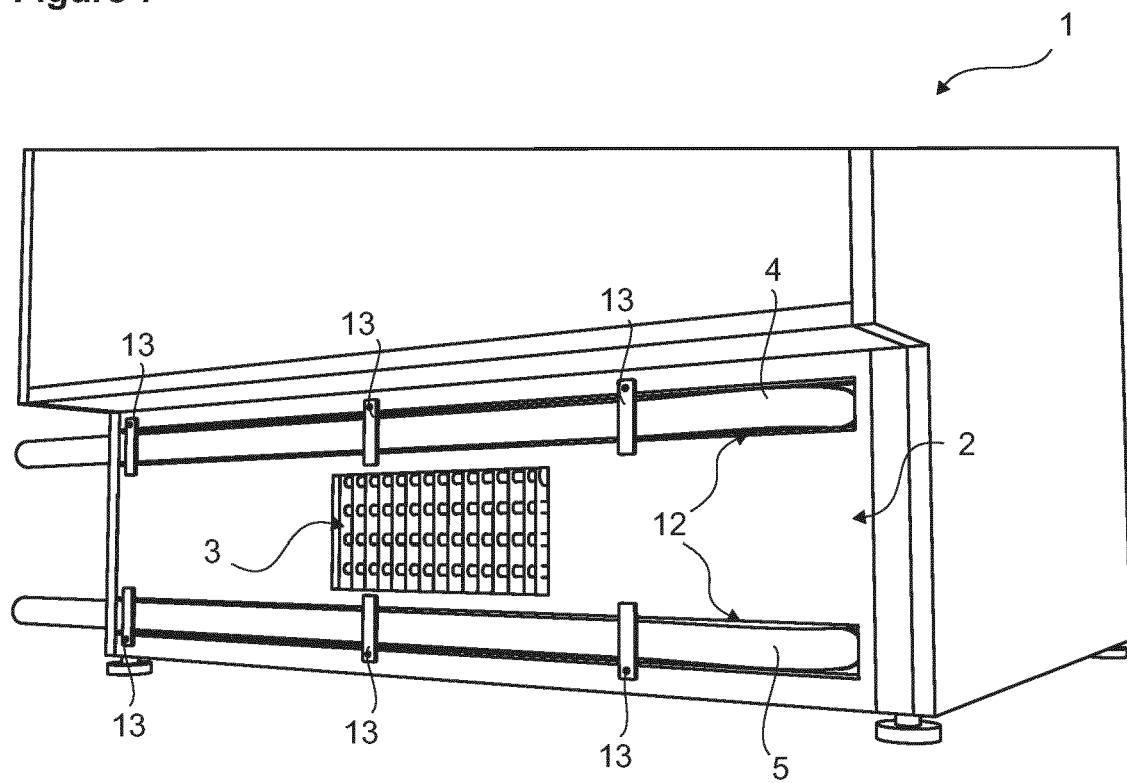


Figure 8

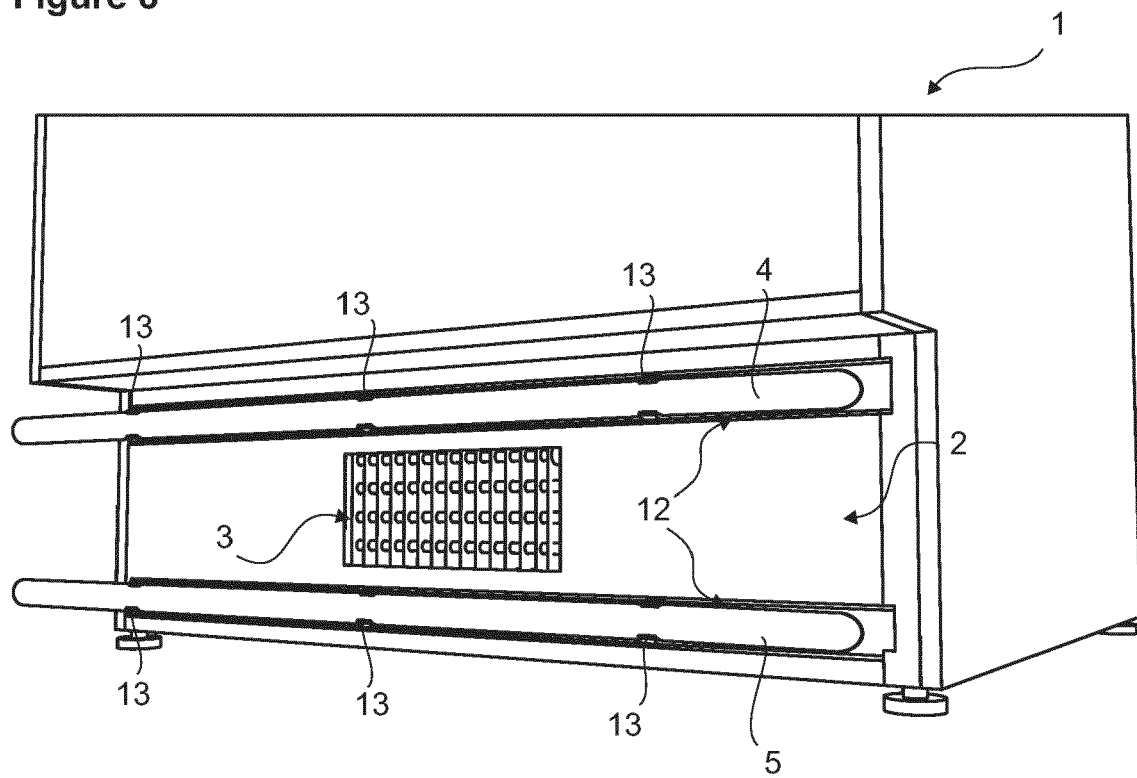
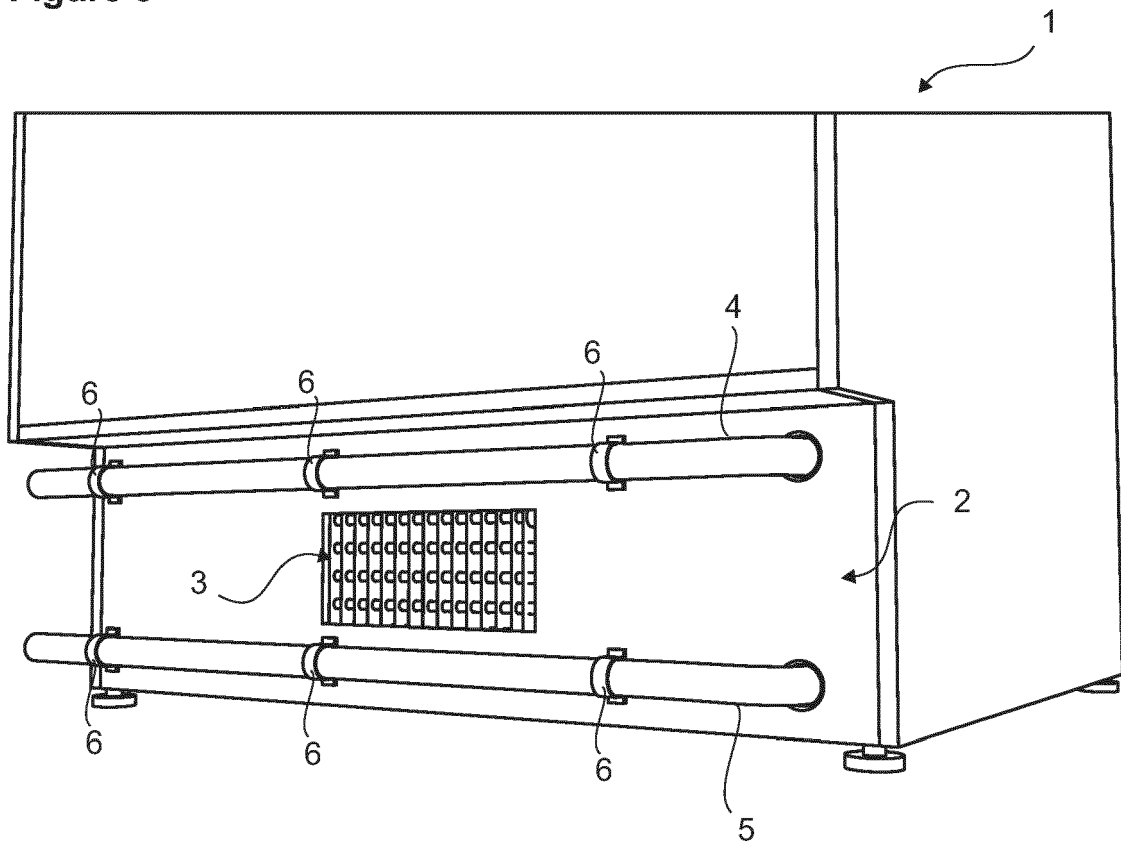


Figure 9





EUROPEAN SEARCH REPORT

Application Number

EP 23 17 6352

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y, D	DE 10 2019 100004 A1 (MIELE & CIE [DE]) 18 July 2019 (2019-07-18)	1-4	INV. A47L15/42
A	* paragraphs [0005] - [0008] * * paragraphs [0018] - [0023] * * figures 1-10 *	5-12	
Y	US 2018/256001 A1 (WONG KWOK DIN [CN] ET AL) 13 September 2018 (2018-09-13) * paragraphs [0023] - [0028] * * figures 1-13 *	1-4	
A	DE 10 2008 016483 A1 (BSH BOSCH SIEMENS HAUSGERAETE [DE]) 1 October 2009 (2009-10-01) * paragraphs [0031] - [0040] * * paragraphs [0005], [0014] * * figures 1-5 *	1-3	
A	US 2011/121698 A1 (KAHRAMAN ERKAN [TR] ET AL) 26 May 2011 (2011-05-26) * paragraphs [0037] - [0050] * * paragraphs [0007] - [0009] * * figures 1-5 *	1, 5	TECHNICAL FIELDS SEARCHED (IPC) A47L
The present search report has been drawn up for all claims			

1

EPO FORM 1503 03:82 (P04C01)

Place of search

Munich

Date of completion of the search

16 October 2023

Examiner

Weinberg, Ekkehard

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

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

EP 23 17 6352

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.

16-10-2023

10

15

20

25

30

35

40

45

50

55

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 102019100004 A1	18-07-2019	NONE	

US 2018256001 A1	13-09-2018	CN 110446448 A	12-11-2019
		EP 3592194 A1	15-01-2020
		MY 194617 A	07-12-2022
		SG 11201906181Y A	27-08-2019
		US 2018256001 A1	13-09-2018
		WO 2018161425 A1	13-09-2018

DE 102008016483 A1	01-10-2009	AT 535640 T	15-12-2011
		DE 102008016483 A1	01-10-2009
		EP 2274468 A1	19-01-2011
		ES 2374702 T3	21-02-2012
		PL 2274468 T3	30-04-2012
		US 2011012485 A1	20-01-2011
		WO 2009121818 A1	08-10-2009

US 2011121698 A1	26-05-2011	CA 2722641 A1	05-11-2009
		TR 201008573 T1	23-05-2011
		US 2011121698 A1	26-05-2011
		WO 2009132970 A1	05-11-2009

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- DE 102019100004 [0004]
- EP 3427628 A [0005]
- EP 2777474 A [0006]