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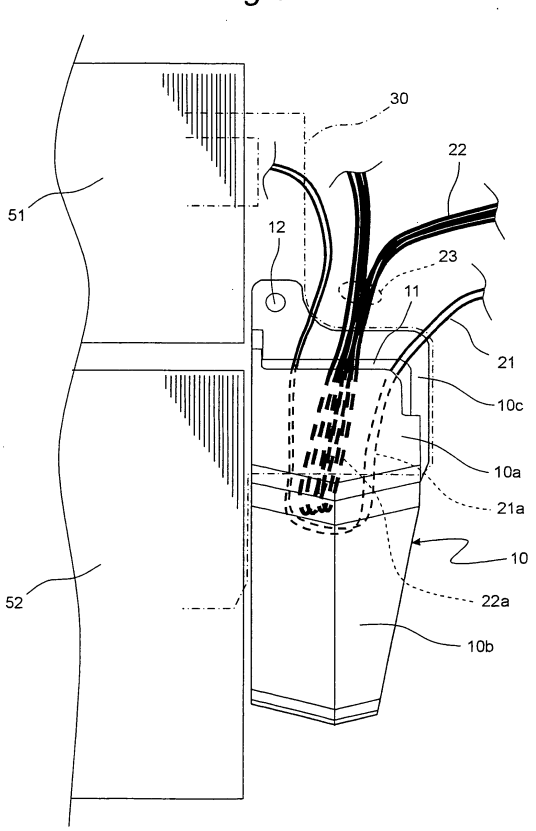
(54) INDOOR DEVICE OF AIR CONDITIONER

(57) The indoor unit for air conditioners includes a body casing, harnesses 21, 22 for connecting electrical parts, which are placed independently within the body casing, to one another, and a harness holding member 10 having an upwardly opened pocket portion 10a for holding the harnesses 21, 22. The harnesses 21, 22 are curved at their some midpoints and those curved portions 21a, 22a of the harnesses 21, 22 are pushed into the upwardly opened pocket portion 10a of the harness holding member 10, so that the harnesses 21, 22 are held by the harness holding member 10.

Fig.1



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Description

TECHNICAL FIELD

[0001] The present invention relates to an indoor unit for air conditioners.

BACKGROUND ART

[0002] In assembling of indoor units for air conditioners, there is a tendency that the handling of wire/cable harnesses (hereinafter, referred to simply as harnesses) becomes more and more complex with recent years' increasingly higher functions.

[0003] Fig. 5 shows a perspective view of an air-conditioner indoor unit according to a prior art. In Fig. 5, a state in which a front panel 56 has been removed is shown.

[0004] As shown in Fig. 5, a first heat exchange part 51 and a second heat exchange part 52 are placed on the front side of a bottom frame 50, and a third heat exchange part 53 is placed on the rear side of the first heat exchange part 51 and the second heat exchange part 52. The first heat exchange part 51, the second heat exchange part 52 and the third heat exchange part 53 constitute an indoor heat exchanger. Further, an electrical part box 55 is placed at a right side place of the indoor heat exchanger. A dripproof cover 54 for preventing drain water from flying out of the unit is mounted on the front side of a piping space between the indoor heat exchanger and the electrical part box 55.

[0005] In this air-conditioner indoor unit, as shown in Fig. 6, there has been a need for providing a trap at a midway point on a harness 60 placed near the indoor heat exchanger in consideration of an event that drain water adheres to the harness 60 so as to be transferred to electrical parts. Also, the air-conditioner indoor unit would involve a need for, with consideration given to assembling variations of the harness, bundling the harness by a tie-wrap for its fixation to the casing so as to prevent drain water from flying out of the unit, or a need for hanging and fixing the harness on a hook (e.g., indicated by 54a in Fig. 6) provided on the casing side. As a result, the air-conditioner indoor unit has a problem of long time needed for the assembly.

[0006] In another indoor unit for air conditioners according to a prior art, a harness is held within a wiring groove having an engagement piece provided on its side wall (see, e.g., JP H9-184639 A). In this air-conditioner indoor unit, a harness is inserted into the wiring groove with the groove width widened by elastic deformation of the side wall of the wiring groove, and thereafter the side wall of the wiring groove is restored to its original configuration, by which the harness is held within the wiring groove.

[0007] In this air-conditioner indoor unit, there is an anxiety that drain water adhering to a harness may be transferred to electrical parts. Moreover, no considerations are given to the prevention of drain water from flying out of the unit.

DISCLOSURE OF THE INVENTION

[0008] Accordingly, an object of the present invention is to provide an indoor unit for air conditioners which allows harnesses to be easily and securely held with countermeasures for drain water provided in a simple construction, and which also allows the assembling time to be shortened.

[0009] In order to achieve the above object, there is provided an indoor unit for air conditioners, comprising:

a body casing;
a harness for connecting electrical parts, which are placed independently within the body casing, to one another; and
a harness holding member having an upwardly opened pocket portion for holding the harness, wherein
the harness is curved at its some midpoint and the curved portion of the harness is pushed into the pocket portion of the harness holding member, so that the harness is held by the harness holding member.
It is noted here that the harness holding member is mounted directly or indirectly at a mounting portion, for example, on the body casing, a heat exchanger or other members.

[0010] With this constitution, a harness for connecting electrical parts, which are placed independently in the body casing, to one another is curved on its some midpoint and the curved portion of the harness is pushed into a pocket portion of the harness holding member, thus the harness being held by the harness holding member. Since the pocket portion of the harness holding member is upwardly opened, the curved portion of the harness pushed into the pocket portion is held within the pocket portion in a state that the curved portion has its forward end side directed downward. Then, drain water adhering to the harness drops down along the curved portion of the harness, thus the curved portion of the harness serving a role as a trap. As a result, without bundling the harness by using a tie-wrap for its fixation to the body casing, or without hanging and fixing the harness on a hook provided on the body casing side, the harness can be easily and securely held with countermeasures for drain water provided in a simple construction, and the assembling time can be shortened. It is noted here that the pocket portion is a bag-shaped one having an opening on its upper side, where the bottom may be holed or the bottom may be closed. In the case where the bottom of the pocket portion is holed, drain water adhering to the harness can be treated without being accumulated.

[0011] In one embodiment of the invention, the indoor unit for air conditioners further comprises
an indoor heat exchanger placed in the body casing,

wherein
the harness holding member is placed on a front side of a space between a side portion of the indoor heat exchanger and a side face of the body casing.

[0012] In this embodiment, since the harness holding member is placed on the front side of a space between a side portion of the indoor heat exchanger and a side face of the body casing, the work of pushing the curved portion of the harness into the pocket portion of the harness holding member can be easily achieved.

[0013] In one embodiment of the invention, the harness holding member is a portion of a dripproof cover.

[0014] In this embodiment, part of the dripproof cover placed on the front side of a space between a side portion of the indoor heat exchanger and a side face of the body casing serves also as the harness holding member, so that effective use of a narrow space can be fulfilled while parts count and assembling man-hour can be reduced.

[0015] In one embodiment of the invention, the harness holding member has a guide portion which is provided on a lower side of the pocket portion and which serves for guiding drain water flowing down along the curved portion (21a, 22a) of the harness pushed into the pocket portion.

[0016] In this embodiment, since drain water that flows down along the curved portion of the harness pushed into the pocket portion of the harness holding member is guided by the guide portion provided on the lower side of the pocket portion, drain water adhering to the harness is prevented from flying outside and, for example, providing the drain pan on the lower side allows waste water treatment to be easily achieved.

[0017] In one embodiment of the invention, the indoor unit for air conditioners further comprises
a bundling portion for bundling together both sides of the curved portion of the harness.

[0018] In this embodiment, since both sides of a curved portion curved at some midpoint of a harness are bundled together by a bundling portion, the curved portion of the harness pushed into the pocket portion of the harness holding member is prevented from loosening into pieces so as to be stabilized within the pocket portion, making it possible to achieve more reliable holding of the harness.

[0019] As apparent from the above description, according to the indoor unit for air conditioners of this invention, there can be realized an indoor unit for air conditioners capable of easily and securely holding harnesses with countermeasures for drain water provided in a simple construction, and moreover capable of shortening the assembling time.

[0020] Also, according to one embodiment, by the arrangement that the harness holding member is placed on the front side of a space between the side portion of the indoor heat exchanger and the side face of the body casing, the work of pushing the curved portion of the harness into the pocket portion of the harness holding member can be easily achieved from the front face side of the body casing.

[0021] Also, according to one embodiment, part of the dripproof cover placed on the front face side of a space between a side portion of the indoor heat exchanger and a side face of the body casing serves also as the harness holding member, so that a narrow space can be utilized effectively while parts count and assembling man-hour can be reduced.

[0022] Also, according to one embodiment, since drain water that has flowed down along the curved portion of the harness pushed into the pocket portion of the harness holding member is guided by the guide portion provided on the lower side of the pocket portion, drain water adhering to the harness is prevented from flying outside and, for example, providing the drain pan downward allows waste water treatment to be easily achieved.

[0023] Also, according to one embodiment, since both sides of a curved portion curved at a some midpoint of a harness are bundled together by a bundling portion, the curved portion of the harness pushed into the pocket portion of the harness holding member is stabilized within the pocket portion, making it possible to achieve more reliable holding of the harness.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024]

Fig. 1 is a schematic view of main part of an air-conditioner indoor unit according to an embodiment of the invention;
Fig. 2 is a top view of a harness holding member of the air-conditioner indoor unit;
Fig. 3 is a front view of the harness holding member;
Fig. 4 is a sectional view of the harness holding member taken along the line IV - IV of Fig. 3;
Fig. 5 is a perspective view of an air-conditioner indoor unit according to a prior art; and
Fig. 6 is a front view of main part of the air-conditioner indoor unit.

DETAILED DESCRIPTION OF THE INVENTION

[0025] The indoor unit for air conditioners according to the present invention will now be described in detail by way of embodiment thereof illustrated in the accompanying drawings.

[0026] Fig. 1 shows a front view of main part of an air-conditioner indoor unit according to one embodiment of the invention. The air-conditioner indoor unit of this embodiment is similar in construction to the prior-art air-conditioner indoor unit of Fig. 5 except a harness holding member or the like and so Fig. 5 is used also in the following description.

[0027] This air-conditioner indoor unit, as shown in Fig. 1, includes a front-side first heat exchange part 51 placed on a front face side of a bottom frame 50 (shown in Fig. 5), a front-side second heat exchange part 52 placed on

a front face side of the bottom frame 50 and on a lower side of the first heat exchange part 51, and a rear-side third heat exchange part 53 (shown in Fig. 5) placed between the bottom frame 50 and a rear face side of the first heat exchange part 51 and the second heat exchange part 52. The first heat exchange part 51, the second heat exchange part 52 and the third heat exchange part 53 constitute an indoor heat exchanger. Also, the bottom frame 50 and a front panel 56 (shown in Fig. 5) constitute a body casing.

[0028] A mounting frame 30 fixed on the front face side of the first heat exchange part 51 and the second heat exchange part 52 is set in place. This mounting frame 30 is so shaped as not to cause increases in resistance to an air flow that passes through the first heat exchange part 51 and the second heat exchange part 52. Also, the mounting frame 30 covers part of the front face side of the first heat exchange part 51 and the second heat exchange part 52, while part of the mounting frame 30 protrudes outward on the right side.

[0029] Then, a harness holding member 10 is fixed at the protruding portion of the mounting frame 30. Electrical parts placed independently in the body casing (50, 56) are connected to one another by harnesses 21, 22. It is noted here that the term "electrical parts" refers to an electrical part box (not shown) including an indoor fan motor, a motor-operated valve, a flap motor and the like, as well as a control circuit for controlling those parts. The harness holding member 10, although mounted on the mounting frame 30 in this embodiment, may also be mounted directly or indirectly at a mounting portion, for example, on the body casing, a heat exchanger or some other member. In addition, in Fig. 1, reference numeral 10b denotes a guide portion, 10c denotes a fixing portion, 11 denotes an opening and 12 denotes a screw hole.

[0030] The harnesses 21, 22 are curved at their some midpoints, respectively, and those curved portions 21a, 22a of the harnesses 21, 22 are pushed into a pocket portion 10a of the harness holding member 10. Thus, the harnesses 21, 22 are held by the harness holding member 10.

[0031] Fig. 2 shows a top view of the harness holding member 10, Fig. 3 shows a front view of the harness holding member 10, and Fig. 4 shows a sectional view thereof taken along the line IV - IV of Fig. 3.

[0032] As shown in Figs. 2 and 3, the harness holding member 10 includes a pocket portion 10a having a rectangular-shaped opening 11 on its upper side, a guide portion 10b provided on a lower side of the pocket portion 10a and inclined toward the rear face side, and a fixing portion 10c provided with a screw hole 12 for fixation to the mounting frame 30.

[0033] The harness holding member 10 having the pocket portion 10a, the guide portion 10b and the fixing portion 10c is integrally molded from resin. In addition, positioning use protruding portions 14, 15 are protrusively provided on the rear face side of the fixing portion 10c of the harness holding member 10.

[0034] In mounting of the harness holding member 10 onto the mounting frame 30, with the rear face side of the fixing portion 10c kept in contact with the mounting surface of the mounting frame 30, the protruding portion 14 protruding from the fixing portion 10c toward the rear face side is inserted into a hole 31 (shown in Fig. 4) provided in the mounting frame 30 (the same applies also to the protruding portion 15 shown in Fig. 2). By this process, positioning of the harness holding member 10 is achieved. Then, a fixing screw (not shown) is inserted into the screw hole 12 of the positioned harness holding member 10 and tightened up into a hole (not shown) of the mounting frame 30. Thus, the harness holding member 10 is fixed to the mounting frame 30.

[0035] Also, the mounting frame 30 closes a rear-face side region of the pocket portion 10a except a portion on the lower side of the opening. As a result of this, the harnesses 21, 22 (shown in Fig. 1) pushed into the pocket portion 10a through the opening 11 are securely held within the pocket portion 10a.

[0036] As shown in Fig. 4, drain water that has flowed down along the harnesses 21, 22 (shown in Fig. 1) pushed through the opening 11 into the pocket portion 10a of the harness holding member 10 is guided downward by the guide portion 10b (arrows R1, R2 in Fig. 4). Ribs 13 are erectly provided so as to extend along both-side edge portions of the guide portion 10b of the harness holding member 10 so that drain water having flowed down from upward is guided toward the lower end side of the guide portion 10b by the ribs 13 without flowing down sideways. Then, drain water that has flowed off the lower end of the guide portion 10b is received by a drain pan (not shown) and thereafter discharged outside.

[0037] As shown above, according to the air-conditioner indoor unit constructed as described above, the harnesses 21, 22 for connecting electrical parts placed independently in the body casing to one another are curved on their some midpoints, and those curved portions 21a, 22a of the harnesses 21, 22 are pushed into the pocket portion 10a of the harness holding member 10 fixed on the body casing side, so that the harnesses 21, 22 are held by the harness holding member 10. Since the pocket portion 10a of the harness holding member 10 is opened upward, the curved portions 21a, 22a of the harnesses 21, 22 pushed into the pocket portion 10a are held within the pocket portion 10a in a state that the curved portions 21a, 22a have their forward end side directed downward. Therefore, drain water adhering to the harnesses 21, 22 drops down along the curved portions 21a, 22a of the harnesses 21, 22 as shown in Fig. 1, thus the curved portions 21a, 22a of the harnesses 21, 22 serving the role as traps. As a result, without bundling the harnesses by using a tie-wrap to fix them to the body casing, or without hanging and fixing the harnesses on a hook provided on the body casing side, the harnesses 21, 22 can be easily and securely held with countermeasures for drain water provided in a simple construction, and the assembling time can be shortened.

[0038] Also, since the harness holding member 10 is placed on the front side of a space between a side portion of the indoor heat exchangers (51, 52, 53) and a side face of the body casing (50, 56), the work of pushing the curved portions 21a, 22a of the harnesses 21, 22 into the pocket portion 10a of the harness holding member 10 can be easily carried out from the front face side of the body casing.

[0039] Also, since drain water that has flowed down along the curved portions 21a, 22a of the harnesses 21, 22 pushed into the pocket portion 10a of the harness holding member 10 is guided downward by the guide portion 10b provided on the lower side of the pocket portion 10a, drain water adhering to the harnesses 21, 22 is prevented from flying outside, and providing the drain pan on the lower side allows waste water treatment to be easily achieved.

[0040] In this embodiment, the harness holding member 10 is fixed to the mounting frame 30. However, without being limited to this, the harness holding member may be provided by, for example, part of a dripproof cover placed on the front side of a space between a side portion of the indoor heat exchangers and a side face of the body casing. In this case, part of the dripproof cover serves also as the harness holding member 10, so that effective use of a narrow space can be fulfilled while parts count and assembling man-hour can be reduced.

[0041] Also in this embodiment, it is also allowable that, for example, both sides of the curved portion 22a curved at some midpoint of the harness 22 are bundled together by a tie-wrap 23 (shown in Fig. 1) as an example of a bundling portion. In this case, the curved portion of the harness pushed into the pocket portion of the harness holding member is prevented from loosening into pieces so as to be stabilized within the pocket portion, making it possible to achieve more reliable holding of the harness.

[0042] Further, the above embodiment has been described on the harness holding member 10 placed on the front side of a space between a side portion of the indoor heat exchangers (51, 52, 53) and a side face of the body casing (50, 56). However, without being limited to this, the harness holding member may hold harnesses positioned at other places where electrical parts placed independently within the body casing are connected to one another.

Claims

1. An indoor unit for air conditioners, comprising:

a body casing (50, 56);
a harness (21, 22) for connecting electrical parts, which are placed independently within the body casing (50, 56), to one another; and
a harness holding member (10) having an upwardly opened pocket portion (10a) for holding the harness (21, 22), wherein
the harness (21, 22) is curved at its some midpoint and the curved portion (21a, 22a) of the harness (21, 22) is pushed into the pocket portion (10a) of the harness holding member (10), so that the harness (21, 22) is held by the harness holding member (10).

2. The indoor unit for air conditioners as claimed in Claim 1, further comprising
an indoor heat exchanger (51, 52, 53) placed in the body casing (50, 56), wherein
the harness holding member (10) is placed on a front side of a space between a side portion of the indoor heat exchanger (51, 52, 53) and a side face of the body casing (50, 56).

3. The indoor unit for air conditioners as claimed in Claim 2, wherein
the harness holding member is a portion of a dripproof cover.

4. The indoor unit for air conditioners as claimed in Claim 1, wherein
the harness holding member (10) has a guide portion (10b) which is provided on a lower side of the pocket portion (10a) and which serves for guiding drain water flowing down along the curved portion (21a, 22a) of the harness (21, 22) pushed into the pocket portion (10a).

5. The indoor unit for air conditioners as claimed in Claim 1, further comprising
a bundling portion (23) for bundling together both sides of the curved portion (21a, 22a) of the harness (21, 22).

Fig.1

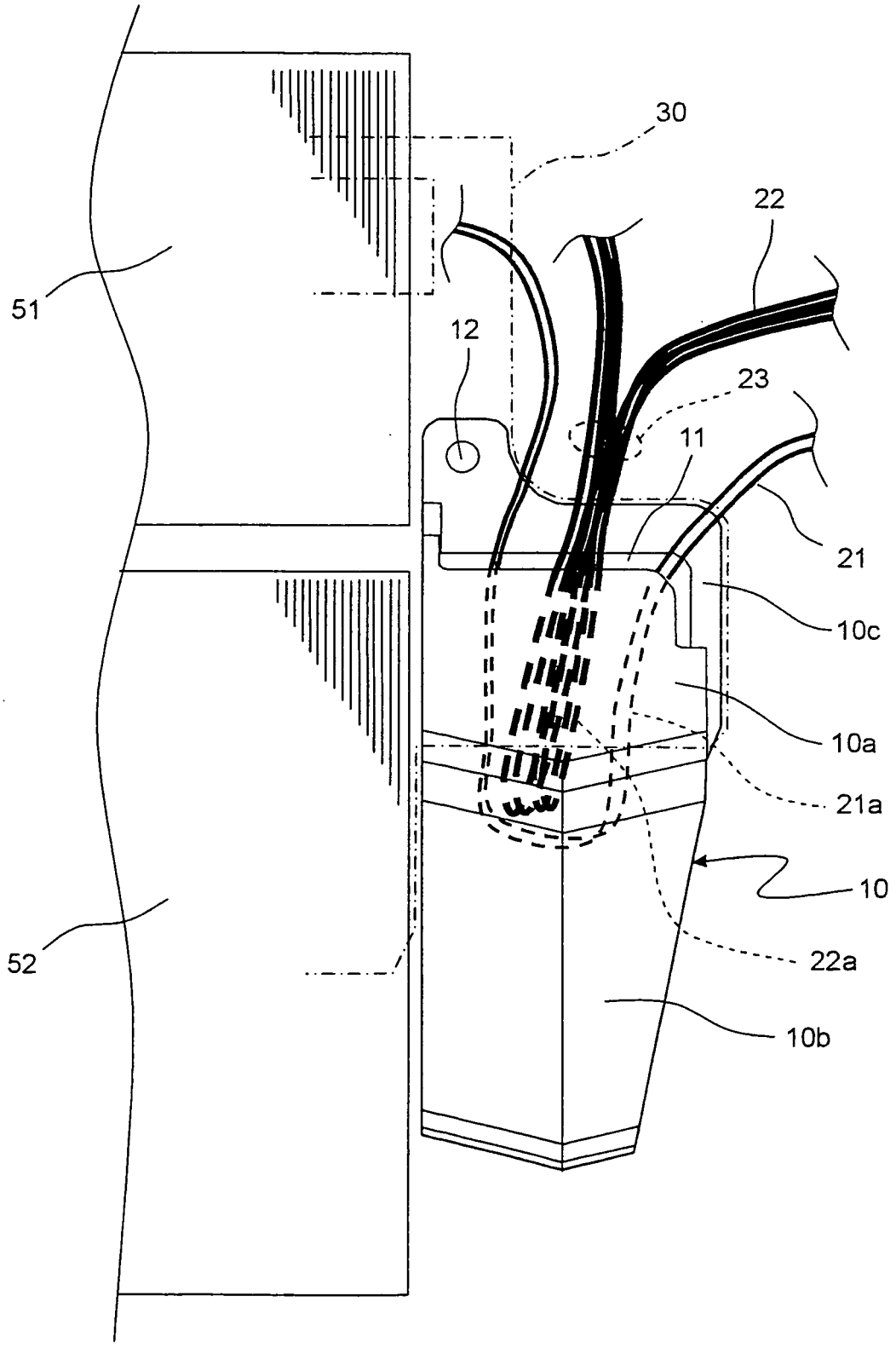


Fig.2

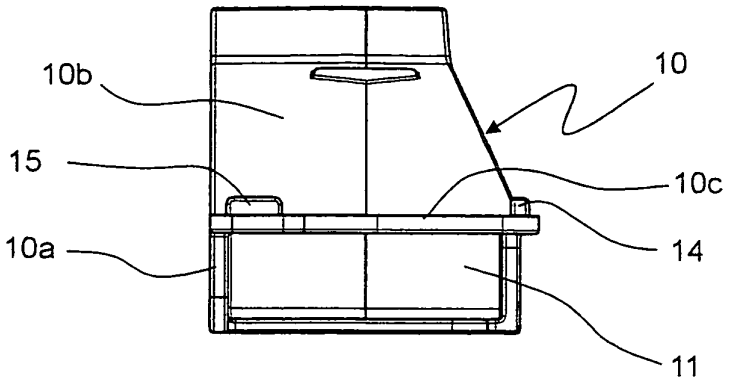


Fig.3

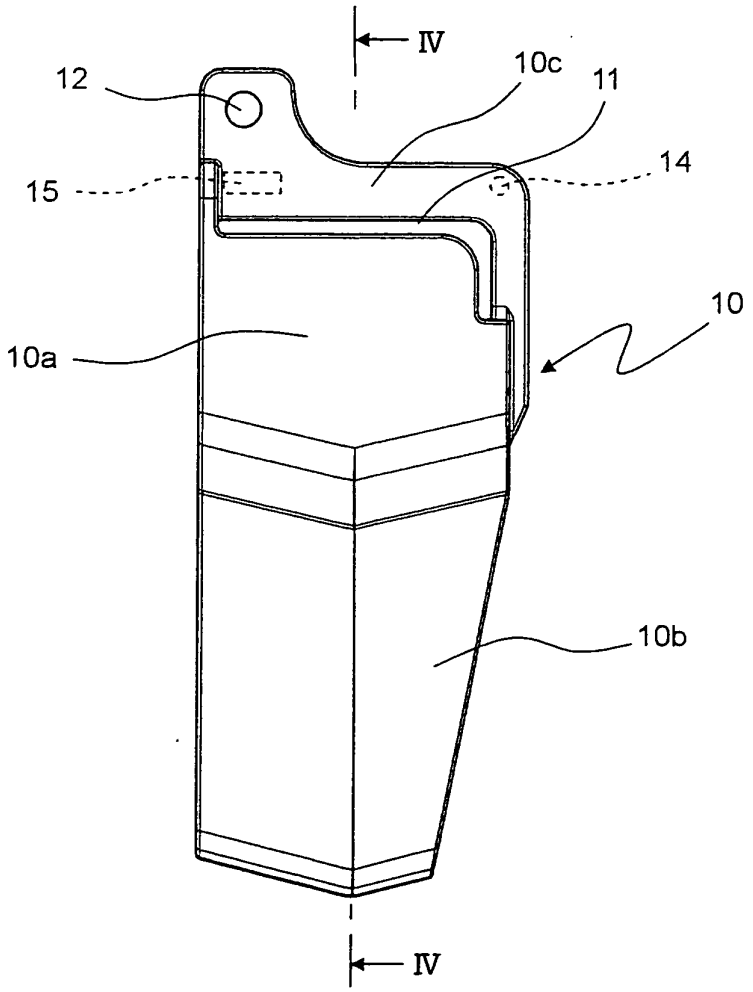
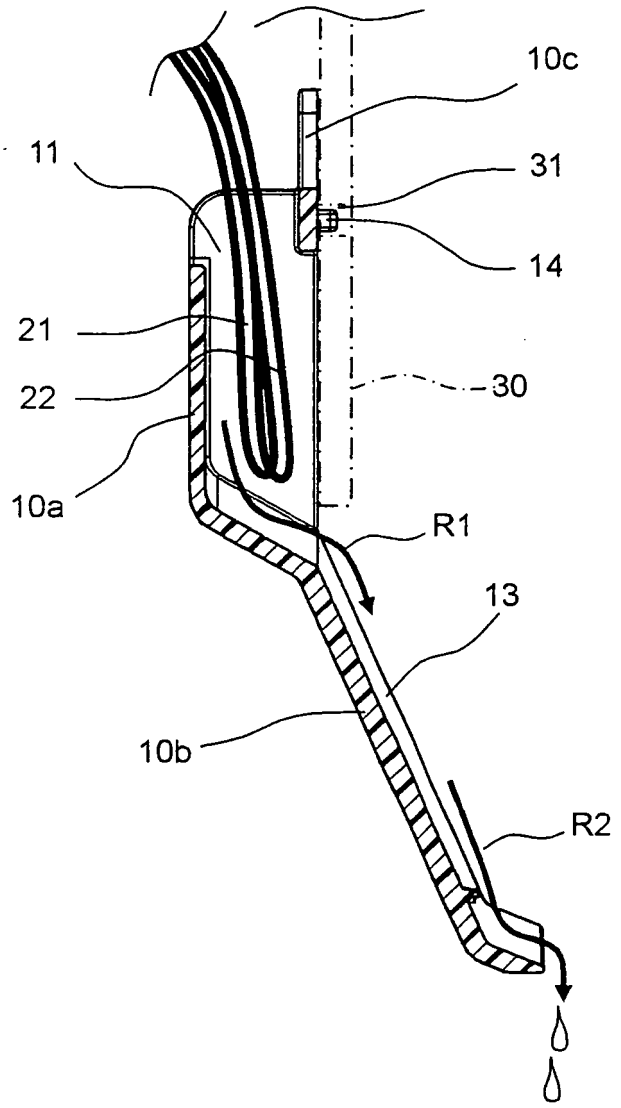


Fig.4



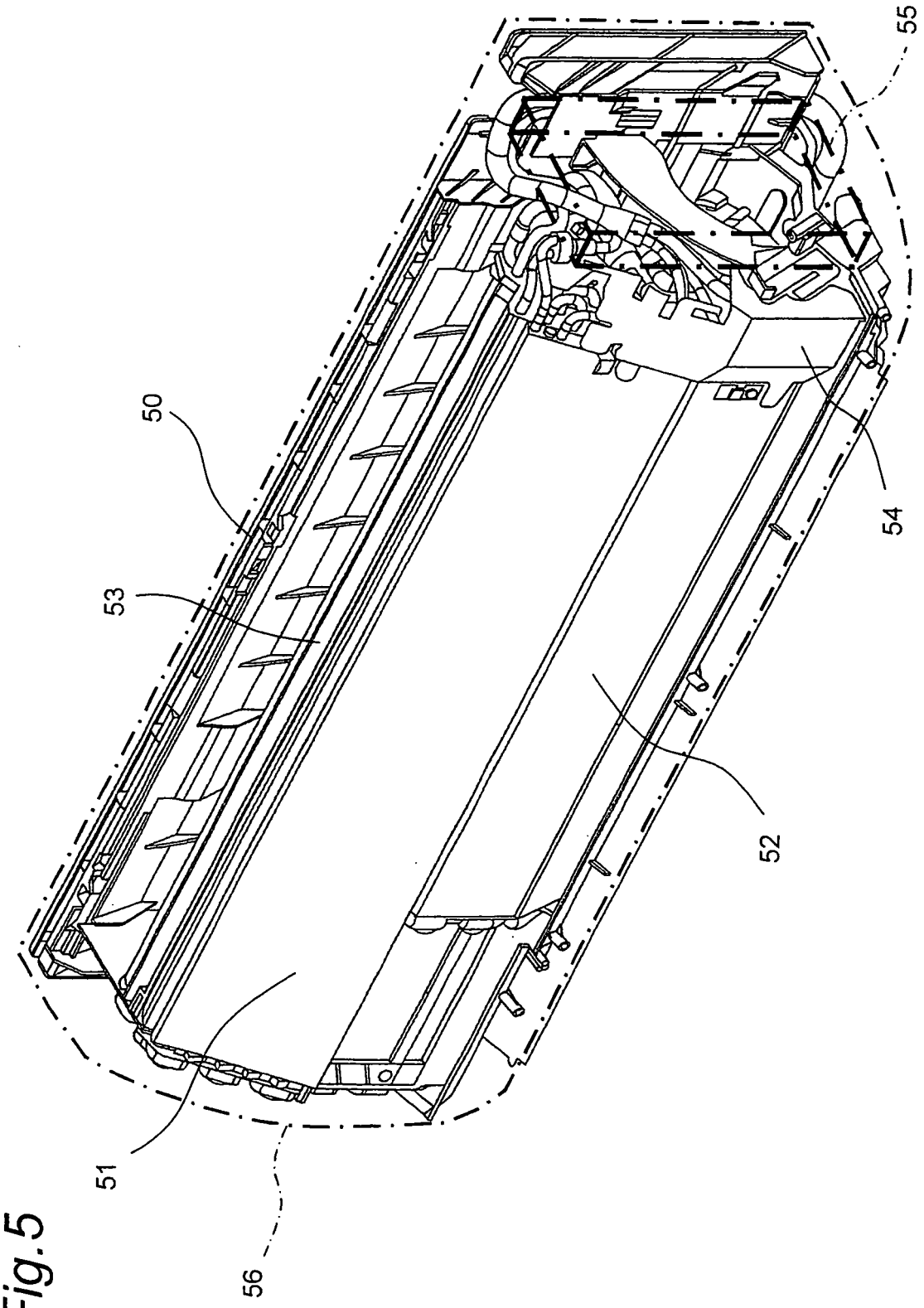
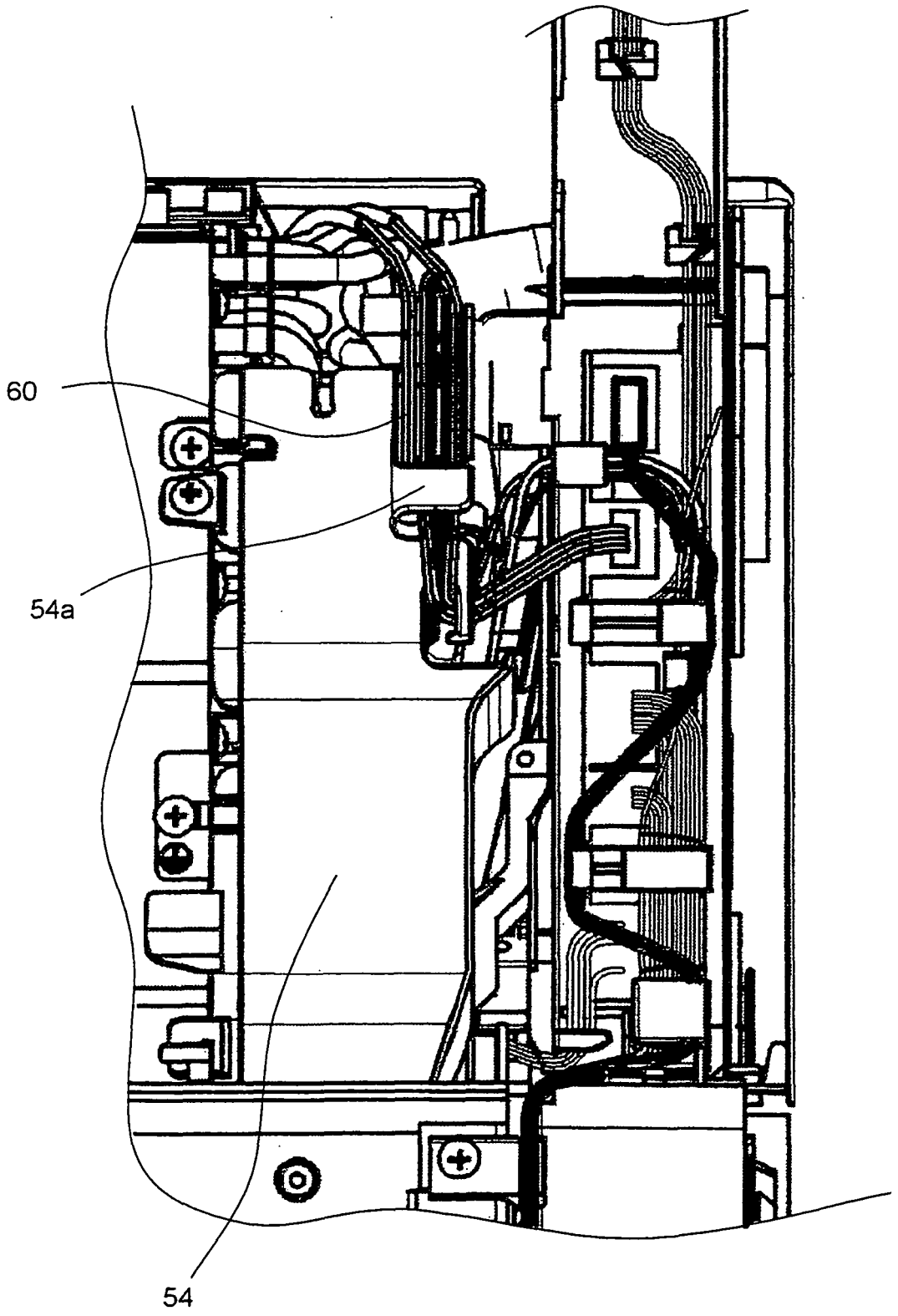


Fig.5

Fig.6



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2006/323155

A. CLASSIFICATION OF SUBJECT MATTER
F24F1/00(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
F24F1/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2007
Kokai Jitsuyo Shinan Koho 1971-2007 Toroku Jitsuyo Shinan Koho 1994-2007

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 10-2579 A (Toshiba A.V.E. Kabushiki Kaisha), 06 January, 1998 (06.01.98), Par. Nos. [0027], [0028]; Figs. 1, 2 (Family: none)	1-5
A	JP 7-133941 A (Noritz Corp.), 23 May, 1995 (23.05.95), Par. No. [0008]; Fig. 1 (Family: none)	1-5

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
28 February, 2007 (28.02.07)	06 March, 2007 (06.03.07)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP H9184639 A **[0006]**