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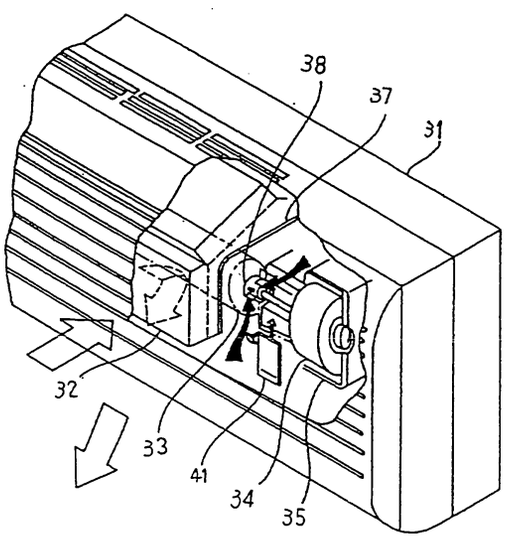
(54) Air conditioner

(57) An air conditioner is provided which comprises a housing (31) and a heat exchanger (32) disposed in the housing of (31). A line flow fan (33) is disposed between the heat exchanger (32) and the housing (31) for blowing air heat-exchanged by the heat exchanger (32) to the outside. A casing (35) is mounted in the housing (31) for receiving a motor (34) for driving the line flow fan (33). A partition plate (37) is provided between an air passageway in which the air is carried out by the line flow fan (33) and a space in which the casing (35) of the motor (34) is mounted. In the partition plate (37) a receiving portion (38) is disposed to permit insertion therethrough of a coupling fixation portion (49) for coupling the motor (34) with the line flow fan (33). A shielded space (50) is formed inside the casing (35) so that an outer circumference of a shaft of the motor (34) is covered, and the casing (35) is disposed in close contact with the partition plate (37).

FIG. 10



EP 1 574 789 A2

Description

BACKGROUND OF THE INVENTION

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

[0002] Fig. 16 is a principal sectional view of a conventional air conditioner, for example, disclosed in JP-U-4-68921. Figs. 17 and 18 are principal side views showing the internal structure of the conventional air conditioner. In Figs. 16 to 18, the reference numeral 101 designates an air conditioner proper; 102, the housing of the air conditioner body 101; 103, a decorative panel; 104, a heat exchanger side wall plate; 105, a heat insulating material; 106, an air outlet; 107, an air blowing passageway; 108, an air filter; 109, a heat exchanger; 110, a fan; 111, a wind direction plate; and 112, a saucer. Incidentally, the surface of the heat exchanger side wall plate 104 is flat.

[0003] In the case of the above-mentioned structure, as shown in Fig. 17, dewdrops 115 formed by condensation on the flat surface of the heat exchanger side wall plate 104 flow downward on the surface of the heat exchanger side wall plate 104. In a stepped portion of the heat exchanger side wall plate 104, however, the dewdrops 115 are frequently apt to cease flowing on the surface of the heat exchanger side wall plate 104 and drop down to the outside of the saucer 112.

[0004] If the dewdrops 115 dropped down to the outside of the saucer 112 in this way, there was a case that the dewdrops 115 leaked to the outside of the housing 102 of the air conditioner proper 101. In order to prevent the dewdrops 115 from dropping down to the outside of the saucer 112, conventionally, as shown in Fig. 18, the heat insulating material 105 was applied to the surface of the heat exchanger side wall plate 104 so as to prevent the surface of the heat exchanger side wall plate 104 from sweating.

[0005] However, the conventional air conditioner as described above was designed so that the heat insulating material 105 was applied to the surface of the heat exchanger side wall plate 104 in order to prevent the surface of the heat exchanger side wall plate 104 from sweating. Accordingly, there has been such a problem that the number of component parts and the number of operation processes increase and the recycling performance deteriorates.

[0006] In the meantime, Fig. 19 is a principal sectional view of a conventional indoor unit of an air conditioner which is, for example, disclosed in JP-A-10-61964. In the drawing, the reference numeral 31 designates the housing of the indoor unit; 33, a line flow fan disposed in the air passageway of the housing 31; 34, a motor for driving the line flow fan 33; 35, a casing of a motor receiving portion; 37, a partition plate for partitioning the air passageway from a motor receiving space; 49, a boss for fixedly connecting the line flow fan 33 and the motor 34; and 48, a shaft cover surrounding the shaft of the motor 34. One side of the shaft cover 48 is fitted over the outer circumference of a bearing rubber cushion of the motor 34 while the other side of the shaft cover 48 is fitted into the partition plate 37.

[0007] In this construction, the outer circumference of the motor shaft is covered with the tubular shaft cover 48. The anti-engine side of the shaft cover 48 is fitted into a receiving hole disposed between the housing 31 and the partition plate 37, which partition the air passageway for the air passing through a heat exchanger from the motor receiving space. Thus, the receiving hole is shielded so that the outside air is prevented from entering the air passageway through this receiving hole. Thus, the line flow fan and the like are prevented from sweating.

[0008] Since the receiving hole for the motor shaft was arranged to be shielded from wind as described above in the conventional air conditioner, the portion where the line flow fan was fixed to the motor was provided on the air passageway side. In addition, the gap between the air passageway partition plate and the line flow fan therefore became so large that there might arise a fault such as high wind noise or the like. Further, for measures against such a fault, a fastening screw had to be provided inside the fan rather than the side wall of the line flow fan. Therefore, the blade of the line flow fan had to be cut to make a hole where a screw fastening tool such as a driver or the like could be inserted, or the blade of the line flow fan had to be partly omitted, so as to provide a fastening screw fixing portion. Thus, the fastening screw fixing portion was the cause to prevent stable air blowing of the line flow fan.

SUMMARY OF THE INVENTION

[0009] It is an object of the present invention to provide an air conditioner in which dewdrops can be collected positively without applying any heat insulating material to any portion which sweats. The object is accompanied by the constructions as stated in claims 1 to 4.

[0010] It is another object of the present invention to prevent a line flow fan from sweating by receiving a partition plate and the side wall of the line flow fan with a minimal gap therebetween so as to ensure improvement in the air blowing characteristics. Further, it is another object of the present invention to make it possible to assemble these component parts easily. These objects are accompanied by the constructions as stated in claims 5 to 7.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011]

Fig. 1 is a principal perspective view showing the interior of an air conditioner of Embodiment 1 according to the present invention.

Fig. 2 shows side views of a heat exchanger side wall plate having a flat surface and a heat exchanger side wall plate having a continuously corrugated rough portion formed on its surface.

Fig. 3 shows enlarged diagrams each showing the continuously corrugated rough portion formed on the surface of the heat exchanger side wall plate shown in Fig. 2.

Fig. 4 is a principal side view showing the interior of the air conditioner shown in Fig. 1.

Fig. 5 is a principal sectional view showing the interior of an air conditioner of Embodiment 2 according to the present invention.

Fig. 6 is a principal sectional view showing the interior of a modified air conditioner of Embodiment 2 according to the present invention.

Fig. 7 is a side view of a heat exchanger side wall plate on which a rough portion having a shape other than a continuously corrugated shape, that is, a continuous triangular shape, is formed.

Fig. 8 is a side view of a heat exchanger side wall plate on which a rough portion having a shape other than a continuously corrugated shape, that is, a continuous square shape, is formed.

Fig. 9 is a principal perspective view of an air conditioner showing Embodiment 3 of the present invention.

Fig. 10 is a partially cutaway perspective view of an air conditioner indoor unit according to Embodiment 4 of the present invention.

Fig. 11 is a principal enlarged perspective view showing Embodiment 4 of the present invention.

Fig. 12 is a principal plan view showing Embodiment 4 of the present invention.

Fig. 13 is a principal sectional view showing Embodiment 4 of the present invention.

Fig. 14 is a principal sectional view showing Embodiment 5 of the present invention.

Fig. 15 is a principal perspective view showing Embodiment 6 of the present invention.

Fig. 16 is a principal sectional view of an air conditioner showing the prior art.

Fig. 17 is a principal side view of the air conditioner showing the prior art.

Fig. 18 is a principal side view of the air conditioner showing the prior art.

Fig. 19 is a principal enlarged view of a conventional air conditioner indoor unit.

BEST MODE FOR CARRYING OUT THE INVENTION

[0012] Embodiments of the present invention will be described below with reference to the drawings.

Embodiment 1.

[0013] Fig. 1 is a principal perspective view showing the interior of an air conditioner of Embodiment 1 according to the present invention. Figs. 2(a) and 2(b) are a side view of a heat exchanger side wall plate the surface of which is flat, and a side view of a heat exchanger side wall plate on the surface of which a continuously corrugated rough portion is formed, respectively. Figs. 3(a) and 3(b) are enlarged views showing the continuously corrugated rough portion formed on the surface of the heat exchanger side wall plate shown in Fig. 2 (b) . Fig. 4 is a principal side view showing the interior of the air conditioner shown in Fig. 1. Fig. 2 (a) shows the heat exchanger side wall plate the surface of which is flat, and Fig. 2 (b) shows the heat exchanger side wall plate on which a continuously corrugated rough portion is formed.

[0014] In Figs. 1 to 4, the reference numeral 1 designates an air conditioner proper; 2, the housing of the air conditioner proper 1; and 3, a heat exchanger disposed in the housing 2. The reference numeral 4 designates a heat exchanger side wall plate formed on the side wall of the heat exchanger 3; 4a, a rough portion which has, for example, a continuously corrugated shape, and which is formed on the surface of the heat exchanger side wall plate 4 in a direction in which dewdrops 5 flow, so as to restrain the dewdrops 5 from flowing; 6, a saucer disposed under the heat exchanger 3 for collecting the dewdrops 5 formed on the heat exchanger side wall plate 4.

[0015] The continuously corrugated rough portion 4a formed on the surface of the heat exchanger side wall portion 4 is formed in the direction in which the dewdrops 5 flow, so that the pitch of the irregularities is set to be, for example, 6 mm, and the height of the irregularities is set to be, for example, 1 mm. The rough portion 4a formed on the surface of the heat exchanger side wall plate 4 with such pitch and height can be made to serve as an obstacle to the flow of the dewdrops 5 so as to restrain the dewdrops 5 from flowing.

[0016] A dewdrop 5 formed on the external surface of the heat exchanger side wall plate 4 is reduced in quantity gradually whenever the dewdrop 5 gets over one raised area (ridge) of the continuously corrugated rough portion 4a, as shown in Figs. 3 (a) and 3 (b) . Fig. 3(a) shows the state where the dewdrop 5 formed on the rough portion 4a has not yet got over a ridge of the rough portion 4a, and Fig. 3(b) shows the state where the dewdrop 5 formed on the rough portion 4a has partially got over one ridge of the rough portion 4a and has been separated into two parts in the front and back of the ridge so that the quantity of the dewdrop 5 in the travelling direction has been reduced.

[0017] The quantity of the dewdrop 5 is reduced gradually whenever the dewdrop 5 sequentially gets over one ridge of the rough portion 4a formed continuously. As a result, the flowing force of the dewdrop 5 is restrained. On the other hand, with respect to the retained dewdrop 5 which has not got over one ridge of the rough portion 4a, if another dewdrop is formed newly and joined to the retained dewdrop 5, or if another dewdrop

gets over the previous ridge and is joined to the retained dewdrop 5, the quantity of the retained dewdrop 5 increases so that the retained dewdrop 5 begins to flow.

[0018] Then, in the same manner, the quantity of the dewdrop 5 now flowing is reduced gradually whenever the dewdrop 5 gets over one ridge of the rough portion 4a. Thus, the flowing force of the dewdrop 5 is restrained. If the retained dewdrop 5 is newly joined by no dewdrop 5, the dewdrop 5 will not begin to flow. In such a case, the retained dewdrop 5 evaporates naturally without separating and dropping down from the surface of the heat exchanger side wall plate 4.

[0019] In this embodiment, the rough portion 4a for preventing the dewdrop 5 from flowing is thus formed continuously on the external surface of the heat exchanger side wall plate 4. As a result, the dewdrop 5 formed on the surface of the rough portion 4a on the external surface of the heat exchanger side wall plate 4 can be reduced in quantity gradually whenever the dewdrop 5 gets over one raised are (ridge) of the continuously corrugated rough portion 4a, as shown in Figs. 3 (a) and 3(b). Thus, the flowing force of the dewdrop 5 can be restrained.

[0020] As a result, as shown by the arrows A1 and A2 in Fig. 4, the dewdrop 5 flowing toward the saucer 6 can be made difficult to separate from the surface of the heat exchanger side wall plate 4 and hence difficult to drop down to the outside of the saucer 6. In addition, in this embodiment, the flowing force of the dewdrop 5 can be restrained when the dewdrop 5 is collected in the saucer 6. Accordingly, the dewdrop 5 can be dropped down into the saucer 6 so slowly that the dewdrop 5 is made difficult to splash on the surface of the saucer 6. Thus, the dewdrop 5 can be restrained from being discharged to the outside of the saucer 6.

[0021] Therefore, the dewdrop 5 can be collected in the saucer 6 efficiently without applying any heat insulating material to the surface of the heat exchanger side wall plate 4 which sweats. In addition, because heat insulating material which has been required in the past can be omitted, it is possible to prevent the number of parts and the number of component operation processes from increasing and the recycling performance from deteriorating due to such heat insulating material.

[0022] In addition, in this embodiment, as shown in Fig. 1, in the case where the indoor unit in the housing 2 has a limit in height and depth, the heat exchanger 3 is set back and bent in the lower portion thereof to thereby ensure the required surface area of the heat exchanger 3 in order to improve the performance while keeping the limit. Thus, the saucer 6 can be set deep inside from the end face of the heat exchanger side wall plate 4.

[0023] At this time, if the force of the dewdrop 5 formed on the heat exchanger side wall plate 4 were strong, the dewdrop 5 would separate and drop down from the surface in the set-back portion of the lower portion of the heat exchanger 3. However, in this embodiment, as shown in Fig. 2(b), because the rough portion 4a for restraining the dewdrop 5 from flowing is formed continuously on the external surface of the heat exchanger side wall plate 4, the dewdrop 5 formed on the surface of the rough portion 4a on the external surface of the heat exchanger side wall plate 4 can be reduced in quantity gradually whenever the dewdrop 5 gets over one raised area (ridge) of the continuously corrugated rough portion 4a as shown in Figs. 3(a) and 3(b). Thus, the flowing force of the dewdrop 5 can be restrained.

[0024] Accordingly, even in such a case where the heat exchanger 3 is designed to be set back in the lower portion thereof, the dewdrop 5 flowing toward the saucer 6 can be made difficult to separate from the surface of the heat exchanger side wall plate 4 as shown by the arrows A1 and A2 in Fig. 4. As a result, the dewdrop 5 can be made to flow down to the lowermost portion of the heat exchanger side wall plate 4 while being adhering to the surface of the heat exchanger side wall plate 4, so that the dewdrop 5 can be made difficult to drop down to the outside of the saucer 6.

[0025] In addition, in this embodiment, as shown in Fig. 1, in the case where the indoor unit in the housing 2 has a limit in height and depth, the heat exchanger 3 is designed to be bent in multiple steps to thereby ensure the required surface area of the heat exchanger 3 in order to improve the performance while keeping the limit. At this time, if the force of the dewdrop 5 formed on the surface of the heat exchanger side wall plate 4 were strong, the dewdrop 5 in each stepped portion of the heat exchanger 3 would splash and drop down as it is.

[0026] However, in this embodiment, as shown in Fig. 2(b), because the rough portion 4a for restraining the dewdrop 5 from flowing is formed continuously on the external surface of the heat exchanger side wall plate 4, the dewdrop 5 formed on the surface of the rough portion 4a on the external surface of the heat exchanger side wall plate 4 can be reduced in quantity gradually whenever the dewdrop 5 gets over one raised area (ridge) of the continuously corrugated rough portion 4a as shown in Figs. 3(a) and 3(b). Thus, the flowing force of the dewdrop 5 can be restrained.

[0027] Accordingly, even in such a case where the heat exchanger 3 is designed to be bent in multiple steps, the dewdrop 5 flowing toward the saucer 6 can be likewise made difficult to separate from the surface of the heat exchanger side wall plate 4 as shown by the arrows A1 and A2 in Fig. 4. As a result, the dewdrop 5 in the stepped portion can be restrained from splashing. Thus, the dewdrop 5 can be restrained from dropping down.

[0028] In Embodiment 1, the rough portion 4a formed on the surface of the heat exchanger side wall plate 4 was formed in the direction in which the dewdrop 5 flows. However, the rough portion 4a may be formed in any direction by which the flow of the dewdrop 5 can be restrained.

[0029] In Embodiment 1, the rough portion 4a was designed to be formed to have irregularities with a preferable pitch and a preferable height as an obstacle to the flow of the dewdrop 5 so as to prevent the dewdrop 5 from flowing. However, in brief, the rough portion 4a is only required to be able to become an obstacle to the flow of the dewdrop 5 so as to prevent the dewdrop 5 from flowing. Accordingly, the rough portion 4a may be formed to have different values in irregularity pitch and irregularity height from the aforementioned preferable values.

[0030] The description was made above on Embodiment 1 about the case which was preferable in the point that the continuously corrugated rough portion 4a was formed on the external surface of the heat exchanger side wall plate 4 so that the dewdrop 5 formed on the external surface of the heat exchanger side wall plate 4 could be efficiently prevented from dropping down from the external surface of the heat exchanger side wall plate 4 to the outside of the saucer 6. However, in brief, the rough portion 4a which can restrain the dewdrop 5 from flowing is only required to be formed selectively on the surface of the heat exchanger side wall plate 4 so that the dewdrop 5 formed on the surface of the heat exchanger side wall plate 4 can be prevented from separating therefrom and dropping down to a place which is the outside of the saucer 6. For example, the rough portion 4a for restraining the dewdrop 5 from flowing may be designed to be formed all over the surface of the heat exchanger side wall plate 4. In this case, the dewdrops 5 formed on the whole surface of the heat exchanger side wall plate 4 can be efficiently restrained from flowing.

Embodiment 2.

[0031] Figs. 5 and 6 are principal sectional views showing the interior of an air conditioner of Embodiment 2 according to the present invention. The reference numeral 7 designates an air outlet of an air conditioner proper 1; 8, an air blowing passageway provided in a housing 2 of the air conditioner proper 1; 9 and 10, an air filter and a fan disposed in the housing 2, respectively; and 11, a decorative panel of the air conditioner proper 1.

[0032] In Embodiment 1, the description was made about the case where the sectional shape of the heat exchanger 3 was designed so that the lower portion thereof was set back and the heat exchanger 3 was bent in multiple steps. However, as in this embodiment, the heat exchanger 3 may be designed to have a sectional shape formed like a straight line shape as shown in Fig. 5, or to have a sectional shape formed like an inverted-V shape as shown in Fig. 6. On the side wall plate surface of the heat exchanger 3 in Fig. 5 or 6, a continuously corrugated rough portion 4a similar to that shown in Fig. 2 (b) is formed in the same manner as in Embodiment 1.

[0033] As shown in Fig. 5 or 6, when the heat exchanger 3 has a sectional shape like a straight line shape or an inverted-V shape, and if the force of a dewdrop formed on the surface of the heat exchanger side wall plate 4 is strong, it is necessary to increase the depth dimension of a saucer 6 on the decorative panel 11 side in consideration of the fact that the dewdrop splashes when it separates from the surface of the heat exchanger side wall plate 4. However, in this embodiment, the rough portion 4a for restraining a dewdrop 5 from flowing is designed to be formed continuously on the surface of the heat exchanger side wall plate 4, as shown in Fig. 2(b), in the same manner as in Embodiment 1. Accordingly, as shown in Figs. 3 (a) and 3 (b), the dewdrop 5 formed on the surface of the rough portion 4a on the surface of the heat exchanger side wall plate 4 can be reduced in quantity gradually whenever the dewdrop 5 gets over one raised area (ridge) of the continuously corrugated rough portion 4a. Thus, the flowing force of the dewdrop 5 can be restrained and dropping of the dewdrop 5 to the outside of the saucer 6 is prevented. In addition, since the depth of the saucer 6 on the decorative panel 11 side can be reduced, it is possible to reduce the influence of the saucer 6 on the depth of the indoor unit.

[0034] Incidentally, the description was made above on Embodiments 1 and 2 about the case where the rough portion 4a formed on the surface of the heat exchanger side wall plate 4 was formed to have a continuous corrugated shape which was preferable as the shape of an obstacle to the flow of the dewdrop 5 as shown in Fig. 2(b). However, as for example, a rough portion 4b formed on the surface of the heat exchanger side wall plate 4 may be designed to be formed into a continuous triangular shape as shown in Fig. 7, or a rough portion 4c formed on the surface of the heat exchanger side wall plate 4 may be designed to be formed into a continuous square shape as shown in Fig. 8. Further, the combination of these continuous triangular and square shapes is also preferable as the shape to be an obstacle to the flow of the dewdrop 5 in the same manner as the continuously corrugated shape.

Embodiment 3.

[0035] Fig. 9 is a principal perspective view showing the interior of an air conditioner of Embodiment 3 according to the present invention. The reference numeral 21 designates a cover which is disposed above a saucer 6 and which is disposed under U-bends 22 disposed in a heat exchanger 3, so that the cover collects dewdrops formed on the U-bends 22. The reference numeral 21a designates a rough portion formed on the surface of the cover 21 in the direction in which dewdrops flow from the U-bends 22, so as to restrain the dewdrops from flowing. The rough portion 21a has, for example, a continuously corrugated shape. Incidentally, the rough portion 21a is formed to have the pitch and height dimensions similar to those in Embodiment 1.

[0036] When a dewdrop formed on one of the U-bends 22 of the heat exchanger 3 reaches the surface of the continuously corrugated rough portion 21a formed on the surface of the cover 21, the quantity of the dewdrop is reduced gradually whenever the dewdrop gets over one raised area (ridge) of the continuously corrugated rough portion 21a as shown in Figs. 3(a) and 3(b) in the same manner as in Embodiment 1.

[0037] The quantity of the dewdrops 5 is reduced gradually whenever the dewdrop gets over one ridge of the rough portion 21a formed continuously. As a result, the flowing force of the dewdrop is restrained. On the other hand, if another dewdrop newly formed or another dewdrop which has got over the previous ridge joins to a retained dewdrop which has not got over one ridge of the rough portion 21a, the quantity of the retained dewdrop increases to start to flow again.

[0038] Then, in the same manner, the quantity of the dewdrop 5 beginning to flow thus is reduced gradually whenever the dewdrop gets over next one ridge of the rough portion 21a. Thus, the flowing force of the dewdrop is restrained. When the retained dewdrop is not newly joined by another dewdrop, the retained dewdrop will not begin to flow. In such a case, the retained dewdrop evaporates naturally without separating and dropping down from the surface of the cover 21.

[0039] In this embodiment, the rough portion 21a for restraining the flow of the dewdrop flowing from the U-bends 22 is thus formed continuously on the surface of the cover 21 in the above-mentioned manner. As a result, the quantity of a dewdrop formed on the surface of the rough portion 21a on the surface of the cover 21 can be reduced gradually whenever the dewdrop gets over one raised area (ridge) of the continuously corrugated rough portion 21a, as shown in Figs. 3 (a) and 3 (b), in the same manner as that in Embodiment 1. Thus, the flowing force of the dewdrop can be restrained.

[0040] As a result, the dewdrop flowing toward the saucer 6 can be made difficult to separate from the surface of the cover 21 and hence difficult to drop down to the outside of the saucer 6. In addition, in this embodiment, the flowing force of the dewdrop can be restrained when the dewdrop is collected in the saucer 6. Accordingly, the dewdrop can be dropped down into the saucer 6 so slowly that the dewdrop is made difficult to splash on the surface of the saucer 6. Thus, the dewdrop can be restrained from being discharged to the outside of the saucer 6.

[0041] Therefore, the dewdrops can be collected in the saucer 6 efficiently without using such heat insulating material as that used conventionally. In addition, because any heat insulating material which has been required conventionally can be omitted, it is possible to prevent the number of component parts and the number of operation processes from increasing and the recycling performance from deteriorating due to such heat insulating material.

[0042] Incidentally, the description was made above on Embodiment 3 about the case where the rough portion 21a for restraining dewdrops from flowing was designed to be formed on the surface of the cover 21 disposed under the U-bends 22. However, a rough portion for restraining dewdrops from flowing may be formed on the surface of a constituent part other than the heat exchanger 3, in which constituent part it is desired to restrain dewdrops from flowing. Such a rough portion may be designed to restrain the flow of dewdrops flowing from any part other than the constituent part as shown in Embodiment 3 or to restrain the flow of dewdrops formed on the constituent part itself as shown in Embodiment 1.

[0043] In Embodiment 3, the rough portion 21a formed on the surface of the cover 21 was formed in the direction in which the dewdrop 5 flows. However, the rough portion 21a may be formed in any direction by which the flow of the dewdrop 5 can be positively restrained.

[0044] According to Embodiment 3, the rough portion 21a was formed to have such irregularity pitch and irregularity height, preferably, as an obstacle to the flow of dewdrops so as to prevent the dewdrops from flowing. However, in brief, the rough portion 21a is only required to be able to become an obstacle to the flow of the dewdrops so as to prevent the dewdrops from flowing, and thus rough portion 21a may be formed to have values different in irregularity pitch and irregularity height from the aforementioned values.

[0045] The description was made above on Embodiment 3 about the case where the rough portion 21a formed on the surface of the cover 21 was formed to have a continuous corrugated shape which was preferable as the shape to be an obstacle to the flow of dewdrops as shown in Fig. 2(b), in the same manner as in Embodiment 1. However, as described above, such a rough portion 21a may be formed into a continuous triangular shape, for example, as shown in Fig. 7 or a continuous square shape, for example, as shown in Fig. 8. Further, the combination of these continuous triangular and square shapes is also preferable as the shape to be an obstacle to the flow of dewdrops, similarly to the case of the continuously corrugated shape.

Embodiment 4.

[0046] Embodiment 4 of the present invention will be described below with reference to Fig. 10. Fig. 10 is a partially cutaway perspective view showing an air conditioner according to the present invention. Fig. 11 is a principal enlarged perspective view of the air conditioner according to the present invention; Fig. 12 is a principal plan view; and Fig. 13 is a principal sectional view.

[0047] In the drawings, the reference numeral 31 designates a housing forming an air passageway of the air conditioner; 32, a heat exchanger attached to the housing 31; 33, a line flow fan for blowing the air heat-exchanged by the heat exchanger 32 to an air outlet; 34,

a motor for driving the line flow fan 33; 35, a casing of a motor receiving portion; 36, a motor cover; 37, a partition plate provided in the housing 31 for partitioning the air passageway from a space where the motor 34 is mounted; 38, a receiving hole disposed in the partition plate 37; 49, a boss (coupling fixation portion) for fixing and supporting the line flow fan; 39, a fastening screw disposed in the boss 49 for fastening together the line flow fan 33 and the shaft of the motor 34; 40, a working space for fastening or loosening the fastening screw 39; 41, a cover member for shielding the working space 40; 42, an insulator applied to the cover member 41 for improving the shielding performance of the working space 40; and 43, an insulator applied to the motor cover 36 and the casing 35 of the motor receiving portion so as to fill up the gap between the partition plate 37 and each of the motor cover 36 and the casing 35.

[0048] In Fig. 10, as the flow of the air in the indoor unit of the air conditioner is shown by the white arrows, the air flows into the unit from its front and passes through the heat exchanger 32 so as to be heat-exchanged. The heat-exchanged air is directed to the air outlet in the lower front of the unit along the air passageway of the housing 31 by the line flow fan 33 so as to be blown to the outside of the indoor unit. At this time, the partition plate 37, and the insulators 42 and 43 which are applied to the cover member 41, and the casing 35 of the motor receiving portion and the motor cover 36, respectively, form a structure in which the air not passing through the heat exchanger 32 is shielded from flowing into the air passageway from such portions as shown by the black arrows.

[0049] Next, the aforementioned shielding structure will be described with reference to Figs. 11, 12 and 13. As shown in the principal enlarged perspective view of Fig. 11, the casing 35 which receives the motor 34 for driving the line flow fan 33 constitutes a substantially lower portion of the shielding structure with respect to the axis of the motor. On the other hand, the motor cover 36 is disposed on the upper portion of this motor so that the motor 34 is fixedly held from above and below. In the lower portion of the casing 35, fastening holes or ribs are provided for fastening the casing 35 to the housing 31 of the indoor unit. In addition, the wall of the casing extends on the motor-shaft side of the casing 35 up to a position adjacent to the partition plate 37, while the motor cover 36 on the upper portion is also provided with a portion extending on the motor-shaft side in the same manner. Thus, these extension portions form a shielded space on the motor-shaft side.

[0050] Further, hooks, grooves, keep plates, etc. are provided in the casing 35 and the motor cover 36 for retaining the electric wiring from the motor 34.

[0051] Fig. 12 is a principal plan view. The air passageway side where the heat exchanger 32 and the line flow fan 33 are received is located on the left side of the partition plate 37 in Fig. 12, while the casing 35 and the motor cover 36 which receive the motor 34 are located on the opposite side so that the motor shaft of the motor 34 is fixedly connected to the line flow fan 33.

[0052] Fig. 13 is a principal sectional view. The motor 34 is fixedly received in the casing 35 and the motor cover 36, and coupled with the boss (coupling fixation portion) 49 of the line flow fan 33 in the air passageway through the receiving hole provided in the partition plate 37 of the housing 31.

[0053] The boss 49 of the line flow fan 33 is projected into the motor side through the receiving hole of the partition plate 37 so that the fastening screw 39 for fastening the motor 34 and the boss 49 can be located outside the air passageway. As a result, the gap between the line flow fan 33 and the air passageway partition plate 37 can be reduced so that the line flow fan 33 can obtain a stable air blowing characteristic. In addition, by loosening the fastening screw 39 of the line flow fan 33 disposed under the heat exchanger 32, the motor can be separated from the fan without removing the heat exchanger 32.

[0054] A shielded space 50 is formed by the extension portion of the casing 35 and the upper motor cover 36 so as to tubularly cover the outer circumference of the shaft of the motor 34 which extends toward the fan side. Thus, the rubber cushion of the bearing portion of the motor 34 is fixed tightly to the casing 35 and the motor cover 36. Accordingly, the air passing from the motor 34 side, not through the heat exchanger, but, through the outside of the air passageway is prevented from entering the air passageway so that the line flow fan 33 can be prevented from sweating.

[0055] When there arises any problem in the motor 34 so that the motor 34 has to be replaced to mount a new one, or when the line flow fan 33 disposed in the air passageway between the heat exchanger 32 and the housing 31 is removed, the cover member 41 attached to the motor cover 36 is removed. As a result, the working space 40 forms an opening like a window for loosening or fastening the fastening screw 39 of the boss which is the coupling portion between the line flow fan 33 and the motor 34. After the replacement and mounting by means of the fastening screw 39, the cover member 41 is attached to the motor cover 36 by a reverse procedure so as to form the shielded space 50 again. Thus, the outside air is prevented from entering the air passageway.

Embodiment 5.

[0056] Fig. 14 is a sectional view showing the attachment of a cover member in Embodiment 5 of the present invention. In the drawing, the reference numeral 36 designates a motor cover; 44, a hook provided on the motor cover; 45, a protrusion portion of the motor cover; 41, a cover member; 46, a hook provided on the lower side of the cover member; and 47, a handle of the cover member 41.

[0057] In this construction, the cover member 41 is

slid on the surface of the motor cover 36 so that the forward end of the cover member 41 is inserted into the hook 44 of the motor cover 36. Thus, the hook 46 of the cover member 41 is fitted over the protrusion portion 45 disposed on the motor cover 36 so that the cover member 41 can be fixed to the motor cover 36. Further, the cover member 41 is provided with the handle 47 on its top so as to improve the manipulating performance. On the other hand, when the cover member 41 is to be removed, the cover member 41 is slid in the direction, converse to the above-mentioned manner, in which the cover member 41 is pulled out. Thus, the hook 46 is disengaged so that the cover member 41 can be removed easily.

Embodiment 6.

[0058] Fig. 15 is a principal perspective view of Embodiment 6 according to the present invention. Although the cover member 41 was designed to be attached to the motor cover 36 in Embodiment 5, the similar effect can be obtained even if the cover member 41 is designed to be attached to the housing 31 closely to the partition plate 37 as shown in Fig. 15.

Claims

1. An air conditioner, comprising:

- a housing (31);
- a heat exchanger (32) disposed in the housing (31);
- a line flow fan (33) disposed between the heat exchanger (32) and the housing (31) for blowing air heat-exchanged by the heat exchanger (32);
- a casing (35) mounted in the housing (31) for receiving a motor (34) for driving the line flow fan (33);
- a partition plate (37) making a partition between an air passageway in which the air is carried out by the line flow fan (33) and a space in which the casing (35) of the motor (34) is mounted; and
- a receiving portion (38) disposed in the partition plate (37) and adapted to permit insertion therethrough of a coupling fixation portion (49) for coupling the motor (34) with the line flow fan (33);
- wherein a shielded space (50) is formed inside the casing (35) so that an outer circumference of a shaft of the motor (34) is covered tubularly; and
- wherein the casing (35) is disposed in close contact with the partition plate (37).

2. The air conditioner according to claim 1, wherein an opening portion is provided in the shielded space (50) opposite to the coupling fixation portion (49) for coupling the motor (34) with the line flow fan (33), and a removable cover member (41) is disposed in the opening portion.

3. Thee air conditioner according to claim 2, wherein the cover member (41) is removable by sliding.

FIG. 1

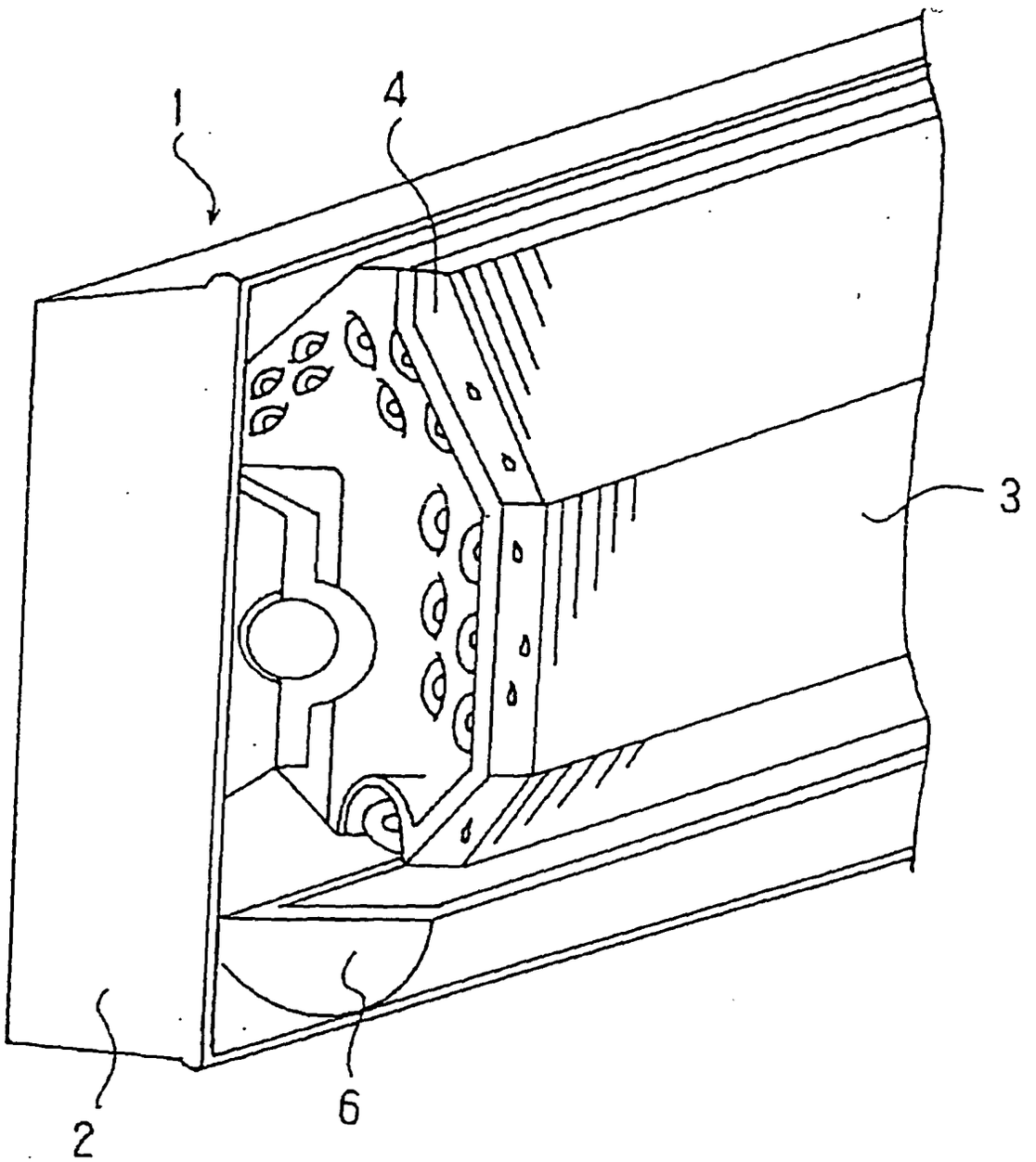


FIG. 2

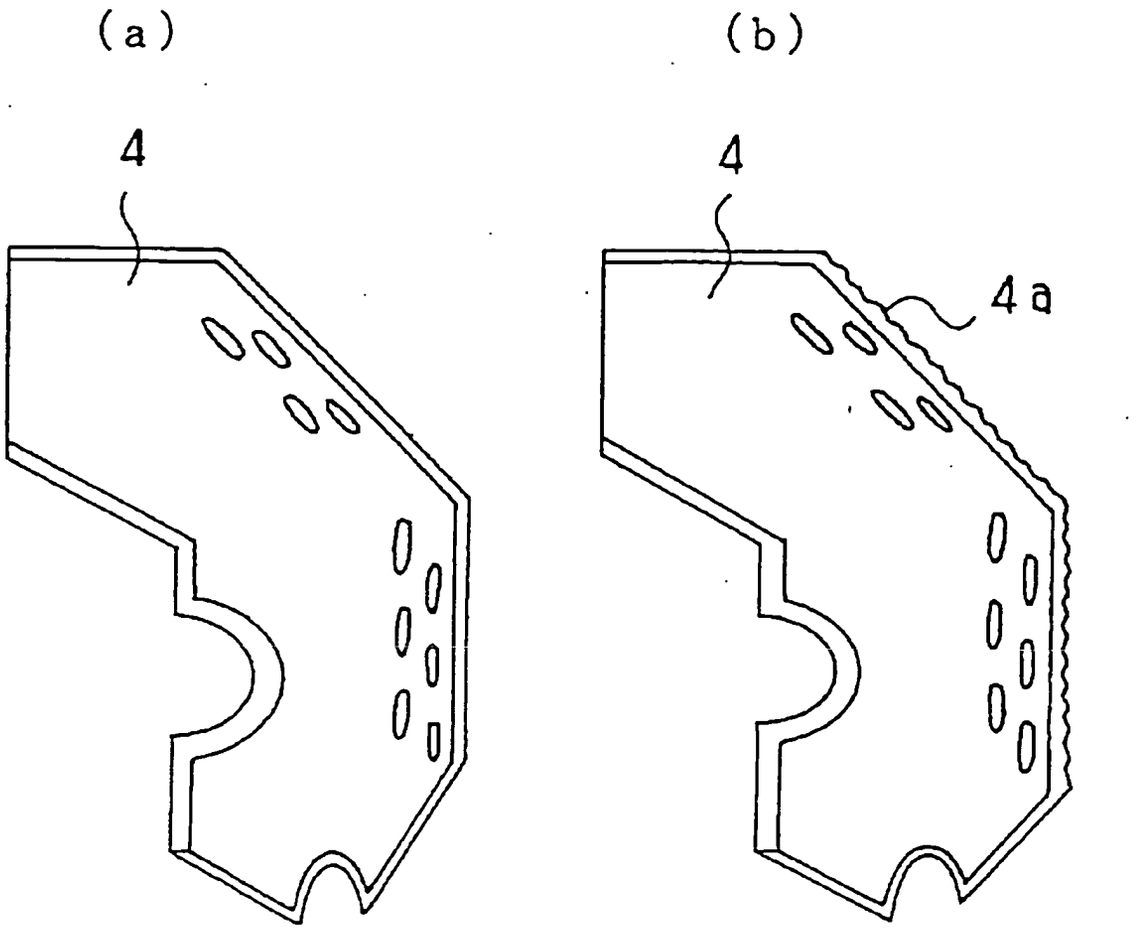


FIG. 3

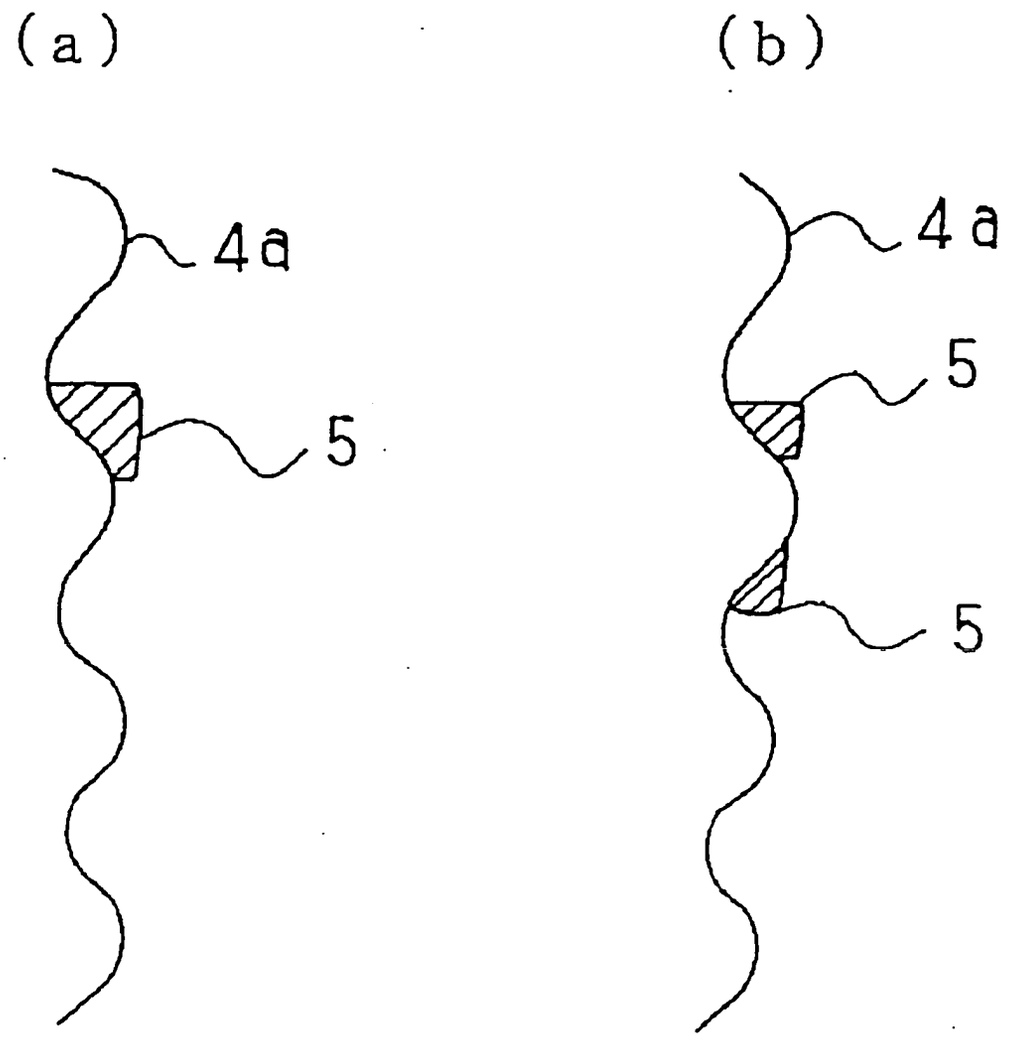


FIG. 4

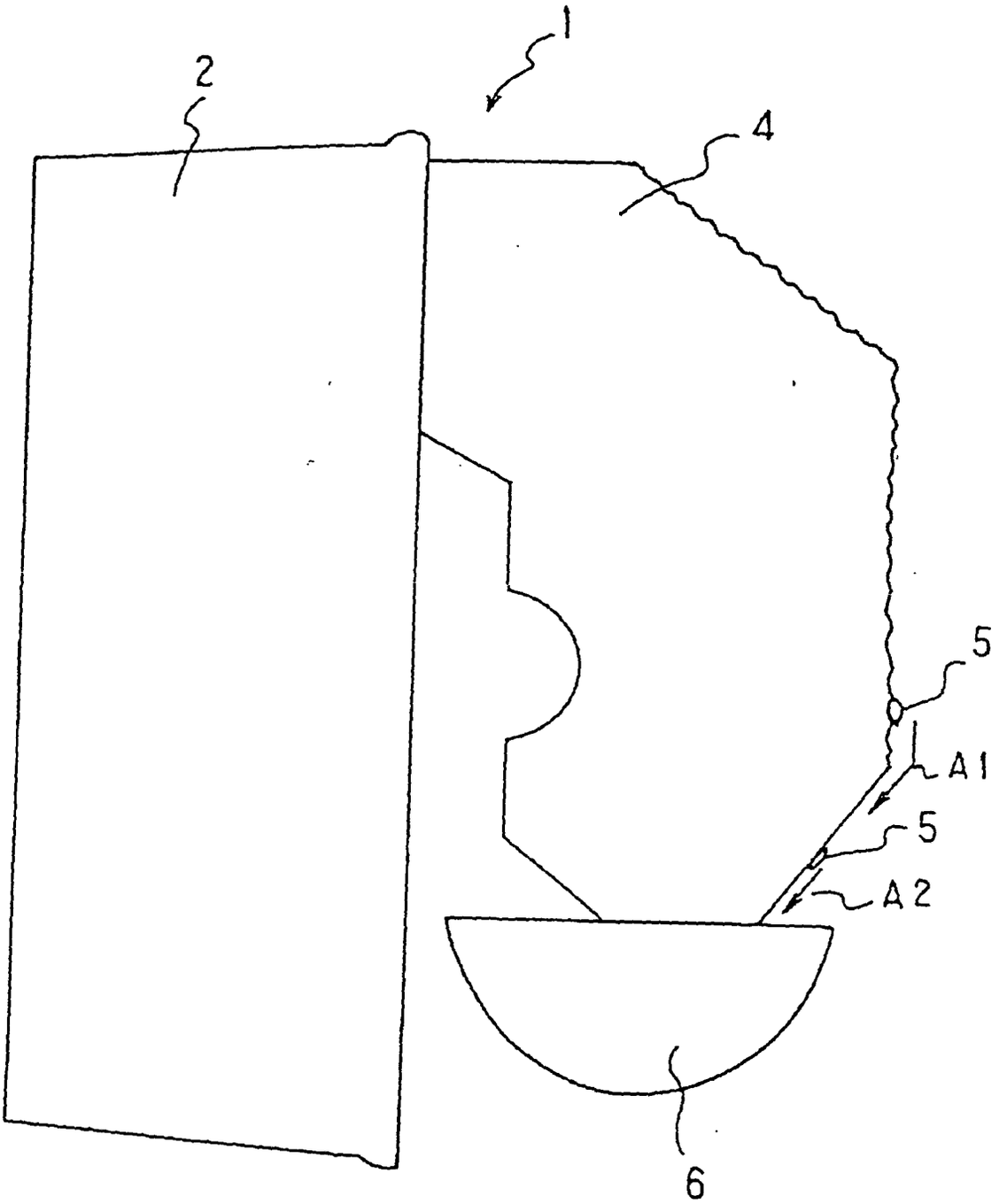


FIG. 5

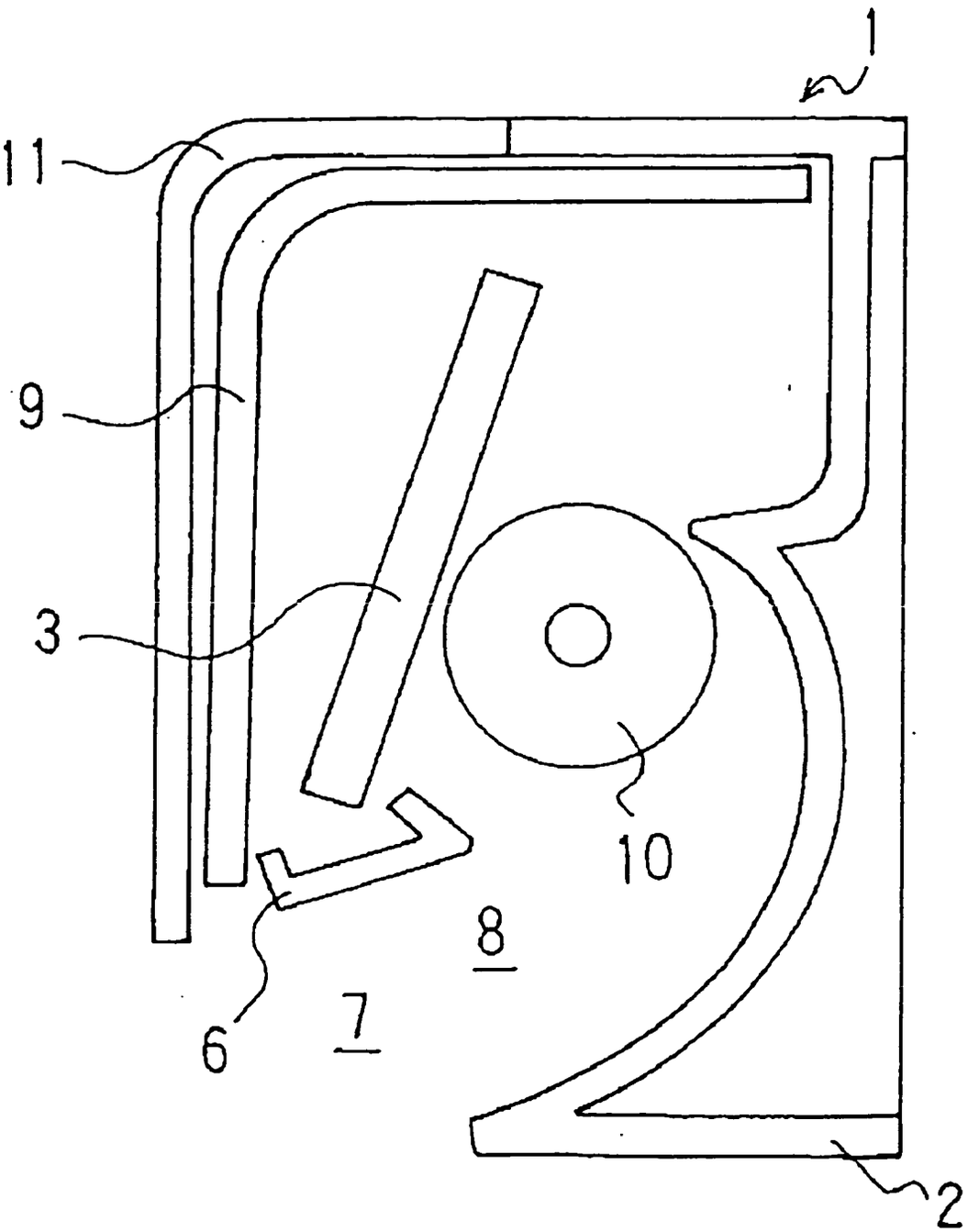


FIG. 6

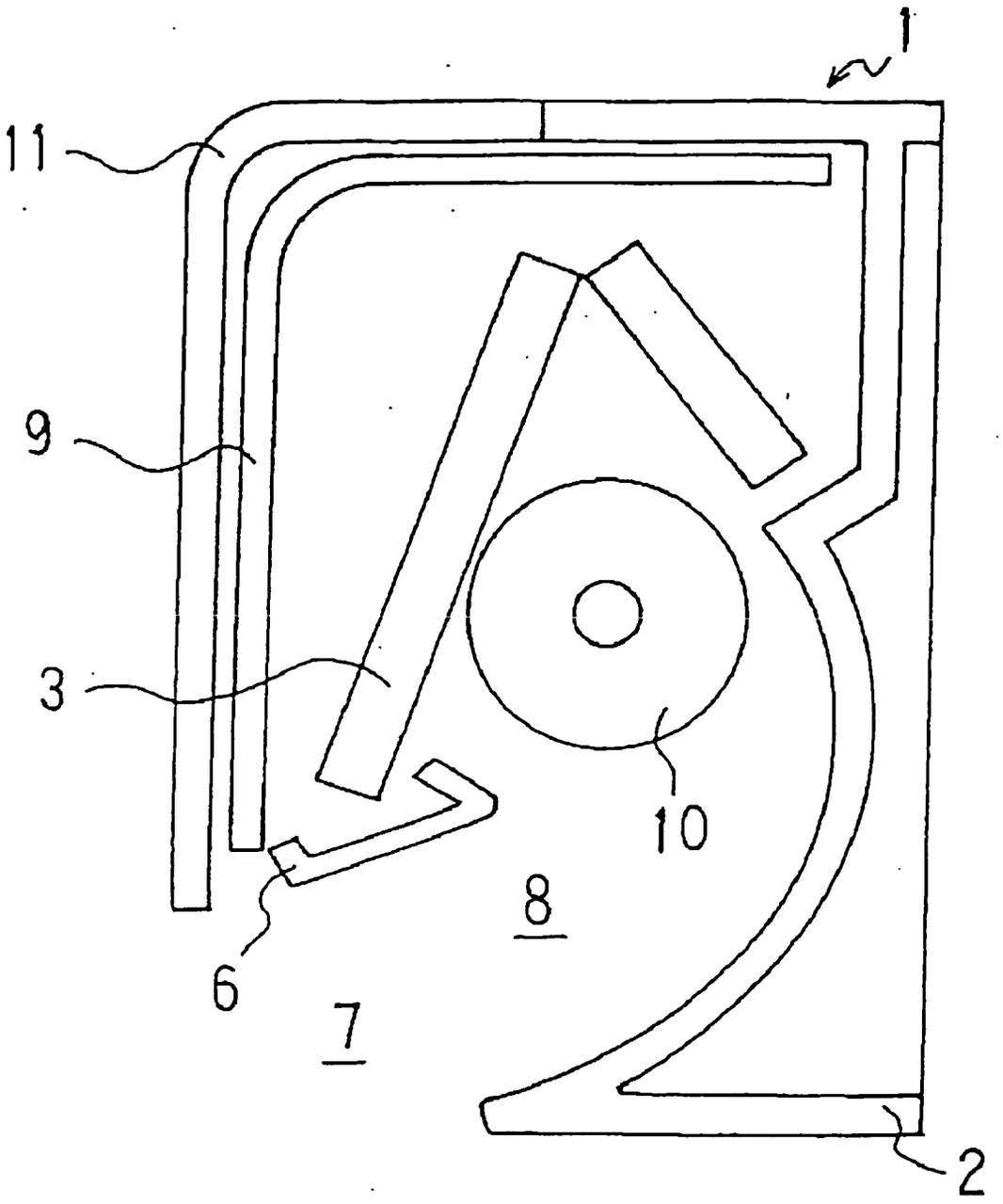


FIG. 7

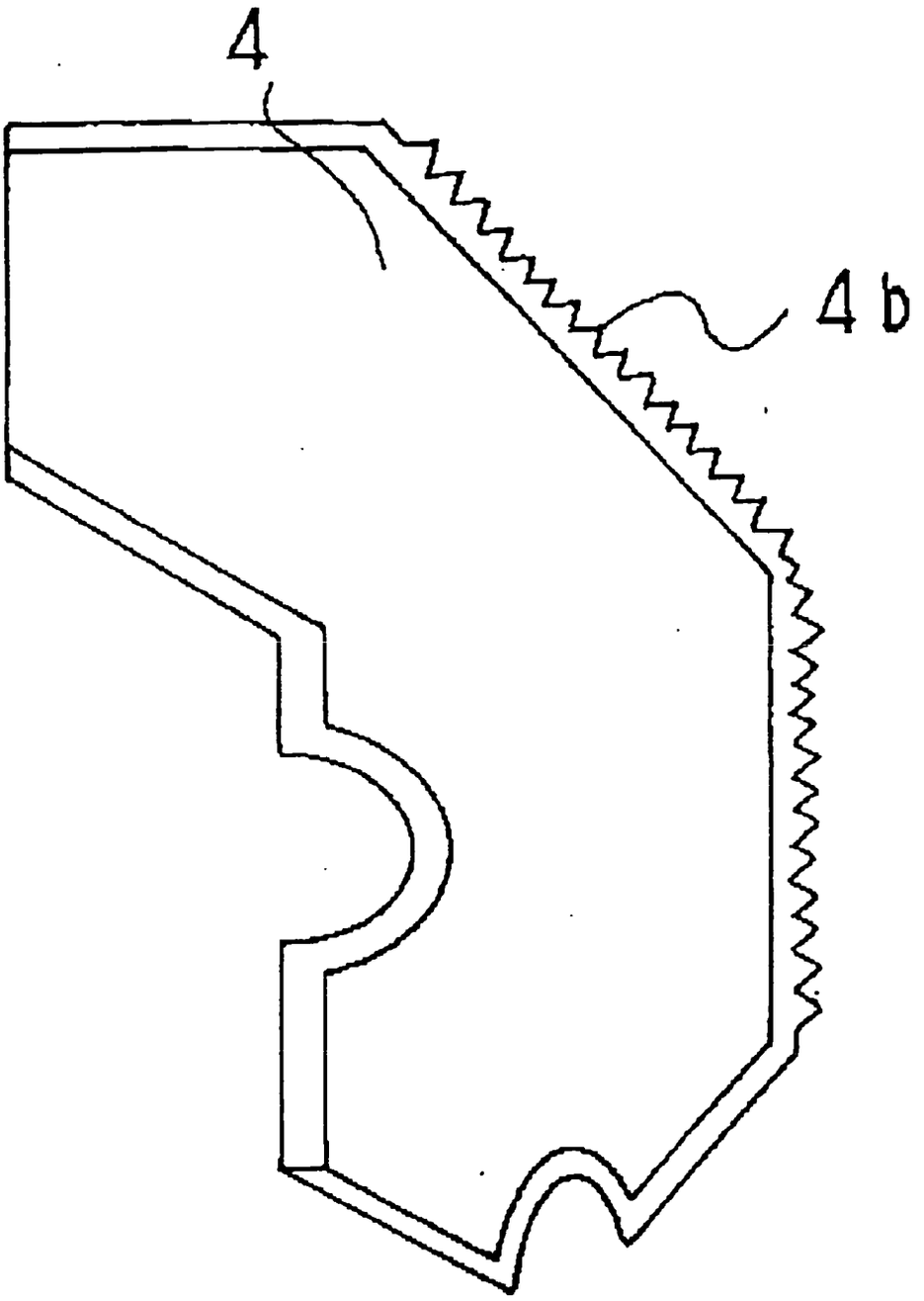


FIG. 8

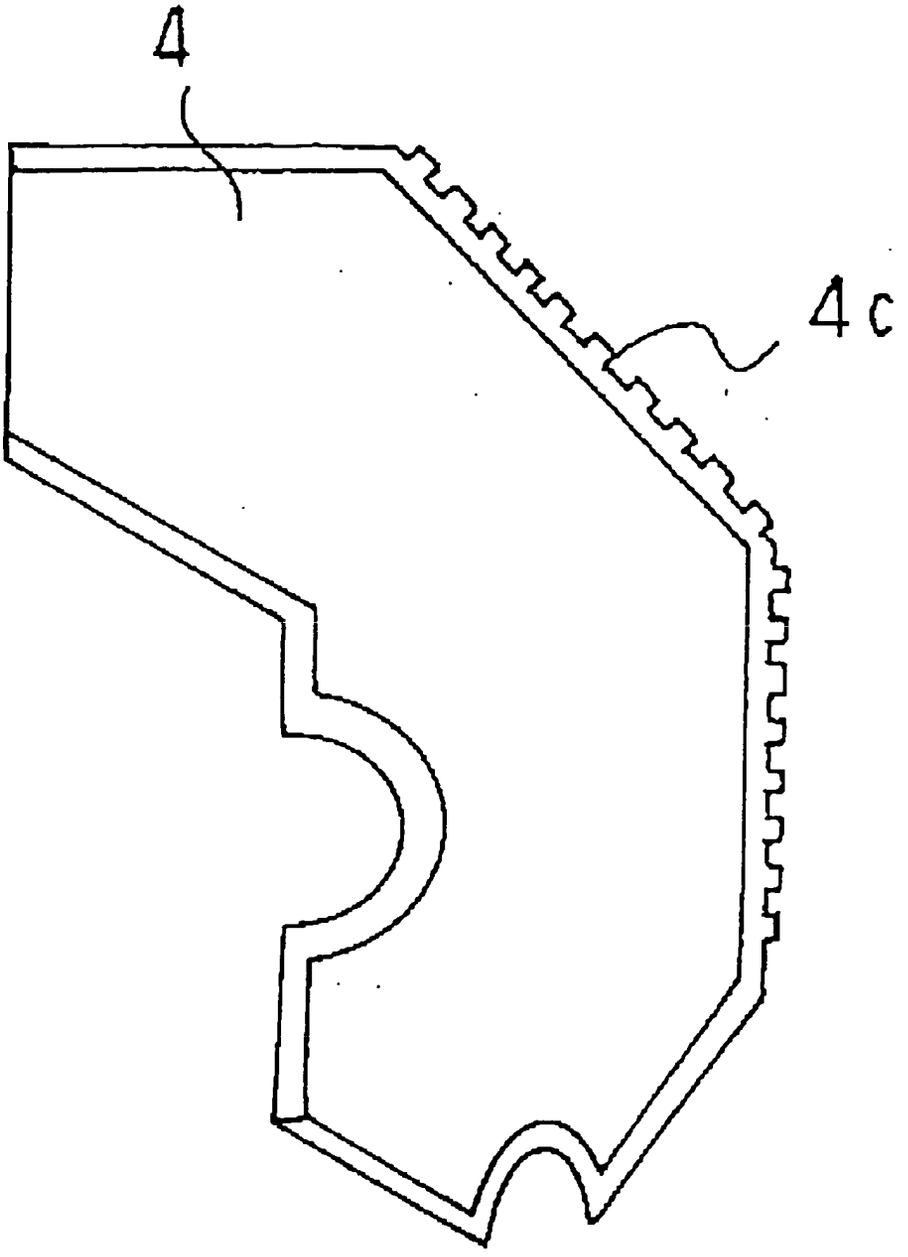


FIG. 9

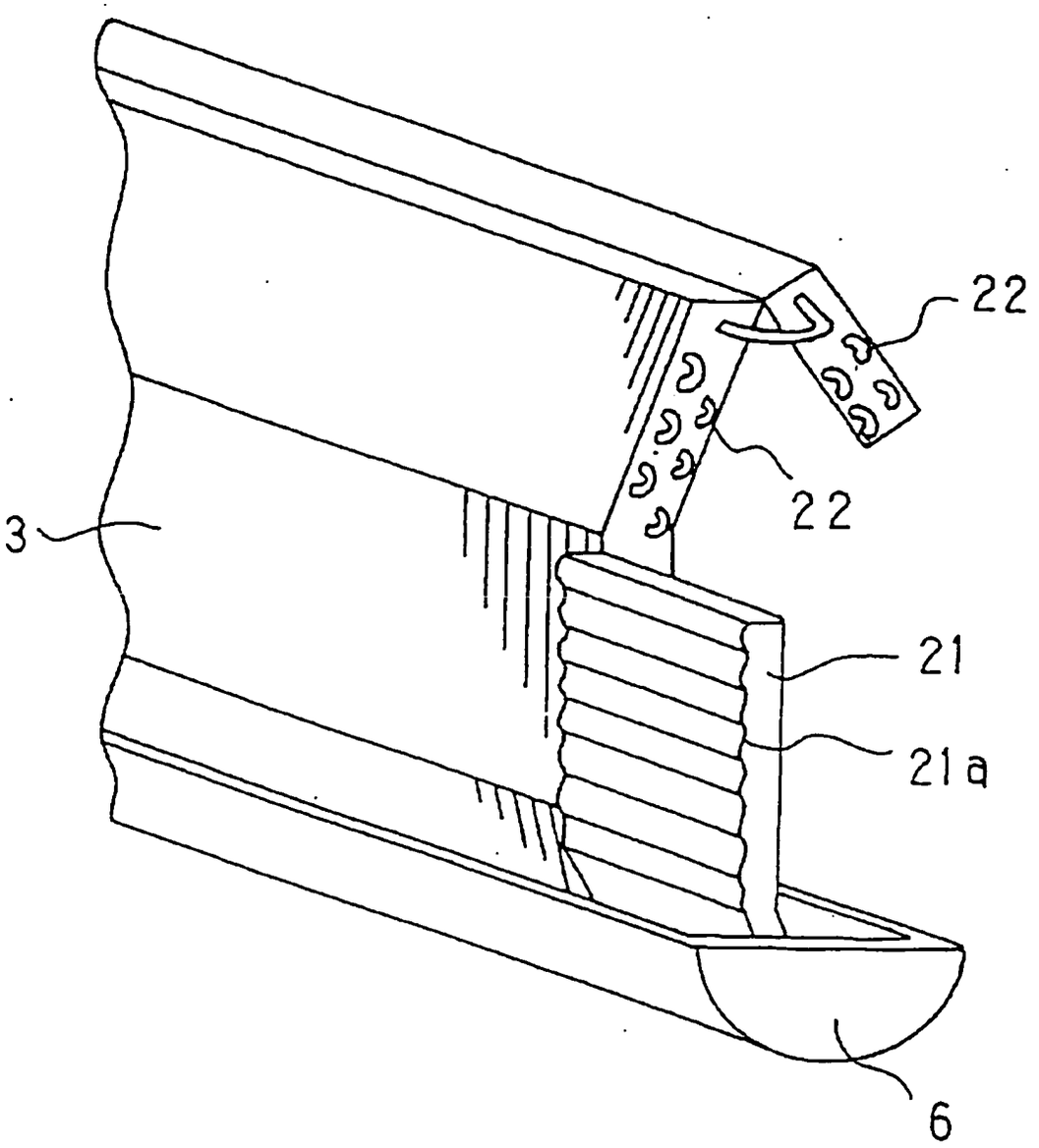


FIG. 10

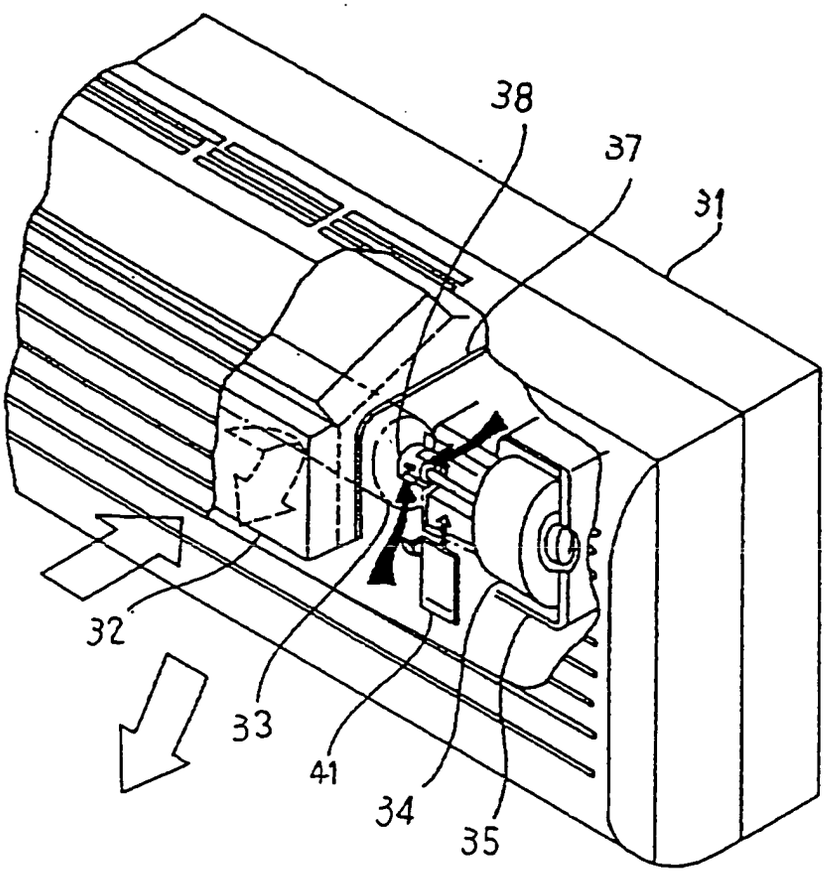


FIG. 11

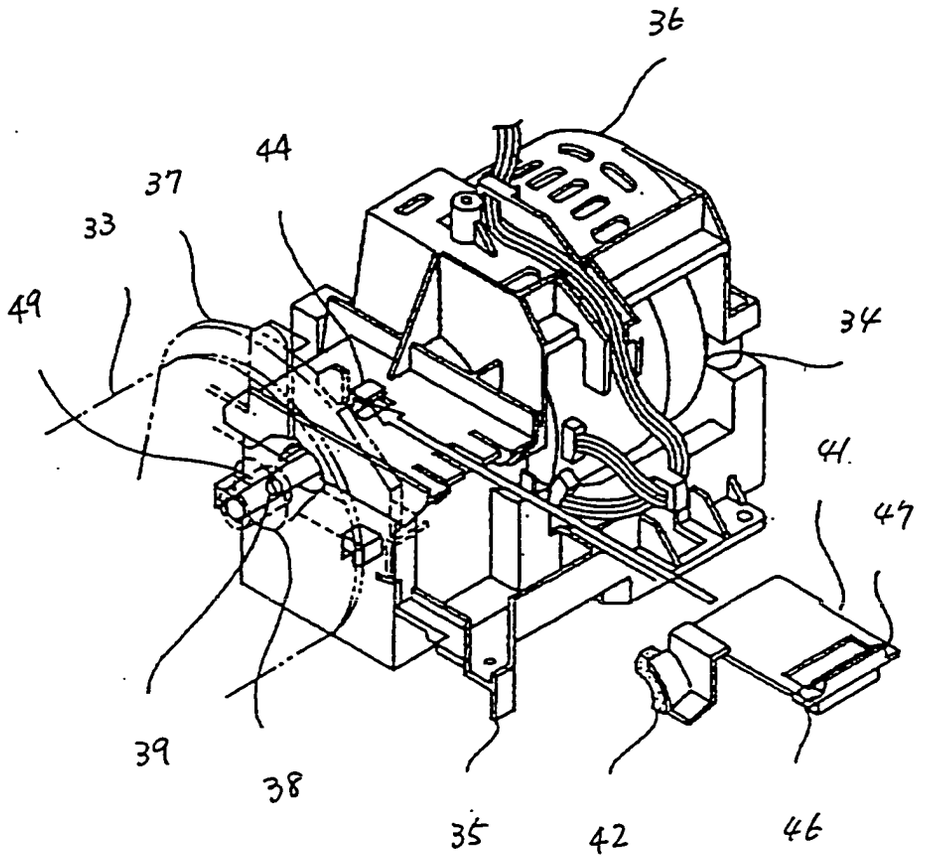


FIG. 12

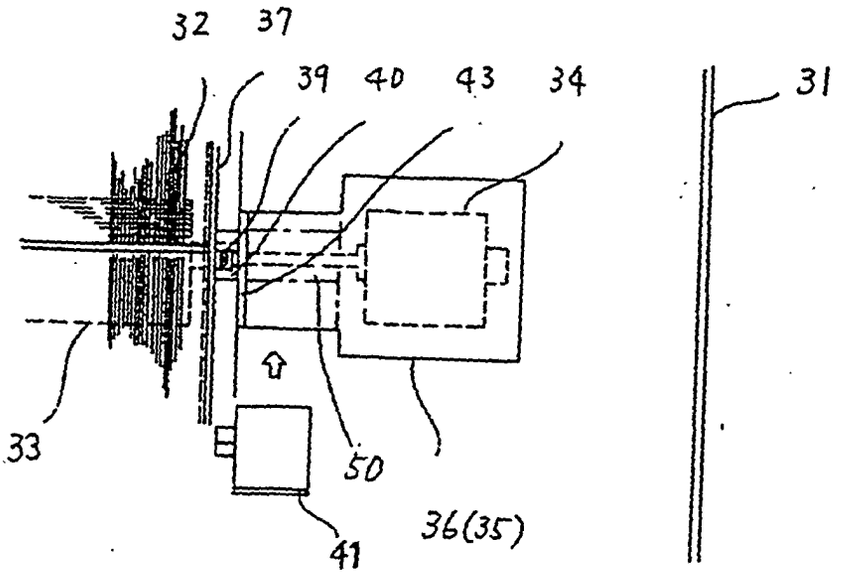


FIG. 13

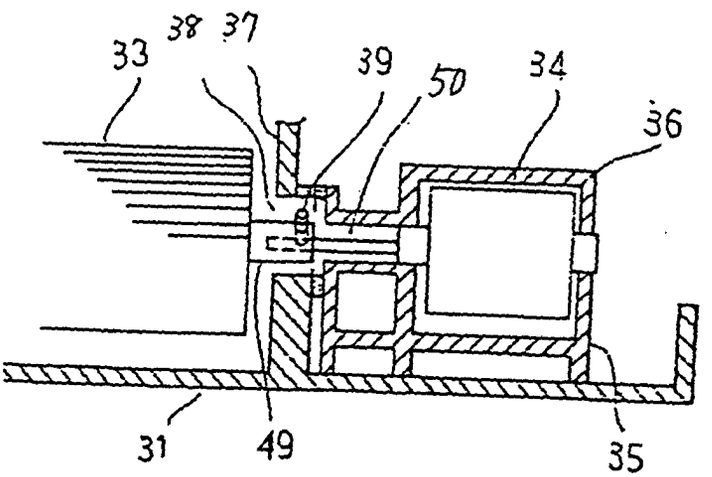


FIG. 14

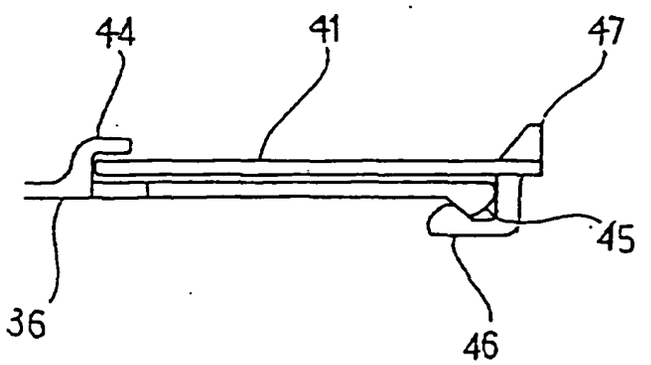


FIG. 15

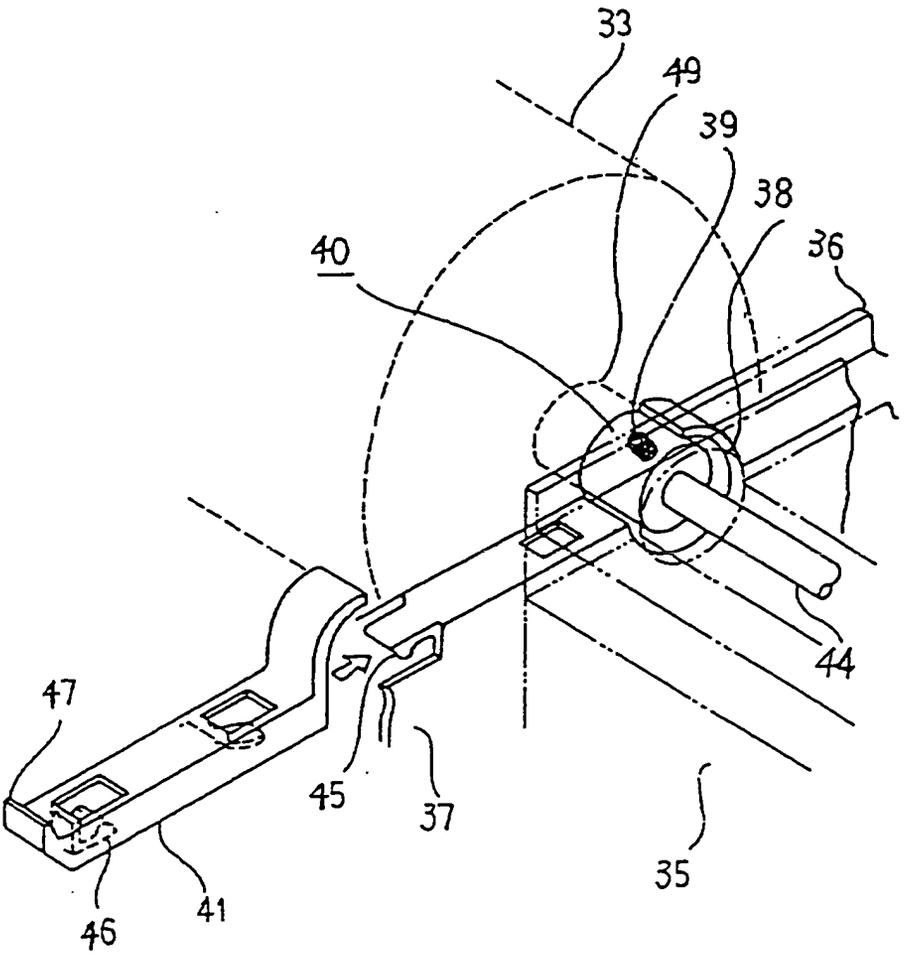


FIG. 16

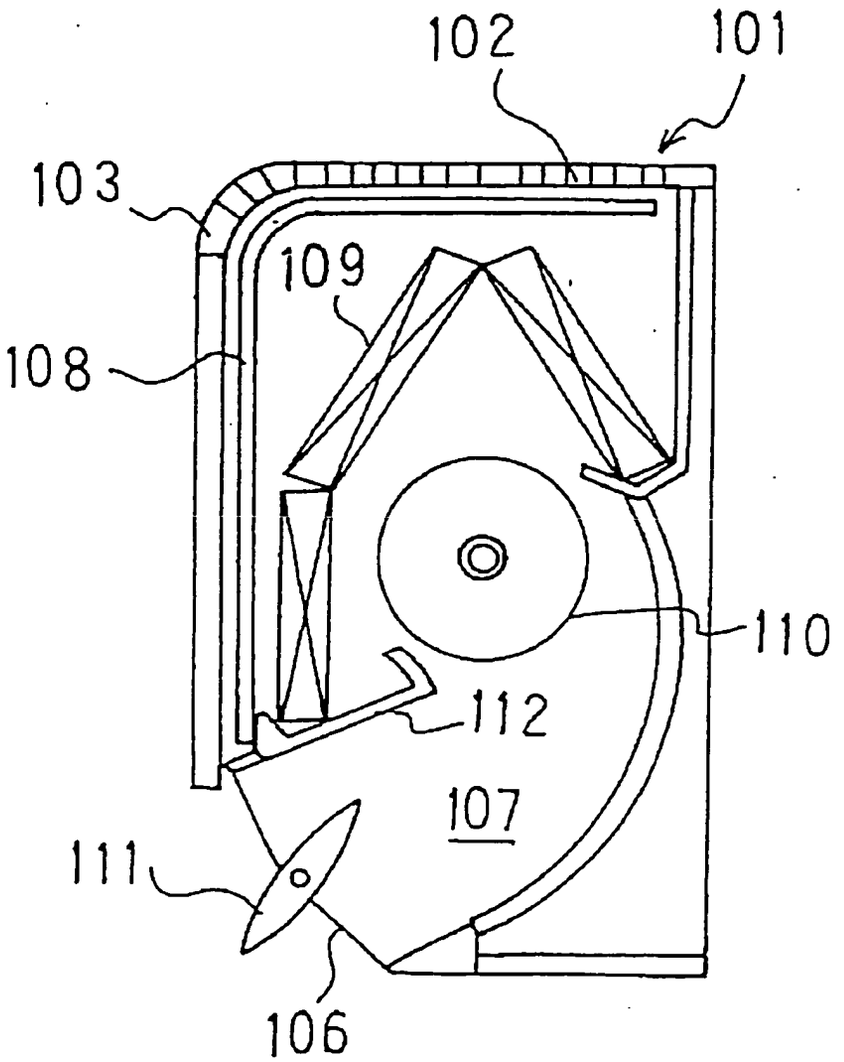


FIG. 17

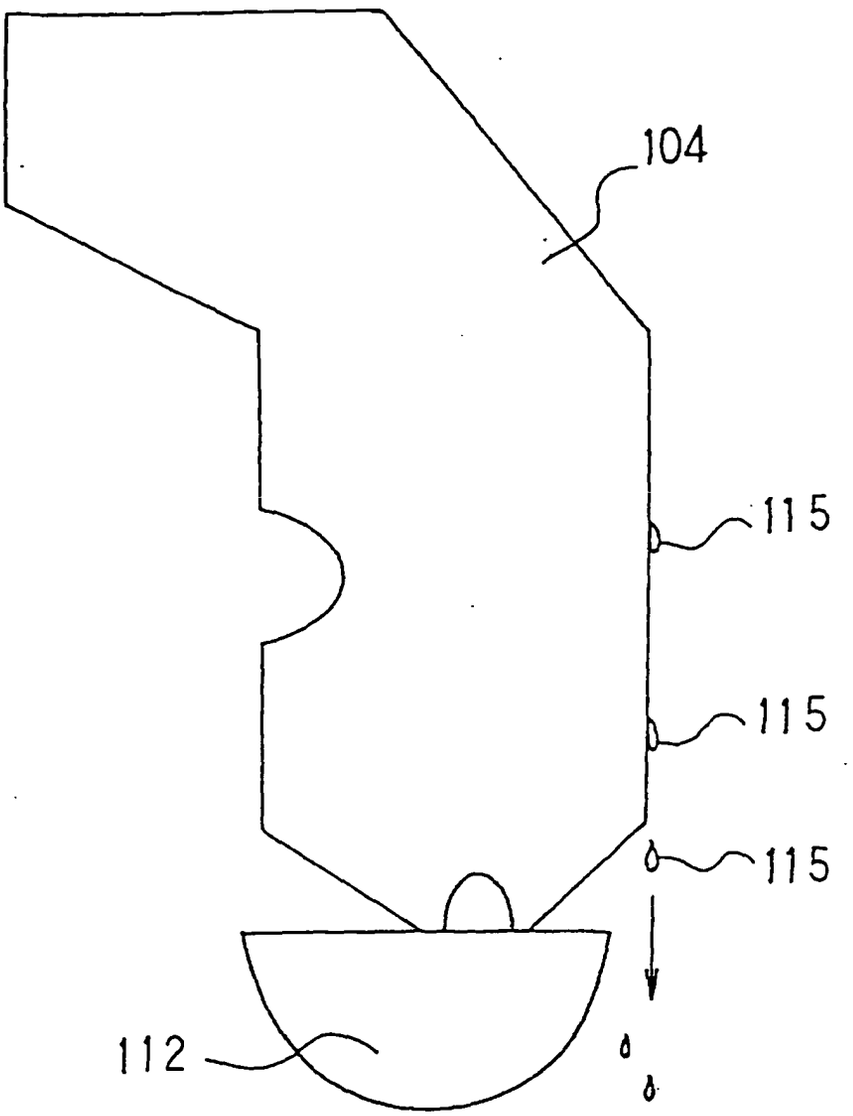


FIG. 18

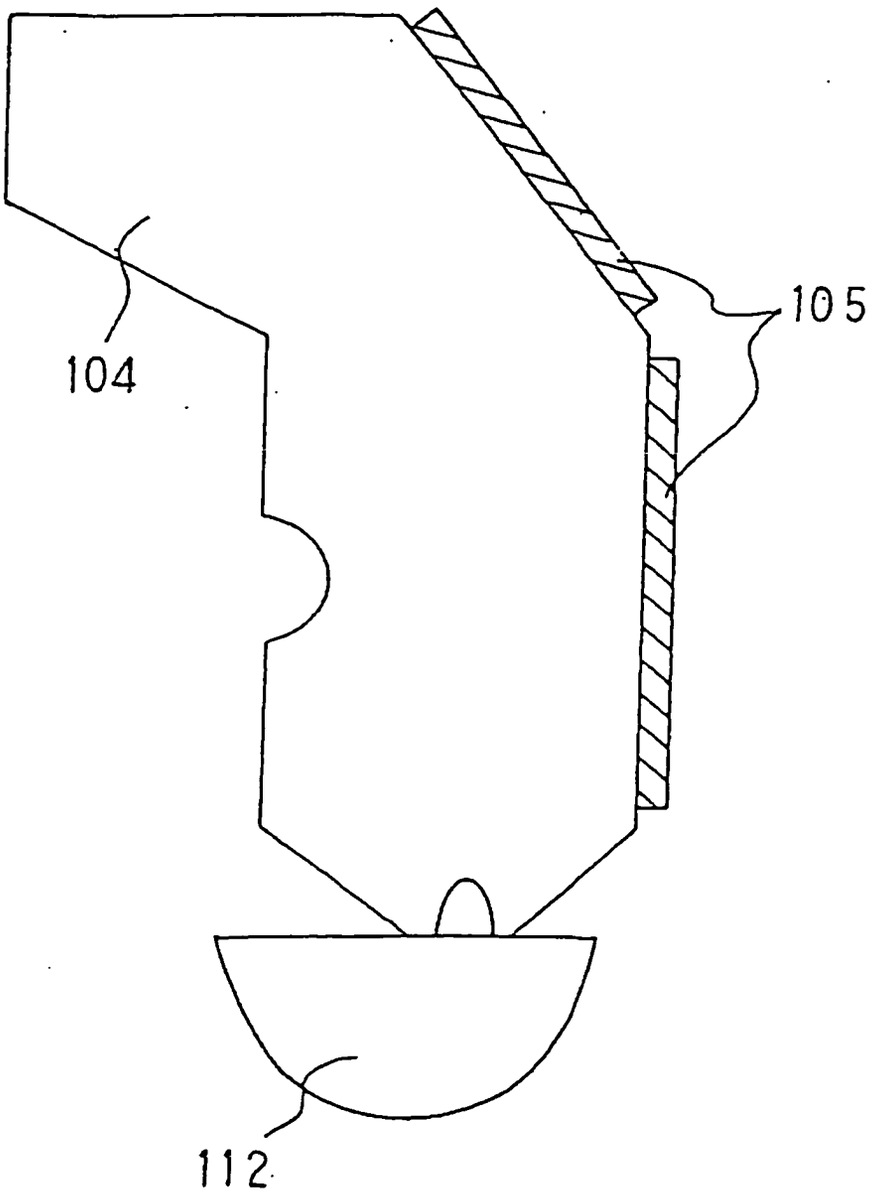


FIG. 19