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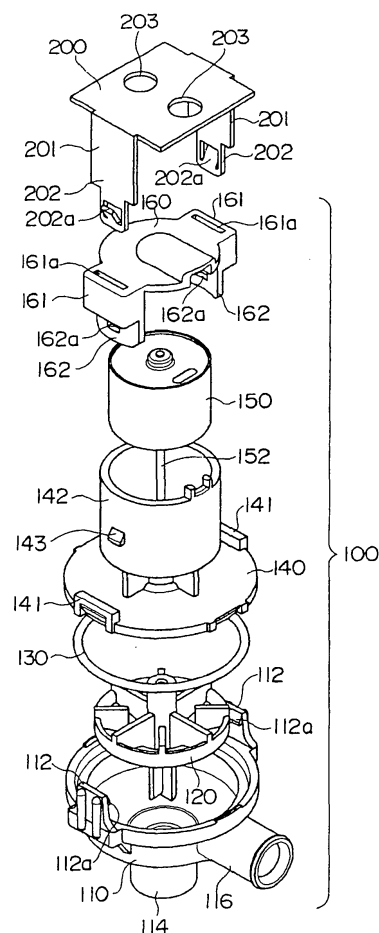
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(54) **Drainage pump**

(57) The invention provides an improved arrangement of a drainage pump disposed in an indoor unit of an air conditioner to simplify the structure thereof and facilitate installation work. A drainage pump 100 includes a receive member 140 formed of synthetic resin that is connected to a body 110 formed of synthetic resin using elastic leg portions 112. On the upper portion of the receive member 140, a cover member 160 made of synthetic resin is mounted by having a leg portion 180 engage with claws 143 of the receive member 140. Amounting portion 161 is formed integrally to the cover member 160, which can be engaged with the bracket 200 via snap-fit engagement, by which the drainage pump 100 can easily be attached to the mounting plate 12 of the indoor unit.

Fig.3



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Description

BACKGROUND OF THE INVENTION

Field of the invention

[0001] The present invention relates to a drainage pump for draining water disposed in an indoor unit of an air conditioner which is attached for example to a ceiling of a room.

Description of the related art

[0002] A known arrangement for mounting a drainage pump in an indoor unit is illustrated in FIGS. 9 and 10.

[0003] An indoor unit, denoted as a whole by reference number 1, includes an evaporator 20 disposed in a casing 10, which carries out heat exchange between the air inside the room and a refrigerant sent into the evaporator 20.

[0004] During cooling operation, the air inside the room is cooled and the moisture in the air is condensed, turning into drain water W_1 and dropping into a drain pan 30. The drain water dropping into the drain pan 30 is collected in a drain water reservoir 32. By activating a drainage pump 50, the drain water collected in the drain water reservoir 32 is discharged to the exterior of the indoor unit via a drain hose 40. The drain hose 40 is supported by a pipe adaptor 42 attached to the casing 10.

[0005] This type of drainage pump is disclosed for example in Patent Application Laid-Open Publication No. 2002-39089 (patent document 1).

[0006] A known structure for installing the drainage pump 50 will now be described in detail with reference to FIGS. 9 and 10. The drainage pump 50 is supported via a bracket 60 prepared separately from the pump on a mounting plate 12 fixed to the casing 10 of the indoor unit.

[0007] The bracket 60 is formed by bending sheet metal, and the drainage pump 50 is fixed to the bracket 60 by engaging mounting screws 61 and 62 from above a pair of mounting poles 51 provided on the drainage pump 50 while having the bracket 60 inserted below a stator S of a driving motor M. Then, the bracket 60 having the drainage pump 50 fixed thereto in the above-described manner is further fixed via rubber vibration isolators 70 to a mounting plate 12 by screws 80 engaged from below the bracket.

[0008] Since the known installation arrangement adopts the above-described structure, it has a drawback in that the structure is complex and the work efficiency for installing the drainage pump requires improvement. Further, since the screws 61 cannot be removed while the screws 80 are engaged, if it is necessary to remove the drainage pump 50 for maintenance operation of the indoor unit, the drainage pump 50 could only be removed with the bracket 60 attached and the screws 80 removed.

SUMMARY OF THE INVENTION

[0009] The primary object of the present invention is to cut down costs by simplifying the installation arrangement of the drainage pump.

[0010] Another object of the present invention is to improve the work efficiency for installing and/or removing the drainage pump.

[0011] In order to achieve the above objects, the drainage pump according to the present invention is arranged as follows. The present drainage pump comprises a body formed of synthetic resin housing a rotary vane, and a receive member formed of synthetic resin attached via a first elastic connecting means to the body so as to cover an opening portion of the body, wherein a cylindrical portion housing a motor for driving the rotary vane is formed integrally to the receive member, a cover member formed of synthetic resin is attached via a second elastic connecting means to the cylindrical portion so as to cover an opening portion of the cylindrical portion, and a mounting portion for removably attaching the drainage pump to a bracket fixed to the indoor unit so as to mount the drainage pump to a housing of the indoor unit is integrally formed to either the receive member or the cover member.

[0012] The bracket is preferably fixed to the mounting portion via an elastic connecting means or a screw.

[0013] The bracket can further preferably be integrally formed with a mounting plate of the indoor unit.

[0014] According to the above-mentioned arrangement, the installation arrangement of the drainage pump is simplified and the costs related thereto are cut down, and the work efficiency for installing and/or removing the drainage pump is greatly improved.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015]

FIG. 1 is a front view showing the relevant portion of an indoor unit including a drainage pump according to a first embodiment of the present invention;

FIG. 2 is a right side view of FIG. 1;

FIG. 3 is a perspective expansion view of the drainage pump according to the first embodiment of the present invention together with a bracket;

FIG. 4(a) is a plan view of the drainage pump according to the first embodiment of the present invention, and FIG. 4(b) is a front view thereof;

FIG. 5(a) is a plan view of the drainage pump according to the second embodiment of the present invention, and FIG. 5(b) is a front view thereof;

FIG. 6(a) is a plan view showing the state in which the drainage pump according to the second embodiment of the present invention is mounted to the bracket, and FIG. 6(b) is a front view thereof;

FIG. 7(a) is a plan view of a drainage pump according to the third embodiment of the present invention, and

FIG. 7(b) is a front view thereof;

FIG. 8(a) is a plan view showing the state in which the drainage pump according to the third embodiment of the present invention is mounted to the bracket, and FIG. 6(b) is a front view thereof;

FIG. 9 is an explanatory view showing the mounting arrangement of the drainage pump disposed in the indoor unit according to the prior art; and

FIG. 10 is a right side view of FIG. 9.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0016] The preferred embodiments for carrying out the present invention will now be described.

[0017] A relevant portion of an indoor unit including a drainage pump according to a first embodiment of the present invention is illustrated in FIGS. 1 and 2. The components equivalent to those of the prior art structure are denoted with the same reference numbers as those used in FIGS. 9 and 10.

[0018] An evaporator 20 is disposed in a casing 10 of an indoor unit 1, and the drain water W_1 is received by a drain pan 30 and collected in a drain water reservoir 32. A bracket 200 is suspended via rubber vibration isolators 70 also functioning as mounting poles on a mounting plate 12 fixed to the casing 10, and a drainage pump 100 according to the present invention is removably attached to the bracket 200. A drain hose 40 supported by a pipe adaptor 42 is connected to the drainage pump 100. By activating the drainage pump 100, the drain water W_1 is discharged to the exterior through the drain hose 40.

[0019] Now, the details of the assembly 100 of the drainage pump according to the first embodiment of the present invention and the arrangement for installing the same will be described with reference to FIGS. 3 and 4.

[0020] The assembly 100 of the drainage pump comprises a body 110 made of synthetic resin. The body 110 includes a leg portion 112 for mounting, an intake port 114 and a discharge port 116 which are formed as an integral component. A rotary vane 120 is disposed inside the body 110, which is connected to an output shaft 152 of a driving motor 150. A receive member 140 is placed via a seal ring 130, such as an O-ring, on the opening formed to the upper portion of the body 110. The receive member 140 is fixed to the body 110 via a so-called elastic connecting means, by engaging the leg portions 112 on the body 110 elastically via snap-fit engagement to the engaging portions 141 of the receive member 140. In other words, since the leg portions 112 made of synthetic resin has elasticity, engaging claws 112a on the leg portions 112 can be elastically engaged (via snap-fit engagement) with the engaging portions 141 of the receive member 140.

[0021] A cylindrical portion 142 for receiving a motor 150 is disposed at a center of the receive member 140, and on the outer circumferential surface of the cylindrical

portion 142 are formed claws 143.

[0022] Mounting portions 161 having slits 161a are formed in bulged manner to the cover member 160 made of synthetic resin, and engagement holes 162a are formed to the leg portions 162 extending downward from the lower surface of the mounting portion 161. By elastically engaging (snap-fitting) the engagement holes 162a on the leg portions 162 to the claws 143 of the cylindrical portion 142, the cover member 160 can be attached easily to the cylindrical portion 142 of the receive member 140. By attaching the cover member 160 to the cylindrical portion 142, the motor 150 is retained in the cylindrical portion 142.

[0023] According to the present embodiment, the bracket 200 is formed by bending a metal plate, wherein leg blocks 201 are extended downward from both sides with engagement blocks 202 extending further downward from the lower ends of the blocks 201, and the engagement blocks have elastically deformable engagement claws 202a extended toward the slantwise outer direction. The engagement blocks 201 and engagement claws 202a can be inserted to the slits 161a formed to the mounting portions 161 of the cover 160, and after being inserted, the engagement claws 202a are restored to its original shape by elasticity, by which the bracket 200 is engaged infallibly to the lower surface of the mounting portion 161.

[0024] According to the above arrangement, the drainage pump assembly 100 can easily be attached to the bracket 200 (refer to FIGS. 1 and 2). Further, in FIG. 3, the holes 203 on the bracket 200 are for receiving the rubber vibration isolators 70 illustrated in FIGS. 1 and 2.

[0025] According to embodiment 1, the bracket 200 is prepared separately from the mounting plate 12 (refer to FIGS. 1 and 2), but the bracket 200 (and leg blocks 201) can also be prepared as an integral component with the mounting plate 12. Even according to such example, the installation of the drainage pump assembly can be performed in the same manner as the above-mentioned embodiment.

[0026] Next, a drainage pump assembly 100A according to a second embodiment of the present invention and the installation thereof is described with reference to FIGS. 5 and 6. According to this embodiment, the assembly 100A is attached to a bracket 200A via screw engagement. The components that are the same as those of embodiment 1 are denoted with the same reference numbers, and the detailed descriptions thereof are omitted. Only the varied points are explained in the following description.

[0027] In the present embodiment, as shown in FIG. 5, a mounting portion 161A of the cover member 160 is formed higher than the upper surface of the cover member. Holes 161b capable of receiving screws (tapping screws) S described later are formed to the mounting portion 161A.

[0028] In response to this change in design of the drainage pump assembly 100A, as shown in FIG. 6, the bracket

et 200A is equipped with mounting blocks 202A that extend horizontally from the lower end of mounting legs 201A. The mounting blocks 202A of the bracket 200A are positioned to face the mounting portions 161Aa of the pump assembly 100A. Therefore, the pump assembly 100A can be attached to the bracket 200A via mounting screws S. Similar to the first embodiment, the bracket 200A is attached to the mounting plate 12 via rubber vibration isolators illustrated in FIGS. 1 and 2.

[0029] Next, a drainage pump assembly 100B according to a third embodiment of the present invention and the installation thereof is described with reference to FIGS. 7 and 8. Also according to this embodiment, the components that are the same as those of embodiments 1 or 2 are denoted with the same reference numbers, and the detailed descriptions thereof are omitted. Only the varied points are explained in the following description.

[0030] According to the present embodiment, the pump assembly 100B is attached to a bracket 200B via screw engagement, but the position at which the mounting portions are formed to the pump assembly differs from the first and second embodiments. That is, the mounting portions 161B of the present embodiment is not formed to the cover member 160, but to the receive member 140 in an integral manner. Along with this change, the position for forming the claws 143B on the outer circumferential surface of the cylindrical portion 142 of the receive member 140 and the position for forming the legs 162B extended integrally downward from the cover member 160 to be engaged elastically to the claws 143B are changed.

[0031] The bracket 200B having been changed in design as described above for attaching the pump assembly 100B is formed substantially similar to the second embodiment. The difference is that according to the present embodiment, the length of the leg blocks 201B of the bracket 200B is somewhat longer than the leg blocks 201A of the bracket 200A according to the second embodiment.

[0032] Further according to the third embodiment, the arrangement of the pump assembly 100B having the mounting portions 161B formed to the cylindrical portion 142 can be modified easily so that the assembly can be mounted via snap-fit engagement to the bracket as according to embodiment 1.

the body;

wherein a cylindrical portion housing a motor for driving the rotary vane is formed integrally to the receive member;

a cover member formed of synthetic resin is attached via a second elastic connecting means to the cylindrical portion so as to cover an opening portion of the cylindrical portion; and
a mounting portion for removably attaching the drainage pump to a bracket fixed to the indoor unit so as to mount the drainage pump to a housing of the indoor unit is integrally formed to either the receive member or the cover member.

2. The drainage pump according to claim 1, wherein the bracket is fixed to the mounting portion via an elastic connecting means or a screw.
3. The drainage pump according to claim 1 or claim 2, wherein the bracket is integrally formed with a mounting plate of the indoor unit.

Claims

1. A drainage pump disposed in an indoor unit of an air conditioner for draining drain water, comprising:

a body formed of synthetic resin housing a rotary vane; and
a receive member formed of synthetic resin attached via a first elastic connecting means to the body so as to cover an opening portion of

Fig.1

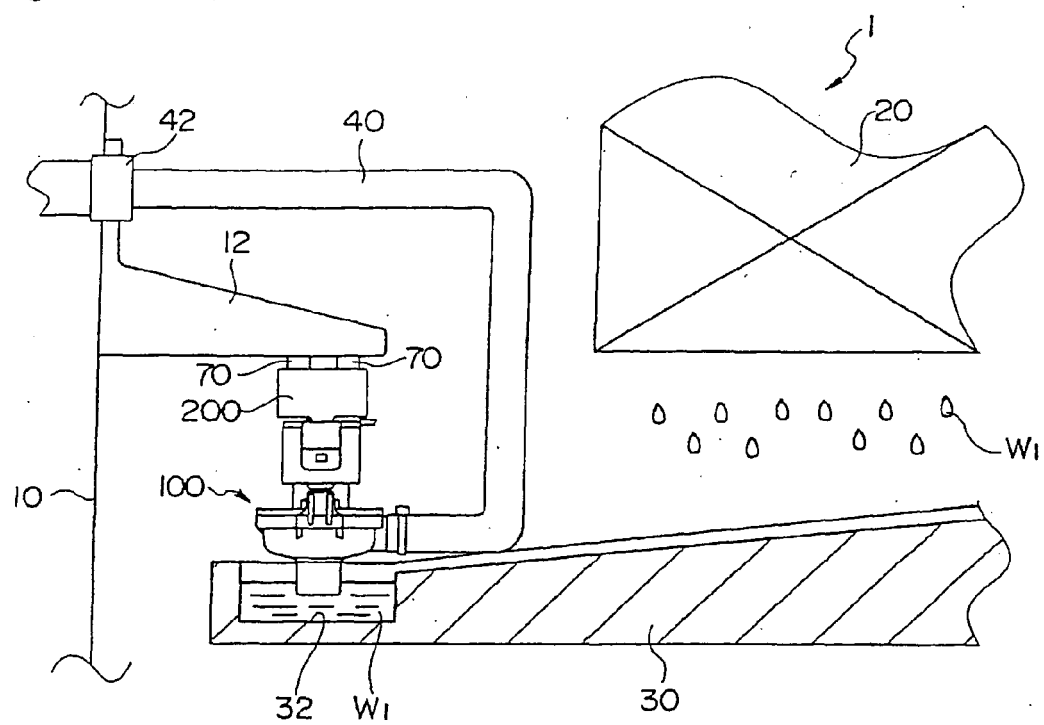


Fig.2

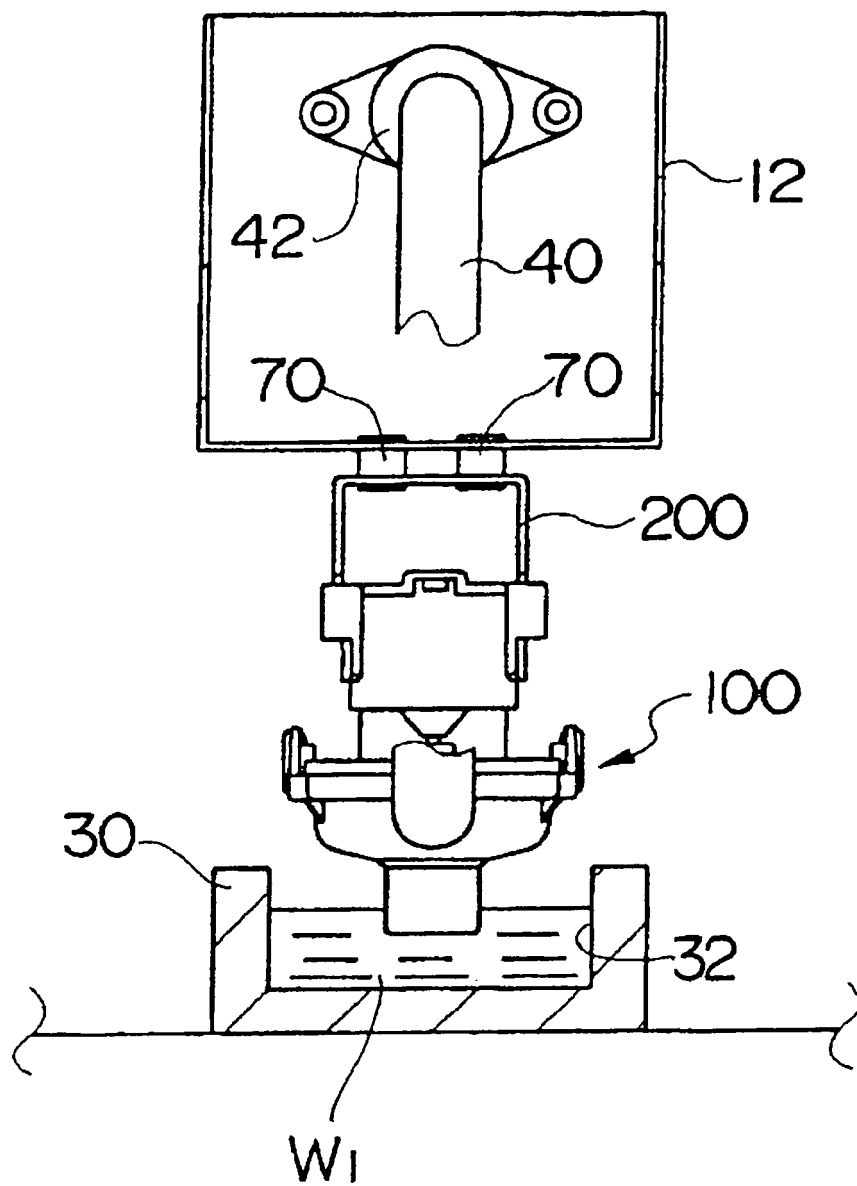


Fig.3

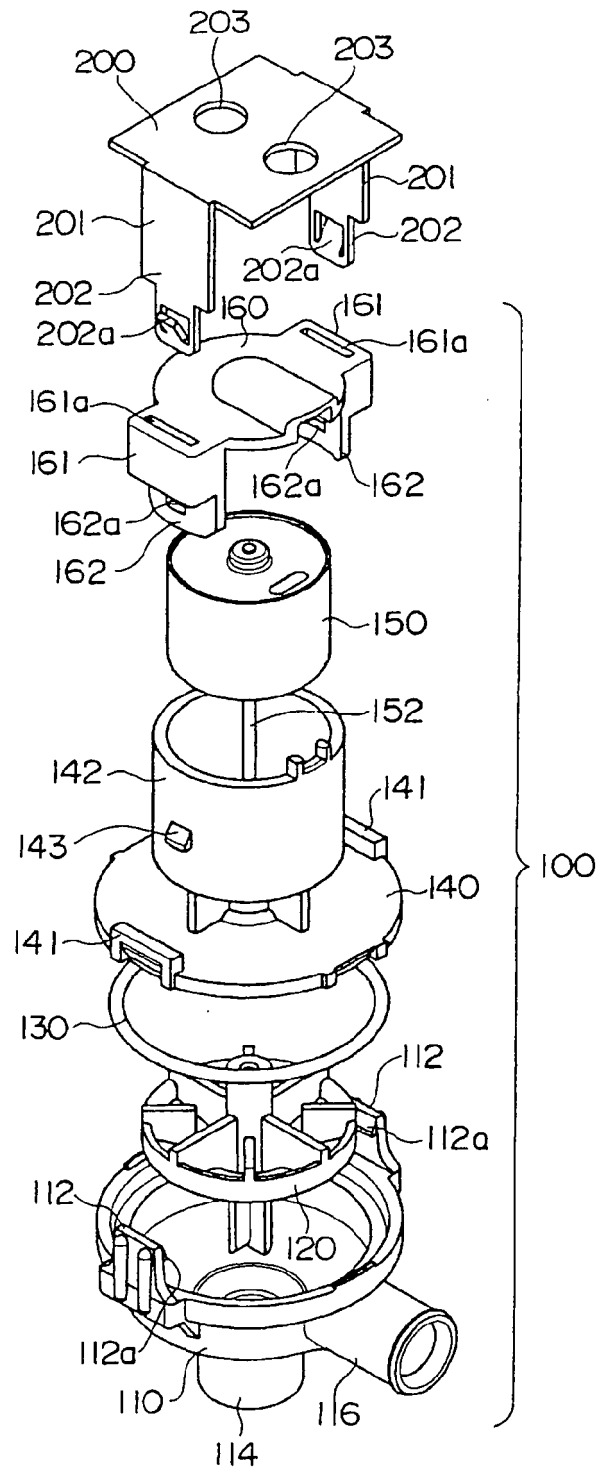


Fig.4

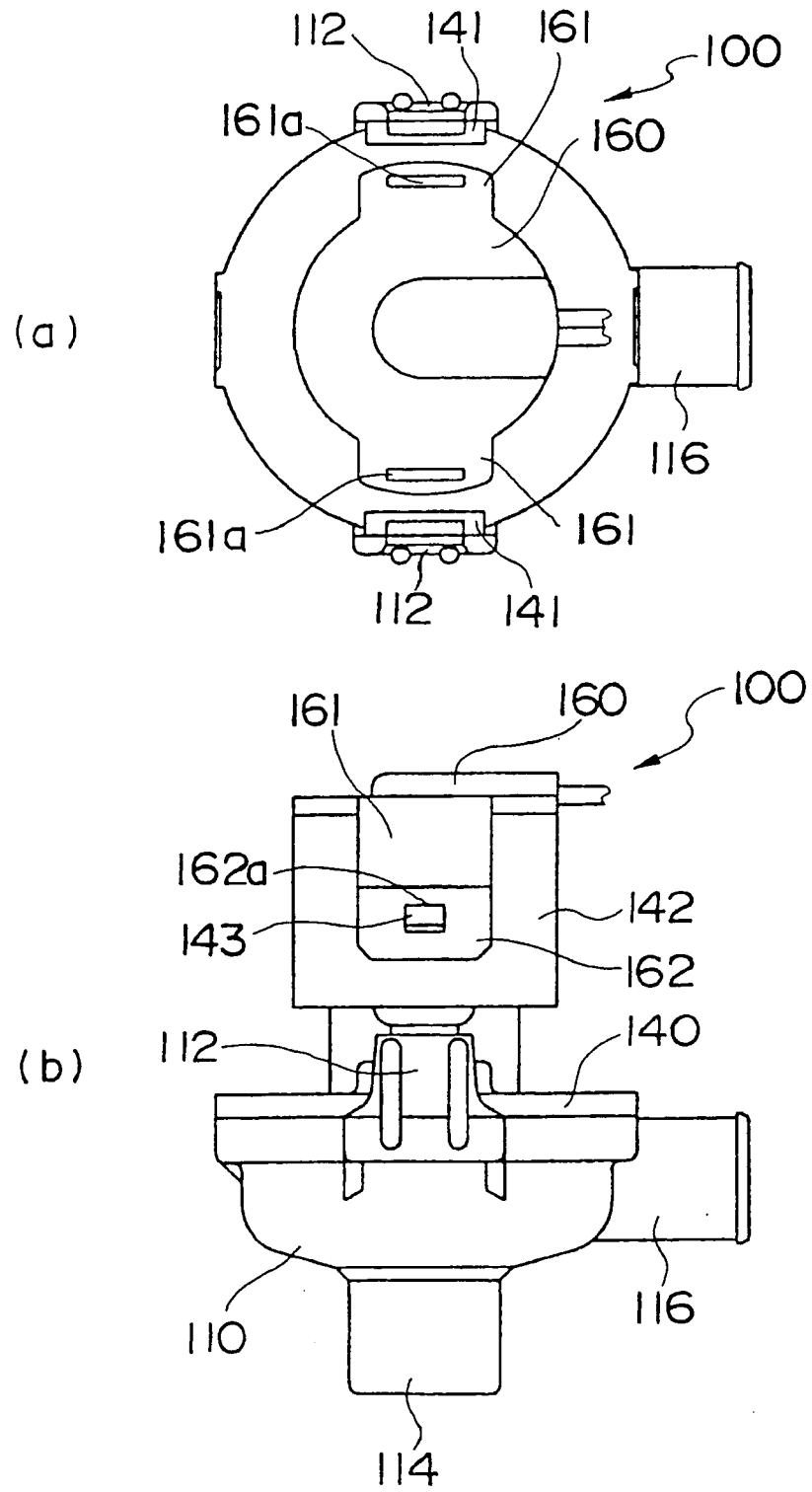


Fig.5

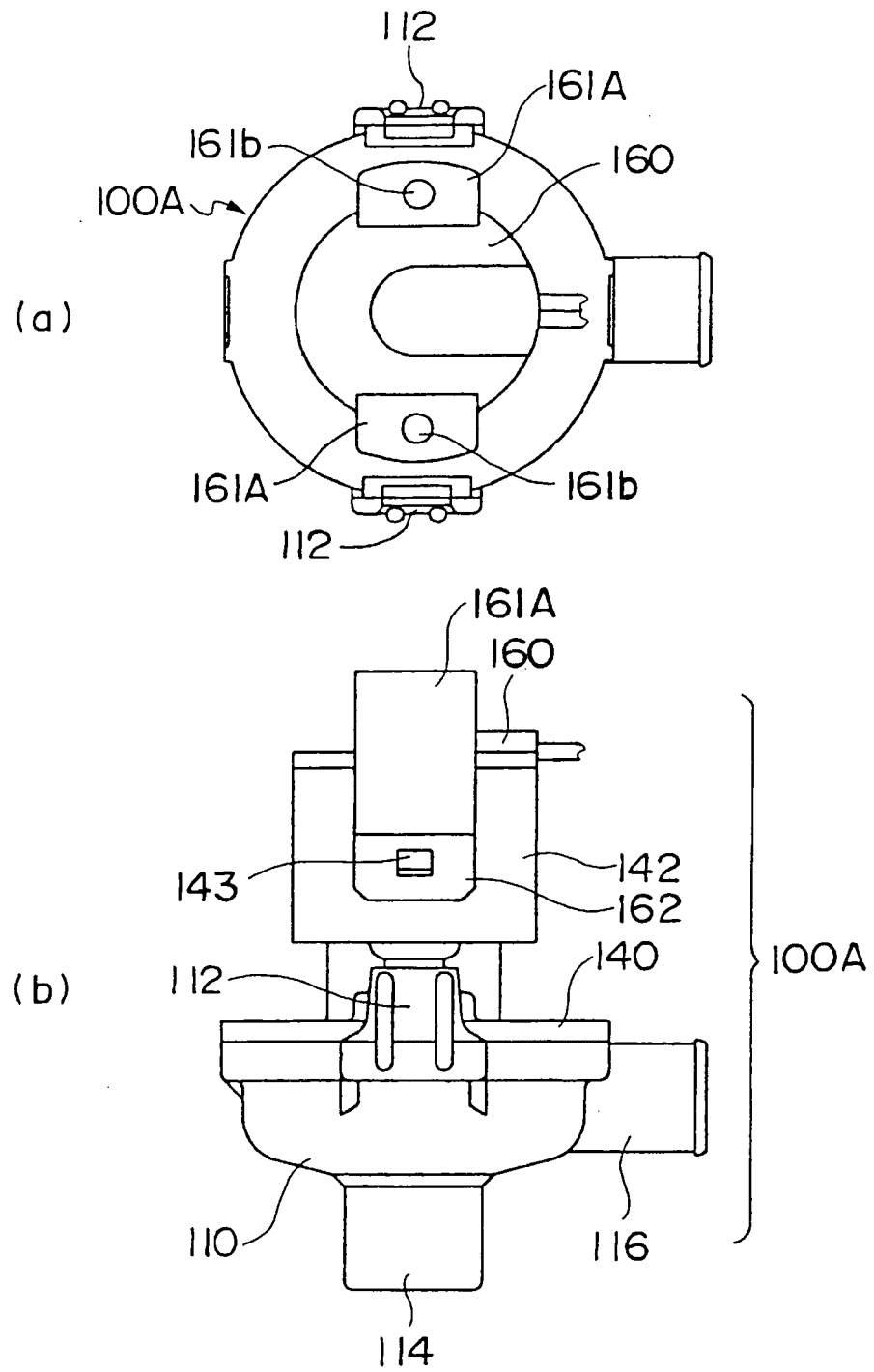


Fig.6

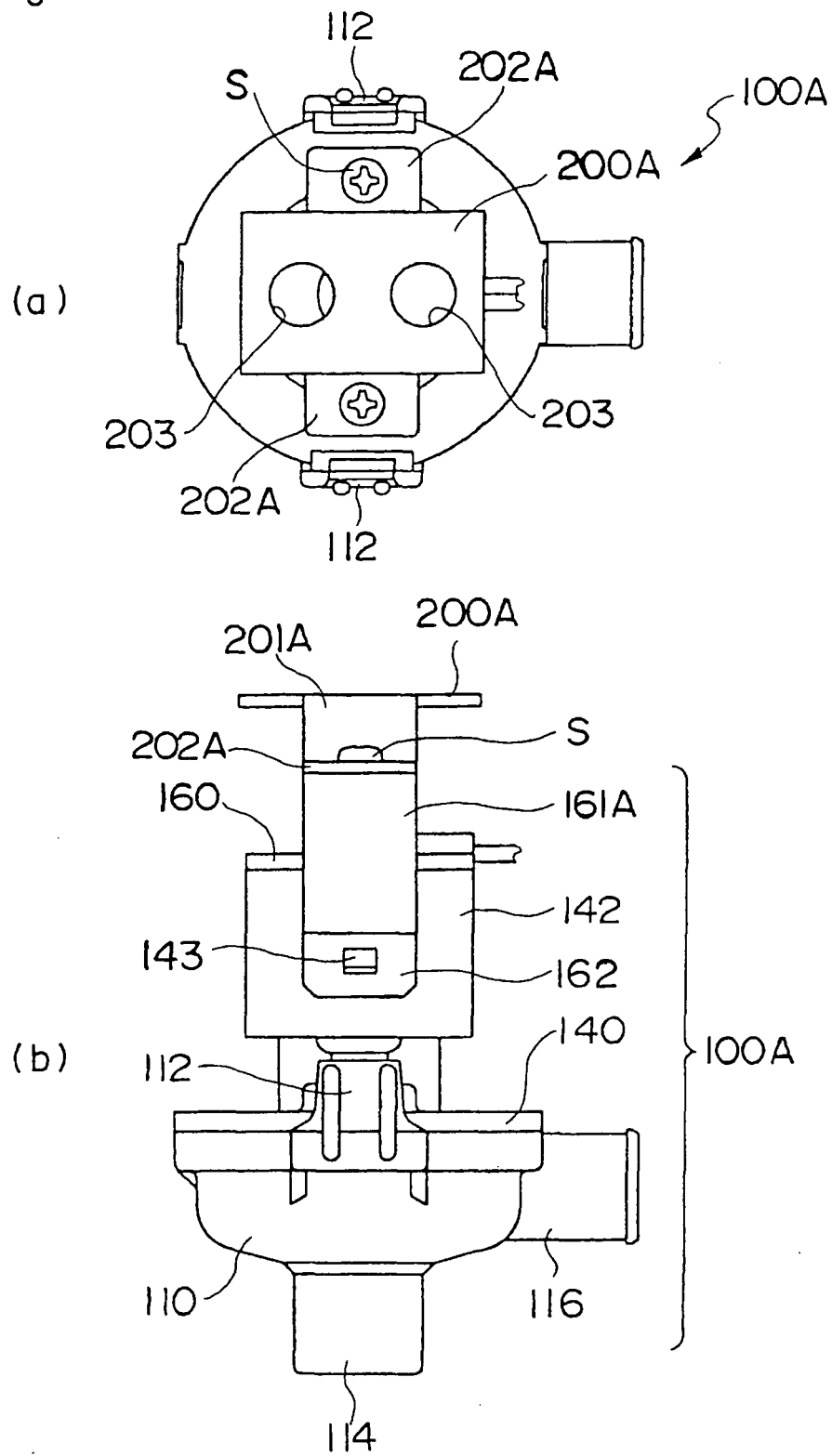


Fig.7

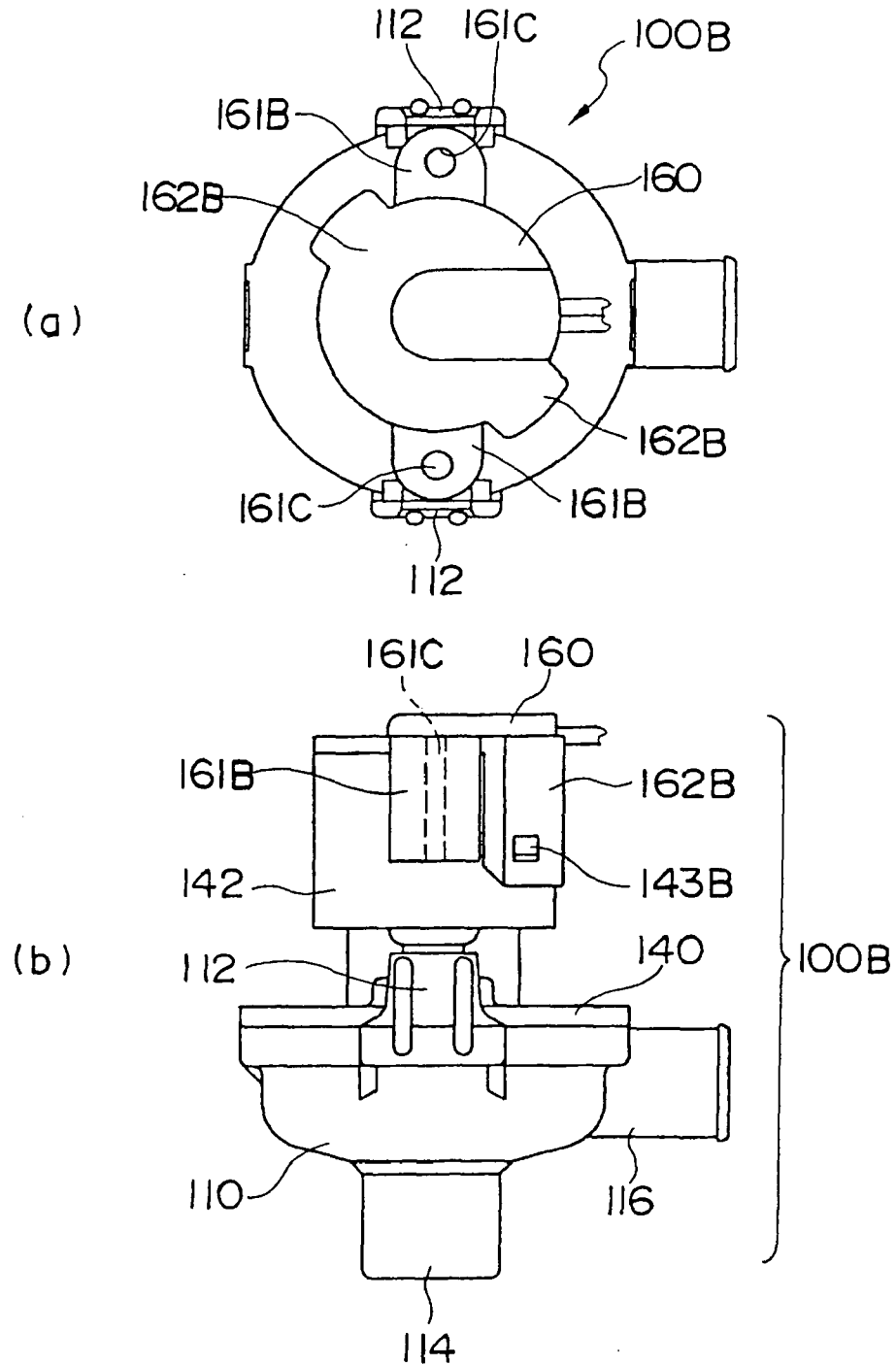


Fig.8

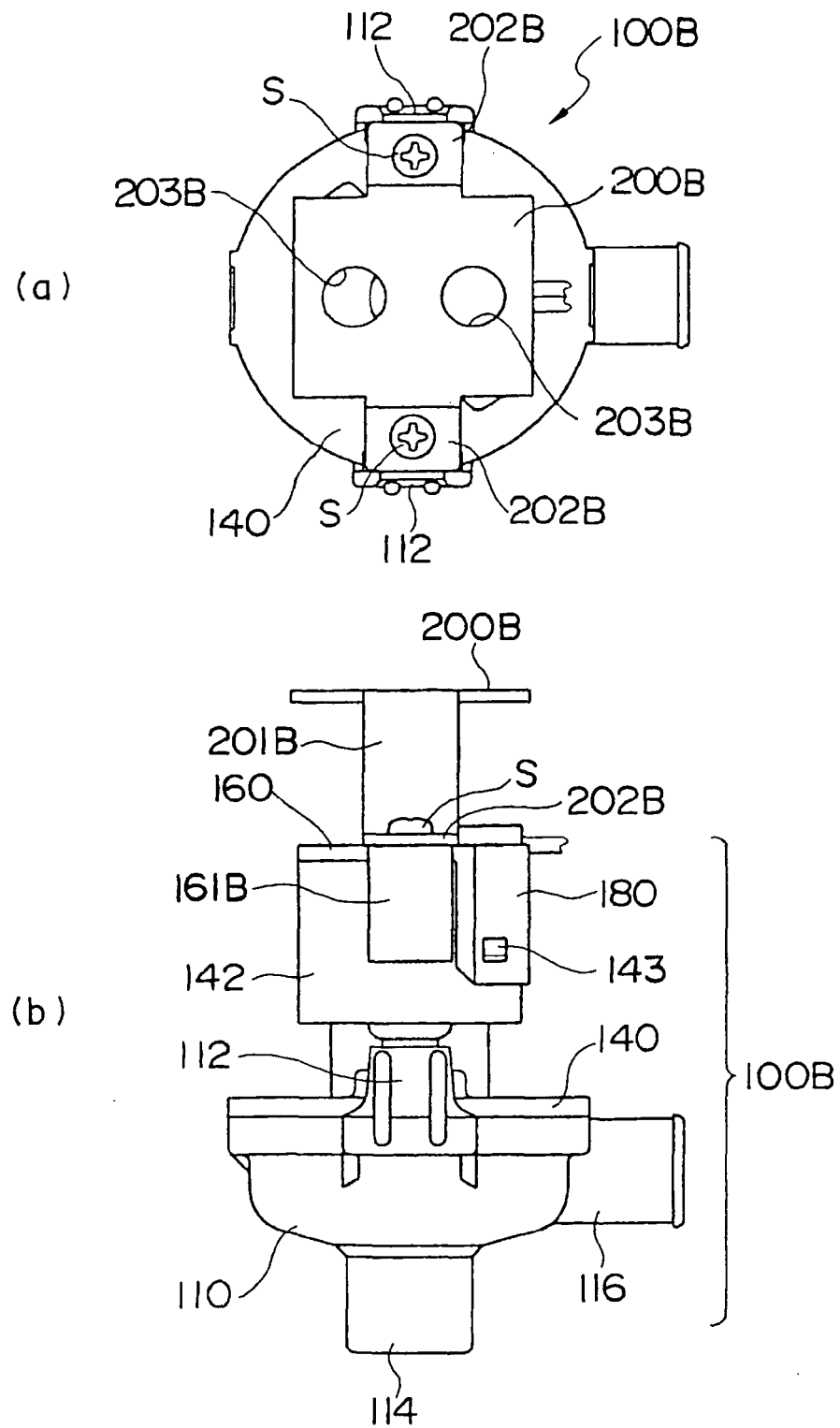


Fig.9

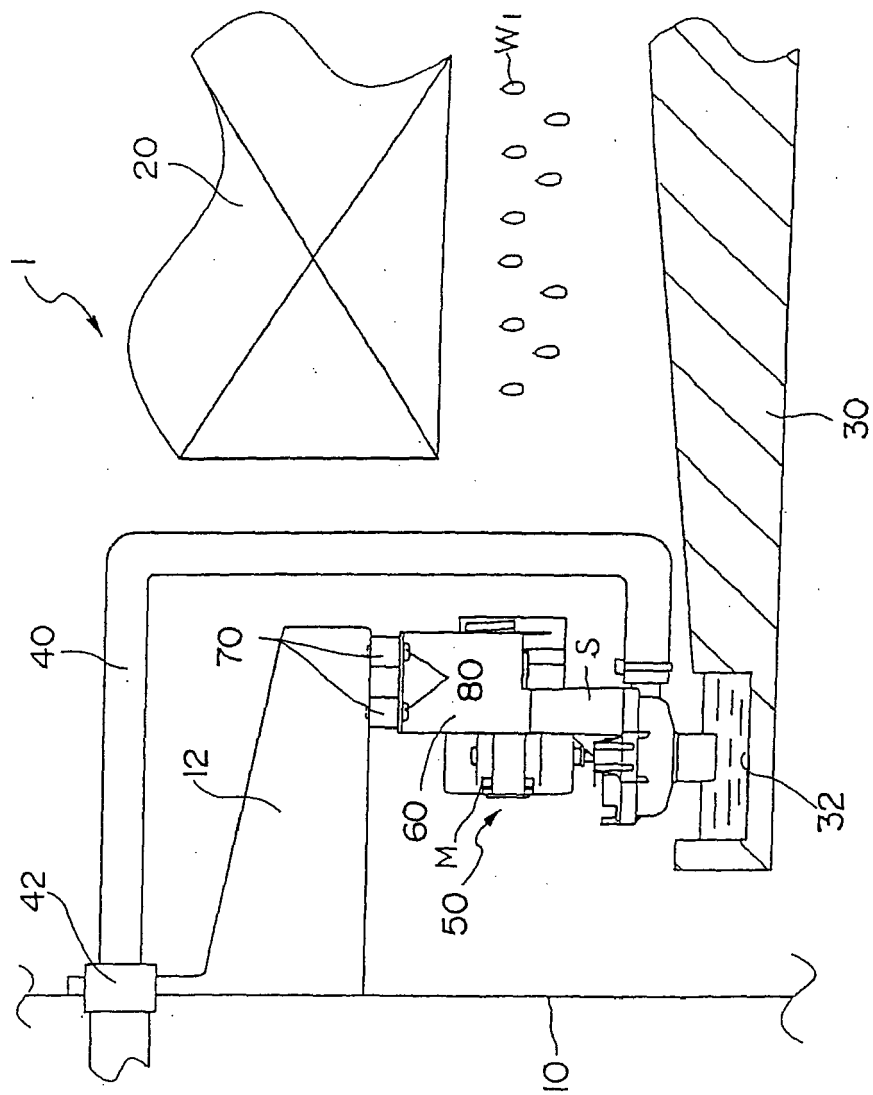


Fig.10

