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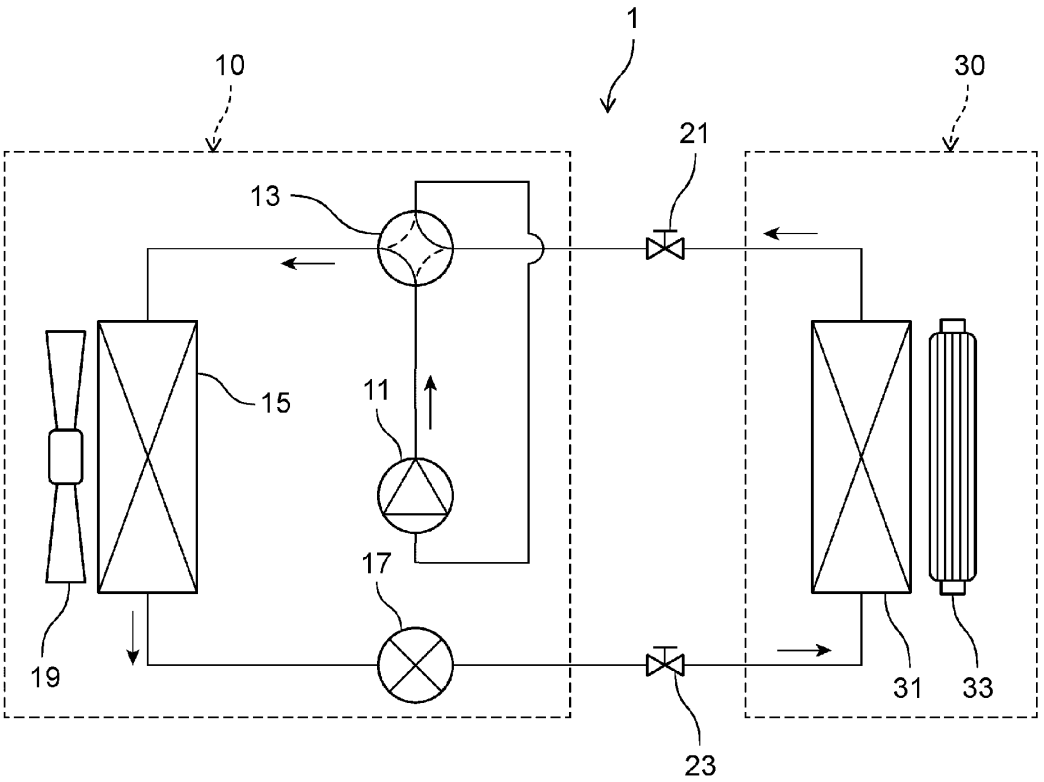
(54) **AIR CONDITIONER**

(57) An air conditioner according to the present disclosure includes: an outdoor unit; indoor unit (30) of a wall-mounted type attached to a wall surface in a room; and a refrigeration cycle circuit filled with a flammable refrigerant, indoor unit (30) including leak detection sensor (39) that detects a leak of the flammable refrigerant, leak detection sensor (39) being provided on exterior bottom part (35b) of indoor unit (30).

FIG. 1



EP 4 464 947 A1

Description

BACKGROUND

1. Technical Field

[0001] The present disclosure relates to an air conditioner.

2. Description of the Related Art

[0002] PTL 1 discloses an air conditioner using a flammable refrigerant and including a leak detection sensor that detects a leak of the flammable refrigerant in an indoor unit. The air conditioner includes a leak detection sensor in a blower circuit unit provided with an indoor heat exchanger in the indoor unit. The air conditioner also includes a communication path that allows a pipe connection housing in which a pipe connector is disposed to communicate with a blower circuit unit.

[0003] PTL 2 discloses an indoor unit including a refrigerant sensor that detects a refrigerant leak using a flammable refrigerant. The indoor unit includes a refrigerant sensor on an air duct during short-circuit operation. When the refrigerant sensor detects a concentration of the refrigerant, the concentration being higher than a first threshold value, the indoor unit starts the short-circuit operation. After that, the concentration of the refrigerant detected by the refrigerant sensor is compared with a second threshold value to determine whether there is a refrigerant leak.

Citation List

Patent Literature

[0004]

PTL 1: Unexamined Japanese Patent Publication No. 2022-112061
PTL 2: Japanese Patent No. 6431339

SUMMARY

[0005] The present disclosure provides an air conditioner capable of improving reliability of detection of a refrigerant leak when a flammable refrigerant leaks in an indoor unit.

[0006] The air conditioner according to the present disclosure includes: an outdoor unit; an indoor unit of a wall-mounted type attached to a wall surface in a room; and a refrigeration cycle circuit filled with a flammable refrigerant, the indoor unit including a leak detection sensor that detects a leak of the flammable refrigerant, the leak detection sensor being provided on an exterior bottom part of the indoor unit.

[0007] The air conditioner according to the present disclosure includes the leak detection sensor in the exterior bottom part through which the flammable refrigerant easily passes when the flammable refrigerant leaks in the indoor unit. This configuration enables improving reliability of detection of a refrigerant leak when the flammable refrigerant leaks in the indoor unit.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008]

Fig. 1 is a refrigeration cycle diagram of an air conditioner according to a first exemplary embodiment;
Fig. 2 is a perspective view of an indoor unit according to the first exemplary embodiment;
Fig. 3 is a sectional view of the indoor unit according to the first exemplary embodiment;
Fig. 4 is a side view of the indoor unit according to the first exemplary embodiment;
Fig. 5 is a rear view of the indoor unit according to the first exemplary embodiment;
Fig. 6 is a side view of an indoor unit according to a second exemplary embodiment; and
Fig. 7 is a front view of an indoor unit according to a third exemplary embodiment.

DETAILED DESCRIPTIONS

(Underlying knowledge and the like of present disclosure)

[0009] At the time when the inventors conceived the present disclosure, a R32 refrigerant is often used as a refrigerant used in an air conditioner. Unfortunately, the R32 has a high global warming potential (GWP), so that an influence on climate change has been concerned. Thus, using natural refrigerants having a low GWP, such as isobutane and propane, as a refrigerant of an air conditioner has been proposed. However, these low GWP refrigerants are flammable, so that a technique has been proposed in which a leak detection sensor capable of detecting a refrigerant leak is provided in an indoor unit. Under such circumstances, the inventors have found a problem that a refrigerant leak needs to be detected with high reliability when a flammable refrigerant leaks into a room, and then have reached a configuration of the subject of the present disclosure to solve the problem.

[0010] Thus, the present disclosure provides an air conditioner capable of improving reliability of detection of a refrigerant leak when a flammable refrigerant leaks in an indoor unit.

[0011] Hereinafter, an exemplary embodiment will be described in detail with reference to the accompanying drawings. Unnecessarily detailed description may not be described. For example, a detailed description of already well-known matters or a duplicated description of a substantially identical configuration may not be described. This is to avoid an unnecessary redundancy in the following description and to facilitate understanding of those skilled in the art.

[0012] The accompanying drawings and the following description are presented only to help those skilled in the art fully understand the present disclosure and are not intended to limit the subject matters described in the scope of claims.

(First exemplary embodiment)

[0013] With reference to Figs. 1 to 5, a first exemplary embodiment will be described below.

[1-1. Configuration]

[1-1-1. Configuration of refrigeration cycle circuit]

[0014] Fig. 1 is a refrigeration cycle diagram of air conditioner 1 according to the first exemplary embodiment, and schematically illustrates a refrigeration cycle circuit provided in air conditioner 1. The refrigeration cycle circuit of air conditioner 1 includes outdoor unit 10 and indoor unit 30. The refrigeration cycle circuit of air conditioner 1 is filled with R290 (i.e., propane), which is a flammable refrigerant, as a refrigerant.

[0015] Outdoor unit 10 is a device installed outdoors, and includes compressor 11, four-way valve 13, outdoor heat exchanger 15, and expansion valve 17, which are sequentially connected by a refrigerant pipe. Compressor 11 is a scroll type compressor, for example, and compresses a refrigerant sucked from a suction port and discharges the refrigerant from a discharge port. Four-way valve 13 is connected to the suction port and the discharge port of compressor 11, and causes the suction port and the discharge port to communicate with outdoor heat exchanger 15 and indoor heat exchanger 31, respectively, by switching a flow path. Outdoor heat exchanger 15 is a fin-tube heat exchanger, and exchanges heat between external air and the refrigerant inside by driving outdoor air blower 19. Outdoor air blower 19 is an axial fan, for example. Expansion valve 17 decompresses the refrigerant.

[0016] Indoor unit 30 is a device installed in a room, and includes indoor heat exchanger 31 and indoor air blower 33. Indoor heat exchanger 31 is connected to four-way valve 13 and expansion valve 17 through refrigerant pipe connectors 21 and 23, respectively. Indoor heat exchanger 31 is a fin-tube heat exchanger, for example. Indoor air blower 33 is a device that is driven to exchange heat between indoor air and the refrigerant in indoor heat exchanger 31, and is a cross flow fan, for example.

[0017] Air conditioner 1 performs air conditioning by circulating the refrigerant in the refrigeration cycle circuit by driving compressor 11 and returning indoor air having exchanged heat with the refrigerant in indoor heat exchanger 31 to the room. Air conditioner 1 also can switch between heating operation and cooling operation by switching the flow path of four-way valve 13.

[1-1-2. Configuration of indoor unit]

[0018] Fig. 2 is a perspective view of indoor unit 30. Fig. 3 is a sectional view of indoor unit 30, and illustrates a section perpendicular to a left-right direction. Fig. 4 is a side view of indoor unit 30. The drawings each show reference sign X indicating a right direction of indoor unit 30, reference sign Y indicating a front direction of indoor unit 30, and reference sign Z indicating an upper direction of indoor unit 30. Directions such as up and down, left and right, and front and back in the following description refer to directions with respect to indoor unit 30 unless otherwise specified.

[0019] Indoor unit 30 is a so-called wall-mounted indoor unit attached to wall surface W in a room. Indoor unit 30 includes cover member 35 in the shape of a box elongated in the left-right direction. Cover member 35 is a housing that houses indoor heat exchanger 31 and indoor air blower 33 illustrated in Fig. 1, and corresponds to an exterior of indoor unit 30. Cover member 35 is made of resin or the like. Cover member 35 is configured to cover indoor heat exchanger 31 and indoor air blower 33 from all around except from a rear side or a backward side on which cover member 35 is open. Cover member 35 is provided on the backward side with an opening closed by back panel 38. Back panel 38 is a member made of resin or the like. Indoor unit 30 is attached to wall surface W by fixing back panel 38 to installation plate 40 made of metal and fixed to wall surface W.

[0020] Cover member 35 is provided with air outlet 36 that communicates inside and outside cover member 35. Air outlet 36 is an opening formed almost through the whole of cover member 35 in the left-right direction. Indoor unit 30 blows air having exchanged heat with the refrigerant in indoor heat exchanger 31 into the room from air outlet 36 to perform air conditioning in the room. Cover member 35 includes air outlet 36 formed between exterior front surface 35a composed of a front surface of cover member 35 and exterior bottom part 35b composed of an outer surface of a bottom part of cover member 35. In other words, exterior bottom part 35b can also be said to be a part of cover member 35, the part being formed rearward from air outlet 36 to extend to wall surface W. Exterior bottom part 35b of indoor unit 30 of the present exemplary embodiment is a substantially horizontal surface extending over the entire length of indoor unit 30 in the left-right direction, and is slightly inclined in a forward and upward direction away from wall surface W.

[0021] Air outlet 36 is provided with flap 37 in the shape of a plate to change a direction of a flow of air blown out from air outlet 36. Flap 37 is held in an attitude corresponding to an outer shape of cover member 35 to close substantially the entire surface of air outlet 36 when air conditioner 1 is stopped as illustrated in Figs. 2 to 4.

[0022] As illustrated in Fig. 4, exterior bottom part 35b is provided with leak detection sensor 39. That is, leak detection sensor 39 is provided outside cover member 35. Leak detection sensor 39 is capable of detecting a

leak of the flammable refrigerant (R290) used in air conditioner 1. When detecting a leak of the flammable refrigerant, leak detection sensor 39 transmits a detection signal of a refrigerant leak to a controller provided in air conditioner 1.

[0023] More specifically, leak detection sensor 39 is provided at backward end 35b 1 that is an end of exterior bottom part 35b, the end being close to wall surface W. Thus, leak detection sensor 39 is close to wall surface W.

[0024] Fig. 5 is a rear view of indoor unit 30, and illustrates indoor unit 30 as viewed from behind. As illustrated in Fig. 5, back panel 38 has bottom surface 38a inside indoor unit 30. Bottom surface 38a faces upward. Bottom surface 38a includes inclined surface part 38a1 and horizontal surface part 38a2.

[0025] Horizontal surface part 38a2 is a flat surface part extending horizontally in the left-right direction. Horizontal surface part 38a2 occupies a range indicated by position P2 from a left end of back panel 38 in Fig. 5 to boundary point 38a3 in the left-right direction. Boundary point 38a3 serves as a starting point at which inclined surface part 38a1 rises. Horizontal surface part 38a2 is a lower end of bottom surface 38a of back panel 38. Position P2 is a part of a position occupied by the lower end of bottom surface 38a in the left-right direction.

[0026] Inclined surface part 38a1 is a flat surface part inclined vertically in the left-right direction. Inclined surface part 38a1 in the present exemplary embodiment is inclined upward and right from boundary point 38a3 as a starting point, and extends to a right end of back panel 38. Thus, the flammable refrigerant having flowed out above bottom surface 38a flows leftward along inclined surface part 38a1 by gravity to be collected on horizontal surface part 38a2.

[0027] As illustrated in Fig. 5, leak detection sensor 39 is located at a left end of exterior bottom part 35b, and position P1 occupied by leak detection sensor 39 partially overlaps position P2 occupied by horizontal surface part 38a2 in the left-right direction. More specifically, position P1 occupied by leak detection sensor 39 extends from position P2 occupied by horizontal surface part 38a2 to position P3 occupied by inclined surface part 38a1 in the left-right direction. In other words, boundary point 38a3, which is the starting point from which inclined surface part 38a1 rises, is within position P1 occupied by leak detection sensor 39 in the left-right direction. Unlike the present exemplary embodiment, the whole of position P1 occupied by leak detection sensor 39 may overlap position P2 occupied by horizontal surface part 38a2. Position P1 occupied by leak detection sensor 39 may be configured to at least partially overlap with position P2 occupied by horizontal surface part 38a2 in the left-right direction.

[1 -2. Operation and action]

[0028] Operation and action of air conditioner 1 configured as described above when the flammable refrigerant leaks in indoor unit 30 during stop of operation will be described.

[0029] When the flammable refrigerant leaks in indoor unit 30, the flammable refrigerant having leaked fills the inside of cover member 35 and the back of back panel 38. The filled flammable refrigerant is likely to flow out to the outside of indoor unit 30 through a gap between flap 37 and air outlet 36 and a gap between cover member 35 and wall surface W regardless of a leakage location.

[0030] The flammable refrigerant in the present exemplary embodiment is R290 having a specific gravity of about 1.5 with respect to air, so that the flammable refrigerant is likely to flow downward after flowing out to the outside of indoor unit 30.

[0031] The flammable refrigerant having flowed out of indoor unit 30 through the gap between flap 37 and air outlet 36 is attracted to exterior bottom part 35b by the Coanda effect, and is likely to flow backward to wall surface W along exterior bottom part 35b as indicated by arrows in Fig. 4. Thus, leak detection sensor 39 provided on exterior bottom part 35b easily detects the flammable refrigerant flowing along exterior bottom part 35b due to the Coanda effect.

[0032] As indicated by block arrows with broken lines in Fig. 4, the flammable refrigerant having flowed out of indoor unit 30 through the gap between cover member 35 and wall surface W is likely to flow downward along wall surface W. Thus, leak detection sensor 39 is provided on backward end 35b 1 of exterior bottom part 35b to be close to wall surface W, so that leak detection sensor 39 is likely to detect the flammable refrigerant flowing downward along wall surface W.

[0033] As indicated by block arrows with two-dot chain lines in Fig. 5, the flammable refrigerant having leaked behind back panel 38 is likely to flow to the left in Fig. 5 along inclined surface part 38a1 of bottom surface 38a of back panel 38 to flow to horizontal surface part 38a2 serving as the lower end of bottom surface 38a. Thus, leak detection sensor 39 occupying position P1 overlapping position P2 occupied by horizontal surface part 38a2 in the left-right direction is likely to detect a leak of the flammable refrigerant.

[0034] As described above, leak detection sensor 39 in the present exemplary embodiment is disposed at a position through which the flammable refrigerant easily passes, thereby improving reliability of detection of a refrigerant leak using leak detection sensor 39 when the flammable refrigerant leaks. For example, after the refrigerant leak is detected by leak detection sensor 39, the controller may drive indoor air blower 33 to diffuse the flammable refrigerant having leaked from indoor unit 30 into the room, thereby causing operation of preventing a region with a high concentration of the flammable refrigerant from being formed.

[1-3. Effects and the like]

[0035] As described above, air conditioner 1 in the present exemplary embodiment includes: outdoor unit

10; indoor unit 30 of a wall-mounted type attached to wall surface W in a room; and a refrigeration cycle circuit filled with a flammable refrigerant, indoor unit 30 including leak detection sensor 39 that detects a leak of the flammable refrigerant, and leak detection sensor 39 being provided in exterior bottom part 35b of indoor unit 30.

[0036] This configuration facilitates detection of the flammable refrigerant flowing along exterior bottom part 35b due to the Coanda effect using leak detection sensor 39 when the flammable refrigerant leaks in indoor unit 30. Thus, reliability of detection of a refrigerant leak can be enhanced. In particular, R290 having a specific gravity of about 1.5 with respect to air is used as the flammable refrigerant in the present exemplary embodiment, so that the Coanda effect is likely to occur, and thus the reliability of detection of a refrigerant leak using leak detection sensor 39 is improved.

[0037] As in the present exemplary embodiment, leak detection sensor 39 may be provided on backward end 35b1 serving as an end of exterior bottom part 35b, the end being close to wall surface W.

[0038] This configuration facilitates detection of the flammable refrigerant flowing along wall surface W using leak detection sensor 39. Thus, reliability of detection of a refrigerant leak can be enhanced.

[0039] Indoor unit 30 is provided behind with bottom surface 38a facing upward as in the present exemplary embodiment. Bottom surface 38a is provided with inclined surface part 38a1 inclined vertically in the left-right direction of indoor unit 30, and position P1 occupied by leak detection sensor 39 in the left-right direction of indoor unit 30 overlaps position P2 occupied by horizontal surface part 38a2 serving as the lower end of bottom surface 38a.

[0040] This configuration facilitates causing the flammable refrigerant to flow along inclined surface part 38a1 toward leak detection sensor 39. Thus, reliability of detection of a refrigerant leak can be enhanced. In particular, boundary point 38a3 serving as the starting point at which inclined surface part 38a1 rises from horizontal surface part 38a2 serving as the lower end of bottom surface 38a is located inside position P1 in the left-right direction in the present exemplary embodiment. That is, position P1 occupied by leak detection sensor 39 extends from position P2 occupied by horizontal surface part 38a2 to position P3 occupied by inclined surface part 38a1 in the left-right direction. Thus, the flammable refrigerant having flowed downward along inclined surface part 38a1 more easily passes through leak detection sensor 39, so that the reliability of detection of a refrigerant leak can be further enhanced.

[0041] Hereinafter, a second exemplary embodiment and a third exemplary embodiment will be described. Only configurations different from that of the first exemplary embodiment already described will be described below, and configurations similar to that of the first exemplary embodiment already described are denoted by same reference numerals to omit description thereof.

(Second exemplary embodiment)

[0042] Fig. 6 is a side view of indoor unit 130 according to a second exemplary embodiment. Indoor unit 130 according to the second exemplary embodiment is different from indoor unit 30 according to the first exemplary embodiment in position of leak detection sensor 39 in a fore-and-aft direction.

[0043] Leak detection sensor 39 in the second exemplary embodiment is provided on flap-side end 35b2 serving as an end of exterior bottom part 35b, the end being close to flap 37 and serving as a front end. Thus, leak detection sensor 39 is located close to air outlet 36 and flap 37.

[0044] As described above, when the flammable refrigerant leaks, the flammable refrigerant filled inside cover member 35 is likely to flow out to the outside through a gap between flap 37 and air outlet 36. Thus, leak detection sensor 39 easily detects the flammable refrigerant having flowed out through the gap between flap 37 and air outlet 36.

[0045] As described above, indoor unit 30 in the present exemplary embodiment includes flap 37 that guides blown air, and leak detection sensor 39 that is provided at an end of exterior bottom part 35b, the end being close to flap 37.

[0046] This configuration facilitates detection of the flammable refrigerant having flowed out to the outside of cover member 35 from around flap 37 using leak detection sensor 39. Thus, reliability of detection of a refrigerant leak can be enhanced.

(Third exemplary embodiment)

[0047] Fig. 7 is a front view of indoor unit 230 according to a third exemplary embodiment. Indoor unit 230 according to the third exemplary embodiment is different from indoor unit 30 according to the first exemplary embodiment in shape of cover member 235 and installation position of leak detection sensor 39.

[0048] Exterior bottom part 235b in the third exemplary embodiment is curved forming a shape in which indoor unit 230 has a center in the left-right direction, the center being positioned downward. That is, exterior bottom part 235b includes lower end (lowermost position) 235b1 positioned at the center in the left-right direction, and two inclined parts 235b2 each extending from lower end 235b1 in a direction inclined upward while curving toward the outside in the left-right direction of indoor unit 230. Then, exterior front surface 235a has a lower edge that is also curved along exterior bottom part 235b in a shape in which the center in the left-right direction is located downward.

[0049] Leak detection sensor 39 in the third exemplary embodiment is located at the center of exterior bottom part 235b in the left-right direction. That is, leak detection sensor 39 in the third exemplary embodiment is provided at lower end 235b1 of exterior bottom part 235b.

[0050] As described above, the flammable refrigerant of each of first to third exemplary embodiments is R290 having a specific gravity of about 1.5 with respect to air, so that the flammable refrigerant having flowed out of cover member 235 flows to lower end 235b1 at the center in the left-right direction along inclined part 235b2 of exterior bottom part 235b due to the Coanda effect. Thus, leak detection sensor 39 provided at lower end 235b1 of exterior bottom part 235b can easily detect the flammable refrigerant.

[0051] As described above, exterior bottom part 235b in the present exemplary embodiment includes inclined part 235b2 inclined vertically in the left-right direction of indoor unit 230, and leak detection sensor 39 is disposed at lower end 235b 1 of exterior bottom part 235b.

[0052] This configuration enables leak detection sensor 39 to easily detect the flammable refrigerant flowing along inclined part 235b2 to lower end 235b1 due to the Coanda effect. Thus, reliability of detection of a refrigerant leak can be enhanced.

(Other exemplary embodiments)

[0053] As described above, the first to third exemplary embodiments have been described as examples of the technique disclosed in the present application. However, the technique in the present disclosure is not limited thereto, and can also be applied to exemplary embodiments in which changes, replacements, additions, omissions, and the like have been made. Alternatively, the components described in the first to third exemplary embodiments may be combined to make an additional exemplary embodiment.

[0054] Thus, other exemplary embodiments will be exemplified below.

[0055] Although the exemplary embodiments described above describe R290 that is used as the flammable refrigerant, the flammable refrigerant is only required to flow along exterior bottom part 35b due to the Coanda effect at the time of leakage. That is, it is considered that a refrigerant having a specific gravity larger than that of air can be used as the flammable refrigerant. Then, using a refrigerant having a specific gravity equal to or more than that of R290 as the flammable refrigerant is more desirable. Examples of the desirable flammable refrigerant include R600 and R600a.

[0056] These flammable refrigerants may be each used as a single refrigerant, or may be each used as a mixed refrigerant including two or more kinds of refrigerant in which corresponding one of the flammable refrigerants is mixed with one or more of R32, R1234yf, R1234ze, R1132(E), HFO-1123, and the like. Examples of the refrigerant to be mixed include a refrigerant having density higher than that of air under atmospheric pressure (e.g., at a temperature of room temperature (25°C)).

[0057] Although the first exemplary embodiment has been described in which the bottom surface 38a is formed by back panel 38, this is an example. Bottom surface 38a may be formed by cover member 35 or installation plate 40, and may be disposed backward and inside indoor unit 30. Bottom surface 38a has a shape that is not limited that described in the first exemplary embodiment. For example, bottom surface 38a may include two inclined surface parts 38a1 inclined in respective directions reversed to each other in the left-right direction, and may have a concave shape when viewed from behind. In this case, leak detection sensor 39 is disposed occupying positions in the left-right direction, the positions overlapping those occupied by the lower end of bottom surface 38a in the left-right direction. Inclined surface part 38a1 may be a curved surface instead of a flat surface. Additionally, horizontal surface part 38a2 may not be formed.

[0058] Although the third exemplary embodiment has been described in which lower end 235b1 of exterior bottom part 235b is located at the center of exterior bottom part 235b in the left-right direction, this is an example. For example, lower end 23 5b 1 may be formed at a position shifted in any direction in the left-right direction from the center of exterior bottom part 235b in the left-right direction.

[0059] The exemplary embodiments described above are to exemplify the technique in the present disclosure, and thus, various modifications, replacements, additions, omissions, and the like can be made in the scope of claims or in an equivalent scope of the claims.

[Configurations supported by exemplary embodiments described above]

[0060] The exemplary embodiments described above support configurations below.

(Note)

[0061] (Technique 1) An air conditioner including: an outdoor unit; an indoor unit of a wall-mounted type attached to a wall surface in a room; and a refrigeration cycle circuit filled with a flammable refrigerant, the indoor unit including a leak detection sensor that detects a leak of the flammable refrigerant, the leak detection sensor being provided on an exterior bottom part constituting a bottom part of an exterior of the indoor unit.

[0062] This configuration facilitates detection of the flammable refrigerant flowing along the exterior bottom part using the leak detection sensor when the flammable refrigerant leaks in the indoor unit. Thus, reliability of detection of a refrigerant leak can be enhanced.

[0063] (Technique 2) The air conditioner according to Technique 1, in which the leak detection sensor is provided at an end of the exterior bottom part, the end being close to the wall surface.

[0064] This configuration facilitates detection of the flammable refrigerant flowing along the wall surface using the leak detection sensor. Thus, reliability of detection of a refrigerant leak can be enhanced.

[0065] (Technique 3) The air conditioner according to

Technique 1, in which the indoor unit includes a flap that guides blown air, and the leak detection sensor is provided at an end of the exterior bottom part, the end being close to the flap.

[0066] This configuration facilitates detection of the flammable refrigerant having flowed out to the outside of cover member 35 from around the flap using the leak detection sensor. Thus, reliability of detection of a refrigerant leak can be enhanced.

[0067] (Technique 4) The air conditioner according to any one of Techniques 1 to 3, in which the indoor unit is provided inside with a bottom surface facing upward and being located backward, the bottom surface including an inclined surface part inclined vertically in a left-right direction of the indoor unit, and the leak detection sensor occupies a position in the left-right direction of the indoor unit, the position at least partially overlapping a position occupied by a lower end of the bottom surface.

[0068] This configuration facilitates causing the flammable refrigerant to flow along the inclined surface part toward the leak detection sensor. Thus, reliability of detection of a refrigerant leak can be enhanced.

[0069] (Technique 5) The air conditioner according to any one of Techniques 1 to 4, in which the exterior bottom part is inclined vertically in a left-right direction of the indoor unit, and the leak detection sensor is disposed at a lowermost position of the exterior bottom part.

[0070] This configuration facilitates detection of the flammable refrigerant flowing to the lowermost position of the exterior bottom part along inclination of the exterior bottom part using the leak detection sensor. Thus, reliability of detection of a refrigerant leak can be enhanced.

[0071] (Technique 6) The air conditioner according to any one of Techniques 1 to 5, in which the leak detection sensor is provided at an outside of the exterior bottom part.

[0072] This configuration enables enhancing reliability of detection of a refrigerant leak from the inside of the indoor unit.

[0073] The present disclosure is applicable to an air conditioner including an indoor unit of a wall-mounted type and using a flammable refrigerant as a refrigerant. Specifically, the present disclosure is applicable to an air conditioner for household use, an air conditioner for business use, and the like.

Claims

1. An air conditioner comprising:

an outdoor unit;
an indoor unit of a wall-mounted type attached to a wall surface in a room; and
a refrigeration cycle circuit filled with a flammable refrigerant,
the indoor unit including a leak detection sensor that detects a leak of the flammable refrigerant,
the leak detection sensor being provided on an exterior bottom part constituting a bottom part of an exterior of the indoor unit.

2. The air conditioner according to Claim 1, wherein the leak detection sensor is provided at an end of the exterior bottom part, the end being close to the wall surface.

3. The air conditioner according to Claim 1, wherein

the indoor unit includes a flap that guides blown air, and
the leak detection sensor is provided at an end of the exterior bottom part, the end being close to the flap.

4. The air conditioner according to any one of Claims 1 to 3, wherein

the indoor unit is provided inside with a bottom surface facing upward and being located backward,
the bottom surface including an inclined surface part inclined vertically in a left-right direction of the indoor unit, and
the leak detection sensor occupies a position in the left-right direction of the indoor unit, the position at least partially overlapping a position occupied by a lower end of the bottom surface.

5. The air conditioner according to any one of Claims 1 to 3, wherein

the exterior bottom part is inclined vertically in a left-right direction of the indoor unit, and
the leak detection sensor is disposed at a lowermost position of the exterior bottom part.

6. The air conditioner according to any one of Claims 1 to 3, wherein the leak detection sensor is provided at an outside of the exterior bottom part.

FIG. 1

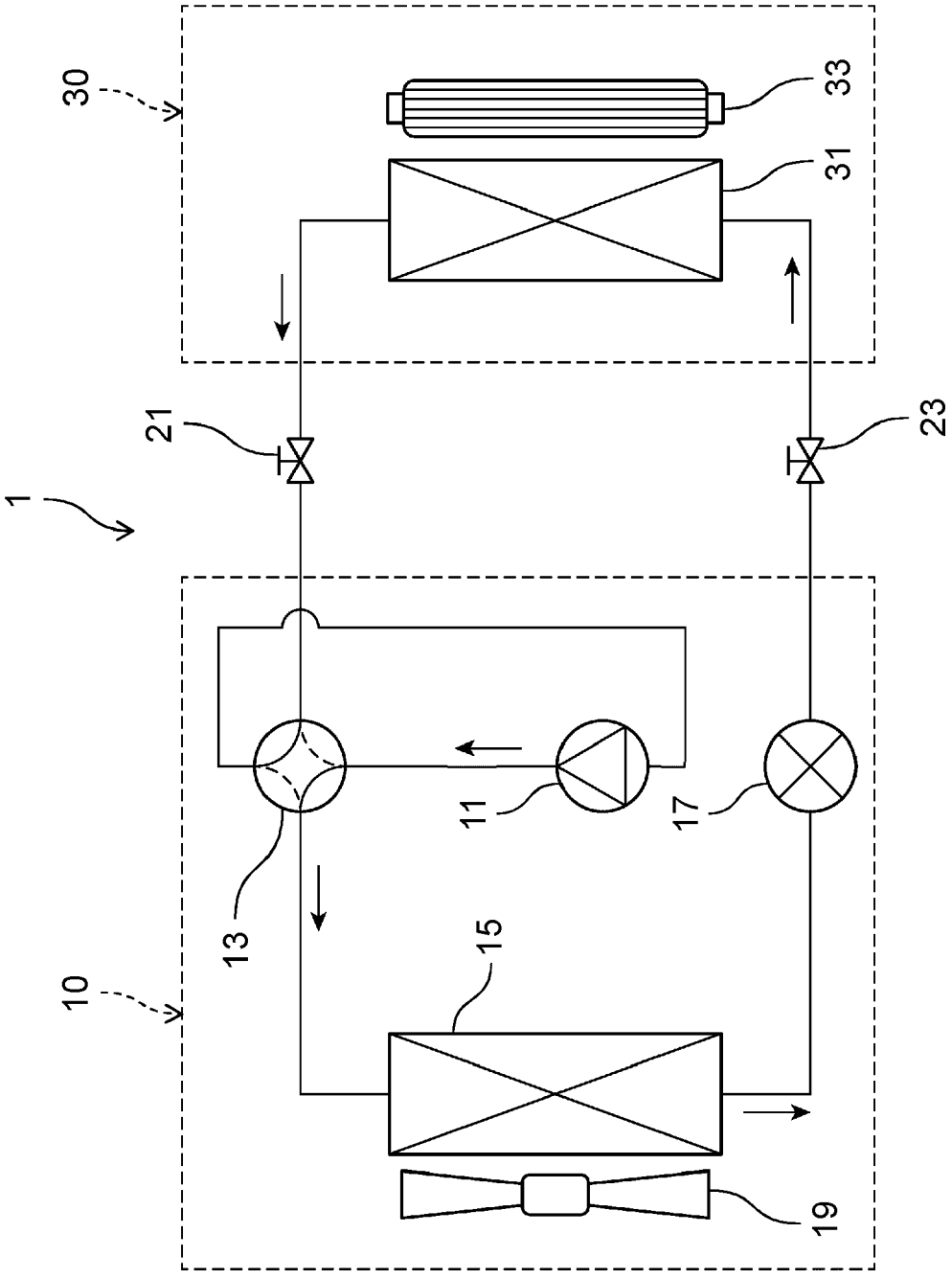


FIG. 2

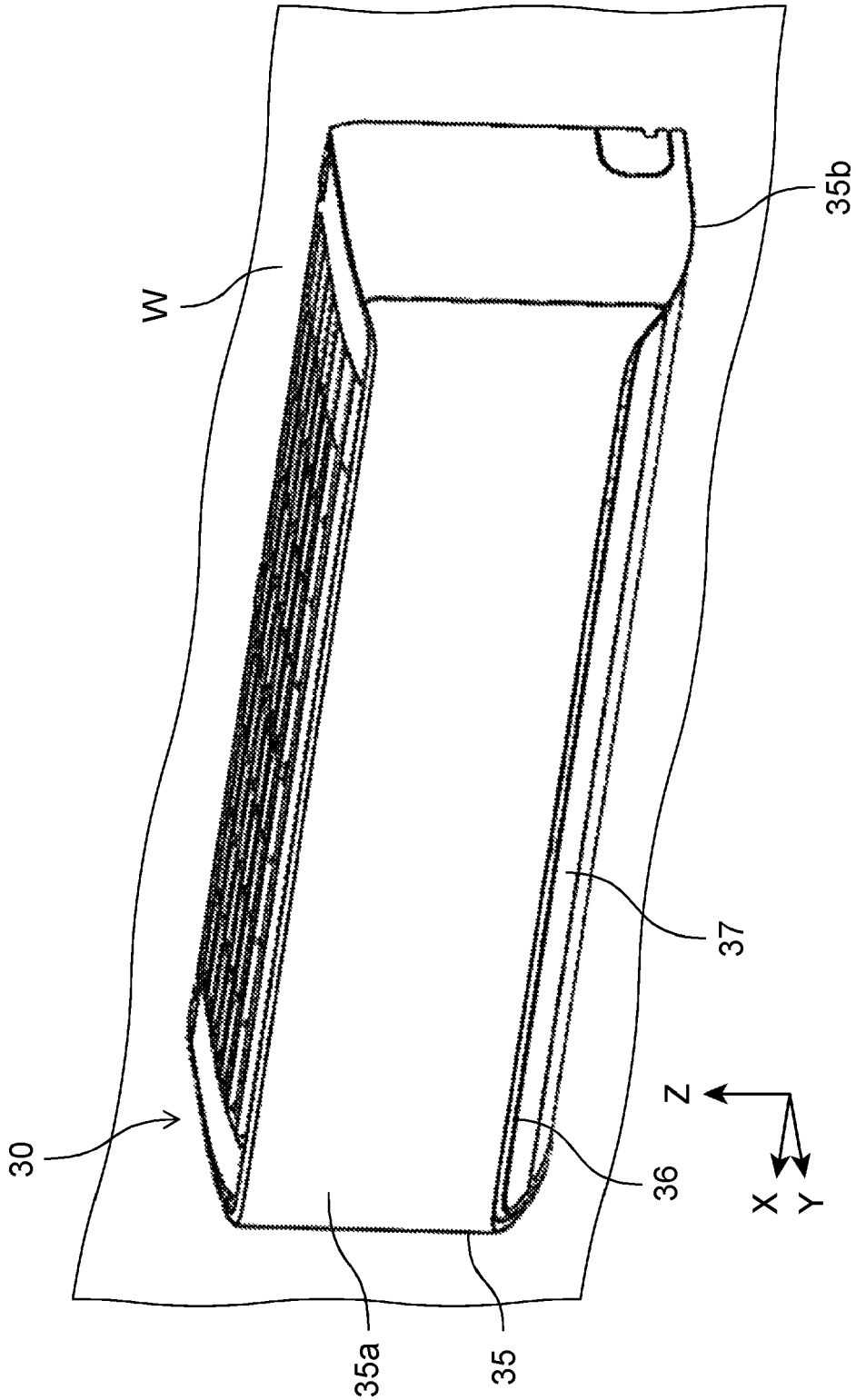


FIG. 3

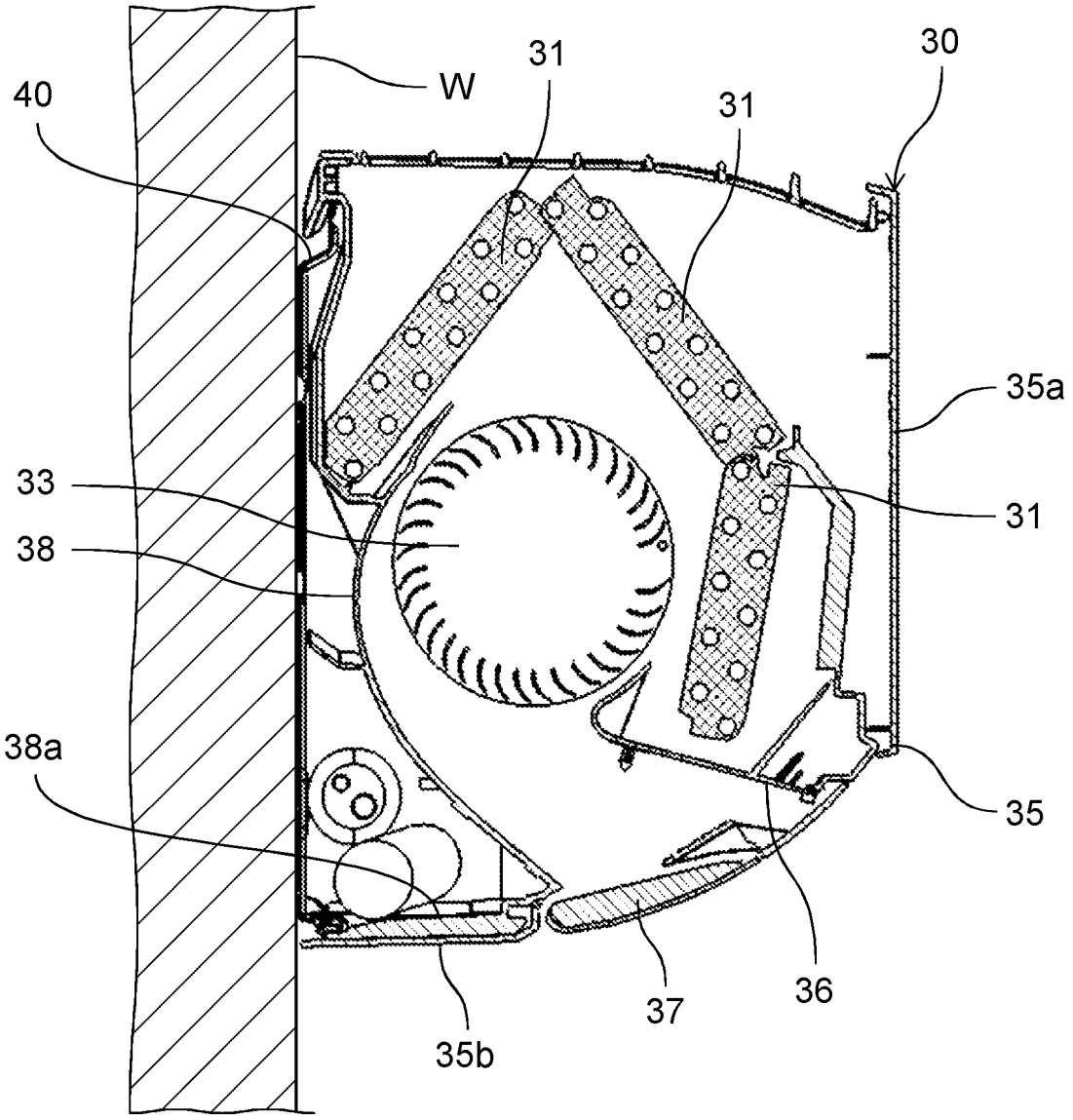


FIG. 4

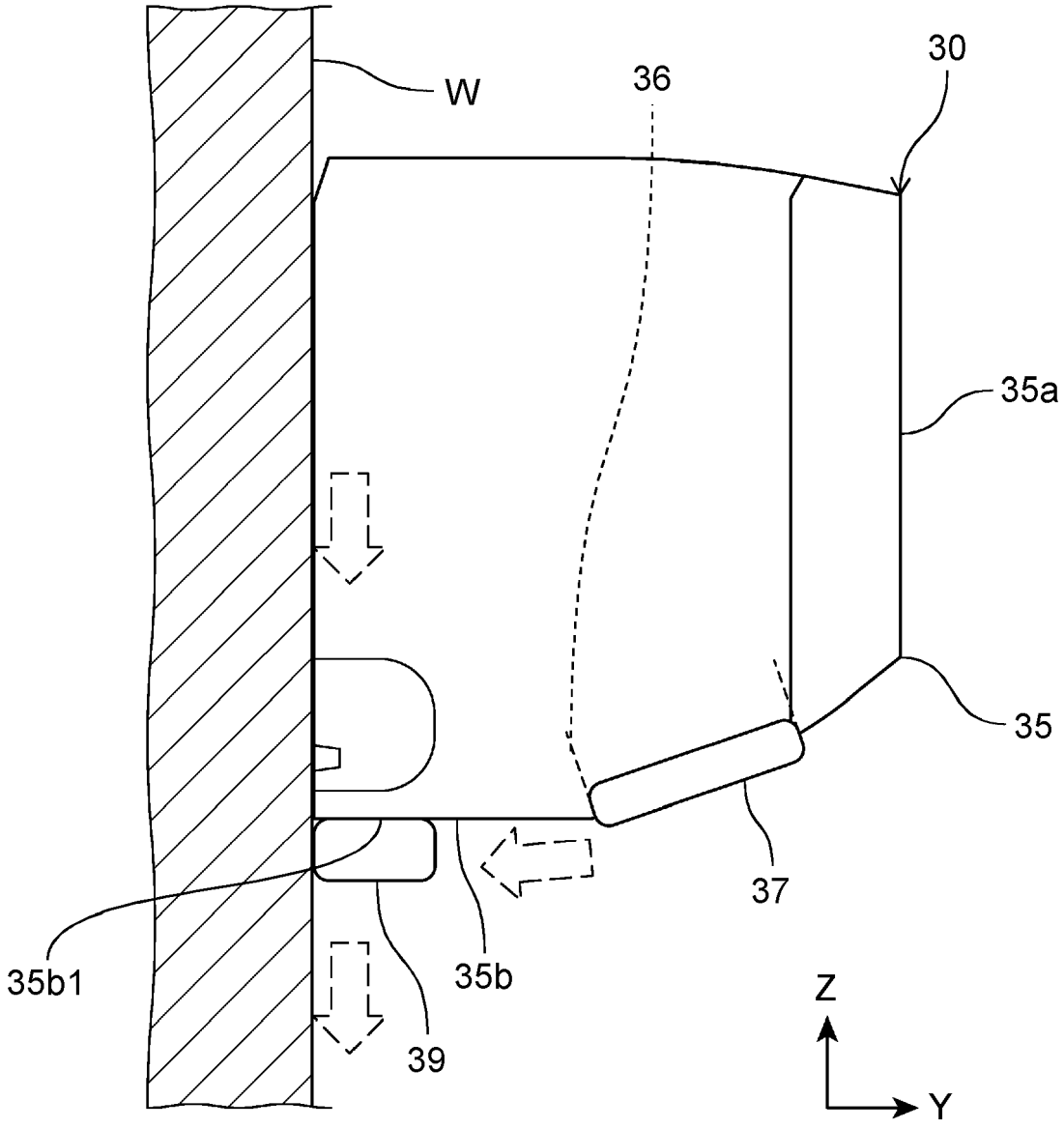


FIG. 5

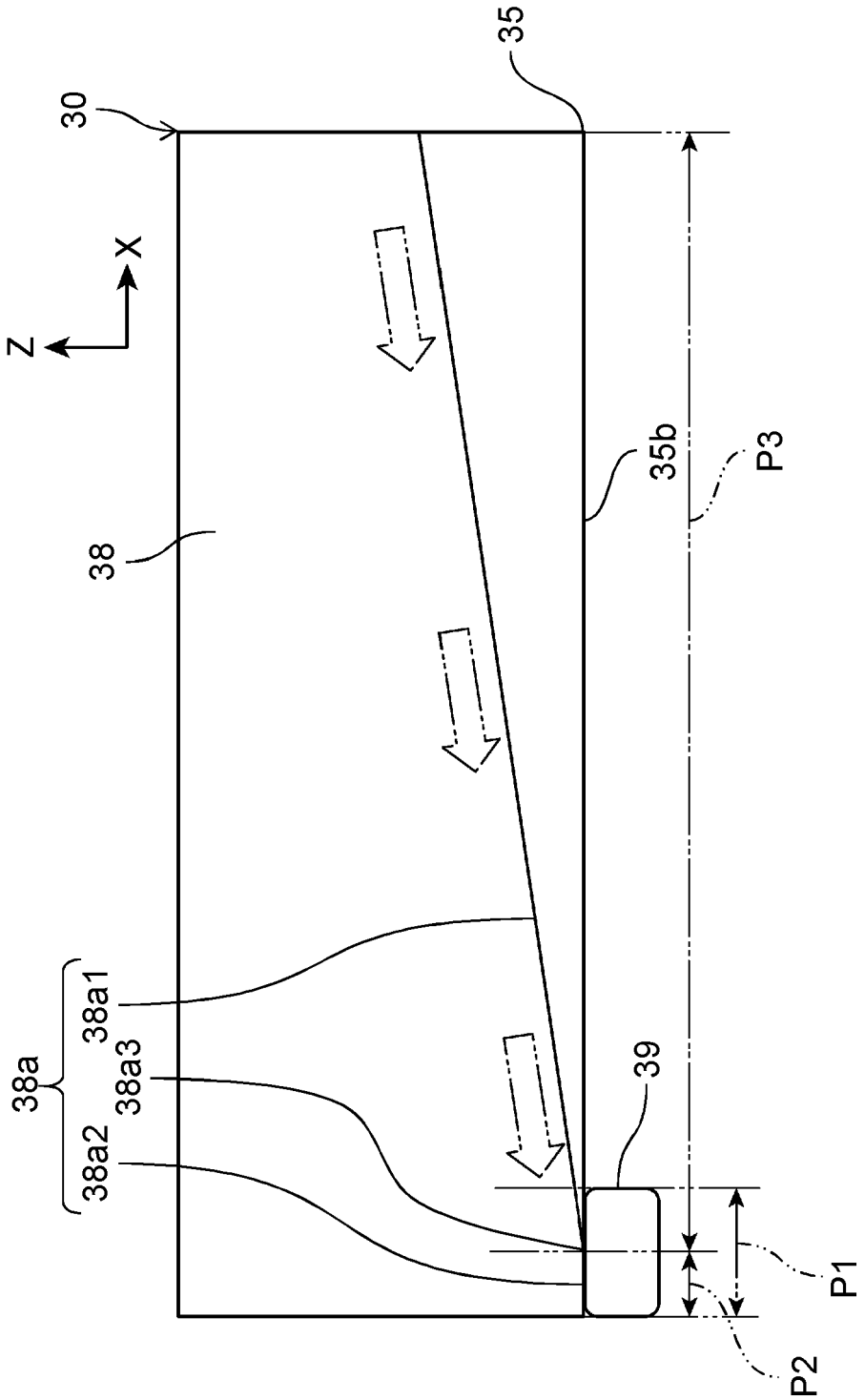


FIG. 6

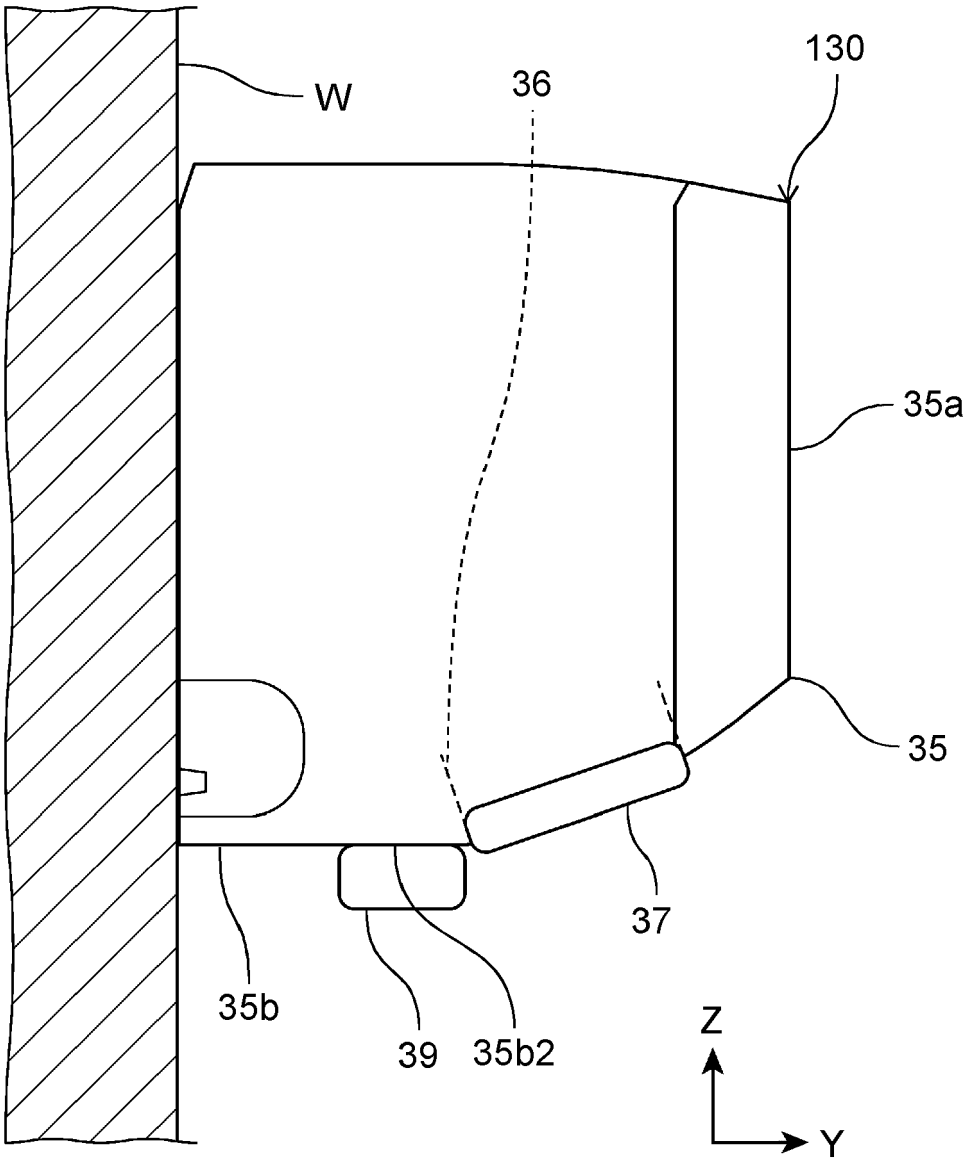
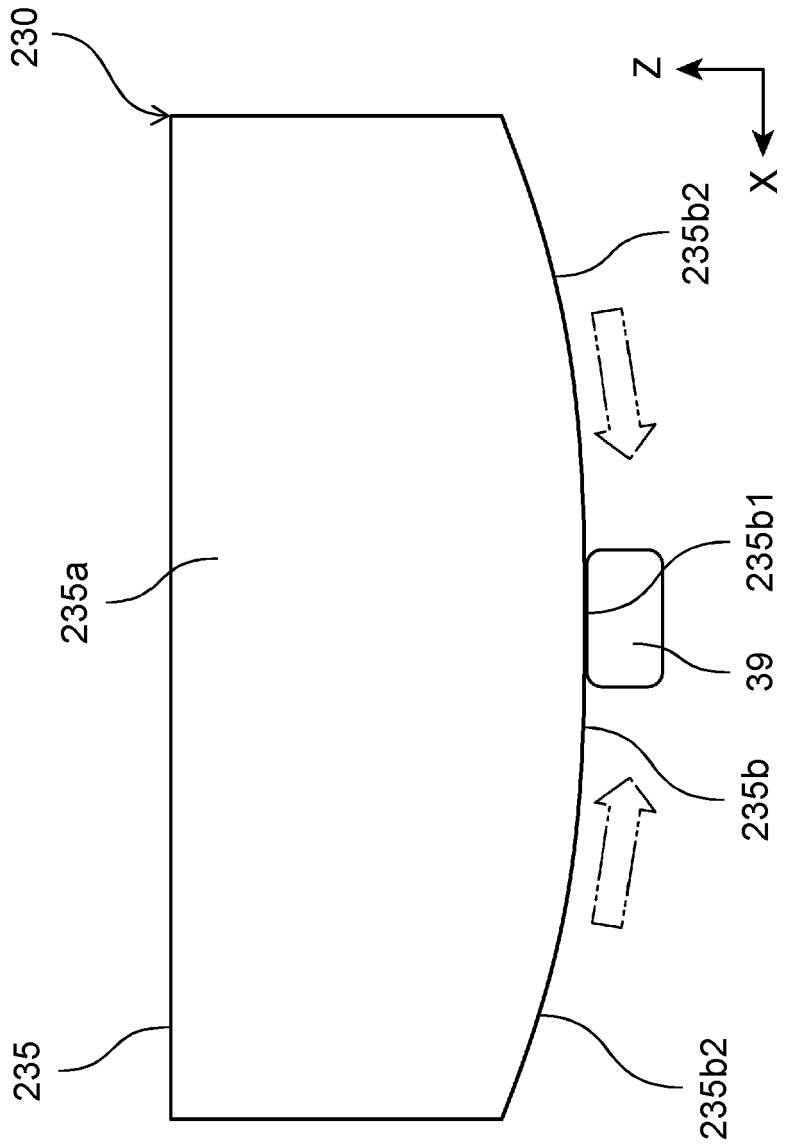


FIG. 7



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Place of search	Date of completion of the search	Examiner
Munich	25 September 2024	Mattias Grenbäck

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