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(54) **Air conditioning unit for a condensation dryer**

Klimaanlageneinheit für einen Kondensationswäschetrockner

Unité de climatisation d'air pour un sèche-linge à condensation

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(73) Proprietor: **Panasonic Corporation
Kadoma-shi
Osaka 571-8501 (JP)**

(72) Inventors:
• **Nakai, Kouji**
Osaka 540-6207 (JP)
• **Kotani, Junji**
Osaka 540-6207 (JP)

(74) Representative: **Schwabe - Sandmair - Marx
Patentanwälte
Stuntzstraße 16
81677 München (DE)**

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Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to an air conditioning unit which is installed in an equipment such as a drum type washer-dryer, and conditions a circulating air.

2. Description of the Related Art

[0002] A conventional air conditioning unit is built inside a drum type washer-dryer through use of a dead space in a rear portion of its tub or the like, and is connected to the middle of a circulating air passage having a blowing fan. Thereby, the circulating air passage sucks in and discharges an air inside the tub by the drive of the blowing fan, introduces the air to an air conditioning unit from its suction inlet port, and subjects the air to dehumidification by an evaporator and heating by a condenser, to give a dry high-temperature air. Thereafter, the circulating air passage discharges the air from a suction outlet port, sends the air to the tub side so as to return it into the tub, and dries laundry inside a rotating drum. The above operations are repeated to execute a drying process after a washing process and a rinsing process.

[0003] For this purpose, inside an air conditioning case having the suction inlet port and the suction outlet port for the air, an air passage from the suction inlet port to the suction outlet port is formed between front and rear opposed walls of the air conditioning case. In the middle of this air passage, an area is partitioned between a suction inlet side facing the rear wall as one of the front and rear opposed walls and a suction outlet side facing a front wall as the other opposed wall, and an evaporator and a condenser for dehumidifying and heating the air are disposed in the partitioned sides. Further, the suction inlet port is provided upward closely to the rear wall side of a ceiling wall of the air conditioning case and communicates with the suction inlet side from its upper portion. The suction outlet port is provided in a lower portion of an end wall of the air conditioning case and communicates with the suction outlet side from its lateral side.

[0004] Meanwhile, a heat exchange area is provided with a reservoir for reserving dew condensation water that is generated in a dehumidification function of the evaporator or water that may get in the area for some reason. The water reserved in the reservoir is then discharged by means of a drainage pump. Here, since flowing-in of a foreign matter such as lint accompanying a circulating air may cause clogging in the drainage pump or an operational failure, a filter has conventionally been provided at an opening of the reservoir. It is to be noted that the technical contents described above are disposed in Unexamined Japanese Patent Publication Laid-Open No. 2008-79861.

[0005] However, in the conventional air conditioning

unit, when lint is caught in the filter, the lint accumulates there to obstruct drainage performance. Therefore, the filter needs to be regularly removed and cleaned, which complicates the usage of the washer-dryer.

[0006] JP 2007-330439 A describes a washing and drying machine to perform drying operation by using a heat pump mechanism having a heat exchanger, and which is capable of smoothly discharge dehumidified water without causing a clogging phenomenon due to a foreign matter such as lint, etc. in the dehumidified water produced by the heat exchanger. In this respect, a container type tank constituted in a roughly closed state to collect and reserve the dehumidified water produced by an evaporator which is the heat exchanger and a drainage pump to discharge the dehumidified water reserved in this tank are provided out of a route of a circulating duct, and a filter to catch the foreign matter in the dehumidified water is arranged in the tank. This washing and drying machine is constituted to discharge the dehumidified water collected in the tank out of a main body through the drainage pump in a state of removing the foreign matter by passing the dehumidified water through the filter.

SUMMARY OF THE INVENTION

[0007] The invention is defined by the subject-matter of independent claim 1. The dependent claims are directed to advantageous embodiments.

ADVANTAGES OF THE INVENTION

[0008] Advantageously, it is provided an air conditioning unit that discharges waters generated or collected in a heat exchange area by means of a drainage passage devised so as to prevent a foreign matter such as lint from flowing onward, thereby eliminating the need for a filter and its maintenance.

[0009] An advantageous air conditioning unit is an air conditioning unit in which a heat exchange area of an air passage from a suction inlet port to a suction outlet port for an air is partitioned between a suction-inlet-side heat exchange area and a suction-outlet-side heat exchange area, and a heat exchanger for dehumidification and a further heat exchanger for heating to dehumidify and heat an air are disposed in the partitioned areas inside a unit case having the suction inlet port and the suction outlet port, wherein waters generated in the heat exchange area are discharged to a bottom portion of the heat exchange area through a drainage passage provided with a projection and/or a narrowed portion as obstruction portions for catching a foreign matter such as lint so as not to flow onward.

[0010] With such a configuration, it is possible to continuously send an air as a high-temperature air obtained by dehumidifying, heating and drying a sucked air by use of the heat exchanger for dehumidification and the heat exchanger for heating which are disposed in the heat exchange area formed between the suction inlet port and

the suction outlet port for an air of the unit case. Especially in the heat exchange area of the air passage, waters obtained by separating moisture in an air that exchanges heat with the heat exchanger for dehumidification as dew condensation water are repeatedly discharged outside through the drainage passage. Since the projection and/or the narrowed portion as obstruction portions which are provided in this drainage passage catch and capture a foreign matter such as lint so as not to flow onward, it is possible to prevent the foreign matter from getting in a drainage pump even without a filter.

[0011] Further, the advantageous air conditioning unit is an air conditioning unit in which a heat exchange area of an air passage from a suction inlet port to a suction outlet port for an air is partitioned between a suction-inlet-side heat exchange area and a suction-outlet-side heat exchange area, and a heat exchanger for dehumidification and a heat exchanger for heating to dehumidify and heat an air are disposed in the partitioned areas inside a unit case having the suction inlet port and the suction outlet port, wherein a bottom portion of the heat exchange area is provided with: a dew condensation water discharging tray, provided so as to catch dew condensation water flowing from the heat exchanger for dehumidification and discharge the water; a water collecting portion that collects and reserves water or the like dropping or running down to a suction-inlet-side heat exchange area side of the heat exchanger for dehumidification; and an auxiliary discharging tray that bypasses around the dew condensation water discharging tray from part of the water collecting portion to communicate with the dew condensation water discharging tray, and guides water collected in the water collecting portion to the dew condensation water tray to discharge the water. Further, at least a drainage passage of the auxiliary discharging tray out of the auxiliary discharging tray and the dew condensation water discharging tray is provided with a projection or a narrowed portion as obstruction portions for catching a foreign matter such as lint so as not to flow onward.

[0012] With such a configuration, it is possible to continuously send an air as a high-temperature air obtained by dehumidifying, heating and drying a sucked air by use of the heat exchanger for dehumidification and the heat exchanger for heating which are disposed in the heat exchange area of the air passage formed between opposed side walls of the air conditioning case between the suction inlet port and the suction outlet port for an air of the air conditioning case, the heat exchange area being partitioned between the suction-inlet-side heat exchange area and the suction-outlet-side heat exchange area. In particular, water obtained by separating moisture in an air that exchanges heat with the heat exchanger for dehumidification as dew condensation water can be taken in the dew condensation water discharging tray and then discharged outside through the drainage passage. Further, while waters dropping or running down to the suction-inlet-side heat exchange area side of the heat exchanger for dehumidification are collected and reserved

in the water collecting portion, the waters can be guided to the dew condensation water discharging tray through the auxiliary discharging tray that bypasses around the dew condensation water discharging tray from part of the water collecting portion and then discharged without a dedicated drainage system. Moreover, in order to deal with that a foreign matter such as lint is apt to adhere to the suction surface side of the heat exchanger for dehumidification and flow down along with the dew condensation water on the suction-inlet-side heat exchange area side, the projection or the narrowed portion as obstruction portions, which are provided in at least the drainage passage of the auxiliary discharging tray out of the auxiliary discharging tray and the dew condensation water discharging tray, catch the foreign matter such as lint so as not to flow onward. It is thereby possible to prevent the foreign matter from getting in a drainage pump even without a filter. This can prevent clogging in the filter and make the filter maintenance-free.

[0013] In the above, further, the auxiliary discharging tray communicates with the dew condensation water discharging tray through the narrowed portion.

[0014] With such a configuration, also the narrowed portion, through which the auxiliary discharging tray communicates with the dew condensation water discharging tray, also serves as an objection portion to catch the foreign matter such as lint so as to prevent the matter from getting into the dew condensation water discharging tray side connected to the drainage system.

[0015] In the above, moreover, the heat exchanger for dehumidification and the heat exchanger for heating form a heat exchanger in which each other's fins are aligned in parallel, the heat exchanger for dehumidification is directly placed on the dew condensation water discharging tray, and the heat exchanger for heating is directly placed on the auxiliary discharging tray.

[0016] With such a configuration, each other's fins of the heat exchanger for dehumidification and the heat exchanger for heating are aligned in parallel, so as to avoid formation of an isolated space between the heat exchangers which is a wasted space and causes bypassing of the flow of the circulating air to the suction outlet port side. Further, the heat exchanger for dehumidification can be directly placed on the dew condensation water discharging tray and covered, thereby to take and discharge dew condensation water neither accompanied with lint or the like nor entering from therearound. It is to be noted that the auxiliary discharging tray is functioned through use of a lower space of the heat exchanger for heating directly placed on the auxiliary discharging tray.

[0017] In the above, further, the auxiliary discharging tray communicates with a bottom portion of the suction-outlet-side heat exchange area in the heat exchange area. Since the auxiliary discharging tray communicates with the bottom portion of the suction-outlet-side heat exchange area in the heat exchange area, even when water gets into the suction-outlet-side heat exchange area side for some reason, it can be discharged through

the auxiliary discharging tray and the dew condensation water discharging tray.

BRIEF DESCRIPTION OF DRAWINGS

[0018]

Fig. 1 is a side view of an air conditioning unit according to an embodiment of the present invention, which is mounted in a drum type washer-dryer;
 Fig. 2 is a rear view of the air conditioning unit according to the embodiment of the present invention, which is mounted in the drum type washer-dryer;
 Fig. 3 is a sectional view showing an air-conditioning fan unit in which a blowing fan is connected to the air conditioning unit according to the embodiment of the present invention;
 Fig. 4 is a cross sectional view of an accommodating area of a compressor, as well as a one-end-side posterior area as part of an air passage which is partitioned from the accommodating area, of the air conditioning unit according to the embodiment of the present invention;
 Fig. 5 is a cross sectional view of a heat exchange area of the air conditioning unit according to the embodiment of the present invention;
 Fig. 6 is a plan view of the air conditioning unit according to the embodiment of the present invention when an upper divided portion of a unit case is removed;
 Fig. 7 is a perspective view of the air conditioning unit according to the embodiment of the present invention in the state of Fig. 6 when viewed from an oblique angle;
 Fig. 8 is an external perspective view of the air conditioning unit according to the embodiment of the present invention when viewed from the front side;
 Fig. 9 is an external plan view of the air conditioning unit according to the embodiment of the present invention when viewed from above;
 Fig. 10 is a plan view of a lower divided portion of the unit case of the air conditioning unit according to the embodiment of the present invention;
 Fig. 11 is a perspective view of the lower divided portion of Fig. 10;
 Fig. 12 is a bottom view of the upper divided portion of the unit case of the air conditioning unit according to the embodiment of the present invention;
 Fig. 13 is a perspective view showing a combined state of an elastic base and the compressor built in the air conditioning unit according to the embodiment of the present invention;
 Fig. 14 is a partial perspective view of the air conditioning unit according to the embodiment of the present invention when viewed from obliquely above in the state of Fig. 6; and
 Fig. 15 is a side view of the air conditioning unit according to the embodiment of the present invention

when viewed from the accommodating area side.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

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[0019] An air-conditioning fan unit according to an embodiment of the present invention is described below with reference to Figs. 1 to 15 for making the present invention understood. The following descriptions are specific examples of the present invention and do not restrict the contents of the claims.

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[0020] Figs. 1 and 2 are views of an air conditioning unit according to an embodiment of the present invention, which is mounted in a drum type washer-dryer. In Figs. 1 and 2, in drum type washer-dryer 1, tub 3 is installed in a floating state inside washer-dryer body 44 by a suspension structure not shown, and rotating drum 2 formed in a bottomed cylindrical shape inside tub 3 is installed with its axial directed downward with inclination from the front surface side to the rear surface side. Laundry loading-unloading opening 11 communicating with an open end of rotating drum 2 is formed on the front surface side of tub 3, and by opening door 9 that openably/closably closes an opening provided on an upward inclined surface formed on the front surface side of washer-dryer body 44, laundry can be put into and take out of rotating drum 2 through laundry loading-unloading opening 11. With door 9 provided on the upward inclined surface, an operation of putting in and taking out the laundry can be conducted without bending one's back.

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[0021] A large number of through holes 8 communicating with the inside of tub 3 are formed on the circumferential surface of rotating drum 2, and agitating protections (not shown) are provided in a plurality of positions on the inner circumferential surface in a circumferential direction. This rotating drum 2 is rotated and driven in forward and backward rotational directions by motor 7 fitted on the rear surface side of tub 3. Further, water filling pipe 12 and drainage pipe 13 are piped and connected in tub 3, and inject and discharge water into and from tub 3 by control of a water injection valve and water discharge valve, not shown.

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[0022] Door 9 is opened, and laundry and detergent are put into rotating drum 2. Then, when an operation of drum type washer-dryer 1 is then started through control by control board 67 also provided inside control panel 66 or the like, on the basis of an operation performed on control panel 66 provided for example on the upper portion of the front surface of drum type washer-dryer 1, a predetermined volume of water is injected from water filling pipe 12 into tub 3, and rotating drum 2 is rotated and driven by motor 7, to start a washing process. By the rotation of rotating drum 2, the laundry accommodated inside rotating drum 2 is repeatedly subjected to an agitation operation of bringing up the laundry in the rotating direction and dropping the laundry from an appropriate height to which the laundry has been brought up by the agitating projections provided on the inner circumferen-

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tial wall of rotating drum 2, and thereby, a beat-washing action is exerted on the laundry for washing. After the lapse of predetermined washing time, waste washing water is discharged from drainage pipe 13, and the washing water included in the laundry is removed by a dehydration operation of rotating rotating drum 2 at high speed. Thereafter, water is injected from water filling pipe 12 into tub 3 to carry out a rinsing process. Also in this rinsing process, the laundry accommodated inside rotating drum 2 is repeatedly subjected to the agitation operation of bringing up the laundry and dropping the laundry by the agitating projections on the basis of rotation of rotating drum 2, and thereby, beat-washing is acted on the laundry for rinsing.

[0023] This drum type washer-dryer 1 is provided with a function of drying the laundry accommodated inside rotating drum 2. Therefore, as already described, in drum type washer-dryer 1, air-conditioning fan unit 39 and circulating air passage 5 for sucking and discharging an air inside tub 3 to introduce the air to air-conditioning fan unit 39 and again sending a dry high-temperature air, subjected to dehumidification and heating, are built and blowing fan 15 is provided on the downstream of air-conditioning fan unit 39 of circulating air passage 5.

[0024] When this blowing fan 15 is rotationally driven, the flow of the air is generated in circulating air passage 5, and a wet air inside rotating drum 2 accommodating the laundry is sucked and discharged by circulating air inlet pipe 16, which introduces the air from tub 3 to blowing fan 15 side, through through holes 8. This discharged wet air is introduced from suction inlet port 391 into the air passage of air-conditioning fan unit 39 which is located on the upstream side of blowing fan 15 by being direct connected thereto or the like. The air is then dehumidified by formation of dew from moisture in the air in evaporator 31 located in the middle of the air passage, and heated by heat exchange with condenser 32, so as to be constantly made a dry high-temperature air. This dry high-temperature air is sucked to blowing fan 15 through suction outlet port 392, and then sent to blower tube 33 guiding to tub 3, to be sent into tub 3. The dry high-temperature air sent into tub 3 enters into rotating drum 2 through through holes 8, passes through rotating drum 2 to tub 3 while being exposed to the laundry such as clothes, and is introduced again to circulating air inlet pipe 16. A drying process is conducted by repetition of the circulation of the air in circulating air passage 5.

[0025] It should be noted that in this drying process through use of circulating air passage 5, a foreign matter, such as lint, generated from laundry primarily like clothes is apt to be mixed into the air being circulated in circulating air passage 5, to obstruct performance of the drying process by clogging in evaporator 31 and condenser 32, biting in a rotating portion of blowing fan 15, and accumulation on the inner surface of blowing fan 15, thereby necessitating frequent performance of troublesome maintenance. Therefore, generally, in the middle of circulating air passage 5, specifically on the upstream side of evap-

orator 31, condenser 32 and blowing fan 15, and thus in the middle of above-mentioned circulating air inlet pipe 16, filter room 36 accommodating filter 35 for removing a foreign matter in the circulating air is provided. Thereby, even if a foreign matter is mixed into the air after drying of the laundry and introduced to circulating air inlet pipe 16 side of evaporator 31 side, the foreign matter is captured in filter 35 when passing through filter room 36, and is thus not mixed into the circulating air flowing to the downstream side. Hence functions of evaporator 31, condenser 32, and blowing fan 15 are maintained over the long term. On the other hand, captured foreign matters are accumulated on filter 35 inside filter room 36, to cause passage resistance of the circulating air to gradually increase, leading to deterioration in drying function and thereby, filter 35 is detachably provided as in the general case. Further, air-conditioning fan unit 39 is directly connected with blowing fan 15 to constitute air-conditioning fan unit 81 that can be handled as a single body, but the configuration is not restricted to this.

[0026] Here, evaporator 31 in which dew condensation water is generated forms the heat exchanger 395 together with condenser 32, and reservoir 63 of dew condensation water is provided in a range corresponding to a dehumidification area of the bottom portion of air conditioning case 38 of the heat exchanger. Reservoir 63 is connected with drainage pipe 65 having drainage pump 64, and water is discharged in proper volume based upon detection of a water level by use of a water-level sensor, not shown. However, when the water level abnormally increases due to some drainage abnormality, the reserved dew condensation water might flow to another portion of circulating air passage 5. In consideration of these, the heat exchanger is provided so as to be located at the lowest level portion of circulating air passage 5.

[0027] As thus described, since air-conditioning fan unit 39 that operates as mounted in a variety of equipment has an influence on a size increase, a product price, time and effort for maintenance, and running cost of the equipment installed with air-conditioning unit 39, it is desired to reduce the size, the number of parts, the number of assembly processes, and the number of replacement parts.

[0028] Fig. 3 is a sectional view showing an air-conditioning fan unit in which a blowing fan is connected to the air conditioning unit according to the embodiment of the present invention. Fig. 4 is a cross sectional view of an accommodating area of the compressor, as well as a one-end-side posterior area as part of the air passage which is partitioned from the accommodating area, of the air conditioning unit according to the embodiment of the present invention. Fig. 5 is a cross sectional view of the heat exchange area of the air conditioning unit according to the embodiment of the present invention. Fig. 6 is a plan view of the air conditioning unit according to the embodiment of the present invention when an upper divided portion of the unit case is removed. Fig. 7 is a perspective view of the air conditioning unit according to the

embodiment of the present invention in the state of Fig. 6 when viewed from an oblique angle.

[0029] In Figs. 3 to 7, air-conditioning unit 39 of the present embodiment has a basic configuration where heat exchanger 395 made up of evaporator 31 and condenser 32 that are located in the middle of air passage 393 from suction inlet port 391 to suction outlet port 392 and dehumidify and heat the circulating air, and compressor 37 that circulates the cooling medium through this heat exchanger 395 are built inside unit case 38 having suction inlet port 391 and suction outlet port 392. In this basic configuration, unit case 38 is made up of a plurality of divided portions 381, 382 (specifically two, upper and lower, divided portions), sealing material 384 is continuously held in scored line 383 formed by divided portions 381, 382 bordering the outer surface of unit case 38, to make the inside and the outside of unit case 38 air-tight, and on the outer wall of the water collecting portion typified by already-mentioned reservoir 63 of unit case 38, drain mechanism 101 is provided which is opened by collected water and discharges the collected water while inhibiting suction of outside air (cf. Figs. 4 and 5).

[0030] In this manner, unit case 38 is made up of the plurality of divided portions 381, 382, and in the simple configuration where sealing material 384 is held in scored line 383 formed by divided portions 381, 382 bordering the outer surface of unit case 38, to make the inside and the outside of unit case 38 air-tight, even when air passage 393 from suction inlet port 391 to suction outlet port 392 is communicated with accommodating area 394 side of compressor 37, the suction action does not actively reach and thus has no influence on accommodating area 394 that serve as an air reservoir, whereby it is possible to ensure functions of circulation of a sucked air and the functions of dehumidification and heating. Further, with air passage 393 and accommodating area 394 not separated from each other through use of mutual communication therebetween, in case of abrupt water collection, drain mechanism 101 provided in reservoir 63 of unit case 38 or the like is opened by collected water and discharge the collected water so as to deal with the water collection, and meanwhile, drain mechanism 101 inhibits suction of the outside air so as to ensure its function of introducing the circulating air, performing heat exchange, and discharging the water.

[0031] Consequently, since the number of parts, the number of assembly processes and the number of replacement parts are reduced by as much as the sealing place is smaller than the conventional ones, the production cost and the running costs are both reduced. Especially when unit case 38 is made up of two divided portions 381, 382 as in the present embodiment, the number of parts, the number of assembly processes and the number of replacement parts are further reduced.

[0032] As thus described, without the sealing configuration, even when air passage 393 is connected with accommodating area 394 side in both partition portions, the

suction action hardly reaches accommodating area 394 due to combination with the partition effect. It is thereby possible to reliably ensure the functions of circulation of the sucked air, dehumidification and heating, so as to enhance performance. Partition portion 386 makes a partition by a confronting structure of upper and lower partition walls 386a, 386b integrally formed in both upper and lower divided portions 381, 382, and thus realizes the partition by a simple configuration formed of two portions while unit case 38 is a complicated space shaped body having partitioned accommodating area 394 and air passage 393. Furthermore, in place of upper and lower partition walls 386a, 386b, a single partition wall formed in one of divided portions 381, 382 can be used as partition portion 386.

[0033] Valve mechanism 101 serves as drain hole 101a provided on the outer wall of the water collecting portion such as reservoir 63 and check valve 101b for closing this drain hole 101a from the outside by pulling pressure inside unit case 38. Only at the time of operation when the pulling pressure exerts inside unit case 38, drain mechanism 101 closes drain hole 101a provided on the outer wall of the water collecting portion such as reservoir 63 by the pulling pressure, to block the outside air with high air-tightness, so as to maintain the function of air-conditioning unit 39. In case of a large volume of water collection, water pushes the valve with its own weight to open the valve and can then be discharged, and at the time of non-operation, check valve 101b is not necessarily closed, and can thus be realized by a simple flap-type valve piece having no closing trait (cf. Figs. 4, 5). Specifically, as check valve 101b made of a rubber piece, the valve can be easily mounted in such a manner that hook 101c integrally formed in the top of check valve 101b is elastically engaged into mounting hole 101d provided in the upper portion of drain hole 101a, and even with frequent closing and closing-release in response to suction and suction-release, the action stroke of check valve 101b is minute and does not promote fatigue, and hence check valve 101b is extremely rarely a replacement part in maintenance.

[0034] In the present embodiment, in association with the possibility that abrupt water collection may reach accommodating area 394 relative to the communication structure of air passage 393 and accommodating area 394, the bottom portion of the accommodating area 394 is made as water reservoir 396 like reservoir 63 according to heat exchanger 395 and provided with drain mechanism 101. Thereby, even in a case where the water collection having once reached accommodating area 394 side due to the high-low relation or the like between air passage 393 and accommodating area 394 cannot be completely cleared in reservoir 63 side of air passage 393 side, the water can be discharged on accommodating area 394 side.

[0035] Fig. 8 is an external perspective view of the air conditioning unit according to the embodiment of the present invention when viewed from the front side. Fig.

9 is an external plan view of the air conditioning unit according to the embodiment of the present invention when viewed from above. In Figs. 8 and 9, unit case 38 is formed in almost rectangular shape, in which suction inlet port 391 is provided at the rear portion of the ceiling wall of one end of the longitudinal direction of unit case 38, and suction outlet port 392 is provided on the end wall of the other end. With compressor 37 accommodated in accommodating area 394 closer to the front portion of the one end side inside unit case 38, unit case 38 is partitioned by this accommodating area 394, air passage 393 expanding to the rear portion side and the other end side inside unit case 38 with respect to accommodating area 394, and upper and lower partition walls 386a, 386b extending from both divided portions 381, 382 forming unit case 38 to form partition portion 386 or the divided wall extending from one of the divided portions (cf. Fig. 7). Further, evaporator 31 and condenser 32 are provided as partitioned between the suction inlet side and suction outlet side in the front and rear portions of heat exchange area 393a located between partition portion 386 and the end wall which are mutually opposed in the longitudinal direction of unit case 38. Moreover, suction inlet port 391 opens upward at a higher position than the ceiling wall of heat exchange area 393a of unit case 38, and as shown in Figs. 4 and 7, suction inlet port 391 is provided in such size as to stretch, in a plan view, from a position overlapping the rear portion side of accommodating area 394, and from heat exchange area 393a in air passage 393 to the top of one-end-side posterior area 393b extended to the rear portion of accommodating area 394 on one end side of unit case 38, without an increase in volume to the outside of air conditioning case 38.

[0036] Air passage 393 further includes vertical curved area 393c that smoothly expands from a base opening of suction inlet port 391 to one-end-side posterior area 393b to guide the circulating air downward, and upwardly expanded posterior area 393d formed by upwardly expanding the posterior suction inlet side of heat exchange area 393a from suction inlet port 391 to the other end side of unit case 38 at a position not higher than suction inlet port 391.

[0037] Thereby, in air passage 393, which is located between suction inlet port 391 provided in the rear portion of the ceiling wall on one end of the longitudinal direction of unit case 38 and suction outlet port 392 provided in the end wall of the other end, and almost fully uses the longitudinal direction of unit case 38 except for accommodating area 394 accommodating compressor 37 closer to the front portion of one end of unit case 38 and partitioned by partition portion 386, the circulating air can be naturally sucked and introduced from suction inlet port 391, smoothly subjected to heat exchange in heat exchanger 395, and sucked and discharged to suction outlet port 392. At this time, as shown with arrows in Fig. 7, air passage 393 takes the circulating air introduced from suction inlet port 391 into one-end-side posterior area 393b located off heat exchange area 393a provided to

the side of accommodating area 394 toward the one end side of unit case 38, and upwardly expanded posterior area 393d placed off the rear portion of heat exchange area 393a upward. While the taken circulating airs are converged on the suction and introduction side as the rear portion of heat exchange area 393a, a heat exchange flow passing almost uniformly through almost the entire areas of evaporator 31 and condenser 32 from the rear portion to the front portion without deviation can be generated with the help of a filling effect of heat exchanger 395 installed in heat exchange area 393a due to uniform passage resistance by means of evaporator 31 and condenser 32. Accordingly, the heat exchange efficiency improves, so that the air conditioning function can be enhanced.

[0038] In this case, with suction inlet port 391 having a size, in a plan view, almost overlapping one-end-side posterior area 393b in air passage 393 from a position overlapping the rear portion side of accommodating area 394 of compressor 37, while air passage 393 increases a volume of the circulating air introduced and the flow of the circulating air to one-end-side posterior area 393b with a smaller longitudinal width than that of suction inlet port 391 is narrowed, the air can be smoothly introduced by the guide of vertical curved area 393c without irregular variation or pressure drop and guided to the rear suction inlet side of heat exchange area 393a, and in addition, the flow of the introduced air from suction inlet port 391 to upwardly expanded posterior area 393d side extending to the other end side of unit case 38 is facilitated by as much as the above-mentioned narrowing. This results in more promotion of uniform expansion of the circulating air introduced to air passage 393 to the backward suction face 395a of heat exchanger 395, so as to further enhance the heat exchange efficiency. Moreover, in vertical curved area 393c, with the flow of the sucked and introduced air bent as shown in Fig. 4, moisture removed from accompanying laundry and a detergent component and a fabric conditioner component that might be mixed into the air can be centrifuged, and in clearance portion 393c1 shown with a virtual line that avoids interference with the upper end of compressor 37, the air is also subjected to a collision-separation action.

[0039] Here, as shown in Figs. 4 to 7, the already described reservoir 63 is formed by forming upwardly open, plate-shaped heat exchanger tray 393a1 that has almost a consistent shape with a rectangular shape, in a plan view, of heat exchanger 395 in heat exchange area 393a, and is mounted with heat exchanger 395. Heat exchanger 395 installed and mounted on heat exchanger tray 393a1 forms a unit made by mutual integration of evaporator 31, condenser 32 with each other's fins 395c having a minute gap (not shown). With the thermally separated gap, heat movement from condenser 32 side to evaporator 31 side is suppressed to such a degree that growth of frost or ice in evaporator 31 is suppressed and the frost is melt with increase in temperature of the cooling medium even with the outside air being at low tem-

perature so as to ensure high drying efficiency. Hence, as much as an installation space is made smaller due to omission of the isolated space conventionally provided between evaporator 31 and condenser 32, the size of the equipment can be increased without an increase in entire size, so as to respond to improvement in performance. Moreover, bypass passage to suction outlet port 392 caused by a play in the isolated space can be suppressed to keep an effective area large, so as to enhance dehumidification efficiency, heating efficiency and drying efficiency, and seek for reduction in drying noise. Here, even when the thermally isolated gap is configured to be a space to such a degree as to allow individual handling of evaporator 31 and condenser 32, the performance does not significantly deteriorate.

[0040] Furthermore, heat exchanger 395 is oriented with inclination with respect to the longitudinal direction of unit case 38 as shown in Figs. 6 and 7 such that an opposed distance between suction face 395a which is oriented backward and the suction-inlet-side posterior wall of heat exchange area 393a of air conditioning case 38 opposed to backward suction face 395a becomes shorter from one-end-side posterior area 393b side connected to suction inlet port 391 to the other end side of unit case 38. Thereby, with respect to the shortest direction A of heat exchange area 393a oriented with inclination from one-end-side posterior area 393b side to suction outlet port 392, shown in Fig. 6, an inclination angle θ of the orientation of fin 395c of heat exchanger 395 becomes smaller in proportion to the case of disposing heat exchanger 395 in the longitudinal direction of air conditioning case 38. Ventilation resistance is reduced as much as the inclination angle becomes smaller, and a distribution of the air passing through heat exchanger 395 is made uniform. Accordingly, it is possible to further improve both dehumidification efficiency and heating efficiency, so as to enhance air conditioning performance, and drying efficiency and drying performance at the time of mounting in the washer-dryer, and make sound more quiet.

[0041] Here, the best installation orientation of heat exchanger 395 is to be consistent as possible with the inclined direction A headed in the shortest distance from one-end-side posterior area 393b to suction outlet port 392 in heat exchange area 393a.

[0042] Fig. 10 is a plan view of a lower divided portion of the unit case of the air conditioning unit according to the embodiment of the present invention. Fig. 11 is a perspective view of the lower divided portion of Fig. 10. In Figs. 10 and 11, heat exchange area 393a is formed having a bottom shape of unit case 38 in which heat exchanger tray 393a1 and the suction outlet side of heat exchanger 395 are low as reservoir 63 and the air suction inlet side of heat exchanger 395 is high, and as shown in Fig. 4, accommodating area 394 is formed having the bottom shape of unit case 38 so as to be further lower than reservoir 63. This allows suppression of height at which compressor 37 is installed is suppressed, and low-

ering of the center of gravity.

[0043] As shown in Fig. 3, heat exchanger 395 is directly placed and mounted on heat exchanger tray 393a1 without a filter interposed therebetween. A portion mounted with evaporator 31 is regarded as dew condensation water discharging tray 21 for taking dew condensation water generated in evaporator 31 and discharging water. A portion mounted with condenser 32 of heat exchanger 395 is partitioned from the portion mounted with condenser 32, regarded as separated water discharging tray 23 for separating and taking moisture removed from accompanying laundry and a detergent component and a fabric conditioner component, which might be mixed into the circulation system, before passage of the air through heat exchanger 395 and then discharging water. Dew condensation water discharging tray 21 and separated water discharging tray 23 are roughly partitioned by partition wall 28 getting them mutually partitioned. However, drain hole 22 is provided in dew condensation water discharging tray 21 so that separated water discharging tray 23 discharges water through dew condensation water discharging tray 21.

[0044] The reason for this is as follows. Water in the circulating air is removed by passing through evaporator 31 as dew condensation water and discharged from dew condensation water discharging tray 21 without problems. However, when a highly viscous detergent component or fabric conditioner component that might be mixed into the circulating air gets into heat exchanger 395 or blowing fan 15, it adheres thereto to narrow or clog the air passage or increase the rotating resistance of blowing fan 15. Therefore, the air is subjected to gas-liquid separation before getting into heat exchanger 395, and the separated water is discharged from separated water discharging tray 23 through dew condensation water discharging tray 21 without burdening drainage pump 64. Objects of this gas-liquid separation naturally includes water accompanying the circulating air, and a highly viscous detergent component or fabric conditioner component subjected to the gas-liquid separation can be washed away or diluted by the water simultaneously separated by the gas-liquid separation, thereby to avoid burdening drainage pump 64, which is advantageous.

[0045] For this gas-liquid separation, on the air suction inlet side of heat exchange area 393a, such that the air flowing downward between backward suction face 395a of heat exchanger 395 and the posterior wall of unit case 38, from suction inlet port 391 including one-end-side posterior area 393b and upwardly expanded posterior area 393d, is once caught at the middle position of a height direction of heat exchanger 395 as shown in Figs. 4, 5 and 7, and guided to heat exchanger 395 side, the shelf portion 24 that almost horizontally extends from the posterior wall to the front portion side of unit case 38, and inclined portion 25 that is connected to shelf portion 24 as inclined obliquely downward from shelf portion 24 to heat exchanger tray 393a1 and guides the sucked and introduced air, having passed through shelf portion 24,

to pass over backward suction face 395a of heat exchanger 395 installed and mounted on heat exchanger tray 393a1.

[0046] Accordingly, the sucked air introduced to air passage 393 is collided with shelf portion 24 in the middle of its flow downward from suction inlet port 391 and upwardly expanded posterior area 393d to heat exchanger 395, and guided to heat exchanger 395 side. With this collision, moisture removed from accompanying laundry and the detergent component and the fabric conditioner component which might be mixed into the circulation system can be collision-separated. The separated water, the detergent component and the fabric conditioner component, having been separated, shift in shelf portion 24 to inclined portion 25 side due partly to the flow of the sucked air, and drop with support of inclined portion 25. Specifically, the separated water is actively drifted to inclined portion 25 side and reaches inclined portion 25 side in the form of washing away the highly viscous detergent component and fabric conditioner component. Thereafter, the action of gravity is added to the flow of the sucked air, leading the separated water to drop with support of inclined portion 25. The separated water dropping with support of inclined portion 25 or the like is dammed up by rib 26 shown in Figs. 5 and 11 in the lower portion of inclined portion 25, then allowed to flow to communicating passage 27, shown in Figs. 3 and 11, whose one side, or accommodating area 394 side in the figures, is communicated to separated water discharging tray 23. The separated water then flows into separated water discharging tray 23.

[0047] Meanwhile, heat exchanger tray 393a1 and the entire bottom portion of reservoir 63 formed on the suction outlet side are arranged to get lower toward drain hole 22 provided in dew condensation water discharging tray 21. In accordance with this, separated water discharging tray 23 has minute communicating portion 29a in partition wall 29 for partition from the suction outlet side and minute communicating portion 28a in partition wall 28 for partition from dew condensation water discharging tray 21. Thereby, separated water or the like having flown into separated water discharging tray 23 flows into dew condensation water discharging tray 21 through communicating portion 28a, and then flows to drain hole 22 in dew condensation water discharging tray 21. Further, water in case of overflowing to the suction outlet side for the reason of operational failure of drainage pump 64 connected to drain hole 22 or for some other reason, or water that might be collected, flows into separated water discharging tray 23 through communicating portion 29a, and then flows to dew condensation water discharging tray 21 through communicating portion 28a, to reach drain hole 22.

[0048] For supporting the installation of heat exchanger 395 on heat exchanger tray 393a1 without provision of a filter, communicating portions 28a, 29a are set to have such a size as to allow water to smoothly pass there-through but not to allow highly viscous detergent com-

ponent and fabric conditioner component to pass there-through as they are. Similarly, the middle of the flow passage of each of dew condensation water discharging tray 22 and separated water discharging tray 23 is also provided with communicating portion 41 not to allow lint, the detergent component and the fabric conditioner component to pass therethrough and the baffle projection 42. Even when these communicating portions 28a, 29a, 41 and baffle projection 42 catch the lint, a total volume of the lint caught is small, thus not affecting normal drainage. On the contrary, the caught lint helps catching the detergent component. Although catching the detergent component obstructs the flow of the water, the obstructed water dilutes the detergent while being collected, and finally washes away the diluted detergent to drain hole 22. Here, before passing through heat exchanger 395, the detergent component and fabric conditioner component are efficiently separated along with moisture removed from laundry accompanying the circulating air, and is further discharged after diluted, and thus neither burdens nor stops drainage pump 64. Furthermore, although communicating portion 41 is formed by cutting off the central part of barrier wall 41a crossing the flow passage in V shape and reliably restricts the passage of the detergent component and fabric conditioner component, even when a volume of the lint with its passage restricted slightly increases to restrict the passage of the water, a volume of the water with its passage restricted becomes larger than that of the lint and communicating portion 41 expand upward to reduce the degree of restriction, thereby to facilitate the water with its passage restricted to flow onward along with a component such as the component of the diluted detergent.

[0049] Furthermore, above-mentioned shelf portion 24 and inclined portion 25 effectively act by narrowing an internal space of a posterior area of the lower half of unit case 38, and consequently, a recessed shape shown in Figs. 4 and 7 is added to the inside of the posterior wall of the lower half of unit case 38, to form an empty space S opened backward and downward below shelf portion 24. When air-conditioning unit 39 and air-conditioning fan unit 81 are installed along the posterior wall on the bottom portion of washer-dryer body 44 as shown in Fig. 3, the empty space S can be effectively utilized as a space for wire connection that is made outside air-conditioning unit 39 and air-conditioning fan unit 81, a space for installation of external equipment such as a sensor, or the like, as shown in Figs. 1 and 4.

[0050] It is to be noted that shelf portion 24 and inclined portion 25 are integrally formed on lower divided portion 382 side so as to facilitate the continuity thereof to be ensured, and shelf portion 24 is formed at a position slightly below the joint flange 382a that makes a joint between lower divided portion 382 and upper divided portion 381 while forming scored line 383. The joint flange 382a accommodates a circular sealing material 384 inside a concavity of its circumference, and seals a space with scored line 383 in a joint structure of sandwiching

sealing material 384 by concavo-convex fitting in which a convexity of joint flange 381a of upper divided portion 381 is fitted in the above-mentioned concavity. With these joint and sealing, joint flange 381a and the joint flange 382a are mutually firmly held by screw fastening portion 68 as shown in Fig. 3 which uses fastening holes provided in large number in the circumferential direction as shown in Fig. 11.

[0051] Here, heat exchanger 395 has partition wall 52 that is a metal plate projecting forward and backward and corrosion-resistant, such as an aluminum-based metal plate, as shown in Figs. 4, 6 and 7, at an end fitted, while held from above and below, in opening 51 formed by air passage 393 and partition portion 386 of accommodating area 394 on accommodating area 394 side, as shown in Figs. 3 and 4. Inserting this partition wall 52 from above into guide trench 51a formed at an opening edge, especially a vertical opening edge, of opening 51 positions an end side on accommodating area 394 side, and also forms a rough sealing structure of suppressing the air flow at opening 51 portion of air passage 393 and accommodating area 394. Further, an end of heat exchanger 395 on the opposite side, namely an end on suction outlet port 392 side is roughly fitted for positioning from above between guides 53a, 53b, upwardly integrally formed in front and rear corner portions of the end on suction outlet port 392 side of heat exchanger tray 393a1 of lower divided portion 382, as shown in Figs. 6 and 10. Positioning these both ends positions heat exchanger 395 in a predetermined position on heat exchanger tray 393a1.

[0052] Fig. 12 is a bottom view of the upper divided portion of the unit case of the air conditioning unit according to the embodiment of the present invention. In Fig. 12, since being in contact with the ribbed partition wall 54 formed downward from partition wall 386a over a space with the other end wall opposed to partition wall 386a on the rear surface of the ceiling wall of upper divided portion 381, heat exchanger 395 is prevented from floating from heat exchanger tray 393a1 in collaboration with the upper-portion opening edge of opening 51 of partition portion 386. Simultaneously, in heat exchange area 393a, the suction inlet air on the suction inlet side is prevented from bypassing from the circumference of heat exchanger 395 to the suction outlet side.

[0053] Compressor 37 is elastically borne by being settled inside recess 394a of bottom portion 394c of accommodating area 394 through elastic base 43, so as to absorb shock and vibration. With such a configuration, it is possible to seek for reducing the size, weight and cost of compressor 37 itself. Further, due to the elastic bearing by being placed in recess 394a through elastic base 43, a vibration absorbing action is exerted on vibration of compressor 37, and further, a high buffering action is also exerted on lateral external vibration at the time of dewatering. For example, by as much as compressor 37 is reduced in size from a conventional size of the order of 140 mm to the order of 90 mm in a plan view, and a

space required for accommodating area 394 is reduced, air passage 393 and heat exchanger 395 installed therein can be made larger, while remaining the unit case 38 unchanged from the conventional size, whereby it is possible to enhance the heat exchange efficiency, so as to enhance the air conditioning performance.

[0054] Fig. 13 is a perspective view showing a combined state of an elastic base and the compressor built in the air conditioning unit according to the embodiment of the present invention. In Fig. 13, compressor 37 is placed by means of elastic base 43 (cf. Fig. 3) covered and attached to the lower portion thereof, while having small gap 45 in a radial direction. In accordance with this, projection 145 projecting downward from the upper portion of upper divided portion 381 of unit case 38 as shown in Figs. 3 and 12 is opposed to the upper end of compressor 37 with predetermined gap 46 as shown in Fig. 3, so as to prevent a vent from recess 394a of compressor 37 which exceeds an allowable volume. Specifically, for example, gap 45 is set to the order of 0.5 mm and gap 46 is set to the order of 5 mm. Here, the allowable volume for the vent is in such a range as not to impair the vibration absorbing action and the buffering action on compressor 37.

[0055] Thereby, compressor 37 compresses elastic base 43 until balancing with elastic bearing force of elastic base 43 with its weight, to be settled inside recess 394a, and is floating-borne radially and vertically with some degree of play. As shown in Figs. 3, 5 and 13, elastic base 43 has circular bottom rim 43a opposed to the lower-surface outer circumferential area of compressor 37 and elastically bearing compressor 37, and since not being immaculate, elastic base 43 enhances vibration absorbability against vibration of compressor 37. Further, with its radial movement restricted by fitting of its lower end into concentric, shallow second recess 394b inside recess 394a, bottom rim 43a of compressor 37 is arranged so as to allow some degree of swinging with bottom rim 43a of compressor 37 at the center by as much as a volume of above-mentioned gap 45, while enhancing radial bearing force to compressor 37 in its lower end. Elastic base 43 further has cap portion 43b that is connected with the upper end of bottom rim 43a and covers, with a slightly larger thickness, the lower portion outer circumference of compressor 37, as shown in Figs. 3, 6, 13. Even when swinging of compressor 37 exceeds gap 45 in any particular radial direction, elastic base 43 is compressed in a particular radial direction corresponding to cap portion 43b in the space with the inner circumference of recess 394a, thereby exerting the vibration absorbing action on vibratory swinging and allows reduction in collision sound made in transmission of vibration to unit case 38. Furthermore, with rib 43c in an axial-line direction circumferentially disposed on its outer circumference, cap portion 43b flexibly and naturally executes vibration absorption by compressing in the space with the inner circumference of recess 394a, and elastically bear compressor 37 so as to be located within a prede-

terminated range inside recess 394a. Further, when an engagement recess such as one for being engaged in part of piping projecting from compressor 37 to the body side is previously formed on the circumferential wall of cap portion 43b, it can serve as a rotation stopper for elastic base 43 and compressor 37. Moreover, an engagement portion or fitting portion for a rotation stopper may also be provided between elastic base 43 and recess 394a. Furthermore, bottom rim 43a and cap portion 43b of elastic base 43 and the like may be arranged as partially different bodies. In short, a basic condition is that the space between recess 394a and the lower end of compressor 37 is filled with the elastic member.

[0056] As shown in Fig. 3, in accommodating area 394, bottom portion 394c forming recess 394a is set slightly higher than heat exchanger tray 393a1 and the bottom portion of suction outlet side 393a2 side, accommodating area 394 side and air passage 393 side are partitioned by partition portion 386 around opening 51 holding heat exchanger 395, and a concavity is provided in the lower portion of the opening edge of opening 51, to form communicating passage 47 below heat exchanger 395 of bottom portion 394c, which connects accommodating area 394 side to separated water discharging tray 23 on air passage 393 side, specifically through communicating passage 27. In accordance with this, an almost circular rib 48 formed by extending the inner circumferential wall of recess 394a upward as shown in Figs. 3, 4, 6 and 10, is formed in bottom portion 394c. Further, part of bottom portion 394c corresponds to a dew condensation water dropping portion from cryogenic piping 37a around compressor 37, to take dropping dew condensation water. Consequently, dew condensation water constantly dropping from cryogenic piping 37a during operation even in small volume is taken in bottom portion 394c around recess 394a, passes through communicating passage 47 formed at the same level as bottom portion 394c in the opening-edge lower portion of opening 51 of partition portion 386, and flows and drops to separated water discharging tray 23 lower than bottom portion 394a, so as to be naturally discharged along with separated water, and does not flow into recess 394a by being obstructed by rib 48. Accordingly, the drainage channel can be reduced without the need for a drainage hole in recess 394a where compressor 37 is seated, and the outside air is not sucked, thus preventing deterioration in drying efficiency at the time of low temperature.

[0057] As already described, the inclined arrangement of heat exchanger 395 with respect to the longitudinal direction of unit case 38 does not make a difference to that the suction action reaching suction outlet port 392 from blowing fan 15 on the downstream exerts with a greater force on the closer side to suction outlet port 392 with respect to the entire area of exhaust surface 395b oriented to the front portion of heat exchanger 395. Therefore, on the suction outlet side of heat exchange area 393a, there is a concern that dew condensation water generated at the time of passage through evaporator

31 may be sucked from the closer side to suction outlet port 392 of front exhaust surface 395b of heat exchanger 395 to exhaust surface 395b side, and then sucked into blowing fan 15 through suction outlet port 392.

[0058] Fig. 14 is a partial perspective view of the air conditioning unit according to the embodiment of the present invention when viewed from obliquely above in the state of Fig. 6. Fig. 15 is a side view of the air conditioning unit according to the embodiment of the present invention when viewed from the accommodating area side. In Fig. 14, in the present embodiment, shielding wall 56 is formed which obstructs suction of dew condensation water due to a strong suction action from suction outlet port 392 through use of guide 53a extending upward on the front portion side of the end on suction outlet port 392 side of heat exchanger tray 393a1. Further, in Fig. 15, for supporting that the blowing fan 15 connected to suction outlet port 392 has scroll case 15b and is provided in a positional relation where blowout portion 15d thereof (cf. Fig. 12) arises upward in the rear portion so that the strong deviation of the suction action comes to a corner portion along the end edge on the lower half portion of suction outlet port 392 side of exhaust surface 395b of heat exchanger 395 and the front portion side of the lower end edge, as shown in Figs. 3, 8 and 11, shielding wall 56 in a simple shape formed stepwise including guide 53a can cover exhaust surface 395b of heat exchanger 395 in minimum area required.

[0059] Furthermore, for supporting a strong suction action exerted especially on the lower portion of the end portion of suction outlet port 392 side of condenser 32, the stepped shielding wall 56 is formed in the shape of steps with its lower portion projecting from its lateral side to exhaust surface 395b side in larger volume than its upper portion. Therefore, for dealing with that the suction from suction outlet port 392 strongly acts especially on the lower portion of the end portion of suction outlet port 392 side of exhaust surface 395b of condenser 32 and gradually decreases from there to the upper portion thereof, shielding wall 56 covers the lower portion of suction outlet port 392 side of condenser 32 in a larger area than the upper portion thereof, whereby it is possible to restrict the suction in a proper volume in accordance with strength of a distribution of the suction strongly exerted from the suction outlet port 392 of exhaust surface 395b of condenser 32.

[0060] Shielding wall 56 has a projecting edge including inclination, curvature, and the like, in place of the shape of steps, which is provided as projecting from the lower portion or the side portion of the vicinity of the discharge surface of the condenser. In order for shielding wall 56 to project from the vicinity of condenser 32 to its discharge surface 395b side for obstructing the strong suction from suction outlet port 392, its projecting edge has a shape of any one of inclination, curvature and steps. This can facilitate to make a projecting volume proportional to the degree to which shielding wall 56 projects to exhaust surface 395b side of condenser 32

for obstructing the strong suction from suction outlet port 392, so as to allow restriction in a more proper volume.

[0061] Further, in order to minimize narrowing of a ventilation area of exhaust surface 395b due to shielding wall 56, overhanging portion 56a from guide 53a is floated as shown in Fig. 6 to form gap 111. In such a manner, shielding wall 56 projects to exhaust surface 395b side of condenser 32 to cover the strong suction from suction outlet port 392, so as to restrict the strong suction from suction outlet port 392. However, with gap 111 provided in a space with exhaust surface 395b, the suction from suction outlet port 392 is bypassed to reach, and hence condenser 32 does not stop its function due to blocking of the air flow in the range covered by shielding wall 56. It is thus possible to avoid narrowing of the action area of condenser 32 from causing deterioration in performance. Using especially a balance between the degree of restriction of the strong suction by shielding wall 56 and the degree of bypass suction by gap 111, the heating exchange in the whole area of condenser 32 can be made uniform.

[0062] Moreover, in suction outlet port 392 concentric to fan 15a of blowing fan 15, a suction restricting side where the suction is restricted by shielding wall 56 is formed in the shape of having a vertical straight edge 392b that narrows the circular shape around the axis line of fan 15a of suction outlet port 392 and projecting to the axis line side, as shown in Fig. 11, so as to facilitate prevention of suction of water from the end portion on suction outlet port 392 side of heat exchanger 395. Similarly, the lower edge of suction outlet port 392 is formed in lateral straight edge 392c that narrows upward to the axis line up to the same height as that of heat exchanger tray 393a1, to restrict suction of moisture from the bottom portion of reservoir 63.

[0063] As shown in Fig. 3, connection between suction outlet port 392 of unit case 38 and blowing fan 15 is made such that connecting tube 15c1 of suction port 15c of scroll case 15b accommodating fan 15a is fitted with the inner circumference of suction outlet port 392 with a play. The front edge of connecting tube 15c1 is press-welded to flange wall 392a on the inner circumference of suction outlet port 392. Joint 62 is provided where scroll case 15b and unit case 38 are screw-fastened at a plurality of places (e.g. more than three places) around the connecting portion of suction outlet port 392 and suction port 15c, to hold the above-mentioned press-welded state, thereby to easily seal the connecting portion. This allows omission of a sealing material that becomes a consumable, thereby to reduce running cost.

[0064] In addition, unit case 38 has an advantage that, when it has a configuration formed by three divided materials, each molded article can be made small in volume, and thus facilitate to deal with a complicated shape. In the case of applying this to the illustrative example, when this case is described with reference to Fig. 8, for example, upper divided portion 381 is divided with scored lines (chain double-dashed lines) 61 bordering the outer sur-

face of unit case 38 on a simple plane between a part on and below the ceiling wall of the 303a1 and a part above the ceiling wall, namely upwardly expanded posterior area 393d, suction inlet port 391 and the upper portion of accommodating area 394, and a continuous sealing material is intervened between the scored lines 61 on the circumference to seal inside and outside of air conditioning case 38, whereby it is possible to obtain a characteristic attributed to the configuration of three divided materials without impairing the characteristics obtained in the case of the above-mentioned embodiment of the two-divided structure.

[0065] According to the present invention, waters generated or collected in the heat exchange area inside the air conditioning case can be discharged without a filter, thereby to eliminate the need for the filter and its maintenance.

Claims

1. An air conditioning unit (39) in which a heat exchange area of an air passage (393) from a suction inlet port (391) to a suction outlet port (392) for an air is partitioned between a suction-inlet-side heat exchange area and a suction-outlet-side heat exchange area, and a heat exchanger (32) for dehumidification and a further heat exchanger (31) for heating to dehumidify and heat the air are disposed in the partitioned areas inside a unit case (38) comprising said suction inlet port (391) and said suction outlet port (392), wherein a bottom portion of the heat exchange area (393a) is provided with:

a dew condensation water discharging tray (21), provided so as to catch dew condensation water flowing from the heat exchanger (32) for dehumidification and discharge the water; and a water collecting portion (63) that collects and reserves water or the like dropping or running down to a suction-inlet-side heat exchange area side of the heat exchanger (32) for dehumidification;

characterized in that:

the bottom portion of the heat exchange area (393a) is further provided with:

an auxiliary discharging tray (23) that bypasses around the dew condensation water discharging tray (21) from part of the water collecting portion (63) to communicate with the dew condensation water discharging tray (21), and guides water collected in the water collecting portion (63) to the dew condensation water tray (21) to discharge the water, wherein at least a drainage passage of the auxiliary discharging tray (23) out of the auxiliary

discharging tray (23) and the dew condensation water discharging tray (21) is provided with a projection and/or a narrowed portion as obstruction portions for catching a foreign matter so as not to flow onward.

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2. The air conditioning unit (39) according to claim 1, wherein the auxiliary discharging tray (23) communicates with the dew condensation water discharging tray (21) through said narrowed portion.

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3. The air conditioning unit (39) according to claim 1, wherein the heat exchange (32) for dehumidification and the further heat exchanger (31) for heating form a heat exchanger (395) in which each other's fins (395c) are aligned in parallel, the heat exchanger (32) for dehumidification is directly placed on the dew condensation water discharging tray (21), and said further heat exchanger (31) for heating is directly placed on the auxiliary discharging tray (23).

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4. The air conditioning unit (39) according to claim 1, wherein the auxiliary discharging tray (23) communicates with a bottom portion of the suction-outlet-side heat exchange area in the heat exchange area (393a).

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Patentansprüche

1. Klimatisierungseinheit bzw. Luftkühlungseinheit (39), in welcher ein Wärmeaustauschbereich von einer Luftpassage (393) von einer Saug-Einlass-Öffnung (391) zu einer Saug-Auslass-Öffnung (392) für Luft partitioniert ist, und zwar zwischen einem Saug-Einlass-seitigem Wärmeaustauschbereich und einem Saug-Auslass-seitigem Wärmeaustauschbereich, und ein Wärmetauscher (32) zur Entfeuchtung und ein weiterer Wärmetauscher (31) zum Heizen bzw. Erwärmen in den partitionierten Bereichen innerhalb eines Einheitenbehälters (38) angeordnet sind, der die Saug-Einlass-Öffnung (391) und die Saug-Auslass-Öffnung (392) aufweist, um zu entfeuchten und um die Luft zu erwärmen bzw. aufzuheizen, wobei ein Bodenabschnitt des Wärmeaustauschbereichs (393a) bereitgestellt ist mit:

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einem Tau-Kondensationswasserentladefach bzw. einer Tau-Kondensationswasserablasswanne (21), das bzw. die bereitgestellt ist, um Tau-Kondensationswasser einzufangen, das von dem Wärmetauscher (32) zur Entfeuchtung fließt, und um das Wasser zu entladen bzw. abzulassen; und ein Wassersammelabschnitt (63), der Wasser

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oder dergleichen sammelt und zurückhält, welches tropft oder zu einer Saug-Einlass-seitigen Wärmeaustauschbereichsseite des Wärmeaustauschers (32) zur Entfeuchtung nach unten läuft;

dadurch gekennzeichnet, dass:

der Bodenabschnitt des Wärmeaustauschbereichs (393a) weiter bereitgestellt ist mit:

einem Hilfsentladefach bzw. einer Hilfsablasswanne (23), das bzw. die das Tau-Kondensationswasserentladefach bzw. die Tau-Kondensationswasserablasswanne (21) bypasst bzw. darum herumführt, und zwar von einem Teil des Wassersammelabschnitts (63), um mit dem Tau-Kondensationswasserentladefach bzw. der Tau-Kondensationswasserablasswanne (21) zu kommunizieren, und um Wasser zu dem Tau-Kondensationswasserfach bzw. der Tau-Kondensationswasserablasswanne (21) zu führen, das in dem Wassersammelabschnitt (63) gesammelt wurde, um das Wasser zu entladen bzw. abzulassen, wobei zumindest eine Dränagenpassage bzw. Entwässerungspassage des Hilfsentladefachs bzw. der Hilfsablasswanne (23) von dem Hilfsentladefach bzw. der Hilfsablasswanne (23) und dem Tau-Kondensationswasserentladefach bzw. der Tau-Kondensationswasserablasswanne (21) mit einer Projektion bzw. Auskragung oder einer Nase und/oder einem verengten Abschnitt als Hindemisabschnitte bzw. Blockierungsabschnitte aufweist, um einen fremden Gegenstand bzw. Fremdstoff einzufangen, so dass dieser nicht weiter fließt.

2. Klimatisierungseinheit bzw. Luftkühlungseinheit (39) nach Anspruch 1, wobei das Hilfsentladefach bzw. die Hilfsablasswanne (23) mit dem Tau-Kondensationswasserentladefach bzw. der Tau-Kondensationswasserablasswanne (21) durch den genannten verengten Abschnitt kommuniziert.

3. Klimatisierungseinheit bzw. Luftkühlungseinheit (39) nach Anspruch 1, wobei der Wärmetauscher (32) zur Entfeuchtung und der weitere Wärmetauscher (31) zum Heizen bzw. Erwärmen einen Wärmetauscher (395) ausbilden, in welchem gegenseitige bzw. die jeweils anderen oder gegenüberliegende Finnen bzw. Grate oder Rippen (395c) parallel ausgerichtet sind, der Wärmetauscher (32) zur Entfeuchtung direkt auf dem Tau-Kondensationswasserentladefach bzw. der Tau-Kondensationswasserablasswanne (21)

placé est, et
 der weitere Wärmetauscher (31) zum Heizen bzw.
 Erwärmen direkt auf dem Hilfsentladefach bzw. der
 Hilfsablasswanne (23) placé ist.

4. Klimatisierungseinheit bzw. Luftkühlungseinheit
 (39) nach Anspruch 1, wobei das Hilfsentladefach
 bzw. die Hilfsablasswanne (23) mit einem Bodenab-
 schnitt des Saug-Auslass-seitigen Wärmetauschbe-
 reichs in den Wärmetauschbereich (393a) kommu-
 niert.

Revendications

1. Unité de conditionnement d'air (39) dans laquelle
 une surface d'échange thermique d'un passage d'air
 (393) allant d'un orifice d'entrée d'aspiration (391) à
 un orifice de sortie d'aspiration (392) d'air est divisée
 en une surface d'échange thermique côté entrée
 d'aspiration et une surface d'échange thermique côté
 sortie d'aspiration, et un échangeur de chaleur
 (32) de déshumidification et un autre échangeur de
 chaleur (31) de chauffage pour déshumidifier et
 chauffer l'air sont disposés dans les surfaces divi-
 sées à l'intérieur d'un boîtier d'unité (38) comprenant
 ledit orifice d'entrée d'aspiration (391) et ledit orifice
 de sortie d'aspiration (392),
 dans laquelle une portion inférieure de la surface
 d'échange thermique (393a) est munie de :

un plateau d'évacuation d'eau de condensation
 à point de rosée (21) prévu pour capter l'eau de
 condensation à point de rosée s'écoulant de
 l'échangeur de chaleur (32) pour déshumidifier
 et évacuer l'eau ; et
 une portion collectrice d'eau (63) qui recueille
 et conserve l'eau ou analogue qui tombe ou des-
 cend vers un côté surface d'échange thermique
 côté d'entrée d'aspiration de l'échangeur de
 chaleur (32) de déshumidification ;

caractérisée en ce que :

la portion inférieure de la surface d'échange thermi-
 que (393a) est en outre munie de :

un plateau d'évacuation auxiliaire (23) qui con-
 tourne le plateau d'évacuation d'eau de conden-
 sation à point de rosée (21) depuis une partie
 de la portion collectrice d'eau (63) pour commu-
 niquer avec le plateau d'évacuation d'eau de
 condensation à point de rosée (21), et guide
 l'eau recueillie dans la portion collectrice d'eau
 (63) vers le plateau d'évacuation d'eau de con-
 densation à point de rosée (21) pour évacuer
 l'eau,
 dans laquelle au moins un passage de drainage
 du plateau d'évacuation auxiliaire (23) sortant

du plateau d'évacuation auxiliaire (23) et le pla-
 teau d'évacuation d'eau de condensation à point
 de rosée (21) est muni d'une saillie et/ou d'une
 portion rétrécie servant de portions de blocage
 pour capter une matière étrangère afin qu'elle
 ne s'écoule pas plus loin.

2. Unité de conditionnement d'air (39) selon la reven-
 dication 1, dans laquelle le plateau d'évacuation
 auxiliaire (23) communique avec le plateau d'éva-
 cuation d'eau de condensation à point de rosée (21)
 par l'intermédiaire de ladite portion rétrécie.

3. Unité de conditionnement d'air (39) selon la reven-
 dication 1, dans laquelle :

l'échangeur de chaleur (32) de déshumidifica-
 tion et l'autre échangeur de chaleur (31) de
 chauffage forment un échangeur de chaleur
 (395) dans lequel chacune des ailettes (395c)
 des échangeurs sont alignées en parallèle,
 l'échangeur de chaleur (32) de déshumidifica-
 tion est placé directement sur le plateau d'éva-
 cuation d'eau de condensation à point de rosée
 (21), et
 ledit autre échangeur de chaleur (31) de chauf-
 fage est placé directement sur le plateau d'éva-
 cuation auxiliaire (23).

4. Unité de conditionnement d'air (39) selon la reven-
 dication 1, dans laquelle le plateau d'évacuation
 auxiliaire (23) communique avec une portion infé-
 rieure de la surface d'échange thermique côté sortie
 d'aspiration dans la surface d'échange thermique
 (393a)

FIG. 1

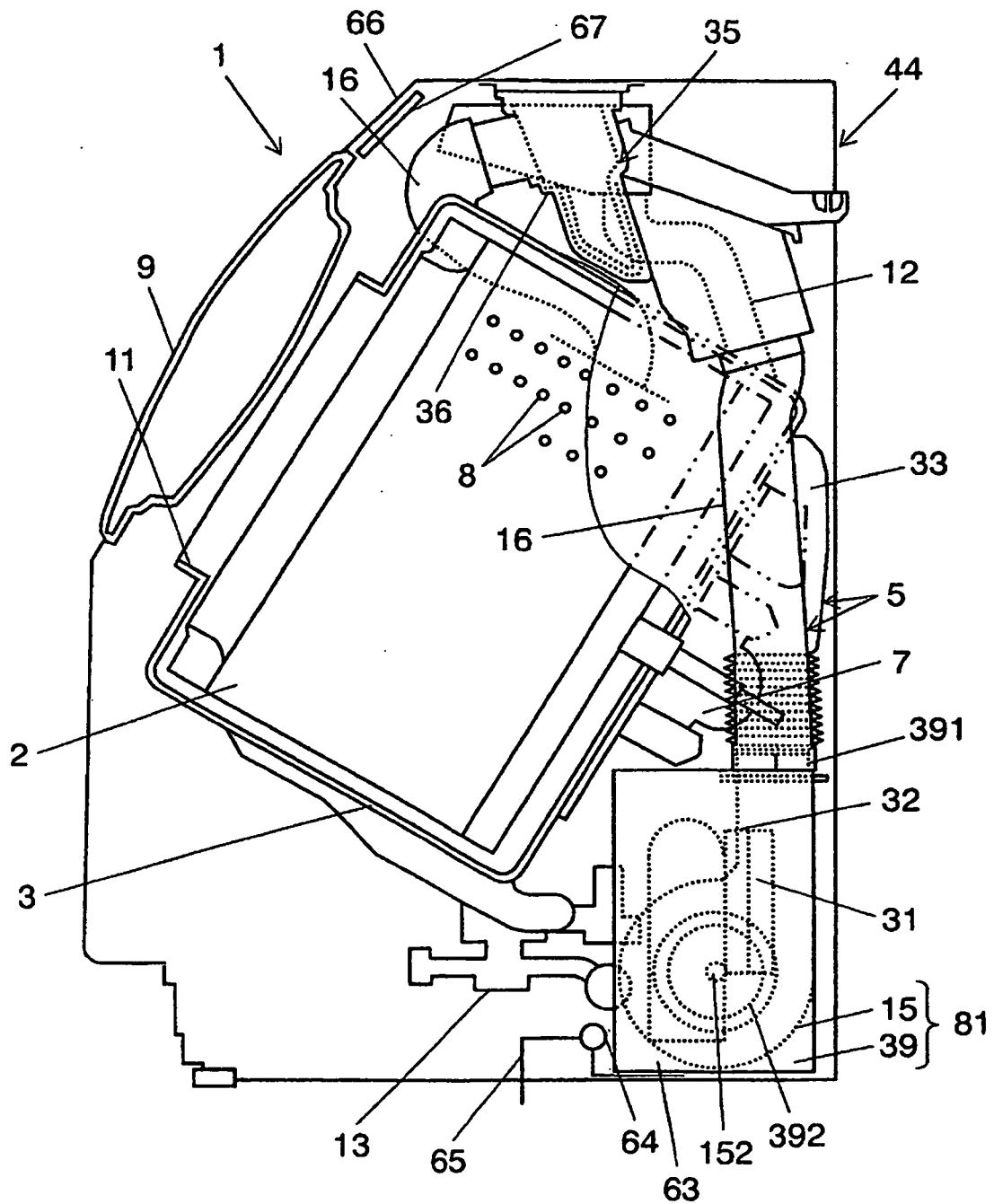


FIG. 2

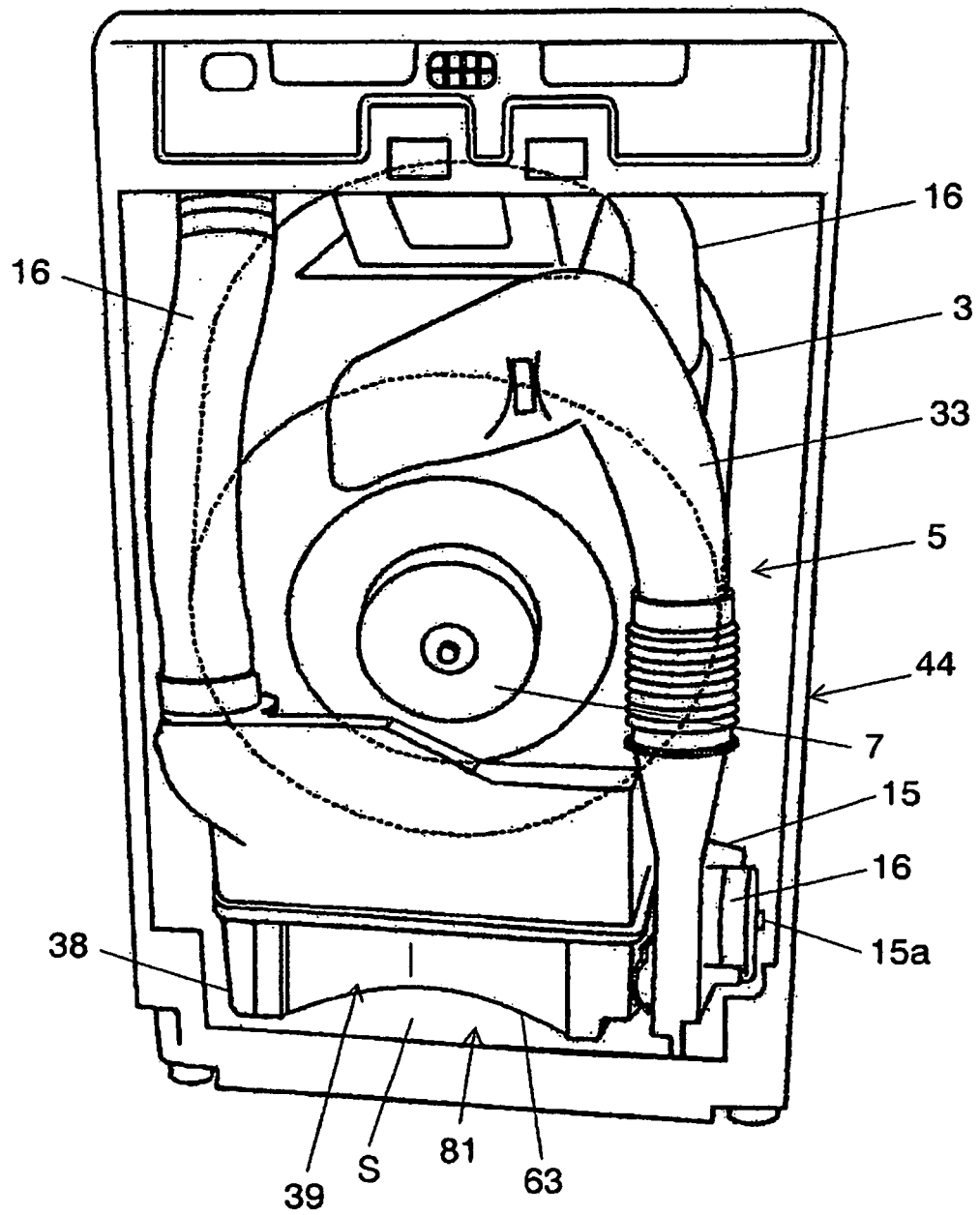


FIG. 3

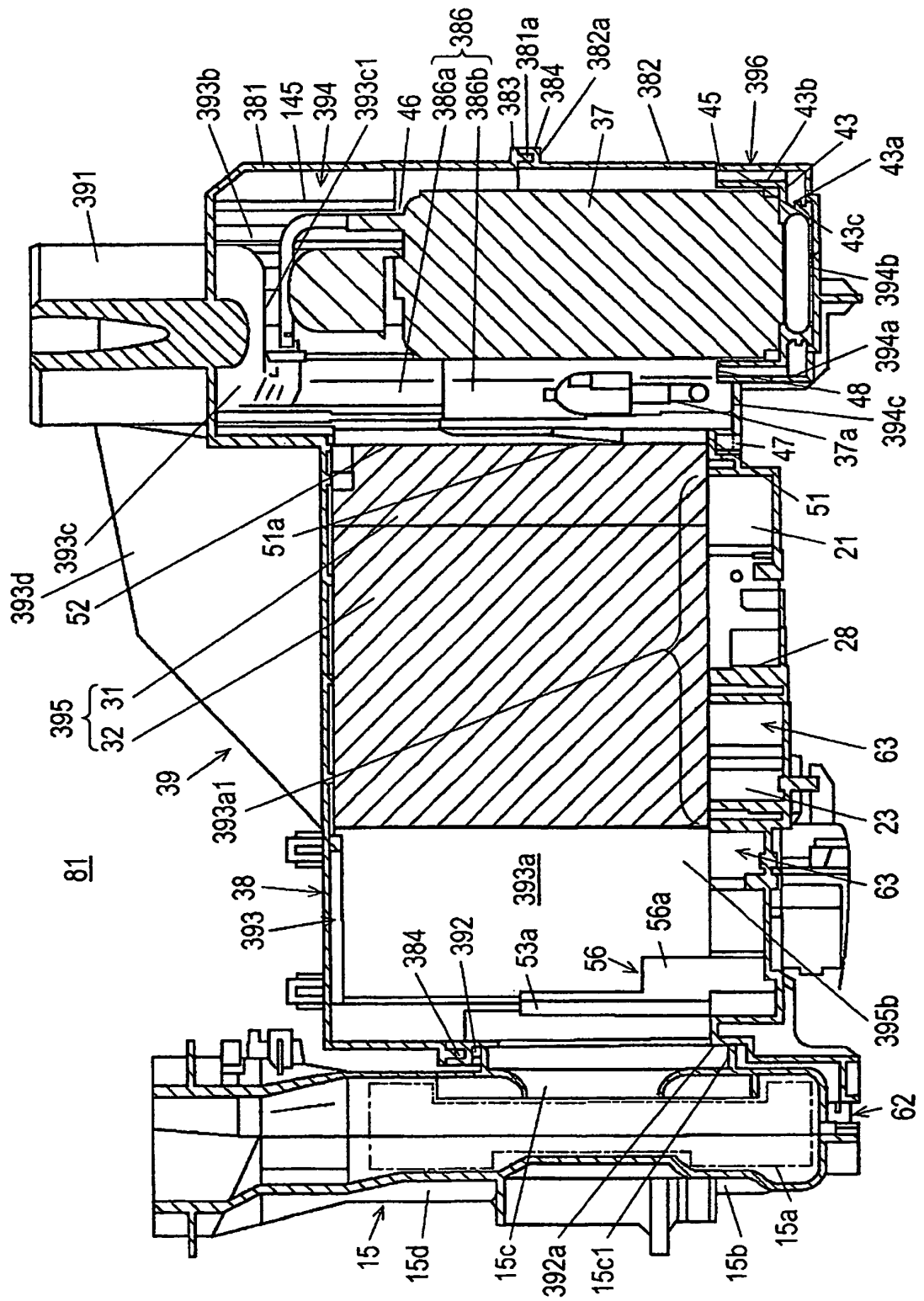


FIG. 4

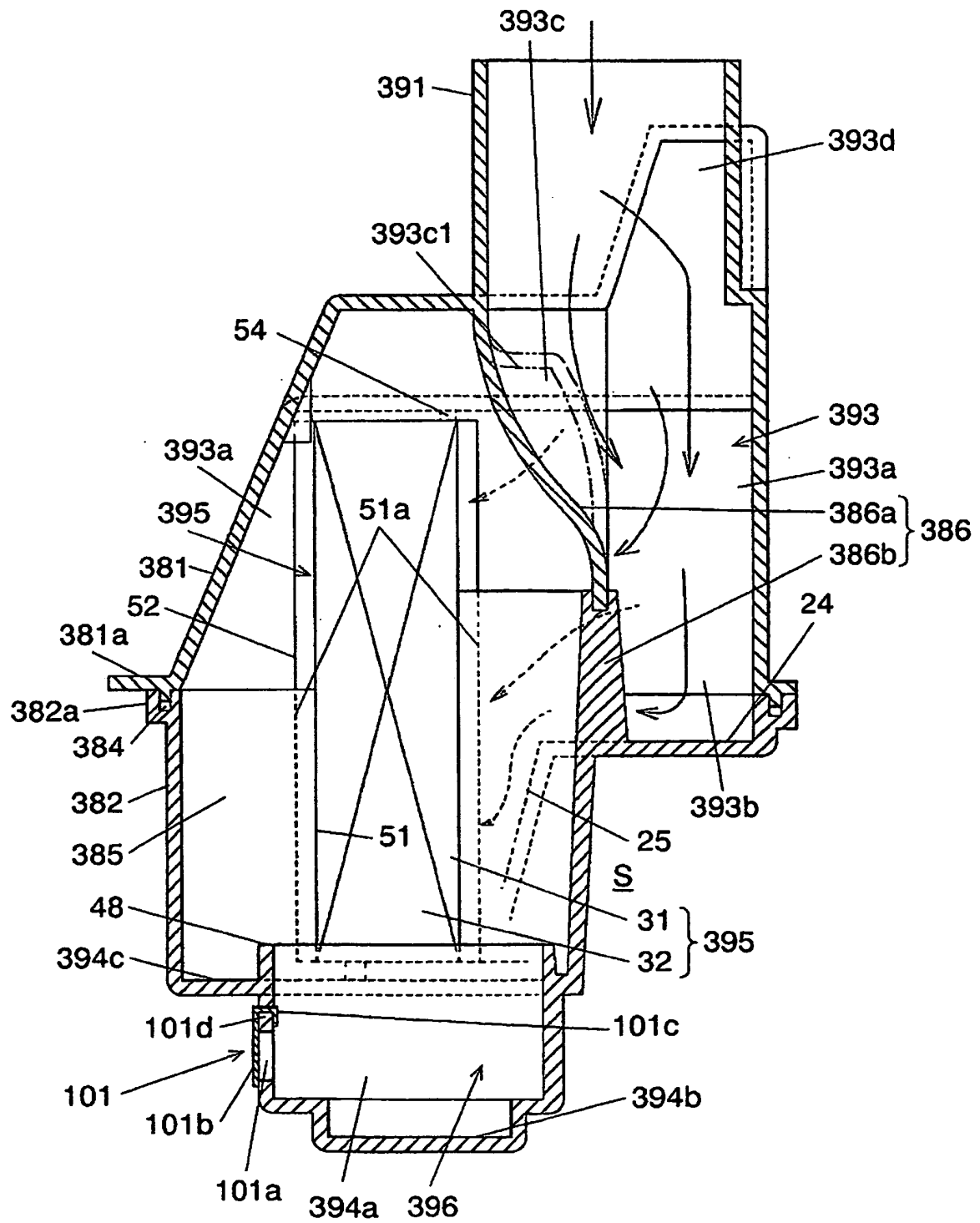


FIG. 5

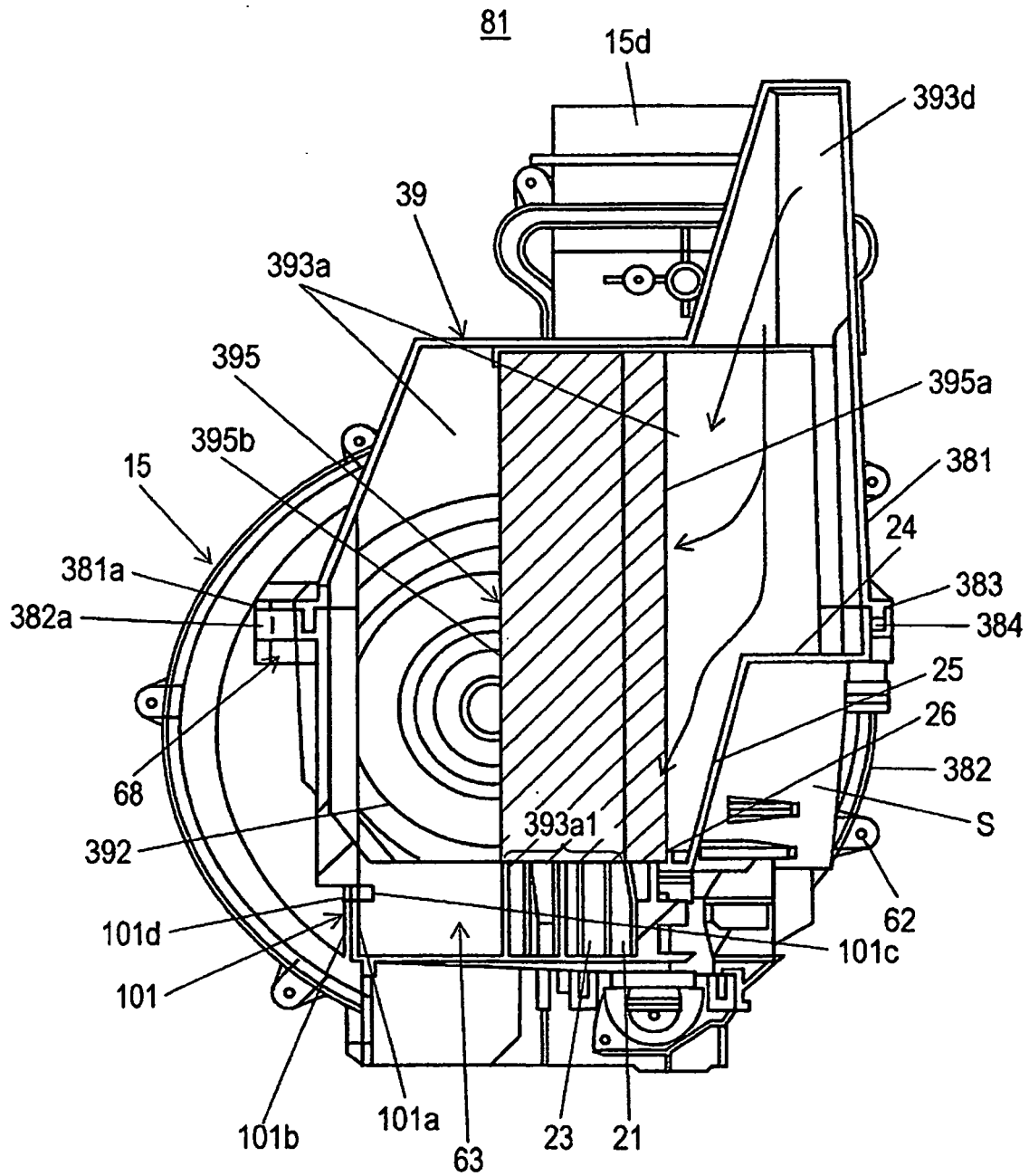


FIG. 6

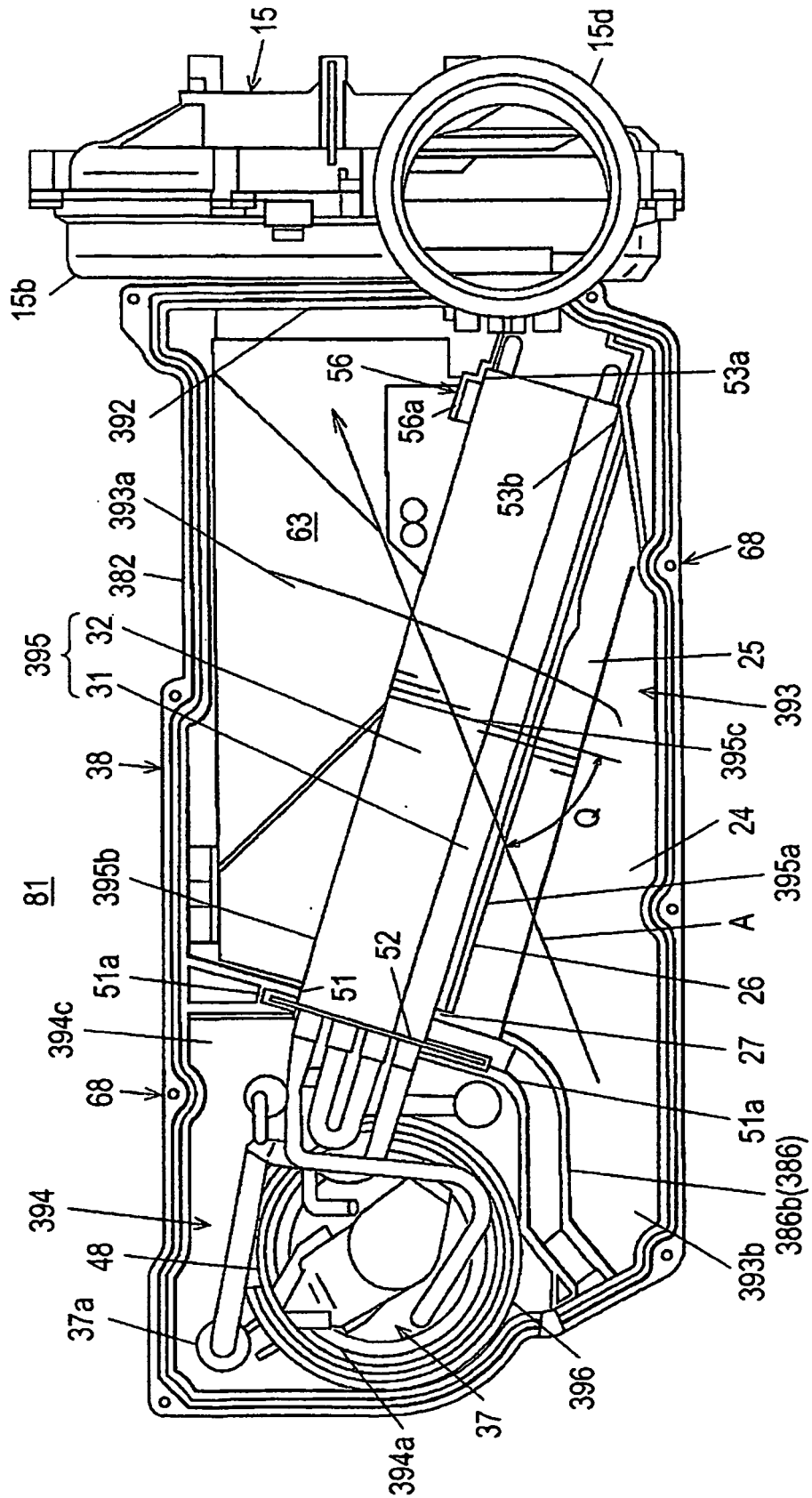


FIG. 7

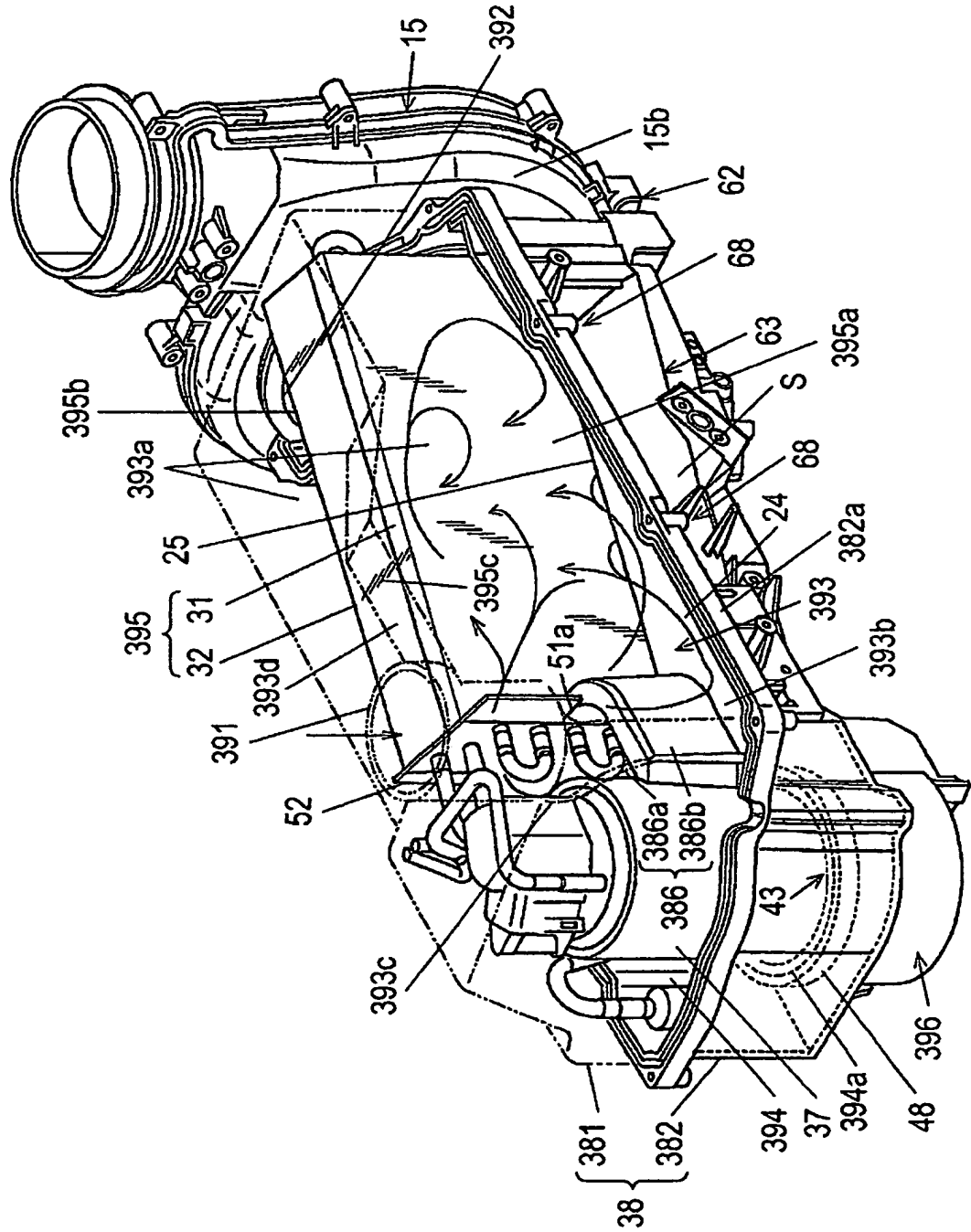


FIG. 8

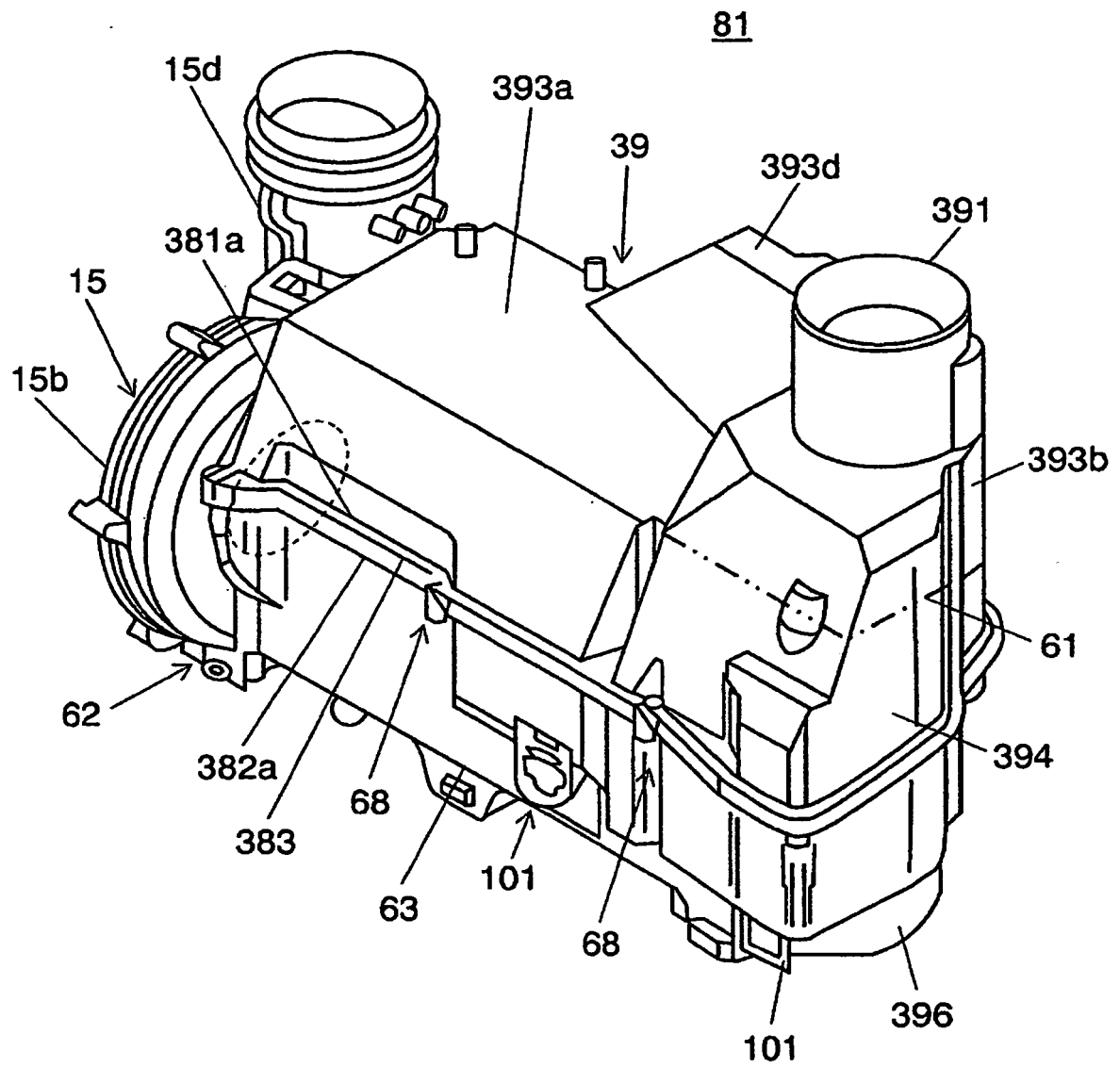


FIG. 9

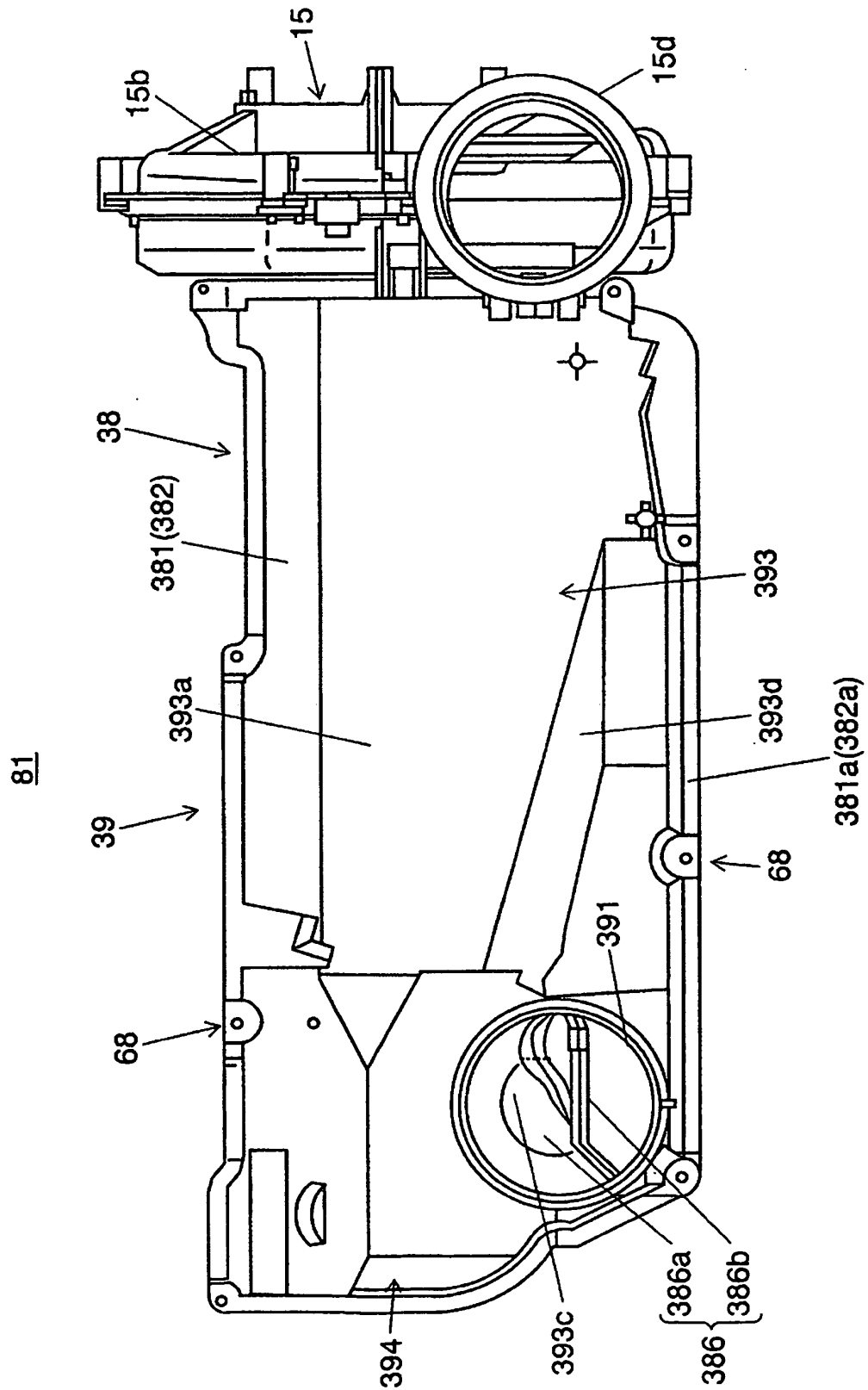


FIG. 10

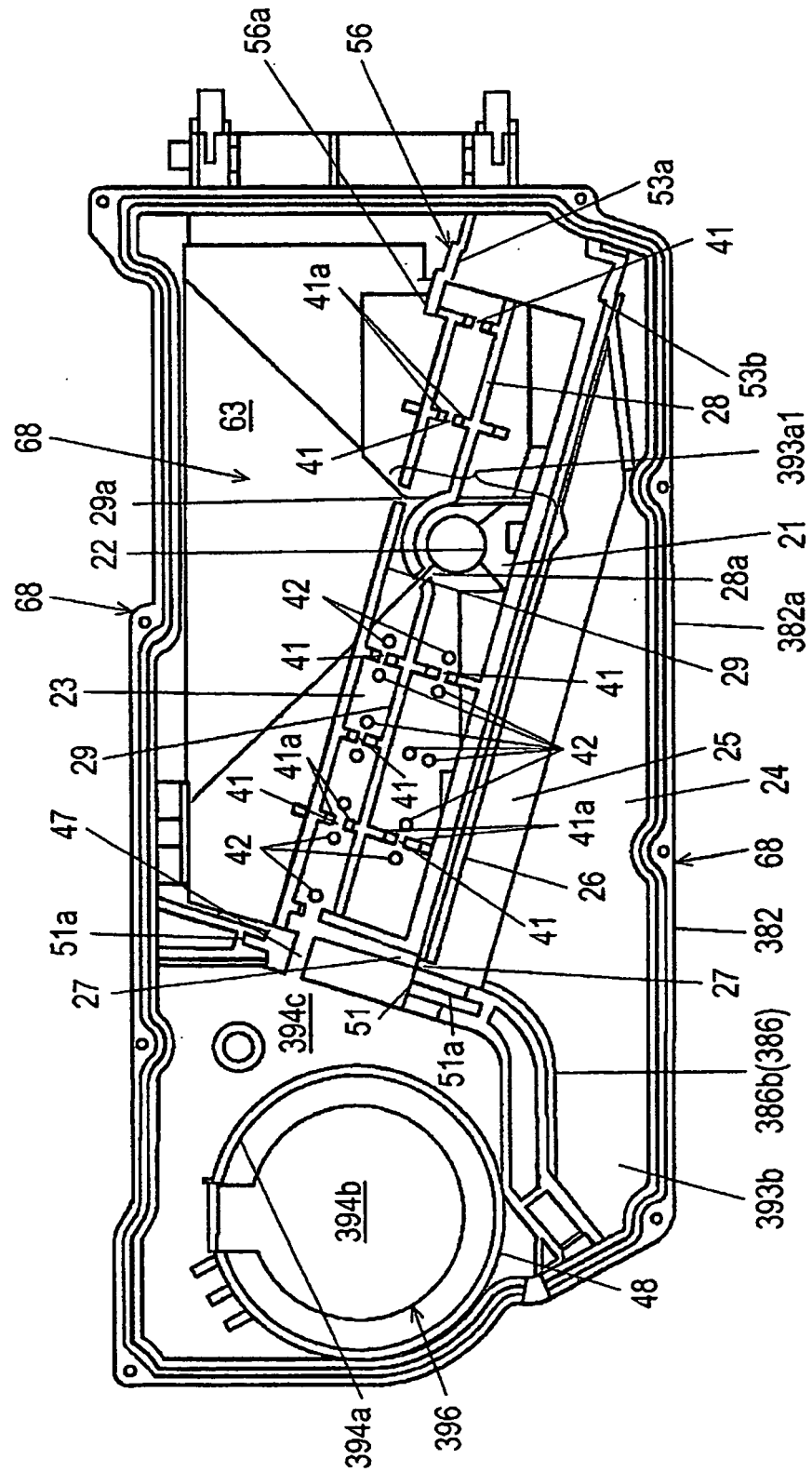


FIG. 11

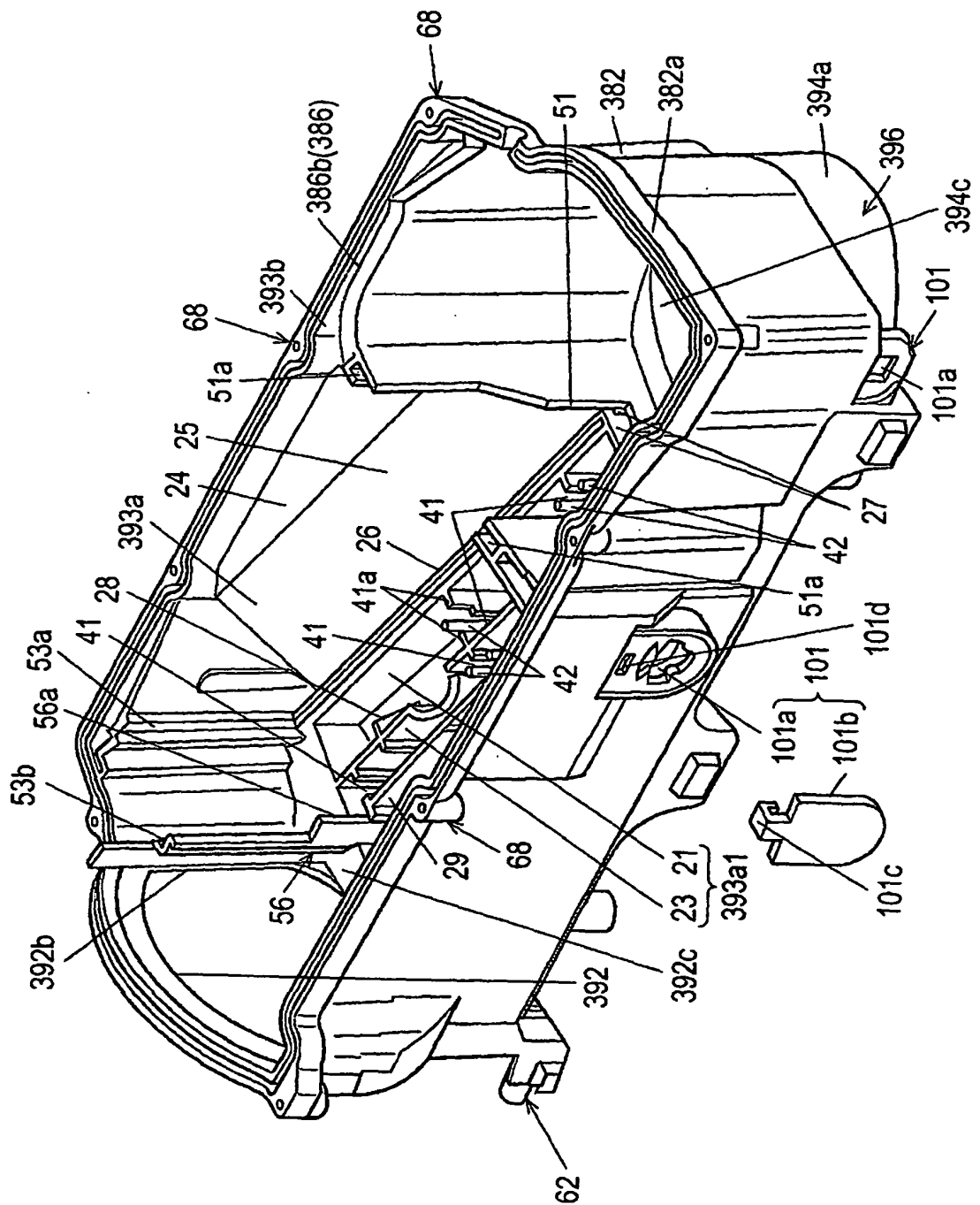


FIG. 12

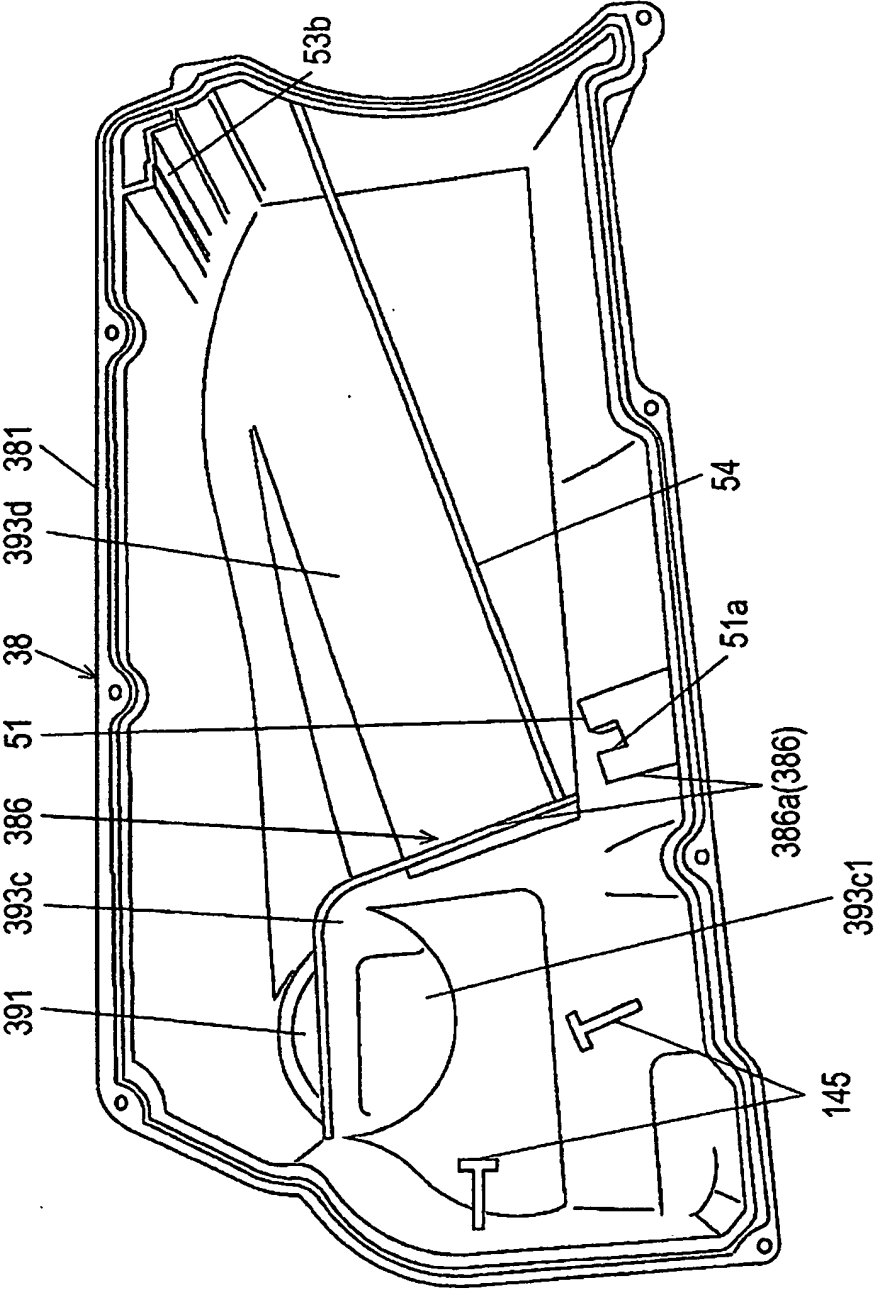


FIG. 13

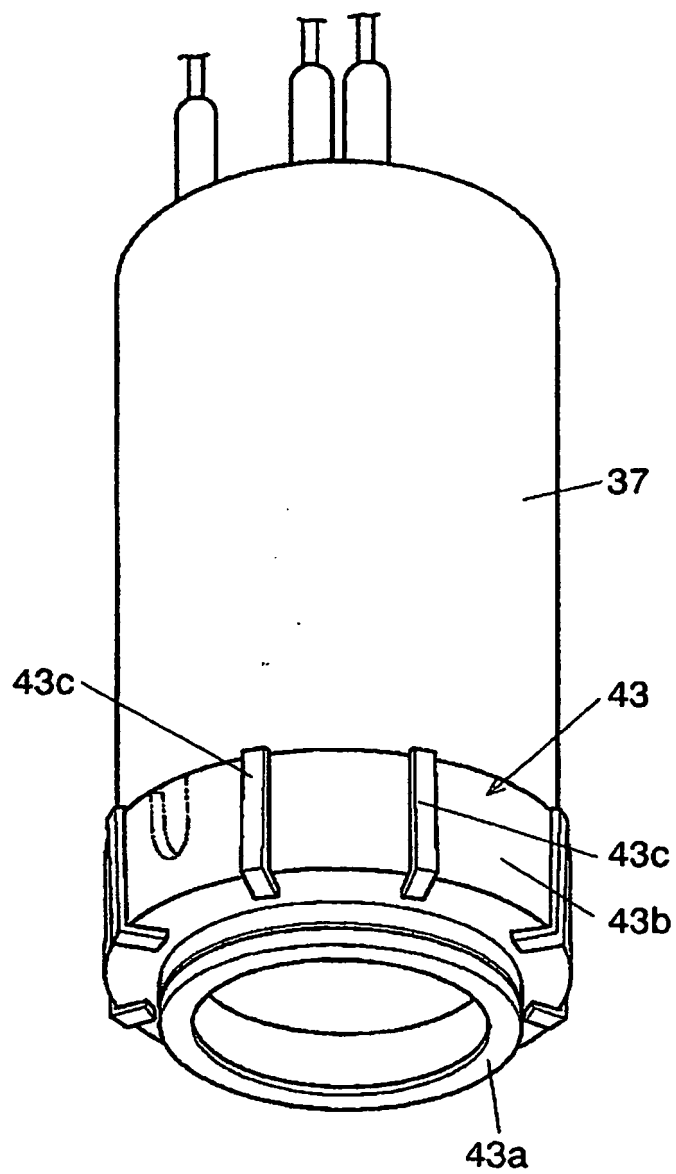


FIG. 14

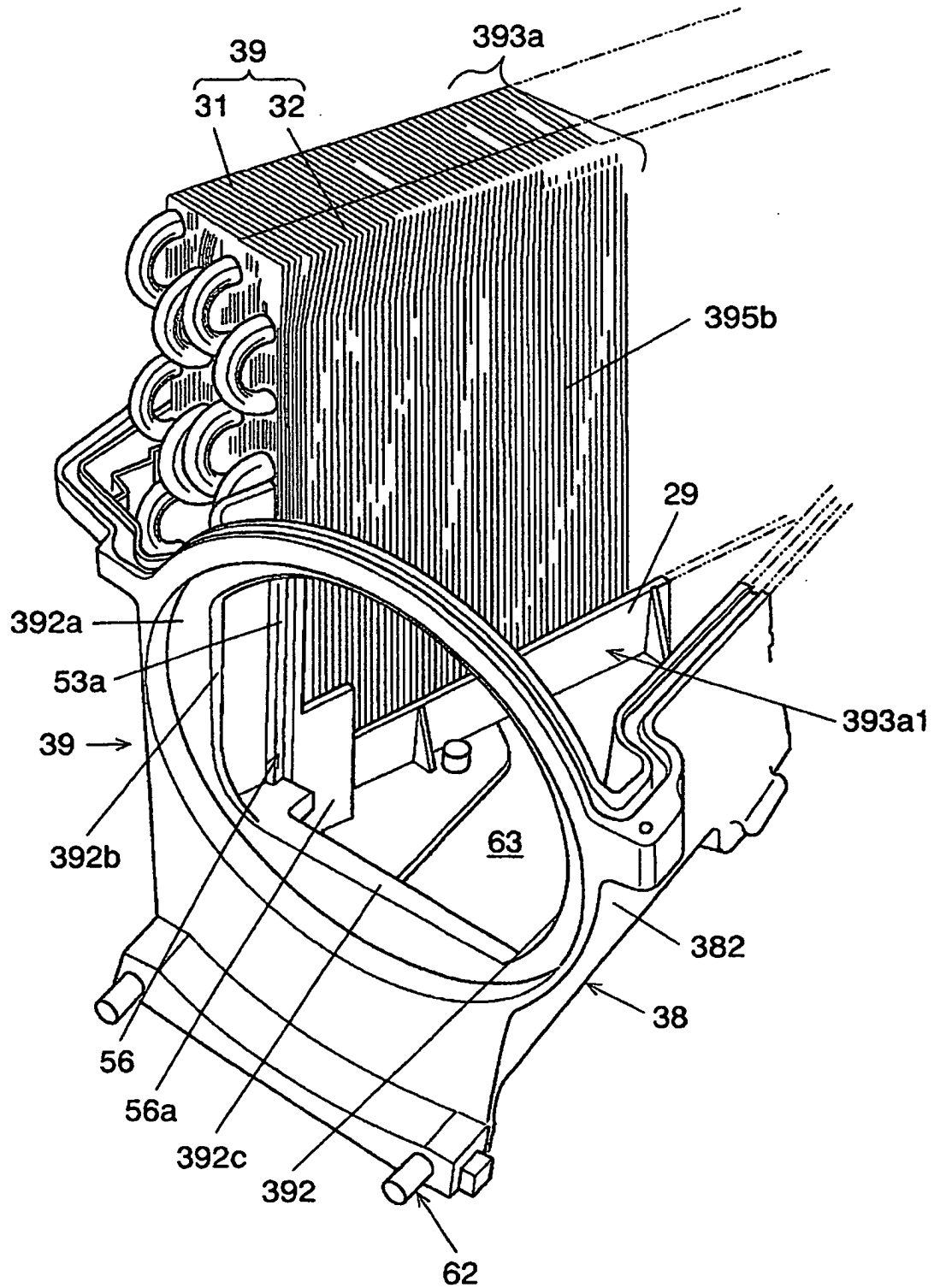
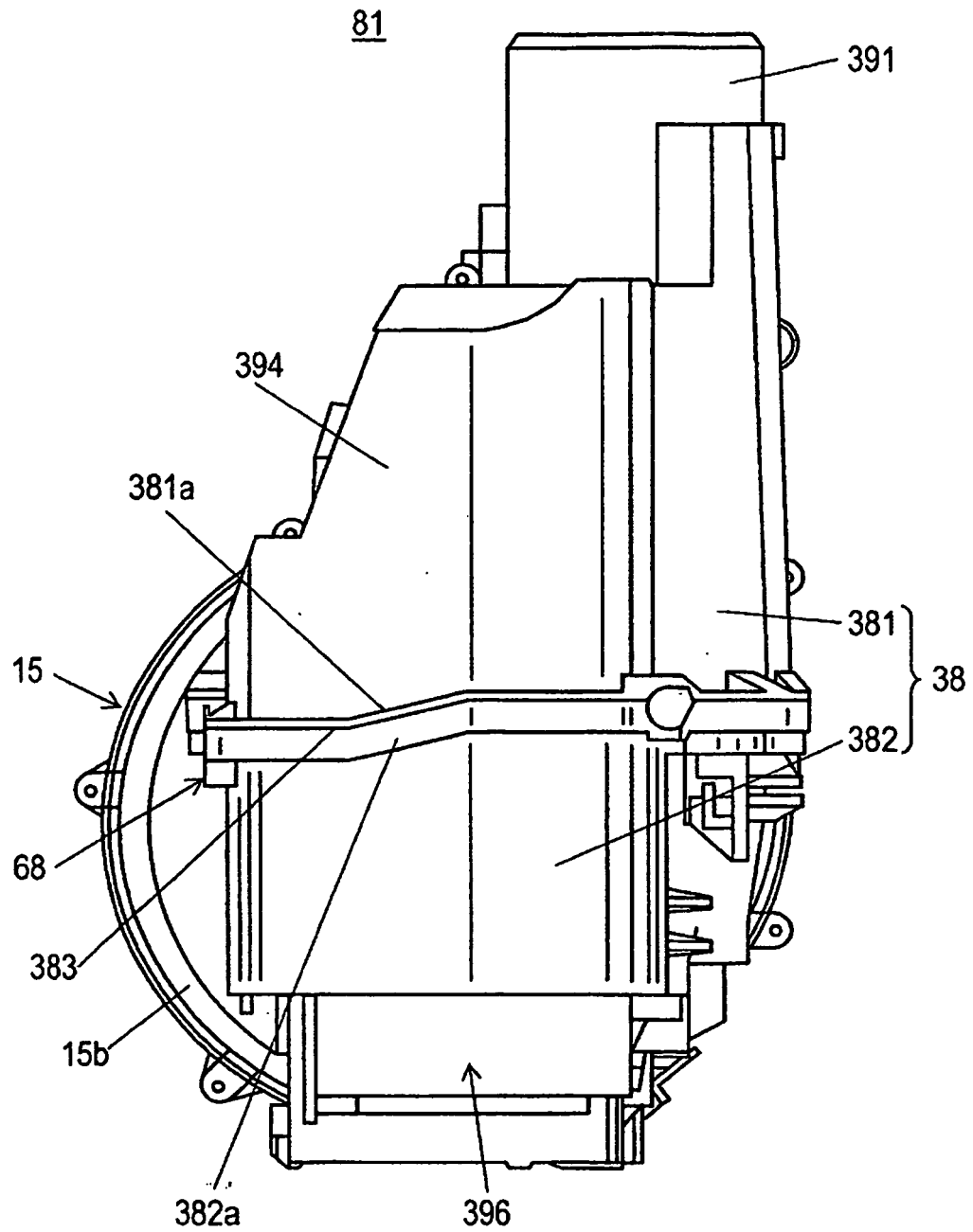


FIG. 15



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2008079861 A [0004]
- JP 2007330439 A [0006]