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(54) **OUTDOOR UNIT FOR AN AIR SOURCE HEAT PUMP**

(57) Outdoor unit for an air source heat pump, , comprising a heat exchanger (50), a bottom (11) having an upper inner side (20) and a lower outer side (21), the bottom (11) supporting a lower end (51) of the heat exchanger (50), and a support (13) at the lower outer side (21) of the bottom (11) for supporting the bottom (11), wherein the bottom (11) has a drainage edge (22) extending along a portion of the support (13) and being configured to drain liquid accumulating on the upper inner side (20) of the bottom (11) to the outside, wherein the drainage edge (22) slopes from the inner side of the bottom (11) in a direction to the outer side of the bottom (11) away from the support (13).

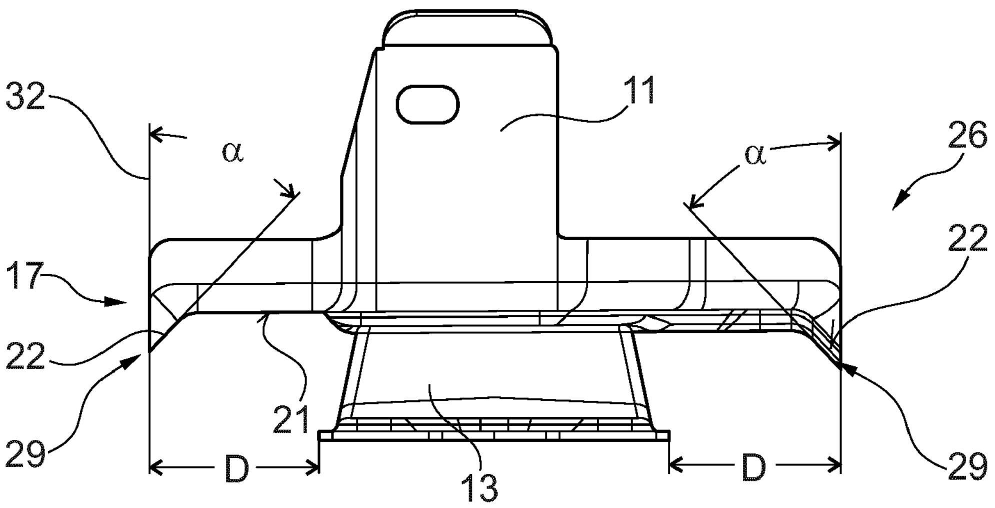

Fig. 5

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Description

TECHNICAL FIELD

[0001] The present disclosure relates to air source heat pumps and particularly to an outdoor unit of an air source heat pump. Even more particularly, the present disclosure relates to air source heat pumps for heating and/or cooling a space, such as for air conditioners, heatings or other HVAC applications or for water heating (domestic hot water).

BACKGROUND

[0002] Outdoor units of this kind include a heat exchanger accommodated in a casing of the outdoor unit. The heat exchanger in the outdoor unit is configured to enable heat exchange between a refrigerant circulating in the refrigerant circuit of the heat pump and outside air as the heat source. For this purpose, the heat exchanger is connected to the refrigerant circuit of the heat pump and flown through by the refrigerant flowing in the refrigerant circuit. Further, outside air is forced through the heat exchanger, e.g. by means of a fan. Due to humidity of the outside air and/or the temperature difference between the outside air and the refrigerant, water may condense on the surfaces of the heat exchanger and freezes at low outdoor temperatures. During a defrosting operation for defrosting the heat exchanger, the ice melts and water flows along the surfaces of the heat exchanger and accumulates in the casing of the outdoor unit and particularly on a bottom of the casing in an area below the heat exchanger.

[0003] JP 2013-217525 discloses such an outdoor unit suggesting a drainage hole in the bottom of the casing in order to drain any condensation water accumulating on a bottom of the casing out of the casing of the outdoor unit. The drainage hole is positioned between opposite ends of the heat exchanger in a longitudinal direction of the heat exchanger and condensation water has to be guided to the drainage hole by suitable configurations of the inner side of the bottom (e.g. inclinations, channels, etc.). Yet, there is a risk under cold weather conditions that the water will freeze inside the casing of the outdoor unit on its way to the drainage hole, because the water cannot be drained fast and efficiently enough.

SUMMARY

[0004] In order to attend to this problem, it had been suggested by the applicant to provide, as shown in Figure 1, at least one cutout 12 in the bottom 11 of the casing 10. The cutout 12 extends along a major portion of the lower end 51 of the heat exchanger 50 (indicated by the broken line) between two distanced portions 52, 53 (supported areas) of the heat exchanger 50 at which the heat exchanger 50 is supported on the bottom 11 of the casing 10. As a result, the water on the surfaces of the heat exchanger 50 may directly drop to the ground along a major portion of the lower end 51 of the heat exchanger 50 without being accumulated on the bottom 11 of the casing 10.

[0005] In general, the cutout 12 and the bottom 11 of the casing 10 can extend along the entire length of the heat exchanger 50 in its longitudinal direction except for the discrete portions 52, 53 of the heat exchanger 50 at which the heat exchanger 50 is supported on the bottom 11 of the casing 10. These discrete portions 52, 53 generally correspond to areas 18, 19 (supporting areas) of the bottom 11 at which the bottom 11 and, hence, the casing 10 are supported on a horizontal surface or via mounting brackets 100 on a vertical wall. For this purpose, the casing 10 has supports 13 in the form of feet extending between opposite edges 14, 15 (in the particular example longitudinal edges) of the bottom 11 and being fixed to the bottom 11. In addition, it is known to sandwich a damping element 30, such as a rubber or metal spring, between the horizontal surface or the mounting brackets 100 and the supports 13.

[0006] In order to most efficiently and quickly drain condensation water from the heat exchanger 50 to the outside of the casing 10, the cutout 12 should be as large as possible. Yet, this leads to the problem that opposite edges 16, 17 of the cutout 12 along the longitudinal direction of the heat exchanger 50 (or of the cutout 12) are located adjacent the supports 13 and, hence, the damping elements 30.

[0007] Because some water still accumulates on the bottom 11 at the areas 18, 19 at which the heat exchanger 50 is supported, this water will be drained in close proximity of the supports 13 and, hence, the damping elements 30. Thus, there is a risk that the water flows along the supports 13 and the damping elements 30 and under cold weather conditions freezes. As a result, the function of the damping elements is impaired and vibrations of the outdoor unit may not be sufficiently absorbed by the damping elements and are, hence, transferred to the horizontal surface or via the mounting brackets 100 to the vertical wall.

[0008] One solution to overcome this problem would have been to increase the distance between the supports 13 and the opposite edges 16, 17 of the cutout 12. This would reduce the risk of condensation water being drained out of the casing 10 flowing along the supports 13 and the damping elements 30. The disadvantage, however, is that the size of the cutout 12 will be reduced, thereby reducing the efficiency with which the water is led out of the casing 10. Moreover, even increasing the distance may not entirely eliminate the risk, because water may, because of the surface tension, be accumulated on a lower side (bottom side) of the bottom and may still reach the supports 13 and the damping elements 30.

[0009] Taking the aforesaid into account, it is the object of the present disclosure to provide an outdoor unit as described above, which enables efficient and fast drainage of any water formed on the outer surfaces of the heat exchanger at the same time preventing the formation of ice on the damping elements and, thereby, maintaining operability of the damping elements.

[0010] This object is solved by the subject matter as defined in claim 1. Embodiments are named in the dependent claims, the following description as well as the drawings.

[0011] According to an aspect, the present disclosure suggests an outdoor unit for an air source heat pump, particularly for heating and/or cooling a space or water heating as described in more detail above. The outdoor unit comprises a heat exchanger. The heat exchanger is to be connected to a refrigerant circuit of the heat pump and configured to exchange heat between outside air and the refrigerant flowing through the refrigerant circuit. The heat exchanger may be of any known kind. In one example, the heat exchanger is flat. In this context, the length and height may be larger than the width. In one embodiment, the heat exchanger is longitudinal in that the length is larger than the height. Further, the heat exchanger may have at least a first straight portion along its longitudinal direction and an optional curved or bent portion at one end of the straight portion in its longitudinal direction.

[0012] Furthermore, the outdoor unit comprises a bottom as part of a casing of the outdoor unit. The casing accommodates the heat exchanger. The bottom has an upper inner side and a lower outer side. The upper inner side is directed toward the inside of the casing, whereas the lower outer side is directed toward the outside of the casing. The bottom is configured to support a lower end of the heat exchanger in its height direction. The bottom may be a longitudinal having a length larger than its width. Further, the bottom may be pan-shaped having upright edges around its periphery (except for drainage edges as described below).

[0013] In order to fix the outdoor unit to a horizontal surface or to a mounting bracket attached to a vertical surface, at least one support is provided at the lower outer side of the bottom. The support may in this context also be defined as a foot. The support may extend between and in some example beyond opposite longitudinal edges (edges along the length) of the bottom. In one example, two of the supports, which are distanced in a longitudinal direction of the bottom (in some examples corresponding to the longitudinal direction of the heat exchanger), may be provided.

[0014] Moreover, the bottom has a drainage edge extending along a portion of the support and being configured to drain liquid (particularly condensation water) accumulating on the upper inner side of the bottom to the outside of the casing. The drainage edge may extend in a widthwise direction of the bottom, i.e. when the support extends between longitudinal edges, it extends in a widthwise direction of the bottom. In one embodiment, the drainage edge is parallel to the widthwise direction of the bottom. Yet, it is also conceivable that the drainage edge is angled relative to the widthwise direction.

[0015] In order to prevent condensation water drained from the casing to reach the supports and/or adhere to the lower outer side of the bottom due to surface tension, the drainage edge slopes from the upper inner side of the bottom in a direction to the lower outer side of the bottom away from the support. A sloping drainage edge on the one hand prevents the water from adhering to the lower outer side of the bottom due to surface tension and on the other hand provides for the advantage that a distance of the free end (extremity) of the drainage edge may be located closer to the support as compared to a case in which the bottom is horizontal at the drainage edge (see Figure 2A) or in which the drainage edge slopes from the upper inner side of the bottom in a direction to the lower outer side of the bottom toward the support (see Figure 2B).

[0016] Furthermore, it has been proven advantageous that the slope of the drainage edge ranges from substantially vertically (1°) to an angle of 55° relative to a line perpendicular to the bottom (vertical line in cross-section). According to another embodiment, the slope of the drainage edge ranges from 10° to 45° relative to a line perpendicular to the bottom (vertical line in cross-section).

[0017] According to an embodiment, a smallest distance between a free end (extremity) of the drainage edge and the support is at least 15 mm. According to another example, the smallest distance resides between 15 mm and 50 mm. Moreover, the distance may be constant, which is particularly the case, if the drainage edge extends parallel to the support (e.g. parallel to the widthwise direction of the bottom).

[0018] Moreover, the bottom may support the lower end (in the height direction) of the heat exchanger at a discrete portion of the heat exchanger, wherein an area of the bottom corresponding to the discrete portion is pan-shaped and comprises the drainage edge. To put it differently, the bottom may have a bead (recess or dimple) at least in the area of the bottom corresponding to the discrete portion. Thus, any water flowing from the heat exchanger is accumulated in the pan-shaped area and drained via the drainage edge being a portion of the circumference of the pan-shaped area.

[0019] The outdoor unit may further comprise a damping element at the support, in particular at a side of the support opposite to the bottom. The damping element may be of any kind, such as a rubber or metal spring.

[0020] As previously mentioned, two of the supports may be provided. The two supports may be distanced from each other in a longitudinal direction of the bottom (and according to an example also along the longitudinal direction of the heat exchanger). Moreover, the bottom may comprise a cutout extending between the supports. The cutout may be a closed opening in the bottom or an opening in the bottom which is open at one side. The bottom supports the lower end of the heat exchanger in the height direction of the heat exchanger at distanced discrete portions of the heat exchanger in areas corresponding to the supports. Hence, a longitudinal portion of the heat exchanger spans the cutout and any water flowing down from the surfaces of the heat exchanger in this portion (portion of the heat exchanger spanning the cutout) will drop to the ground without being accumulated on the bottom or in the casing.

[0021] In one embodiment, two of the drainage edges are disposed at facing (opposite) edges of the cutout. Hence, it may be ensured that a major portion of the condensation water is discharged through the cutout even from the portions at the opposite ends of the cutout where the heat exchanger is supported on the bottom.

[0022] Alternatively or additionally, drainage edges are provided on opposite sides of the support, wherein the drainage edges slope in opposite directions away from each other. Thus, if the heat exchanger extends beyond one of the supports, it can be ensured that any water is efficiently and quickly drained from the area at which the heat exchanger is supported on the bottom. This area corresponds in many cases to the area in which the bottom is supported on a horizontal surface or on a mounting bracket, i.e. to the area of the supports.

BRIEF DESCRIPTION OF DRAWINGS

[0023] In the following, additional features, advantages and embodiments are described with respect to the accompanying drawings in which:

Figure 1 shows the bottom of a previous development not covered by the present application in a top view;

Figures 2A and 2B show schematic side views of alternative drainage edges not covered by the present application;

Figure 2C shows a schematic side view of a drainage edge according to the present disclosure;

Figure 3 shows the bottom of an outdoor unit according to an embodiment of the present disclosure in a top view;

Figure 4 shows the bottom of the embodiment in Figure 3 in a side view;

Figure 5 shows a portion of the bottom shown in Figure 4 at the right support in an enlarged side view; and

Figure 6 shows a partial perspective of the left hand portion of Figure 5 with the support 13 being omitted.

DESCRIPTION OF AN EMBODIMENT

[0024] In the following description the same or similar elements are denoted by the same reference numerals and a repetitive description of these elements is dispensed in order to avoid repetition.

[0025] The bottom 11 of the casing 10 (indicated by the broken line in Figure 4) in Figure 2 has opposite longitudinal edges 14 and 15 as well as opposite transverse edges 23 and 24. The bottom 11 further has an upper inner side 20 and a lower outer side 21 (see Figure 2). The upper inner side 20 is directed toward the inside of the casing 10 whereas the lower outer side 21 is directed to the outside of the casing 10. In the present example, the upper inner side surface 20 of the bottom 11 is the top surface of the bottom 11 facing upward and the lower outer side 21 faces downward.

[0026] A heat exchanger 50 (indicated by the broken line in Figures 3 and 4) is supported at discrete portions 52, 53 (supported portion 52, 53) at a lower end 51 of the heat exchanger 50 in the height direction HD. The height direction HD is perpendicular to the plan view in Figure 3 and, hence, perpendicular to the bottom 11 as indicated in Figure 4. The areas of the bottom 11 supporting the heat exchanger 50 and corresponding to the supported areas are denoted by the reference numerals 18 and 19 (supporting areas 18, 19).

[0027] The heat exchanger 50 may be configured similar to the heat exchanger has disclosed in JP 2013-217525 A. Thus, the heat exchanger 50 may in plan view have a straight portion 54 and a curved portion 55. The straight portion 54 of the heat exchanger 50 extends between the supported portions 52, 53, wherein the curved portion 55 starts at the supported portion 53.

[0028] The heat exchanger 50 may be of a flat type, wherein the height H (see Figure 4) and the length L (see Figure 3) are larger than the width W (see Figure 3).

[0029] The bottom 11 has a cutout 12 extended between the supporting portions 18, 19 in a longitudinal direction LD of the bottom 11. The cutout 12 is open at one side as visible in the plan view of Figure 3. In particular, the cutout 12 is open at the side facing away from the longitudinal side edge 15 of the bottom 11. The depth of the cutout 12 in a widthwise direction WD may be equal to or larger than the width W of the heat exchanger 50. In particular, the cutout 12 should be configured so that a portion of the lower end 51 of the heat exchanger 50 between the supported portions 52 and 53 spans the cutout 12 and is fully accommodated within the cutout 12. The cutout 12 is thus delimited by the longitudinal side edge 15 of the bottom 11 and two opposite edges 16, 17 facing towards each other. As a result, any water flowing down from the heat exchanger 50 may drop immediately to the ground from the lower end 51 of the heat exchanger 50 through the cutout 12 in the bottom.

[0030] Another cutout 25 may be provided to cover a lower end 51 of the curved portion 55 of the heat exchanger 50. The cutout 25 extends between the supported portion 53 or the supporting portion 19 and the end of the heat exchanger 50 opposite to the end at which the supported portion 52 of the heat exchanger 50 is located. Thus, a portion of the lower end 51 of the heat exchanger 50 in the area of the curved portion 55 is fully accommodated within the cutout 25. The cutout 25 in Figure 3 is as well open at an end facing away from the transverse side edge 24 of the bottom 11. Thus, the cutout 25 is delimited by the transverse edge 24, the bottom 11 as well as opposite edges 26 and 27 of the cutout 25. As a result, any water flowing down from the heat exchanger 50 may drop immediately to the ground from the lower end 51 of the heat exchanger 50 through the cutout 25 in the bottom.

[0031] It is clear that each cutout 12, 25 may have an open end as the cutouts 12 and 25 in Figure 3 or that each cutout 12, 25 may be configured as a closed opening as shown with respect to the cutout 25 in Figure 1.

[0032] In order to fix the casing 10 of the outdoor unit to a horizontal surface or via mounting brackets 100 to a vertical surface such as a wall of a house, feet (supports) 13 are attached to the lower outer side 21 of the bottom 11. The supports 13 are in plan view longitudinal and extend between and beyond the opposite longitudinal edges 14, 15 of the bottom 11 in the widthwise direction WD. As best visible from the plan view, the opposite edges 16, 17 of the cutout 12 extend in parallel to the side edges of the supports 13, i.e. parallel to the widthwise direction WD of the bottom 11. The same applies for the edge 22 of the cutout 25.

[0033] As best visible from Figure 4, damping elements 30 are sandwiched between the supports 13 and the mounting brackets 100. In the present example elastic elements (for example cylinders) are employed as damping element 30. For example, the damping element 30 may be made of a rubber. Alternatively, metal springs may be used. The damping elements 30 serve to dampen any vibrations occurring during the operation of the heat pump in the outdoor unit and preventing the vibrations from being transferred to the horizontal surface or to a vertical surface to which the outdoor unit is attached to.

[0034] Furthermore, as best visible from Figure 3, the areas 28 of the bottom 11, at which the supporting surface 18, 19 are provided, are provided with a bead (recess or dimple) so as to be pan-shaped. Thus, any water flowing down from the heat exchanger 50 at the supported portions 52 and 53 will be accumulated in the pan-shaped areas 28 of the bottom.

[0035] In order to lead water accumulated in the pan-shaped areas 28 to the ground, the pan-shaped areas 28 are delimited at a portion of their circumference by drainage edges 22.

[0036] In particular, in the example, the drainage edges 22 are located at the edges 16, 17 and 26 of the cutouts 12 and 25. A further drainage edge 31 is located at the edge 27 of the cutout 25 which may be configured similar to the drainage edges 22 described in the following. Yet, as the drainage edge 31 is not located in close proximity to the supports 13 and, hence, the damping elements 30 as the drainage edges 22, the drainage edge 31 is not that problematic with respect to the formation of ice on the damping elements 30 and will not be described in more detail in this application.

[0037] In particular, in the course of the present development, different configurations of the drainage edge 22 had been considered as shown in Figures 2A to C. In the first place, it had been considered to extend the drainage edge 22 so as to increase the distance Y of the free end 29 of the drainage edge 22 to the support 13 as shown in Figure 2A. However, a relatively large distance Y was necessary in order to avoid any water from reaching the supports 13 and particularly the damping elements 30. A large distance Y, however, results in a narrower cutout 12 in the longitudinal direction LD (along the straight portion 54 of the heat exchanger 50). In addition, experiments showed that water will still adhere to the lower outer side 21 of the bottom 11 and may thus migrate to the damping element 30.

[0038] Alternatively, it had been considered to form the drainage edge 22 so as to slope toward the support 13 as shown in Figure 2B. Yet, also in this configuration, the distance Z needed to be relatively large with the additional disadvantage that the bottom 11 at the edge 17 was even further directed to the cutout 12 than the free end 29 of the drainage edge 22. As a result, the cutout 12 was even smaller than compared to the case in Figure 2A.

[0039] As a consequence, according to the present disclosure, the drainage edge 22 is configured so as to slope from the inner side surface of the bottom 11 in a direction to the outer side surface of the bottom away from the support 13 and, hence, the damping element 30, as schematically shown in Figure 2C and in more detail in Figure 6. This solution provides for the best compromise of a small distance X between the free end 29 of the drainage edge 22 in a cross-sectional side view and a relatively large cutout 12 and the longitudinal direction LD of the bottom 11. As a result, water accumulating in the areas 28 can efficiently and quickly be let out of the casing 10 maintaining a relatively large cutout 12 so that the amount of water accumulating in the areas 28 can be reduced to a minimum.

[0040] In addition and as shown in more detail in the partial side view of Figure 5, the distance D between the free end 29 of the drainage edge 22 and the support 13 should be at least 15 mm and according to an embodiment resides between 15 mm and 50 mm.

[0041] The angle α of the slope of the drainage edge 22 should reside between 1° (close to the vertical or substantially vertical) and 55°, preferably between 10° and 45° relative to a line 32 perpendicular to the bottom 11 or a vertical line 32.

[0042] As will be apparent from Figure 3, drainage edges 22 are positioned at the edges 16, 17 of the cutout 12. Thus, the drainage edges 22 extend parallel to the widthwise direction WD and the supports 13 and delimit the cutout 12. The drainage edges 22 at the edges 16, 17 are disposed opposite to and facing each other in association with the respective supports 13. The drainage edges 22 at the edges 16, 17 slope towards each other.

[0043] The drainage edges 22 at the edges 17 and 26 are associated to the same support 13, but different cutouts 12, 25. The drainage edges 22 at the edges 17 and 26 are provided on opposite sides of the support 13 facing away from each other as clearly apparent from Figures 4 and 5 as well as in the plan view of Figure 3. The drainage edges 22 at the edges 17 and 26 slope in opposite directions away from each other.

[0044] It is clear that the above description relates to a particular embodiment and that modifications are conceivable within the scope of the present disclosure and without sparking from the scope of the appended claims. For example, it is clear that the cutouts may be configured to have open and/or to be closed openings. Moreover, it is clear that the positioning of the drainage edges 22 may be adapted to the shape of the heat exchanger and/or the configuration of the bottom plate and the cutouts. Thus, there may even be further drainage edges 22 or less drainage edges 22 than described in the above embodiment.

LIST OF REFERENCES

[0045]

Casing 10
Bottom 11
Cutout 12
Support 13
Longitudinal edge of the bottom 14
Longitudinal edge of the bottom 15
Transverse edge of the cutout 16
Transverse edge of the cutout 17
Supporting area 18
Supporting area 19
Upper inner side 20
Lower outer side 21
Drainage edge 22
Transverse edge of the bottom 23
Transverse edge of the bottom 24
Further cutout 25
Edge of the further cutout 26
Edge of the further cutout 27
Pan-shaped area 28
Free end 29
Damping element 30
Further drainage edge 31
Vertical line 32
Heat exchanger 50
Lower end of heat exchanger 51
Supported area 52
Supported area 53
Straight portion 54
Curved portion 55
Mounting brackets 100

Claims

1. Outdoor unit for an air source heat pump, comprising:

a heat exchanger (50);
a bottom (11) having an upper inner side (20) and a lower outer side (21), the bottom (11) supporting a lower end (51) of the heat exchanger (50); and
a support (13) at the lower outer side (21) of the bottom (11) for supporting the bottom (11),
wherein the bottom (11) has a drainage edge (22) extending along a portion of the support (13) and being configured to drain liquid accumulating on the upper inner side (20) of the bottom (11) to the outside,
wherein the drainage edge (22) slopes from the inner side of the bottom (11) in a direction to the outer side of the bottom (11) away from the support (13).

2. Outdoor unit according to claim 1, wherein the slope of the drainage edge (22) is angled from 1° to 55°, preferably from 10° to 45° relative to a line perpendicular to the bottom (11).

3. Outdoor unit according to claim 1 or 2, wherein a smallest distance between a free end (29) of the drainage edge (22) and the support (13) is at least 15 mm and preferably resides between 15 mm and 50 mm.

4. Outdoor unit according to any one of the preceding claims, wherein the bottom (11) supports the lower end of the heat exchanger (51) at a discrete portion of the heat exchanger (50), wherein an area of the bottom (11) corresponding to the discrete portion is pan-shaped and comprises the drainage edge (22).

5. Outdoor unit according to any one of the preceding claims, wherein the support (13) extends between two opposite edges of the bottom (11).

6. Outdoor unit according to any one of the preceding claims, further comprising a damping element (30) at the support (13).

7. Outdoor unit according to any one of the preceding claims, wherein two of the supports (13) are provided and the bottom (11) comprises a cutout (12) extending between the supports (13) and wherein the bottom (11) supports the lower end of the heat exchanger (51) at distanced discrete portions of the heat exchanger (50) in areas corresponding to the supports (13) so that a portion of the heat exchanger (50) spans the cutout (12).

8. Outdoor unit according to claim 7, wherein two of the drainage edges (22) are disposed at facing edges of the cutout (12).

9. Outdoor unit according to any one of the preceding claims, wherein drainage edges (22) are provided on opposite sides of the support (13), wherein the drainage edges (22) slope in opposite directions away from each other.

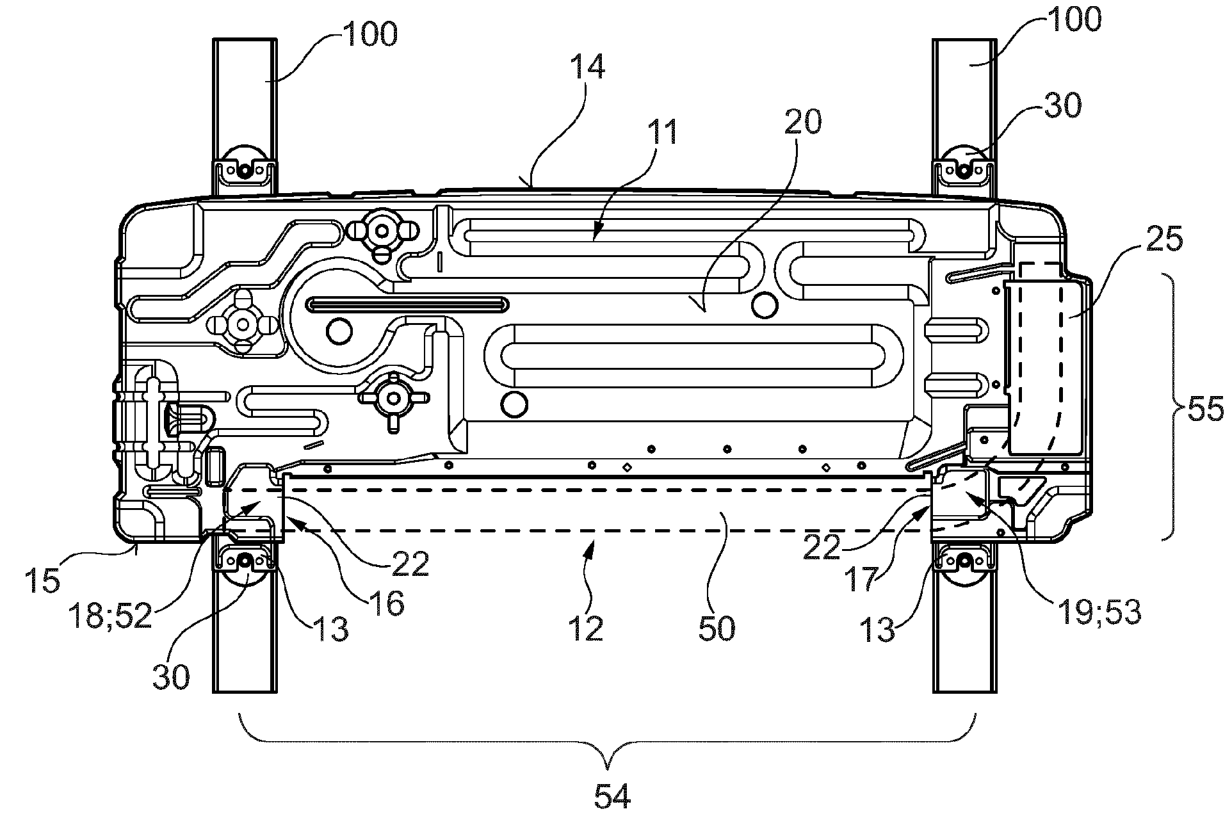
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Fig. 1

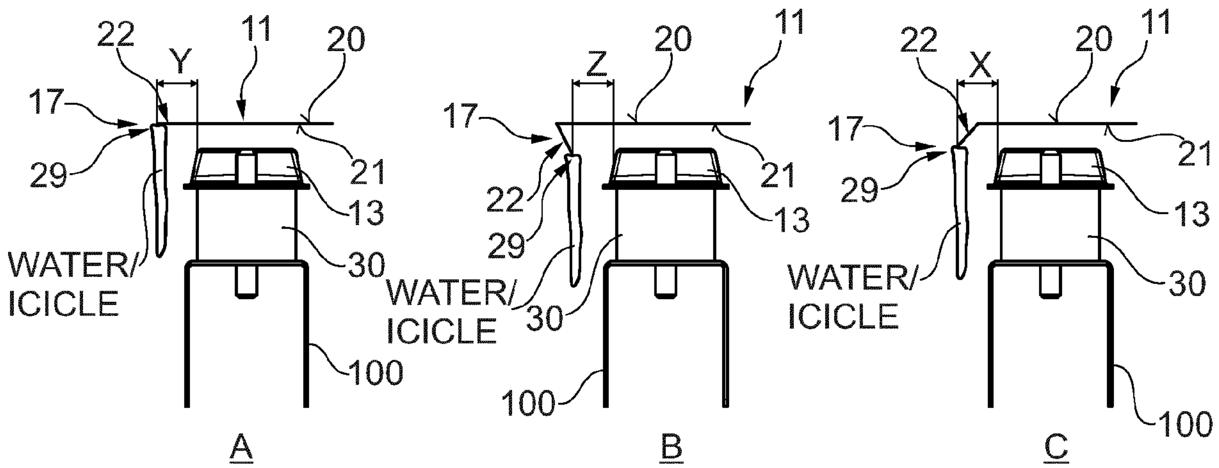
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Fig. 2

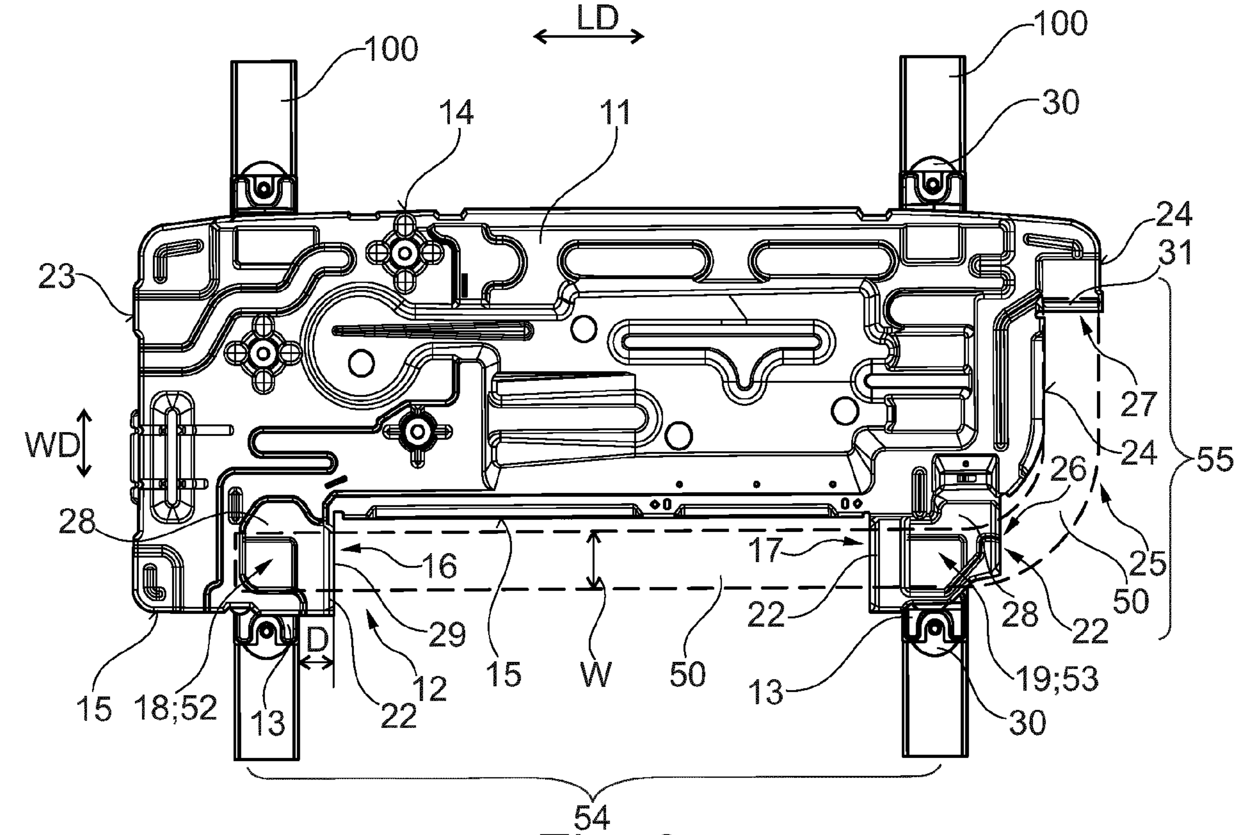
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Fig. 3

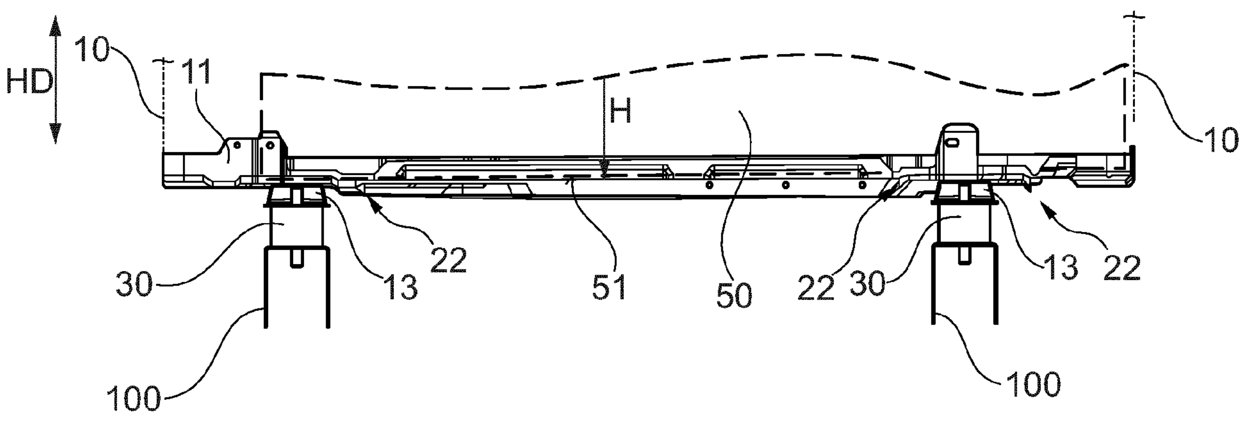
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Fig. 4

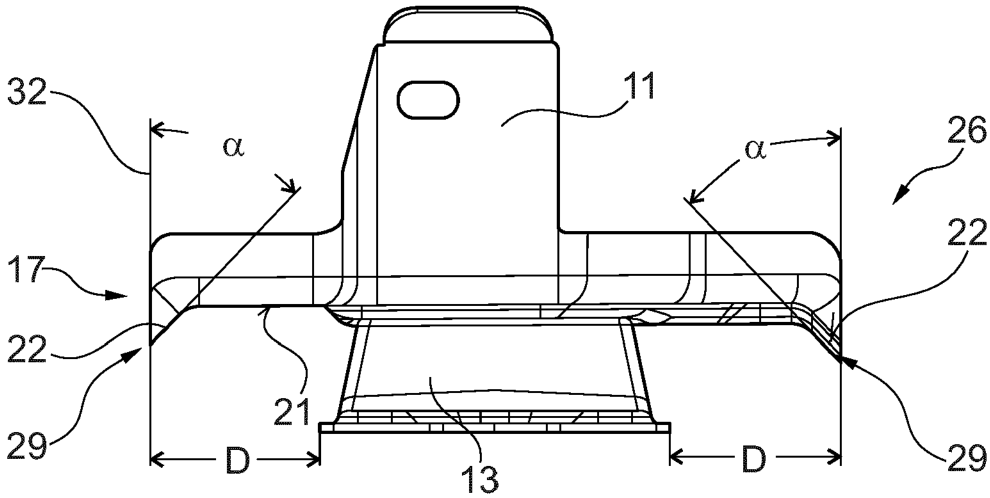

Fig. 5

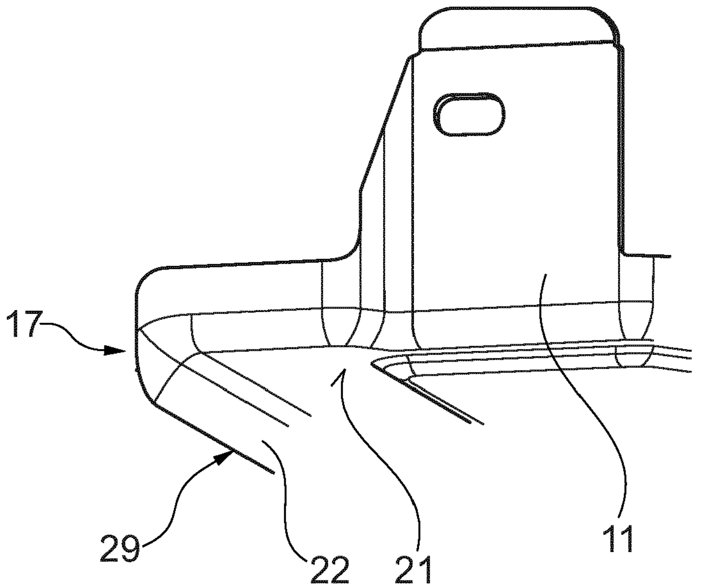

Fig. 6

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 17 18 8992

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 2012/124457 A1 (SHARP KK [JP]; SHIBORINO YOSHINOBU; MORI HIROMI; NAGATA ITARU) 20 September 2012 (2012-09-20) * paragraph [0024] - paragraph [0033]; figures 5-7 *	1-7,9	INV. F24F1/36 ADD. F24F13/22
X	EP 2 995 874 A2 (LG ELECTRONICS INC [KR]) 16 March 2016 (2016-03-16) * paragraph [0032] - paragraph [0044]; figures 4-9 *	1-9	
A	EP 2 333 440 A1 (SHARP KK [JP]) 15 June 2011 (2011-06-15) * paragraph [0018] - paragraph [0021]; figures 4,6 *	1-9	
A	EP 3 076 095 A1 (DAIKIN IND LTD [JP]) 5 October 2016 (2016-10-05) * figures 6-8 *	7	

TECHNICAL FIELDS SEARCHED (IPC)

F24F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	15 March 2018	Anconetani, Mirco

2

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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D : document cited in the application
L : document cited for other reasons

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