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(71) Applicant: **Panasonic Corporation**
Kadoma-shi
Osaka 571-8501 (JP)

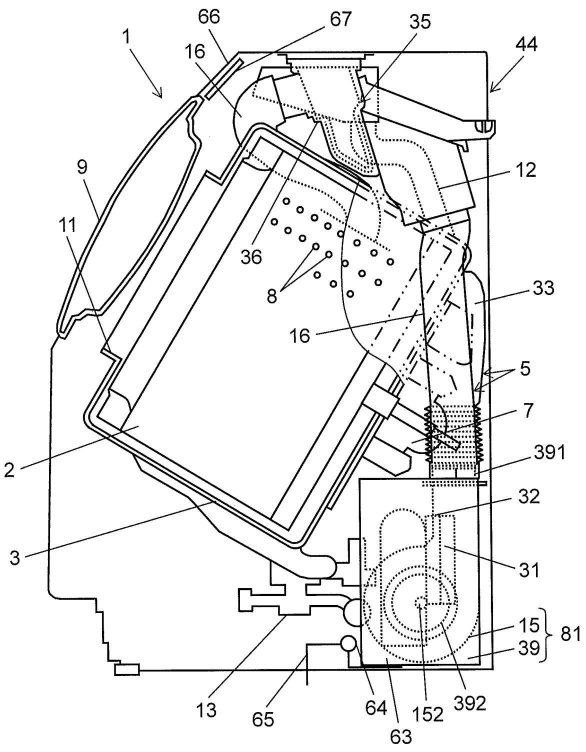
(72) Inventors:
- **Goi, Yasushi**
  Osaka 540-6207 (JP)
- **Uera, Osamu**
  Osaka 540-6207 (JP)
- **Nakai, Kouji**
  Osaka 540-6207 (JP)
- **Kotani, Junji**
  Osaka 540-6207 (JP)

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

(54) **Air conditioning unit**

(57) An air conditioning unit includes a unit case having a suction inlet port and a suction outlet port for circulating air. The unit case includes an evaporator, a condenser, and a compressor. The evaporator and the condenser are disposed somewhere along an air passage leading from the suction inlet port to the suction outlet port so as to dehumidifying and drying the circulating air. The compressor circulates refrigerant through the evaporator and the condenser. The unit case is formed of a plurality of divided portions, which continuously sandwich a sealing member between scored lines formed on the external surface of the unit case so as to ensure the airtightness of the unit case. The unit case includes a water reservoir having a drain mechanism on the outer wall thereof. The drain mechanism discharges stagnant water when opened by the stagnant water and prevents the sucking of outside air.

FIG. 1



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Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to an air conditioning unit installed, for example, in a drum type washer-dryer so as to condition the circulating air.

2. Background Art

[0002] When used in a drum type washer-dryer, a conventional air conditioning unit is accommodated in the dead space behind the tub and connected to a point in a circulating air passage having a blowing fan. The blowing fan allows the air in the tub to be drawn into the circulating air passage and introduced into the air conditioning unit through its suction inlet port. In the air conditioning unit, the air is dehumidified by an evaporator and heated by a condenser so as to be turned into hot and dry air. The air conditioning unit then exhausts the air through its suction outlet port to the tub so as to dry the laundry in the rotating drum. This process is repeated as a dry cycle after wash and rinse cycles.

[0003] The conventional air conditioning unit has a unit case which is partitioned into an air passage and an accommodating area by a partition wall. The air passage includes the evaporator and the condenser and is formed between the suction inlet port and the suction outlet port. The accommodating area houses a compressor, which circulates refrigerant through the evaporator and the condenser. The air passage and the accommodating area are sealed from each other by a sealing member so as to ensure their independence. This conventional technique is disclosed in Japanese Patent Unexamined Publication No. 2008-79861.

[0004] It is costly, however, to provide such a sealing structure to a plurality of positions of the unit case partly due to the complex shape of the unit case. Moreover, most sealing members have a shorter service life than the products in which they are used, are therefore, subject to replacement, thus increasing running cost. The evaporator and the condenser are in contact at their ends with the accommodating area so as to provide the connection to the compressor. This causes the sealing members that are applied around the ends of the evaporator and the condenser to be worn out particularly quickly by the heat from them. Another problem is that the air passage and the accommodating area cannot share the same drainage system because they are sealed from each other by the sealing structure.

SUMMARY OF THE INVENTION

[0005] An object of the present invention is to provide an air conditioning unit having no sealing structure between the accommodating area of a compressor and the air passage in which an evaporator and a condenser are arranged, thereby reducing both product cost and running cost.

[0006] An air conditioning unit according to the present invention includes a unit case having a suction inlet port and a suction outlet port for circulating air, the unit case comprising: an evaporator and a condenser somewhere along an air passage leading from the suction inlet port to the suction outlet port, the evaporator dehumidifying the circulating air and the condenser drying the circulating air; and a compressor for circulating refrigerant through the evaporator and the condenser, wherein the unit case is formed of a plurality of divided portions, the divided portions continuously sandwiching a sealing member between scored lines formed on an external surface of the unit case so as to ensure airtightness of the unit case, and the unit case includes a water reservoir having a drain mechanism on an outer wall thereof, the drain mechanism discharging stagnant water when opened by the stagnant water and preventing sucking of outside air.

[0007] With this structure, the evaporator and the condenser are supplied with refrigerant by the compressor so as to apply suction force to the suction outlet port, and hence, to the suction inlet port of the unit case through the air passage. As a result, airflow is generated from the suction inlet port to the suction outlet port through the air passage. The circulating air is dehumidified by the evaporator and heated by the condenser arranged somewhere along the air passage, thereby being continuously supplied as hot dry air. The unit case is formed of a plurality of divided portions sandwiching a sealing member between scored lines formed on the external surface of the unit case so as to ensure the airtightness of the unit case. With this simple sealing structure, although the air passage leading from the suction inlet port to the suction outlet port is communicated with the accommodating area of the compressor, the function of circulating, dehumidifying, and heating the drawn air can be ensured by preventing the accommodating area, which is an air trap, from being forcefully affected by the suction effect. In case of a sudden puddle, the communication between the air passage and the accommodating area allows the drain mechanism formed in the water reservoir of the unit case to be opened by stagnant water to discharge it. This secures the function of introducing the circulating air for heat exchange and discharging it, while preventing the sucking of the outside air.

[0008] The unit case of the air conditioning unit according to the present invention is formed of a plurality of divided portions for partitioning between the air passage and the accommodating area of the compressor without using a sealing structure. The divided portions continuously sandwich a sealing member between scored lines formed on the external surface of the unit case so as to ensure airtightness of the unit case.

[0009] The unit case includes a water reservoir having a valve mechanism on the outer wall thereof, the valve mechanism discharging stagnant water when opened by the stagnant water and preventing the sucking of outside air.

[0010] With this structure, the evaporator and the condenser are supplied with refrigerant by the compressor so as to apply suction force to the suction outlet port, and hence, to the suction inlet port of the unit case through the air passage. As a result, airflow is generated from the suction inlet port to the suction outlet port through the air passage. The circulating air is dehumidified by the evaporator and heated by the condenser arranged somewhere along the air passage, thereby being continuously supplied as hot dry air. The unit case is formed of a plurality of divided portions for partitioning between the air passage and the accommodating area of the compressor without using a sealing structure. The divided portions sandwich a sealing member between scored lines formed on the external surface of the unit case so as to ensure the airtightness of the unit case. Although the air passage leading from the suction inlet port to the suction outlet port is communicated with the accommodating area of the compressor, the accommodating area is prevented from being affected by the suction effect partly because of the effect of the partition so as to secure the function of circulating, dehumidifying, and heating the drawn air. In case of a sudden puddle, the communication between the air passage and the accommodating area allows the drain mechanism formed in the water reservoir of the unit case to be opened by stagnant water to discharge it. This secures the function of introducing the circulating air for heat exchange and discharging it, while preventing the sucking of the outside air.

[0011] The unit case of the air conditioning unit according to the present invention may be formed of two divided portions. This structure has another advantage of reducing the number of components and sealing members, and the assembly man-hours.

[0012] The valve mechanism of the air conditioning unit according to the present invention includes a drain hole on the outer wall of the water reservoir, and a check valve for closing the drain hole from outside by the sucking force from the inside of the unit case.

[0013] With this structure, the check valve closes the drain hole formed on the outer wall of the water reservoir only during the operation of the air conditioning unit when the sucking force is applied from the unit case so as to hermetically seal the unit case from the outside air, thereby maintaining the functions of the air conditioning unit. In case of a large amount of puddle, on the other hand, the check value is push-opened to discharge the water. Without the need to be closed during non-oporation, the check value can be realized by a simple flap value with no closing behavior.

[0014] The unit case of the air conditioning unit according to the present invention has a substantially rectangular parallelepiped shape having the suction inlet port on the back of the ceiling wall at one end and the suction outlet port on the end wall at the other end in the longitudinal direction of the unit case. The compressor is housed in the accommodating area at a position to the front of the unit case. The accommodating area and the air passage are partitioned from each other by a partition wall expanding from the divided portions forming the unit case, the air passage extending to the rear side and the other end side of the unit case. The unit case includes a heat exchange area between the partition wall and the end wall facing each other in the longitudinal direction of the unit case, the heat exchange area being partitioned into the suction inlet side and the suction outlet side in which the evaporator and the condenser are arranged, respectively, the evaporator and the condenser together forming a heat exchanger. The suction inlet port is opened upward and higher than the ceiling wall of the heat exchange area of the unit case, and when viewed two dimensionally, has a shape extending from the rear side of the accommodating area to the one-end-side posterior area extending from the heat exchange area of the air passage to the back of the accommodating area at one end side of the unit case. The air passage includes vertical curved area smoothly extending from the base opening of the suction inlet port to the one-end-side posterior area so as to guide the circulating air downward, and an upwardly expanded posterior area formed by expanding the suction inlet side of the heat exchange area upward from the suction inlet port to the other end side of the unit case at a height lower than the suction inlet port.

[0015] This structure generates a heat exchange fluid passing substantially uniformly through almost the entire region of the evaporator and the condenser from back to front.

[0016] The valve mechanism of the air conditioning unit according to the present invention is disposed on the bottom of the accommodating area of the compressor and on the bottom of the air passage, thus being functioned as the water reservoir. This structure allows the accommodating area of the compressor and the air passage to be communicated with each other without using a sealing structure. If a sudden puddle reaches from the air passage to the accommodating area, and drainage cannot be performed in the air passage due to the height difference between the air passage and the accommodating area, drainage can be performed in the accommodating area by the valve mechanism which allows the sucking force to work on both the air passage and the accommodating area.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017]

Fig. 1 is a side view of an air conditioning unit according to an embodiment of the present invention, which is installed in a drum type washer-dryer.

Fig. 2 is a rear view of the air conditioning unit.

Fig. 3 is a sectional view of an air-conditioning fan unit in which the air conditioning unit is connected to a blowing fan.

Fig. 4 is a cross sectional view of an accommodating area of a compressor and a one-end-side posterior area of an air passage, which is partitioned from the accommodating area of the air conditioning unit.

Fig. 5 is a cross sectional view of a heat exchange area of the air conditioning unit.

Fig. 6 is a plan view of the air conditioning unit when the upper divided portion of the unit case is removed.

Fig. 7 is a perspective view of the air conditioning unit when the area shown in Fig. 6 is viewed from an oblique angle.

Fig. 8 is an external perspective view of the air conditioning unit when viewed from the front side.

Fig. 9 is an external plan view of the air conditioning unit when viewed from above.

Fig. 10 is a plan view of the lower divided portion of the unit case of the air conditioning unit.

Fig. 11 is a perspective view of the lower divided portion shown in Fig. 10.

Fig. 12 is a bottom view of the upper divided portion of the unit case of the air conditioning unit.

Fig. 13 is a perspective view showing the compressor of the air conditioning unit to which an elastic base has been attached.

Fig. 14 is a partial perspective view of the air conditioning unit when the area shown in Fig. 6 is viewed from obliquely above from the suction outlet side.

Fig. 15 is a side view of the air conditioning unit when viewed from the accommodating area side.

DETAILED DESCRIPTION OF THE INVENTION

[0018] The air conditioning unit according to the present invention will be described in the following embodiment with reference to Figs. 1 to 15. Note that the embodiment is only an example of the present invention and does not limit the scope of the claims.

[0019] Figs. 1 and 2 show air conditioning unit 39 according to the embodiment of the present invention, which is installed in drum type washer-dryer 1. Washer-dryer 1 includes washer-dryer body 44, tub 3, and rotating drum 2. Tub 3 is supported in a floating state by unillustrated suspensions and is provided on its front side with laundry loading-unloading opening 11 leading to the opening end of rotating drum 2. Rotating drum 2 has a bottomed cylindrical shape and is disposed in tub 3 in such a manner that the axial direction of drum 2 is downwardly inclined from the front side to the rear side of tub 3. Washer-dryer body 44 is provided on an upwardly inclined surface of its front side with an opening having door 9. Through door 9 and laundry loading-unloading opening 11, the user can load and unload laundry from rotating drum 2. Door 9, which is provided on the upwardly inclined surface, allows the user to load and unload laundry without bending over.

[0020] Rotating drum 2 is provided on its peripheral surface with a large number of through holes 8 communicating with tub 3 and is also provided on its inner peripheral surface with stirring projections (not shown). Rotating drum 2 is rotated in the forward and reverse directions by motor 7 attached behind tub 3. Tub 3 is connected to water filling pipe 12 and drainage pipe 13 so as to supply and discharge water to and from tub 3 under the control of unillustrated feed-water valve and drain valve.

[0021] The user loads laundry through door 9, puts detergent into rotating drum 2, and operates control panel 66, which is provided, for example, on the upper part of the front surface of washer-dryer 1. As a result, the operation is started under the control of control board 67 inside control panel 66. Then, a predetermined amount of water is fed into tub 3 through water filling pipe 12, and rotating drum 2 starts to rotate by motor 7 so as to perform a wash cycle. During the rotation, the laundry in rotating drum 2 is stirred by being repeatedly lifted in the direction of rotation by the stirring projections formed on the inner wall of rotating drum 2 and dropped from a proper height. The laundry is thus beat-washed. After a predetermined wash time, the used washing water is discharged through drainage pipe 13 and the laundry is spin-dried by the high-speed rotation of rotating drum 2. After this, rinsing water is fed through water filling pipe 12 into tub 3 so as to perform a rinse cycle. In the rinse cycle, too, the laundry in rotating drum 2 is stirred by being repeatedly lifted and dropped by the stirring projections during the rotation of rotating drum 2.

[0022] Drum type washer-dryer 1 has the function of drying the laundry placed in rotating drum 2. To perform this function, as described above, washer-dryer 1 includes air conditioning unit 39 and circulating air passage 5 through which the air in tub 3 is drawn into air conditioning unit 39 for dehumidification and heating, and then returned as hot dry air into tub 3. Washer-dryer 1 also includes blowing fan 15 in the downstream of air conditioning unit 39 in circulating air passage 5.

[0023] Rotating blowing fan 15 generates airflow in circulating air passage 5 so that the wet air in rotating drum 2 having the laundry inside is exhausted from tub 3 via through holes 8 into circulating air inlet pipe 16, which leads to blowing fan 15. The wet air is then introduced into air passage 393 of air conditioning unit 39 through its suction inlet port 391. Air conditioning unit 39 is disposed (for example, directly connected) on the upstream side of blowing fan 15, and includes evaporator 31 and condenser 32 arranged somewhere along the air passage. The wet air is turned into hot dry air by being dehumidified by evaporator 31 that condenses water in the air and then heated by heat exchange with condenser 32. The hot dry air is drawn out from air conditioning unit 39 through its suction outlet port 392 into blowing fan 15, and fed to tub 3 through blower tube 33. The hot dry air fed into tub 3 and then into rotating drum 2 via through holes 8 are drawn out to tub 3 while being applied to the laundry such as clothes and again drawn into circulating air inlet pipe 16. This circulation of air through circulating air passage 5 is repeated as a dry cycle.

[0024] In a dry cycle using circulating air passage 5, the air circulating through circulating air passage 5 can contain foreign bodies such as lint of clothes or other laundry items. These foreign bodies can cause problems in the dry cycle, such as clogging up of evaporator 31 or condenser 32, the jamming into the rotating part of blowing fan 15, and accumulation on the inner surface of blowing fan 15, thus having trouble with maintenance. To avoid such problems, circulating air passage 5 generally includes filter room 36 having filter 35 for removing foreign bodies in the circulating air somewhere along circulating air inlet pipe 16, more specifically, in the upstream side of evaporator 31, condenser 32, and blowing fan 15. Even if, after the laundry is dried, the air containing foreign bodies is drawn into circulating air inlet pipe 16 leading to the evaporator 31, the foreign bodies are caught by filter 35 while passing through filter room 36, thus being prevented from being released to the circulating air flowing downstream. As a result, the functions of evaporator 31, condenser 32, and blowing fan 15 are secured for the long term. On the other hand, filter 35 in filter room 36 accumulates foreign bodies, gradually increasing the air passage resistance, thereby decreasing the drying function. Therefore, filter 35 is designed to be detachable as ordinary ones. Air conditioning unit 39 and blowing fan 15 directly connected thereto together form air-conditioning fan unit 81 so as to be treated as a stand-alone component, but it is not the only structure possible.

[0025] Air conditioning unit 39 includes unit case 38 in which evaporator 31 generating dew condensation water and condenser 32 together form heat exchanger 395. Unit case 38 includes reservoir 63 for dew condensation water. Reservoir 63 is formed in the area used for dehumidification on the bottom of unit case 38 and is connected to drainage pipe 65 having drainage pump 64. Drainage pump 64 allows adequate drainage based on the water level detected by an unillustrated water level sensor. Heat exchanger 395 is disposed at the lowest position of circulating air passage 5 in preparation that the trapped dew condensation water may reach the other part of circulating air passage 5 when an abnormal increase in the water level is caused by abnormal drainage.

[0026] Air conditioning unit 39, which can work in various apparatuses, is expected to be smaller in the number of components including replacement components and in assembly man-hours in order to reduce the sizes of the apparatuses in which air conditioning unit 39 is installed, the prices of manufactured goods, maintenance workload, and running cost.

[0027] Fig. 3 is a sectional view of air-conditioning fan unit 81 in which air conditioning unit 39 is connected to blowing fan 15. Fig. 4 is a cross sectional view of accommodating area 394 of compressor 37 and one-end-side posterior area 393b of air passage 393, which is partitioned from accommodating area 394 of air conditioning unit 39. Fig. 5 is a cross sectional view of heat exchange area 345 of air conditioning unit 39. Fig. 6 is a plan view of air conditioning unit 39 when upper divided portion 381 of unit case 38 is removed. Fig. 7 is a perspective view of air conditioning unit 39 when the area shown in Fig. 6 is viewed from an oblique angle.

[0028] In Figs. 3 to 7, air conditioning unit 39 includes unit case 38 having suction inlet port 391 and suction outlet port 392. Unit case 38 includes heat exchanger 395 and compressor 37. Heat exchanger 395 includes evaporator 31 and condenser 32 for dehumidifying and heating the circulating air, respectively. Evaporator 31 and condenser 32 are arranged somewhere between suction inlet port 391 and suction outlet port 392 in air passage 393 included in unit case 38. Compressor 37 circulates refrigerant through heat exchanger 395. Unit case 38 consists of a plurality of divided portions, namely, upper and lower divided portions 381 and 382, which continuously sandwich sealing member 384 between scored lines 383 formed on the external surface of unit case 38 so as to ensure the airtightness of unit case 38. In unit case 38, the water reservoir, which is generally formed as the above-mentioned reservoir 63, is provided at its outer wall with drain mechanism 101, which is opened by stagnant water to discharge it, but can prevent the sucking of outside air (see Figs. 4 and 5).

[0029] Thus, upper and lower divided portions 381 and 382 together forming unit case 38 sandwich sealing member 384 between scored lines 383 formed on the external surface of unit case 38 so as to ensure the airtightness of unit case 38. With this simple sealing structure, although air passage 393 leading from suction inlet port 391 to suction outlet port 392 is communicated with accommodating area 394 of compressor 37, the function of circulating, dehumidifying, and heating the drawn air can be ensured by preventing accommodating area 394, which is an air trap, from being forcefully affected by the suction effect. In case of a sudden puddle, the communication between air passage 393 and accommodating area 394 allows drain mechanism 101 formed in reservoir 63 of unit case 38 to be opened by stagnant water to discharge it. This secures the function of introducing circulating air for heat exchange and discharging it, while preventing the sucking of the outside air.

[0030] This structure can reduce the number of sealing positions as compared with conventional air conditioning units, thereby reducing the number of components including replacement components and assembly man-hours, and hence, both the product and running costs. When unit case 38 consists of only two, that is, upper and lower divided portions 381 and 382 as in the present embodiment, the numbers of components and sealing members, and assembly man-hours can be further reduced.

[0031] Although air passage 393 is communicated with accommodating area 394 which are partitioned from each other, the absence of the sealing structure between them prevents accommodating area 394 from being affected by the suction effect partly because of the effect of the partition so as to secure the function of circulating, dehumidifying, and heating the drawn air, thereby improving the performance of air conditioning unit 39. Air passage 393 and accommodating area 394 are partitioned by partition portion 386, which is formed by abutting upper and lower partition walls 386a and 386b upon each other. Upper and lower partition walls 386a and 386b are integrally formed with upper and lower divided portions 381 and 382, respectively. Thus, unit case 38, which is a complicated spatial form having accommodating area 394 and air passage 393 partitioned from each other, is formed of only two portions. Alternatively, however, upper and lower partition walls 386a and 386b can be replaced with a single partition wall that is integrally formed with one of upper and lower divided portions 381 and 382 so as to form partition portion 386.

[0032] Valve mechanism 101 consists of drain hole 101a formed on the outer wall of the water reservoir such as reservoir 63, and check valve 101b, which closes drain hole 101a from outside by the sucking force from unit case 38. Check valve 101b closes drain hole 101a only during the operation of air conditioning unit 39 when the sucking force is applied from unit case 38 so as to hermetically seal unit case 38 from the outside air, thereby maintaining the functions of air conditioning unit 39. In case of a large amount of puddle, on the other hand, check valve 101b is opened by the weight of water itself to discharge it. Without the need to be closed during non-operation, check valve 101b can be realized by a simple flap valve with no closing behavior (see Figs. 4 and 5). More specifically, when check valve 101b is formed of a rubber piece, it is possible to provide hook 101c integrally molded with the rubber piece at its top end, and to elastically insert hook 101c into mounting hole 101d formed on the top of drain hole 101a. Even when the closing and releasing operations corresponding to the sucking and releasing operations are frequent, the operation stroke is small enough not to promote fatigue, so that it rarely becomes a replacement component requiring maintenance.

[0033] In the embodiment, in the same manner that heat exchanger 395 includes reservoir 63, accommodating area 394 includes valve mechanism 101 as water reservoir 396 at its bottom. Valve mechanism 101 is provided to prepare for the case that a sudden puddle reaches accommodating area 394 due to the communication between air passage 393 and accommodating area 394. Valve mechanism 101 allows drainage in accommodating area 394 when reservoir 63 of air passage 393 cannot accommodate a puddle, which once reached accommodating area 394 due to the height difference between air passage 393 and accommodating area 394.

[0034] Fig. 8 is an external perspective view of air conditioning unit 39 when viewed from the front side. Fig. 9 is an external plan view of air conditioning unit 39 when viewed from above. In Figs. 8 and 9, unit case 38 is substantially rectangular parallelepiped shaped, having suction inlet port 391 on the back of the ceiling wall at one end, and suction outlet port 392 on an end wall at the other end in its longitudinal direction. Compressor 37 is housed in accommodating area 394, which is at a position to the front on one side of unit case 38. Accommodating area 394 and air passage 393 which extends to the rear side and the other end side of unit case 38 are partitioned from each other either by upper and lower partition walls 386a and 386b extending from upper and lower divided portions 381 and 382, respectively, of unit case 38 so as to form partition portion 386, or by a partition wall extending from one of upper and lower divided portions 381 and 382 (see Fig. 7). Evaporator 31 and condenser 32 are arranged on the suction inlet side and on the suction outlet side, respectively, of heat exchange area 393a, these sides being partitioned from each other. Heat exchange area 393a is located between partition portion 386 and the end wall, which face each other in the longitudinal direction of unit case 38. Suction inlet port 391 is opened upward and higher than the ceiling wall of heat exchange area 393a of unit case 38. As shown in Figs. 4 and 7, when viewed two dimensionally, suction inlet port 391 has a shape extending from the rear side of accommodating area 394 to one-end-side posterior area 393b without taking up space outside unit case 38. One-end-side posterior area 393b extends from heat exchange area 393a of air passage 393 to the back of accommodating area 394 at one end side of unit case 38.

[0035] Air passage 393 includes vertical curved area 393c and upwardly expanded posterior area 393d. Vertical curved area 393c smoothly extends from the base opening of suction inlet port 391 to one-end-side posterior area 393b so as to guide the circulating air downward. Upwardly expanded posterior area 393d is formed by expanding the suction inlet side in the back of heat exchange area 393a upward from suction inlet port 391 to the other end side of unit case 38 at a height lower than suction inlet port 391.

[0036] As described above, air passage 393 extends between suction inlet port 391 on the back of the ceiling wall at one end of unit case 38 and suction outlet port 392 on an end wall at the other end in its longitudinal direction. Air passage 393 is laid over almost the entire length of unit case 38 in the longitudinal direction excluding accommodating area 394, which is partitioned from air passage 393 by partition portion 386 so as to house compressor 37 at a position to the front on one side of unit case 38. The circulating air is smoothly drawn through suction inlet port 391, subjected to heat exchange by heat exchanger 395, and exhausted through suction outlet port 392 in air passage 393. In air passage 393, as shown by the arrows in Fig. 7, the circulating air introduced through suction inlet port 391 is received by one-end-side posterior area 393b and upwardly expanded posterior area 393d. One-end-side posterior area 393b is off to the one end side of unit case 38 from heat exchange area 393a beside accommodating area 394, and upwardly expanded posterior area 393d is off in the above direction from the back of heat exchange area 393a. The circulating airflows thus received are merged on the suction inlet side, which is the back of heat exchange area 393a, thereby generating a heat exchange fluid passing uniformly through almost the entire region of evaporator 31 and condenser 32 from back to front. The uniform passing of the heat exchange fluid can be achieved partly by the filling effect due to equal air passage resistances between evaporator 31 and condenser 32 of heat exchanger 395 in heat exchange area 393a. This provides a high heat exchange efficiency, and hence, high air-conditioning performance.

[0037] As described above, in air passage 393, when viewed two dimensionally, suction inlet port 391 has a shape extending from the rear side of accommodating area 394 having compressor 37 to one-end-side posterior area 393b, so that the introduction amount of the circulating air can be increased. Although this structure narrows down the airflow to one-end-side posterior area 393b having a smaller back and forth width than suction inlet port 391, the circulating air is smoothly introduced with the guide of vertical curved area 393c into the back of the suction inlet side of heat exchange area 393a without disorder or pressure drop. Furthermore, the introduced air is flown, so much easier due to being narrowed down, through suction inlet port 391 into the upwardly expanded posterior area 393d side extending to the other end side of unit case 38. This allows the circulating air introduced into air passage 393 to be spread more uniformly into backward suction face 395a of heat exchanger 395, thereby further improving the heat exchange efficiency. In vertical curved area 393c, as shown in Fig. 4, the flow of the introduced air is bent so as to centrifuge the water removed from the laundry, and the detergent or fabric softener residue which may be left in the air. In addition, the introduced air is subjected to impact separation by clearance portion 393c1 shown by the phantom line, which is formed to avoid interference between the introduced air and the top end of compressor 37.

[0038] As shown in Figs. 4 to 7, the aforementioned reservoir 63 is formed as heat exchanger tray 393a1 for holding heat exchanger 395. Heat exchanger tray 393a1 has the shape of an upward dish, which agrees with the rectangular shape of heat exchanger 395 in heat exchange area 393a when viewed two dimensionally. Heat exchanger 395, which is placed and held by heat exchanger tray 393a1, is a unit formed by integrating evaporator 31 and condenser 32 both of which include fins 395c having small gaps formed by heat (not shown). The gaps formed by heat can reduce the heat transfer from condenser 32 to evaporator 31 to an extent that prevents the growth of frost or ice in evaporator 31 and melts the frost with a temperature increase in the refrigerant even when the outside air is cold, thereby ensuring high drying efficiency. This can eliminate an isolation space, which is conventionally provided between evaporator 31 and condenser 32, so as to reduce installation space, thereby reducing the amount of air passing through a bypass caused by the play in the isolation space leading to the suction outlet port 392 side. As a result, the effective area is maximized, thus improving the heat exchange efficiency and the drying efficiency, and reducing noise when drying.

[0039] In addition, heat exchanger 395 is disposed obliquely to the longitudinal direction of unit case 38 as shown in Figs. 6 and 7. This allows the distance between backward suction face 395a and the back wall on the suction inlet side of heat exchange area 393a which face each other to be reduced from the one-end-side posterior area 393b side leading to suction inlet port 391 toward the other end side of unit case 38. Thus, when heat exchange area 393a is disposed in the direction "A" of Fig. 6 so as to minimize the distance from the one-end-side posterior area 393b side to suction outlet port 392, the tilt angle θ of fins 395c of heat exchanger 395 with respect to the direction "A" can be smaller than in the case where heat exchanger 395 is disposed in the longitudinal direction of unit case 38. The reduction in the tilt angle θ results in a reduction in the ventilation resistance so as to equalize the distribution of air passing through heat exchanger 395. This achieves higher dehumidifying and heating efficiencies, resulting in an increase in drying efficiency and a decrease in noise.

[0040] It is preferable for heat exchanger 395 to be disposed as close to the direction "A" as possible so as to minimize the distance from one-end-side posterior area 393b to suction outlet port 392 in heat exchange area 393a.

[0041] Fig. 10 is a plan view of lower divided portion 382 of unit case 38 of the air conditioning unit 39. Fig. 11 is a perspective view of lower divided portion 382 shown in Fig. 10. In Figs. 10 and 11, heat exchange area 393a is formed in the bottom of unit case 38 in such a manner that heat exchanger tray 393a1 and the suction outlet side 393a2 of heat exchanger 395 which is held by heat exchanger tray 393a1 as reservoir 63, are lower in height than the suction inlet side of heat exchanger 395. Accommodating area 394 is much lower than reservoir 63 as shown in Fig. 4. This design allows compressor 37 to be arranged at a low point in the bottom of unit case 38 and to make its center of gravity lower.

[0042] Heat exchanger tray 393a1 directly holds heat exchanger 395 without placing a filter therebetween as shown in Fig. 3. Heat exchanger tray 393a1 includes dew condensation water discharging tray 21 and separated water discharging tray 23, which are partitioned from each other by partition wall 28. Dew condensation water discharging tray 21 holds evaporator 31, and separated water discharging tray 23 holds condenser 32 of heat exchanger 395. More specifically, dew condensation water discharging tray 21 receives and discharges dew condensation water generated by evaporator 31. Separated water discharging tray 23 receives and discharges the moisture which is removed from the laundry and contained in the circulating air, or the detergent or fabric softener residue which may get into the circulation system, before they pass through heat exchanger 395. Dew condensation water discharging tray 21 has drain hole 22, and the water and the residue accumulated in separated water discharging tray 23 are discharged through dew condensation water discharging tray 21.

[0043] The water in the circulating air can be removed as dew condensation water while passing through evaporator 31 and discharged from dew condensation water discharging tray 21 without problems. On the other hand, the viscous detergent or fabric softener residue, when got into the circulating air, can narrow or clog the air path in heat exchanger 395 or blowing fan 15, or increase the rotational resistance of blowing fan 15. To avoid this, vapor-liquid separation is performed so that the water, before getting into to heat exchanger 395, can be discharged from separated water discharging tray 23 through dew condensation water discharging tray 21 without imposing a burden on drainage pump 64. The water separated by the vapor-liquid separation includes the water contained in the circulating air. The water dilutes and washes out the viscous detergent or fabric softener residue separated by the vapor-liquid separation, thus reducing a burden on drainage pump 64.

[0044] In order to perform the vapor-liquid separation, the suction inlet side of heat exchange area 393a includes shelf portion 24 and inclined portion 25 in lower divided portion 382 of unit case 38. Shelf portion 24 extends substantially horizontally from the back wall toward the front side of unit case 38 so as to once receive the air, which flows as described below, at a position in the height direction of heat exchanger 395 as shown in Figs. 4, 5, and 7, and then to guide the air toward heat exchanger 395. The air flows from suction inlet port 391 including one-end-side posterior area 393b and upwardly expanded posterior area 393d downwardly between backward suction face 395a of heat exchanger 395 and the back wall of unit case 38. Inclined portion 25 extends obliquely downward between shelf portion 24 and heat exchanger tray 393a1 so as to guide the suctioned air coming from shelf portion 24 to pass through the entire surface of backward suction face 395a of heat exchanger 395 held on heat exchanger tray 393a1.

[0045] As a result, the air introduced into air passage 393 is guided toward heat exchanger 395 by bumping into shelf portion 24 while it is flowing downward toward heat exchanger 395 from suction inlet port 391 and upwardly expanded posterior area 393d. This bumping can separate the moisture which is removed from the laundry and contained in the drawn air, or the detergent or fabric softener residue which may get into the circulation system from the drawn air. Both the separated water and the detergent or fabric softener residue travel along shelf portion 24 with the air flowing toward inclined portion 25 and fall down therefrom. More specifically, while washing out the viscous detergent or fabric softener residue, the separated water is pushed forcefully to inclined portion 25, and then falls down therefrom with the air as well as with gravitational effects. The separated water and other materials which fall down from inclined portion 25 are blocked by rib 26 shown in Figs. 5 and 11 under inclined portion 25 so as to be guided to communicating passage 27 shown in Figs. 3 and 11 leading to separated water discharging tray 23, thereby being fed into separated water discharging tray 23 on the one end side, that is, the accommodating area 394 side.

[0046] On the other hand, the entire bottom of reservoir 63, which is formed of heat exchanger tray 393a1 and suction outlet side 393a2, is lower toward drain hole 22 of dew condensation water discharging tray 21. In addition, separated water discharging tray 23 has small communicating portion 29a on partition wall 29 facing the suction outlet side 393a2, and small communicating portion 28a on partition wall 28 facing dew condensation water discharging tray 21. As a result, the separated water and other materials flown into separated water discharging tray 23 are flown into dew condensation water discharging tray 21 through communicating portion 28a so as to reach drain hole 22 of dew condensation water discharging tray 21. If the water overflows or accumulates on suction outlet side 393a2 due to, for example, malfunction of drainage pump 64 connected to drain hole 22, the water is flown into separated water discharging tray 23 through communicating portion 29a, then into dew condensation water discharging tray 21 through communicating portion 28a so as to reach drain hole 22.

[0047] Heat exchanger 395 is placed on heat exchanger tray 393a1 without providing a filter. In accordance with this condition, communicating portions 28a and 29a are designed to a size large enough to pass water but not lint or the viscous detergent or fabric softener residue which may get into the circulating air. Similarly, communicating portions 41 and baffle projections 42 are provided somewhere along the path leading to dew condensation water discharging tray 21 and separated water discharging tray 23 so as to block lint and the detergent or fabric softener residue. The amount of lint caught by communicating portions 28a, 29a and 41, and baffle projections 42 is small enough not to obstruct normal drainage. On the contrary, the caught lint serves to catch the detergent residue. Catching the detergent residue obstructs water flow, but the obstructed water serves to dilute the detergent residue to an extent that is reached to drain hole 22. Before passing through heat exchanger 395, the detergent or fabric softener residue which may get into the circulating air is effectively separated from the air together with the water which is removed from the laundry and contained in the circulating air. Since the detergent or fabric softener residue is discharged after being diluted by the water in this manner, there is no fear to impose a burden on drainage pump 64 or to stop it. Communicating portions 41, which are formed by cutting the middle of each of barrier walls 41a crossing the path into a V-shape, restrict the passing of lint, the detergent or fabric softener residue which are washed out along the bottom of the path. Even if the lint thus restricted from passing through the path is so bulky as to restrict the passing of the water, the water thus restricted from passing through the path can easily go forward together with the diluted detergent residue. This is partly because the water restricted from passing through the path is more bulky than the lint, and partly because communicating portions 41 having an upwardly expanded shape reduces the restriction.

[0048] Shelf portion 24 and inclined portion 25, which function effectively by narrowing the inner space in the posterior area of the lower half of unit case 38, form a free space "S" open to the back side and the downward side under shelf portion 24. The free space "S" is an inner hollow shown in Figs. 4 and 7 formed on the back wall of the lower half of unit case 38. When air conditioning unit 39 or air-conditioning fan unit 81 is installed on the bottom of washer-dryer body 44 along the back wall as shown in Fig. 3, the free space "S" can be used as a space for wiring outside air conditioning unit 39 or air-conditioning fan unit 81 or as a space to install external devices such as sensors shown in Figs. 1 and 4.

[0049] Shelf portion 24 and inclined portion 25 are integrally formed on the lower divided portion 382 side so as to ensure their continuity. Shelf portion 24 is disposed a little lower than joint flanges 381a and 382a, which are joined to each other to form scored lines 383 between upper and lower divided portions 381 and 382. Joint flange 382a of lower divided portion 382 has a recessed stripe around its entire perimeter so as to accommodate annular sealing member 384. Joint flange 381a of upper divided portion 381 has a projecting stripe, which is fitted into the recessed stripe. Thus, sealing member 384 is sandwiched between the recessed stripe and the projecting stripe so as to seal between scored lines 383. The joining between joint flanges 381a and 382a and the sealing between scored lines 383 are enhanced by screw fastening portions 68 shown in Fig. 5 using a large number of fastening holes formed in the circumferential direction "A" as shown in Fig. 11.

[0050] Heat exchanger 395 includes partition wall 52, which is a plate made of an aluminum based or other corrosive metal and is overhung in the front and back directions as shown in Figs. 4, 6, and 7. Partition wall 52 is provided at one end in which partition portion 386 for partitioning between air passage 393 and accommodating area 394 is vertically sandwiched and fitted into opening 51 formed between upper and lower divided portions 381 and 382 in accommodating area 394 as shown in Figs. 3 and 4. Partition wall 52 is slid into guide groove 51a formed on the rim (particularly the vertical rim) of opening 51 from above so as to position the end of heat exchanger 395 on the accommodating area 394 side. Heat exchanger 395 has a rough sealing structure to reduce the airflow through opening 51 between air passage 393 and accommodating area 394. The other end of heat exchanger 395, that is, the end on suction outlet port 392 side is positioned by roughly fitting it from above into between guides 53a and 53b. Guides 53a and 53b are integrally formed upward at the corners on both sides of the end on the suction outlet port 392 side of heat exchanger tray 393a1 of lower divided portion 382 as shown in Figs. 6 and 10. Heat exchanger 395, thus positioned at both sides thereof, is disposed in a predetermined position on heat exchanger tray 393a1.

[0051] Fig. 12 is a bottom view of upper divided portion 381 of unit case 38 of air conditioning unit 39. As shown in Fig. 12, in heat exchanger 395, rib-shaped partition wall 54 is in contact with the rear surface of the ceiling wall of upper divided portion 381. Partition wall 54 is formed downward between upper partition wall 386a and the other end wall opposite thereto. This structure, in corporation with the top rim of opening 51 of partition portion 386, prevents heat exchanger 395 from floating from heat exchanger tray 393a1. This structure also prevents the air on the suction inlet side from bypassing from the vicinity of heat exchanger 395 in heat exchange area 393a to suction outlet side 393a2.

[0052] Compressor 37 is disposed in recess 394a of bottom portion 394c of accommodating area 394 via elastic base 43. Elastic base 43 functions as a buffer and a vibration absorber to elastically support compressor 37, thereby reducing the size, weight, and cost of compressor 37. Elastic base 43 via which compressor 37 is disposed in recess 394a absorbs vibration of compressor 37 and also provides a high buffering action against lateral external vibration during spin drying. Compressor 37, which is conventionally about 140 mm thick when viewed two dimensionally, can be reduced to 90 mm thick or so, thereby reducing the space for accommodating area 394. As a result, air passage 393 and heat exchanger 395 arranged therein can be increased in size, while unit case 38 is the same size as conventional ones, thereby improving heat exchange efficiency, and hence, air-conditioning performance.

[0053] Fig. 13 is a perspective view showing compressor 37 of air conditioning unit 39 to which elastic base 43 has been attached. As shown in Fig. 13, when disposed in recess 394a, compressor 37 has small radial gap 45 between itself and elastic base 43 (see Fig. 3), which is attached to the lower portion of compressor 37. In addition, there are provided projections 145, which project downward from the top of upper divided portion 381 of unit case 38 as shown in Figs. 3 and 12 in such a manner as to face the top end of compressor 37 with predetermined gap 46 therebetween as shown in Fig. 3. This prevents compressor 37 from coming out from recess 394a beyond allowable limits. For example, gap 45 is set to about 0.5 mm, and gap 46 is set to about 5 mm. The allowable limits are within the limits of maintaining vibration-absorption and buffering actions for compressor 37.

[0054] As a result, compressor 37 compresses elastic base 43 by its own weight so as to be balanced with the elastic supporting force of elastic base 43, thereby being settled in recess 394a and supported in a floating state in accommodating area 394 with some play in the radial and vertical directions. Elastic base 43 includes annular bottom rim 43a, which faces the outer peripheral area of the bottom surface of compressor 37 as shown in Figs. 3, 5, and 13 so as to provide high vibration-absorbing performance against the vibration of compressor 37. Bottom rim 43a is restricted in its radial movement by fitting its lower end into second recess 394b, which is concentric with and shallower than recess 394a. Bottom rim 43a thus increases its force at its lower end so as to support compressor 37 in the radial direction, while allowing motion around itself within gap 45. Elastic base 43 also includes slightly thick-walled cap portion 43b, which is connected to the upper end of bottom rim 43a and covers the lower outer periphery of compressor 37 as shown in Figs. 3, 6, and 13. If the motion of compressor 37 exceeds gap 45 in a certain radial direction, cap portion 43b is compressed in the corresponding radial direction between itself and the inner periphery of recess 394a. Thus, cap portion 43b absorbs the vibratory motion, and reduces the collision noise when the vibration reaches unit case 38. Cap portion 43b also includes axial ribs 43c around its outer periphery, which are compressed between the inner periphery of recess 394a and themselves. This achieves a smooth vibration-absorbing action so as to elastically support compressor 37 within a predetermined range in recess 394a. Cap portion 43b may alternatively be provided on its peripheral wall with an engagement recess. The engagement recess is engaged with part of the pipe projecting from compressor 37 toward the side of its body, thereby functioning as a baffle between elastic base 43 and compressor 37. It is also possible to provide an engaging portion or a fitting portion for baffling between elastic base 43 and recess 394a. It is also possible that bottom rim 43a or cap portion 43b of elastic base 43 is composed of separate parts. In short, it is essential to fill the space between recess 394a and the lower end of compressor 37 with an elastic member.

[0055] In accommodating area 394, bottom portion 394c having recess 394a is a little higher than heat exchanger tray 393a1 and the bottom of suction outlet side 393a2 as shown in Fig. 3. Accommodating area 394 is partitioned from air passage 393 by partition portion 386 around opening 51 where heat exchanger 395 is held. Opening 51 is provided at the lower part of its rim with a recessed stripe. Communicating passage 47 is formed under heat exchanger 395 of bottom portion 394c so as to connect accommodating area 394 to separated water discharging tray 23 in air passage 393, more specifically, via communicating passage 27. In addition, bottom portion 394c includes substantially annular rib 48 formed by upwardly extending the inner wall of recess 394a as shown in Figs. 3, 4, 6, and 10. The drops of the dew condensation water from cryogenic piping 37a around compressor 37 are caught by part of bottom portion 394c. As a result, the dew condensation water, which constantly drops from cryogenic piping 37a at least in small amounts during operation, can be caught by bottom portion 394c around recess 394a. The dew condensation water runs down into separated water discharging tray 23, which is lower than bottom portion 394c, through communicating passage 47 formed in the lower part of the rim of opening 51 of partition portion 386. Communicating passage 47 is at the same height as bottom portion 394c. The dew condensation water is drained by gravity together with separated water, while being prevented from flowing into recess 394a by rib 48. This structure eliminates the need to provide drainage holes in recess 394a where holding compressor 37 is placed, thereby reducing the number of drainage channels. This structure also maintains drying efficiency even at low temperatures because it is no fear of sucking the outside air.

[0056] Heat exchanger 395 includes exhaust surface 395b facing the front portion thereof. Even when heat exchanger 395 is disposed obliquely to the longitudinal direction of unit case 38 as described above, the suction effect of downstream blowing fan 15 reaching as far as suction outlet port 392 exerts more strongly on the side of exhaust surface 395b that is closer to suction outlet port 392. This may cause a problem that, in suction outlet side 393a2 of heat exchange area 393a, the dew condensation water generated while the air passes through evaporator 31 is sucked through the side of exhaust surface 395b that is closer to suction outlet port 392 into blowing fan 15 through suction outlet port 392.

[0057] Fig. 14 is a partial perspective view of air conditioning unit 39 when the area shown in Fig. 6 is viewed from obliquely above from suction outlet side 393a2. Fig. 15 is a side view of air conditioning unit 39 when viewed from the accommodating area 394 side. In Fig. 14, in order to prevent dew condensation water from being sucked in by the strong suction effect of suction outlet port 392, shielding wall 56 is formed using guide 53a, which extends upward on the front side of the suction outlet port 392 side end of heat exchanger tray 393a1. In Fig. 15, in order to solve the strongly uneven suction effect, blowing fan 15 connected to suction outlet port 392 includes scroll case 15b and blowout portion 15d (see Fig. 12), which is raised upright at its back. Blowing fan 15 forms a corner portion along the lower half of the suction outlet port 392 side edge of exhaust surface 395b of heat exchanger 395 and the front side of the lower end edge. In accordance with this condition, shielding wall 56 has a simple step-like shape including guide 53a as shown in Figs. 3, 8, and 11 so as to cover exhaust surface 395b of heat exchanger 395 to the minimum necessary. On the other hand, the reduction in the airflow area of exhaust surface 395b caused by shielding wall 56 is minimized by floating overhanging portion 56a of guide 53a from exhaust surface 395b as shown in Fig. 6. In addition, in suction outlet port 392 concentric with fan 15a of blowing fan 15, the side of suction outlet port 392 that has shielding wall 56 for restricting the air suction is formed into a shape overhanging toward the axis line. Suction outlet port 392 includes vertical straight edge 392b for narrowing its circular opening around the axis line of fan 15a as shown in Fig. 11. Vertical straight edge 392b facilitates the prevention of water suction from the suction outlet port 392 side end of heat exchanger 395. Similarly, the lower edge of suction outlet port 392 is formed as lateral straight edge 392c, which extends along the axial line until it reaches the same height as heat exchanger tray 393a1 and then is narrowed upward so as to restrict the water suction from the bottom of reservoir 63.

[0058] As shown in Fig. 3, the connection area between suction outlet port 392 of unit case 38 and blowing fan 15 is sealed in a simple structure. More specifically, scroll case 15b for housing fan 15a includes suction port 15c having connecting tube 15c1, which is loosely fitted into the inner periphery of suction outlet port 392. The tip of connecting tube 15c1 is pressure-welded to flange wall 392a on the inner periphery of suction outlet port 392. Scroll case 15b and unit case 38 are pressure-welded by providing joint 62 in which suction outlet port 392 and suction port 15c are connected to each other by being screwed at a plurality of points, for example, three or more points. This structure eliminates the need to provide the sealing member as an article of consumption, thereby reducing both product cost and running cost.

[0059] Alternatively, unit case 38 can be composed of three divided portions so as to reduce their volumes as mold products, thereby being more readily formed into a complex shape. An example will be described as follows with reference to Fig. 8. In upper divided portion 381, the portion not higher than ceiling wall of heat exchange area 393a is divided from the portion higher than ceiling wall along scored lines (alternate long and two short dashes lines) 61, which are on the external surface of unit case 38 and at the same height as the simple horizontal plane of unit case 38 as shown in Fig. 8. The portion higher than ceiling wall indicates the upper parts of upwardly expanded posterior area 393d, suction inlet port 391, and accommodating area 394. Unit case 38 has a continuous sealing member applied between scored lines 61 along its entire perimeter so as seal unit case 38. This structure provides the features of the three division structure without losing the features of the two division structure described in the embodiment.

[0060] Thus, the present invention eliminates the sealing structure between the accommodating area of the compressor and the air passage in which an evaporator and a condenser are arranged, thereby reducing both product cost and running cost.

Claims

1. An air conditioning unit including a unit case having a suction inlet port and a suction outlet port for circulating air, the unit case comprising:

   an evaporator and a condenser somewhere along an air passage leading from the suction inlet port to the suction outlet port, the evaporator dehumidifying the circulating air and the condenser drying the circulating air; and
   a compressor for circulating refrigerant through the evaporator and the condenser, wherein
   the unit case is formed of a plurality of divided portions, the divided portions continuously sandwiching a sealing member between scored lines formed on an external surface of the unit case so as to ensure airtightness of the unit case, and
   the unit case includes a water reservoir having a drain mechanism on an outer wall thereof, the drain mechanism discharging stagnant water when opened by the stagnant water and preventing sucking of outside air.

2. An air conditioning unit including a unit case having a suction inlet port and a suction outlet port for circulating air, the unit case comprising:

   an evaporator and a condenser somewhere along an air passage leading from the suction inlet port to the suction outlet port, the evaporator dehumidifying the circulating air and the condenser drying the circulating air; and
   a compressor for circulating refrigerant through the evaporator and the condenser, wherein
   the unit case is formed of a plurality of divided portions for partitioning between the air passage and an accommodating area of the compressor without using a sealing structure, the divided portions continuously sandwiching a sealing member between scored lines formed on an external surface of the unit case so as to ensure airtightness of the unit case, and
   the unit case includes a water reservoir having a valve mechanism on an outer wall thereof, the valve mechanism discharging stagnant water when opened by the stagnant water and preventing sucking of outside air.

3. The air conditioning unit of claim 1 or 2, wherein the unit case is formed of two divided portions.

4. The air conditioning unit of claim 2, wherein the valve mechanism comprises:

   a drain hole on the outer wall of the water reservoir; and
   a check valve for closing the drain hole from outside by a sucking force from an inside of the unit case.

5. The air conditioning unit of claim 1 or 2, wherein the unit case has a substantially rectangular parallelepiped shape having the suction inlet port on a back of the ceiling wall at one end and the suction outlet port on an end wall at an other end in a longitudinal direction of the unit case;
   the compressor is housed in the accommodating area at a position to a front of the unit case;
   the accommodating area and the air passage are partitioned from each other by a partition wall ex-

panding from the divided portions forming the unit case, the air passage extending to a rear side and the other end side of the unit case;
the unit case includes a heat exchange area between the partition wall and the end wall facing each other in the longitudinal direction of the unit case, the heat exchange area being partitioned into a suction inlet side and a suction outlet side in which the evaporator and the condenser are arranged, respectively, the evaporator and the condenser together forming a heat exchanger;
the suction inlet port is opened upward and higher than the ceiling wall of the heat exchange area of the unit case, and when viewed two dimensionally, has a shape extending from a rear side of the accommodating area to a one-end-side posterior area extending from the heat exchange area of the air passage to a back of the accommodating area at one end side of the unit case; and
the air passage comprises:

a vertical curved area smoothly extending from a base opening of the suction inlet port to the one-end-side posterior area so as to guide the circulating air downward; and
an upwardly expanded posterior area formed by expanding the suction inlet side of the heat exchange area upward from the suction inlet port to the other end side of the unit case at a height lower than the suction inlet port.

6. The air conditioning unit of claim 5, wherein
the valve mechanism is disposed on a bottom of the accommodating area of the compressor, and on a bottom of the air passage, the valve mechanism being functioned as the water reservoir.

FIG. 1

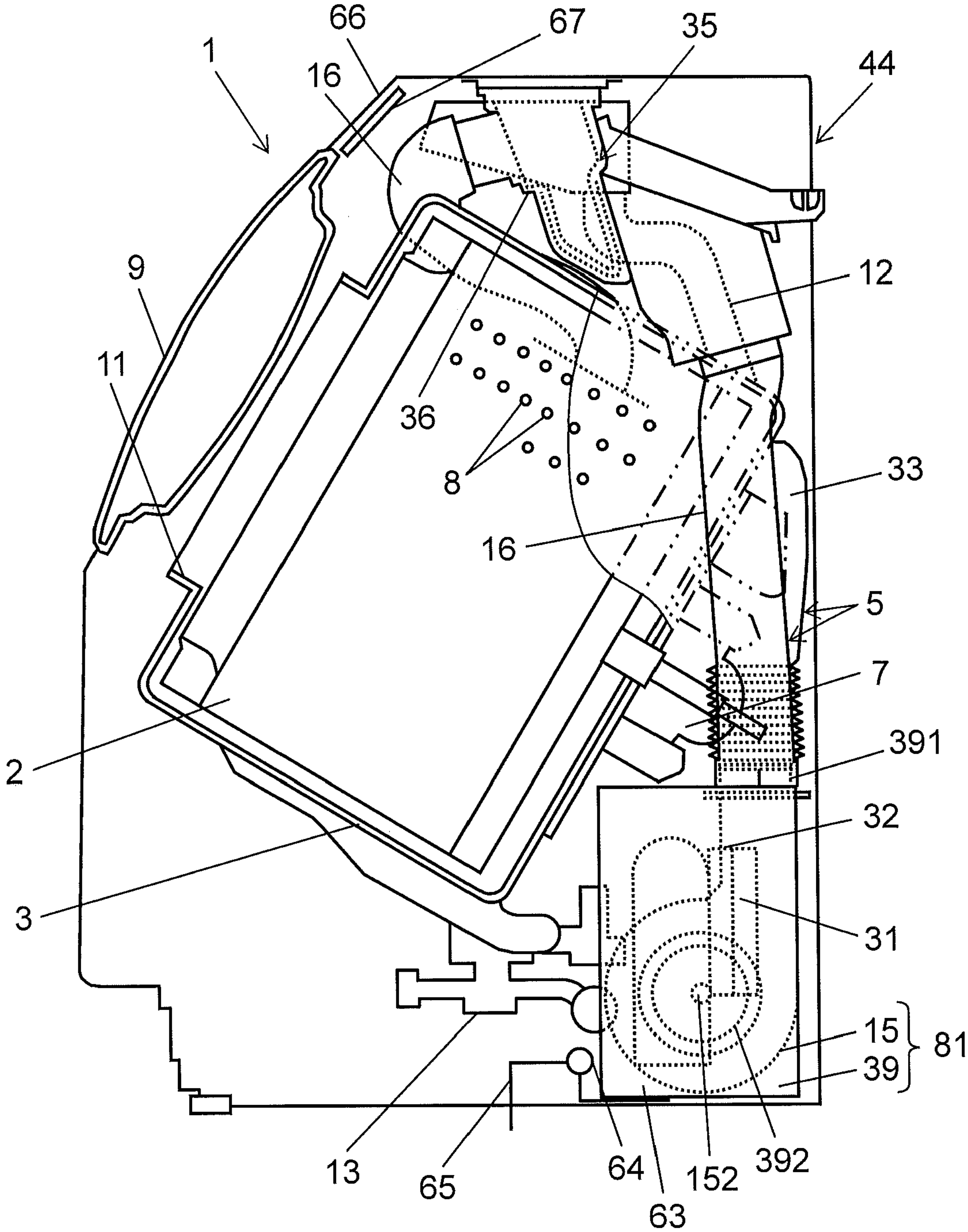
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FIG. 2

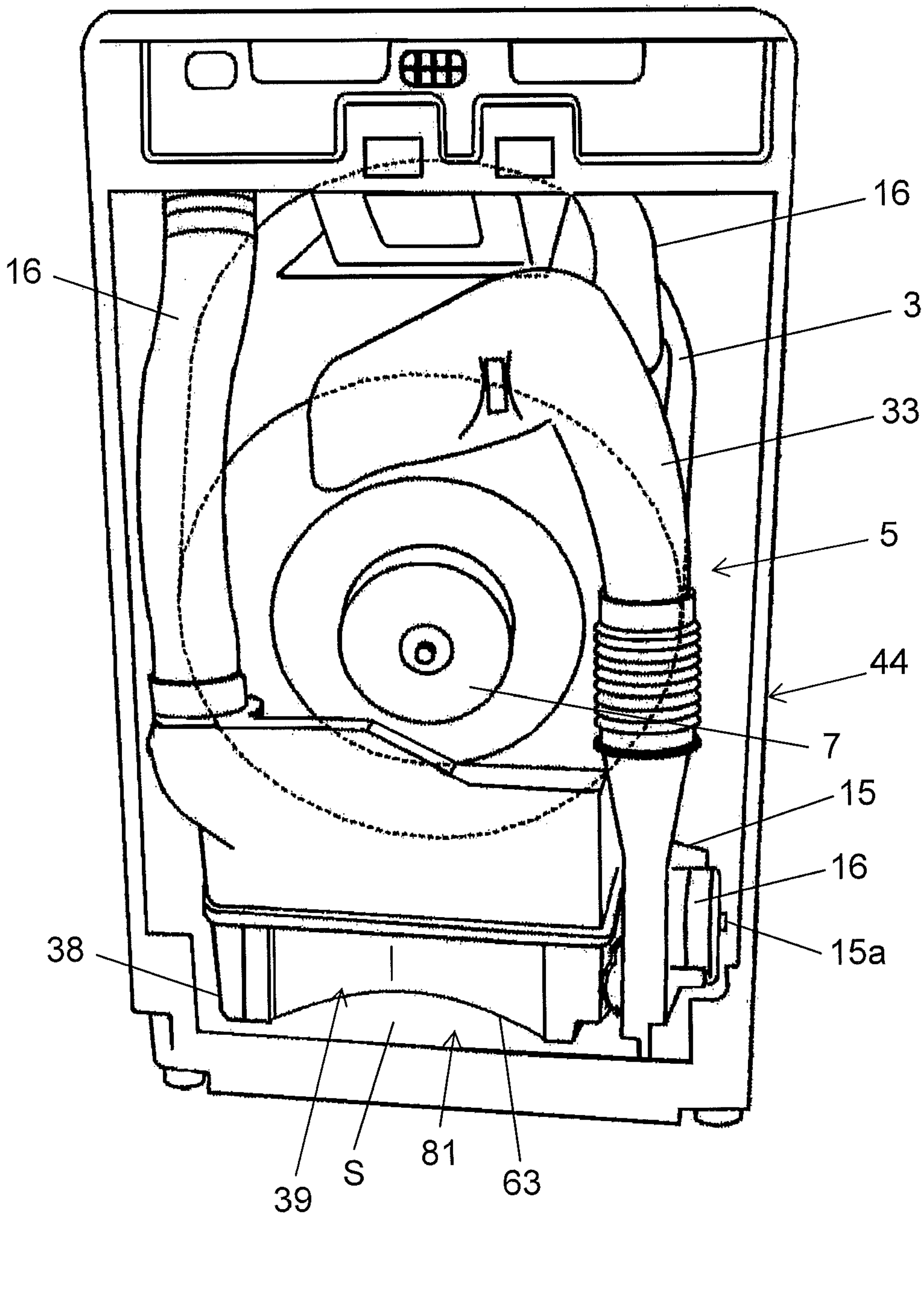
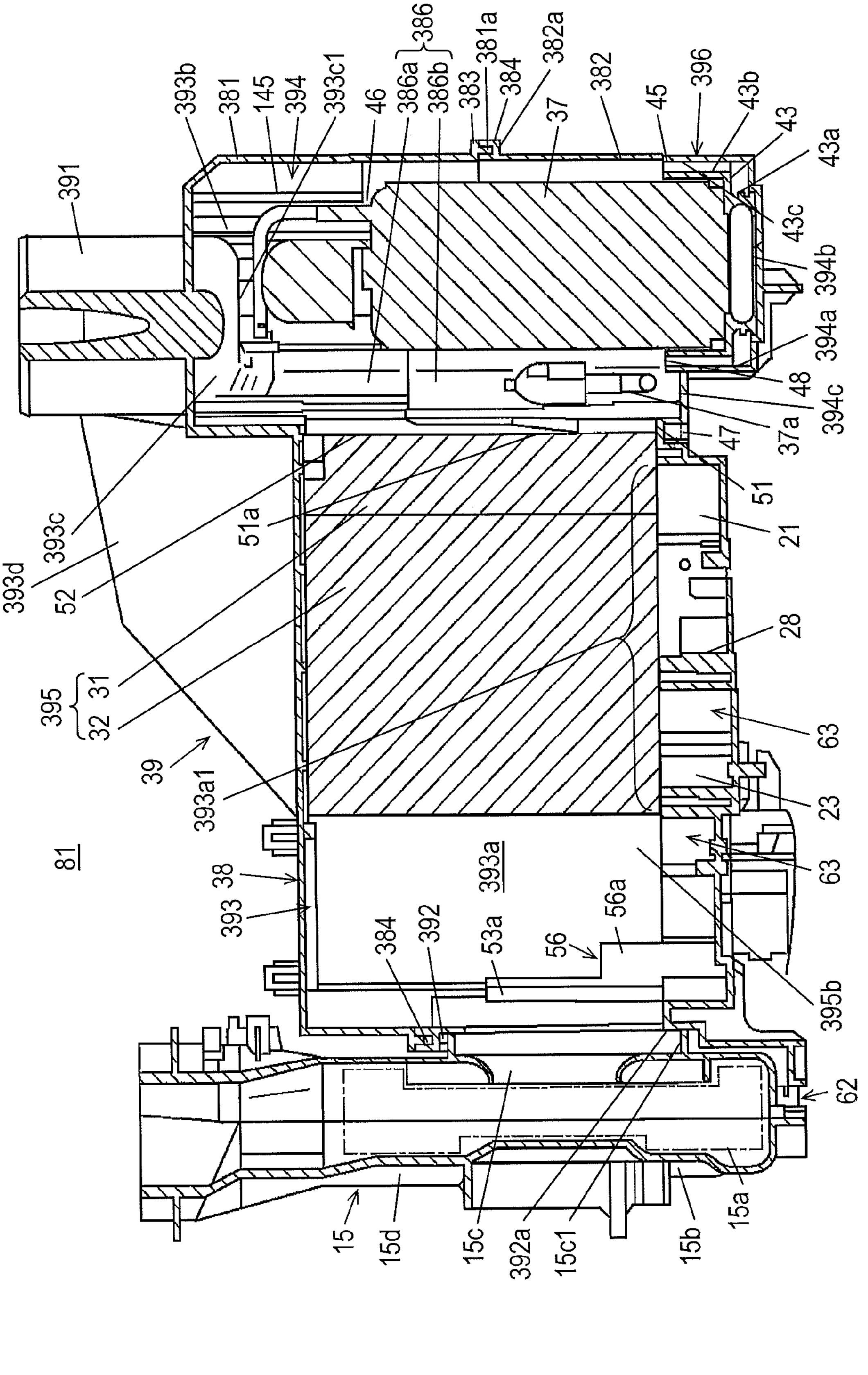


FIG. 3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43a
43c
394b
394a
48
394c
37a
47
51
21
28
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23
63
62
393c
393d
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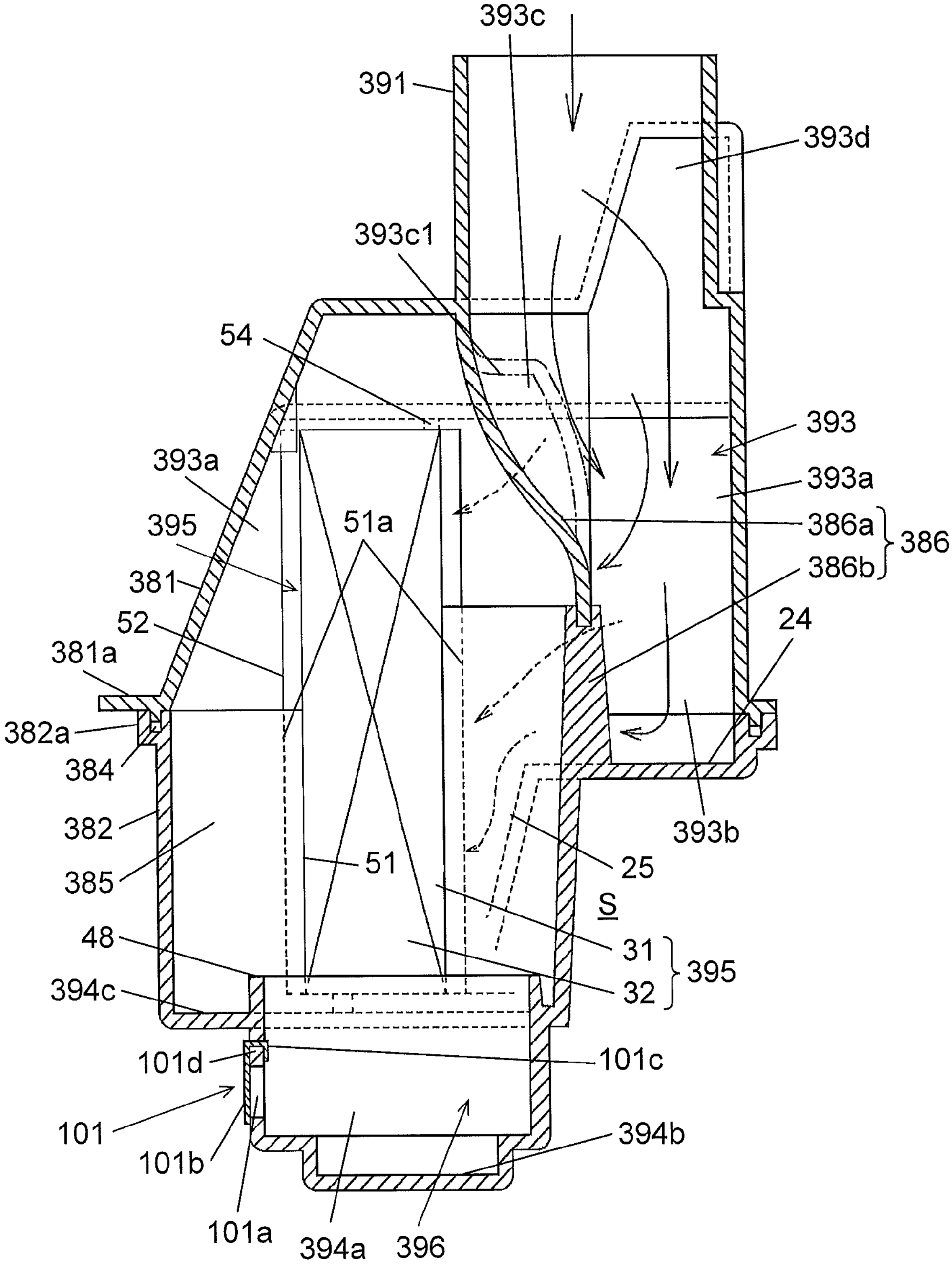
FIG. 4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384
382
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394a
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FIG. 5

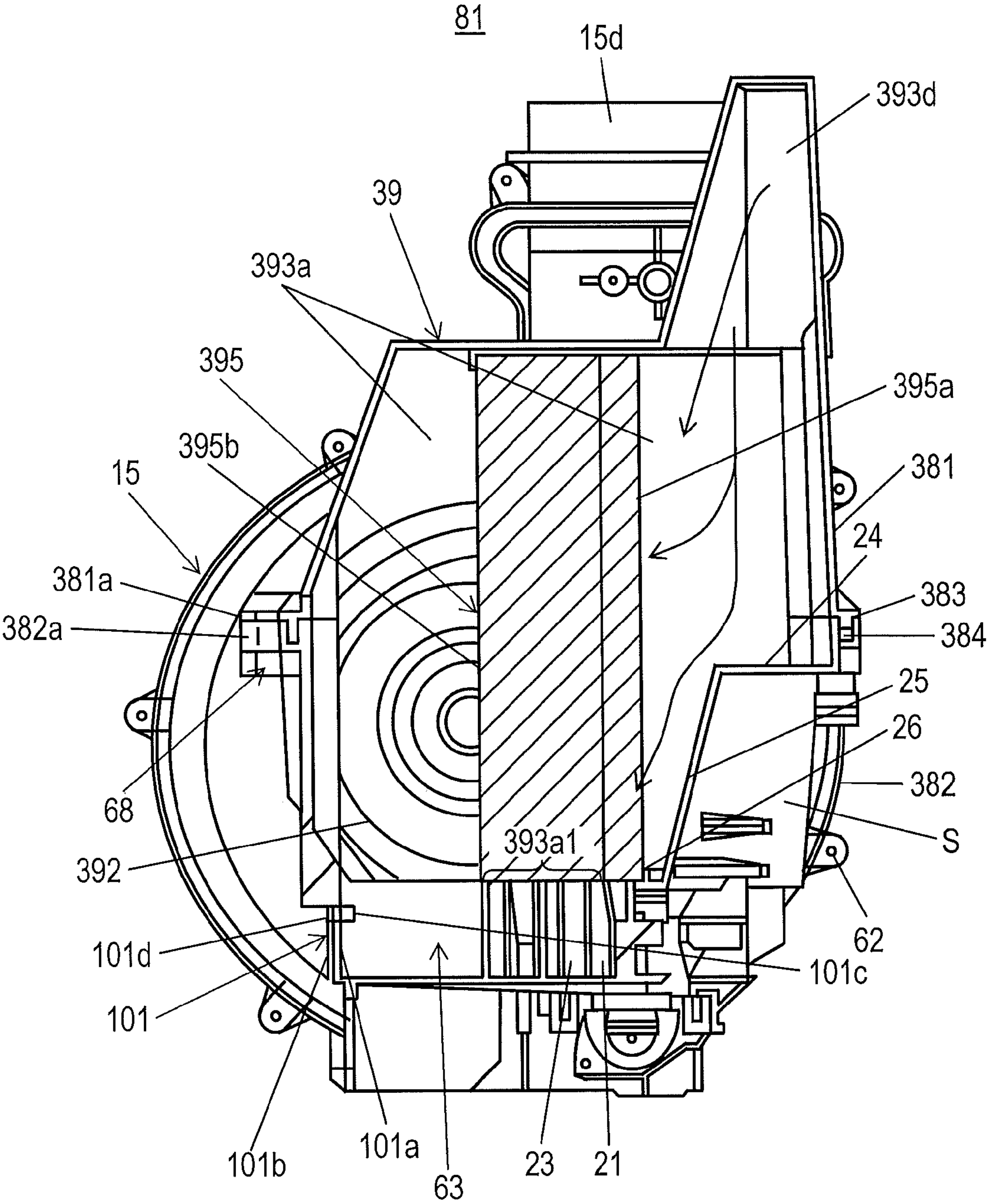
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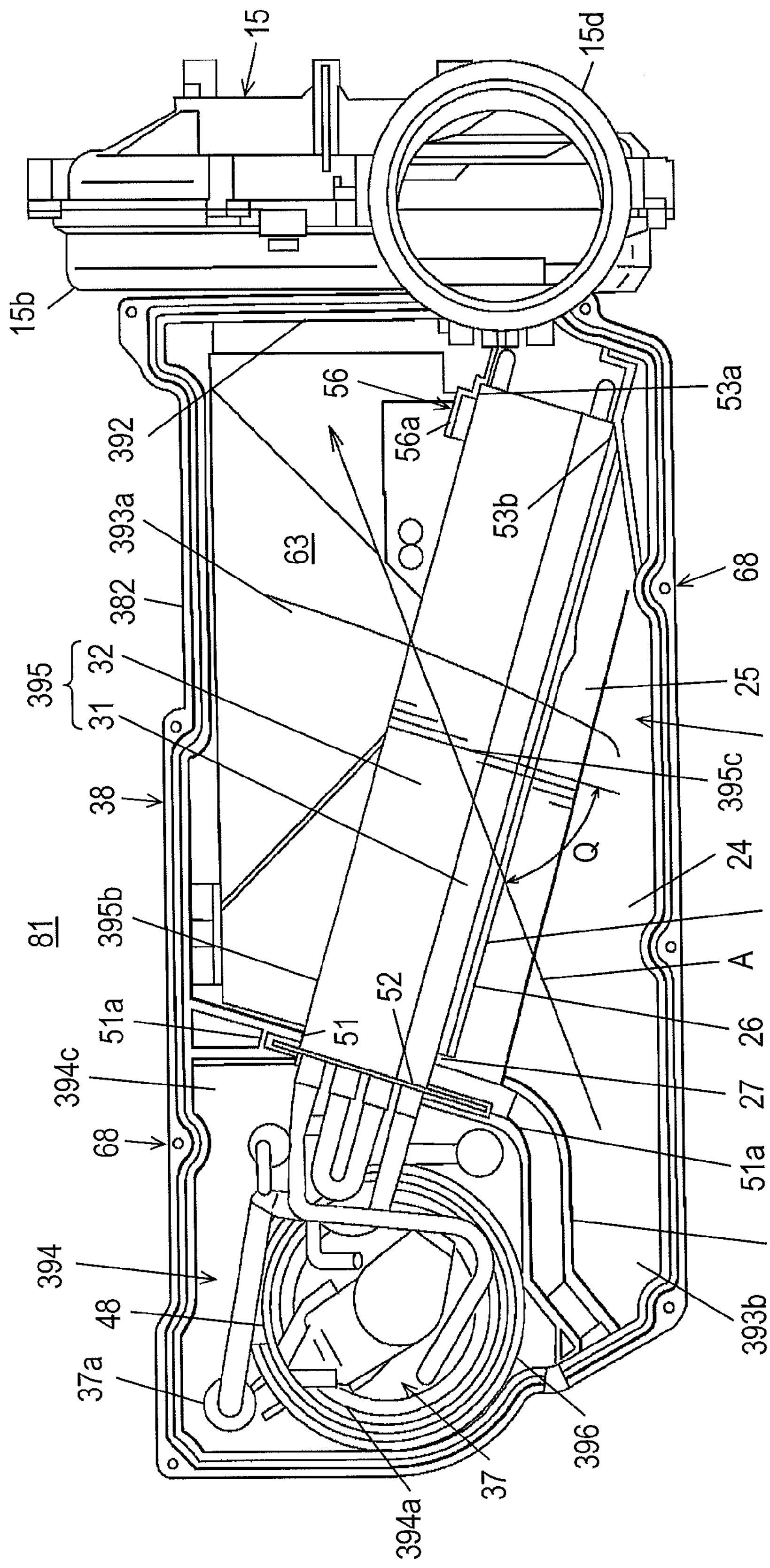
FIG. 6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Q
24
81
395b
395a
A
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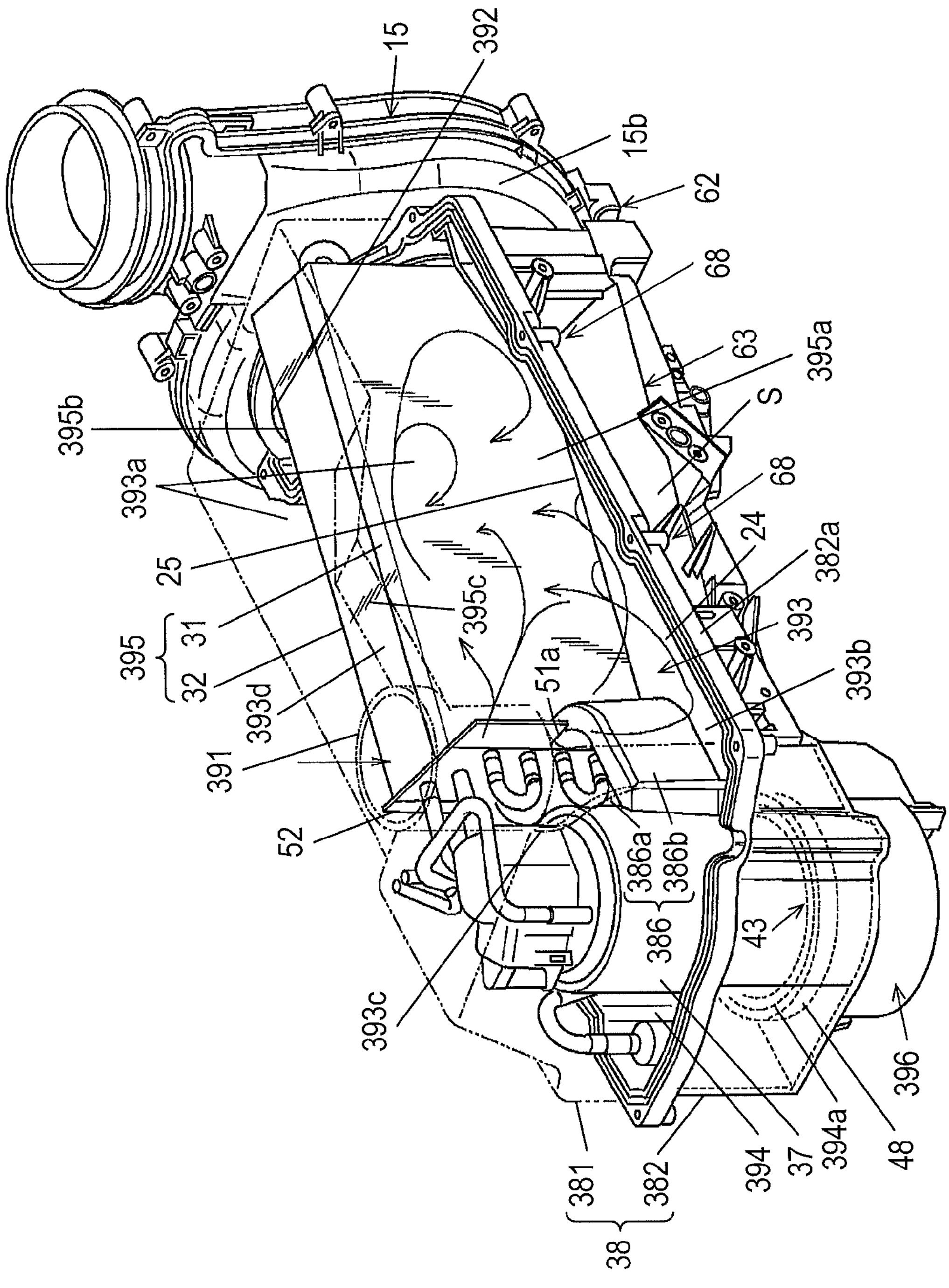
393b
37a
396
37
394a

FIG. 7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393d
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38

FIG. 8

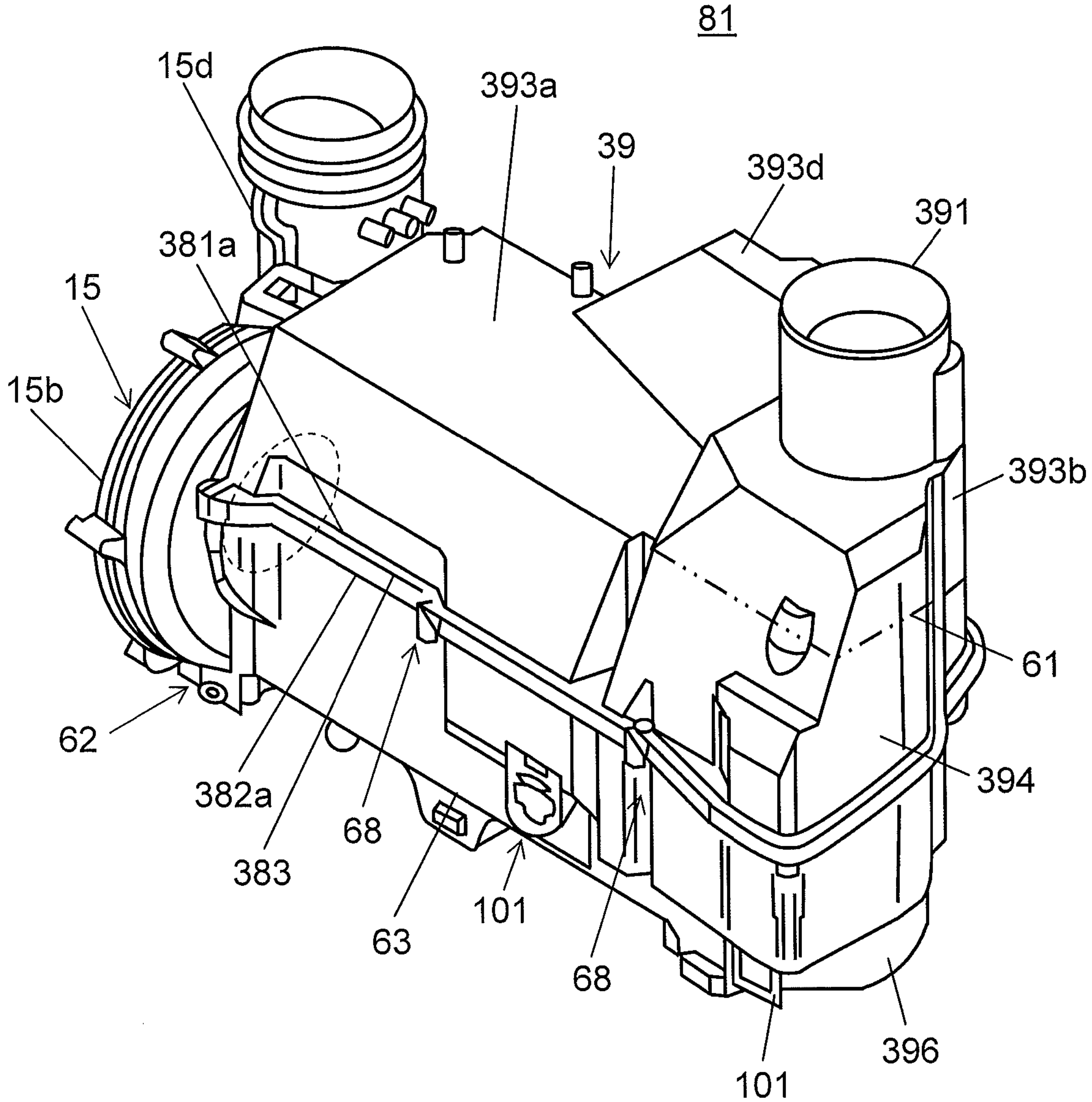
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FIG. 9

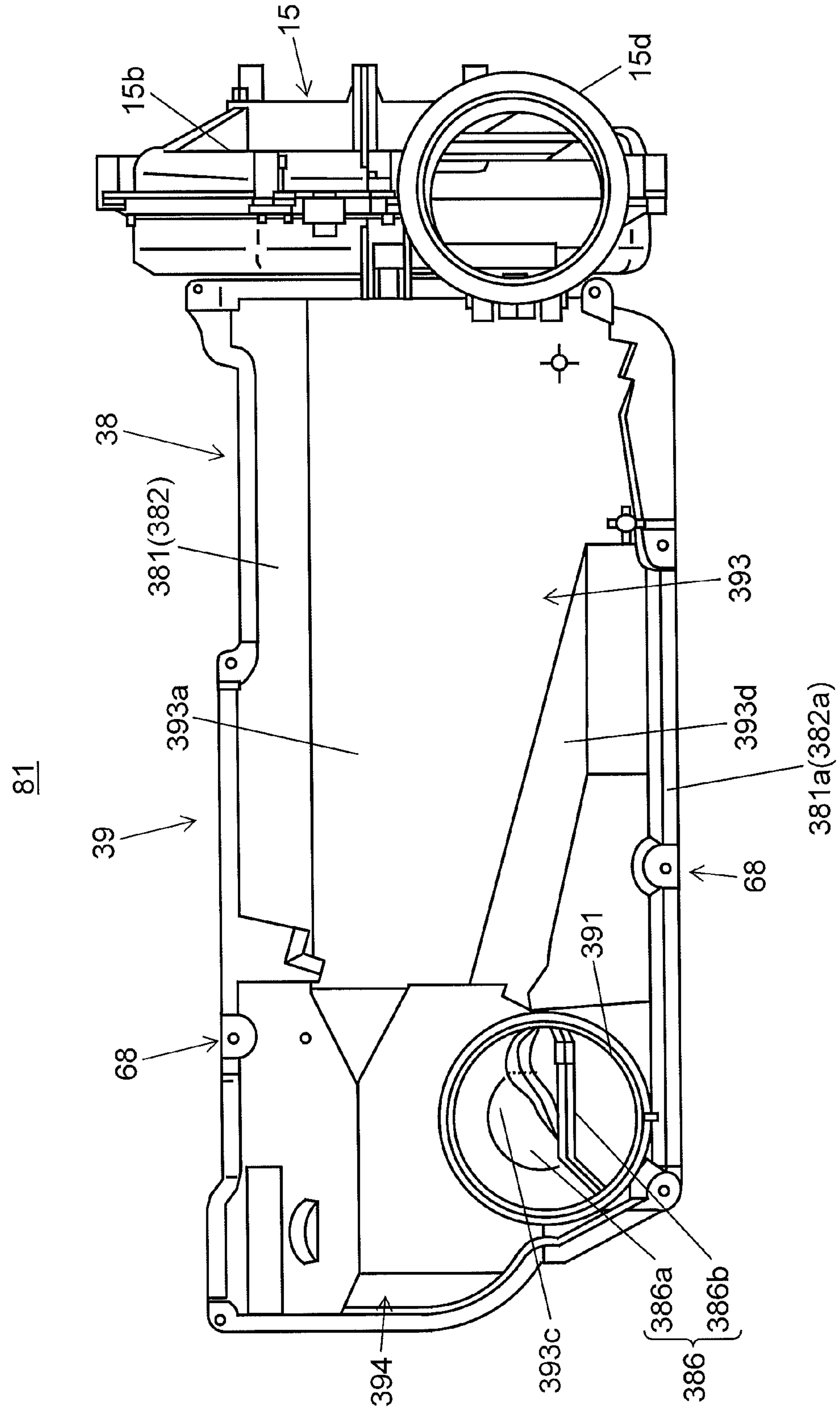
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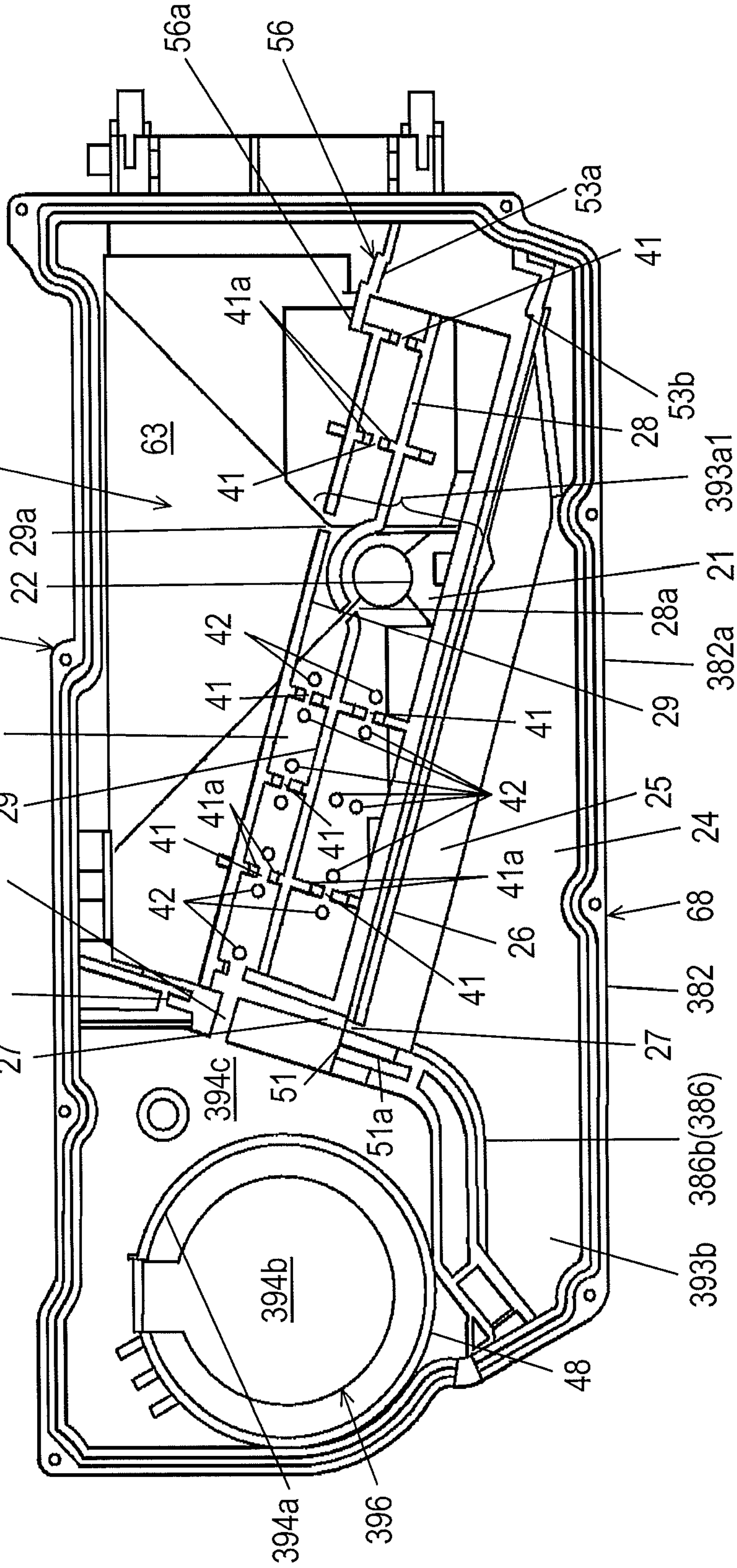
FIG. 10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29
41a
42
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24
41
41a
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68
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51a
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394b
393b
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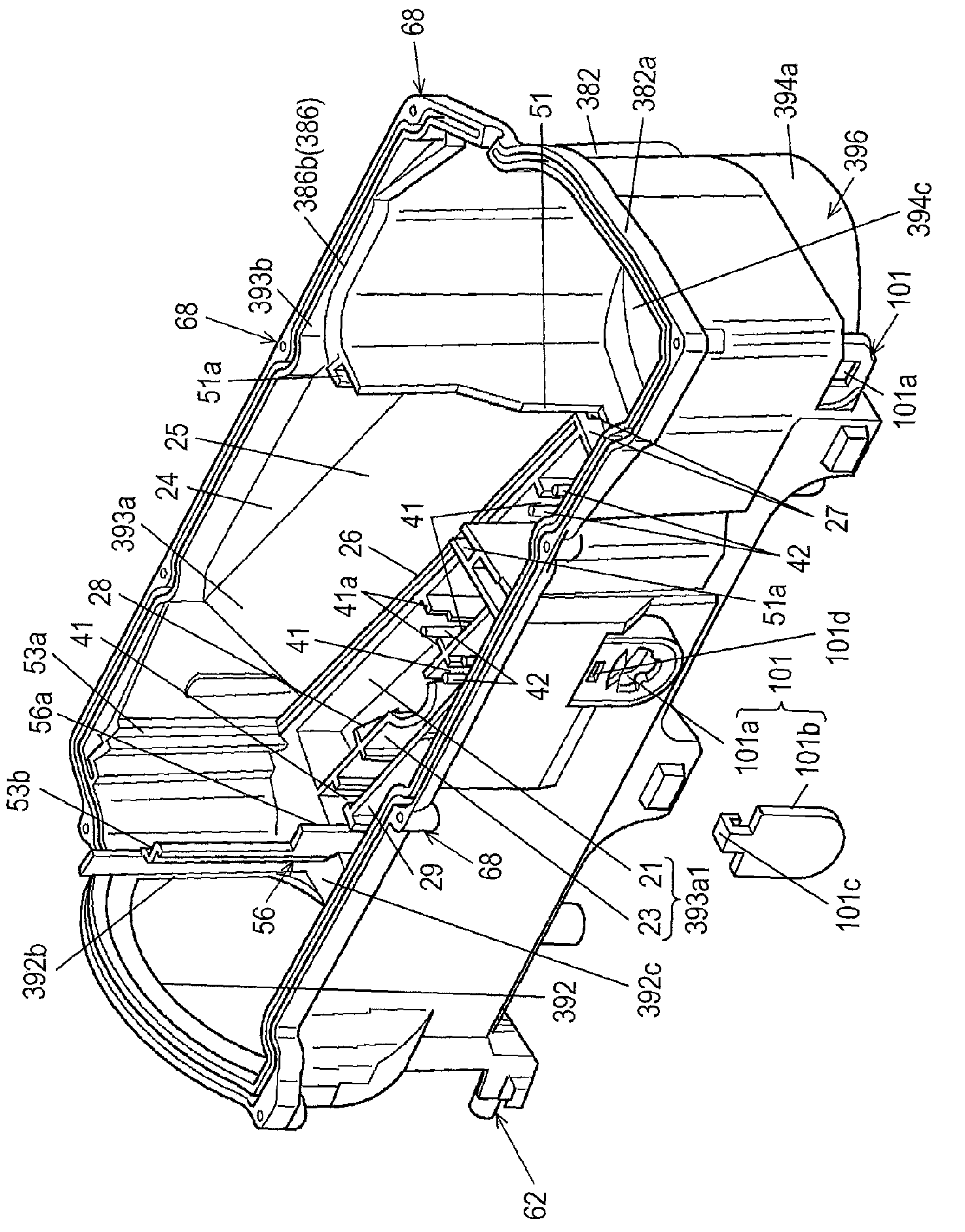
394a
396

FIG. 11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392c
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FIG. 12

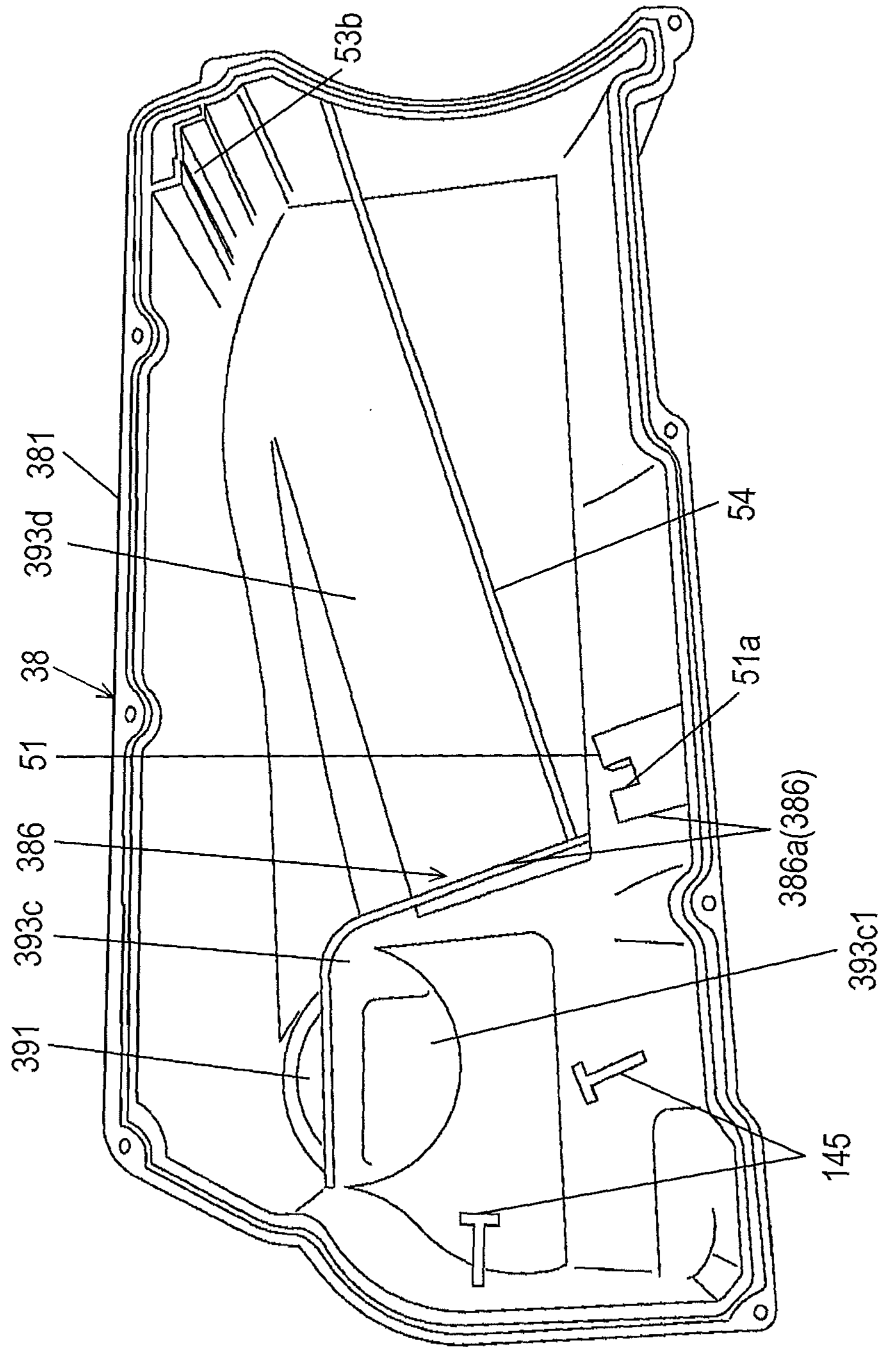


FIG. 13

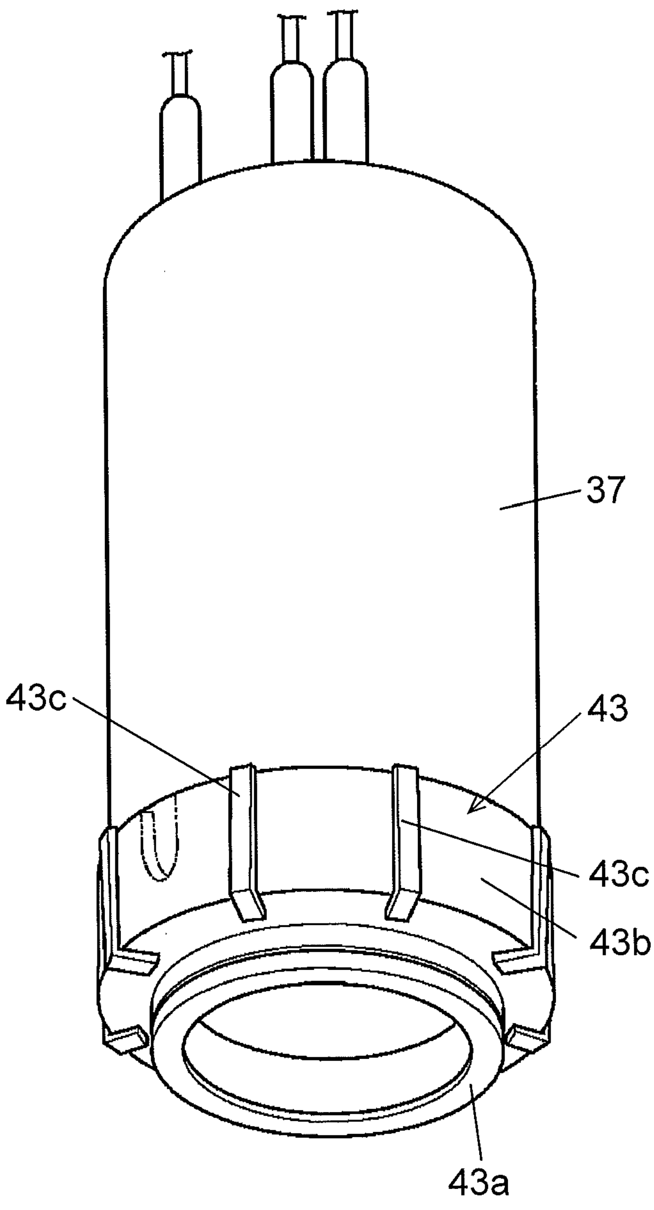
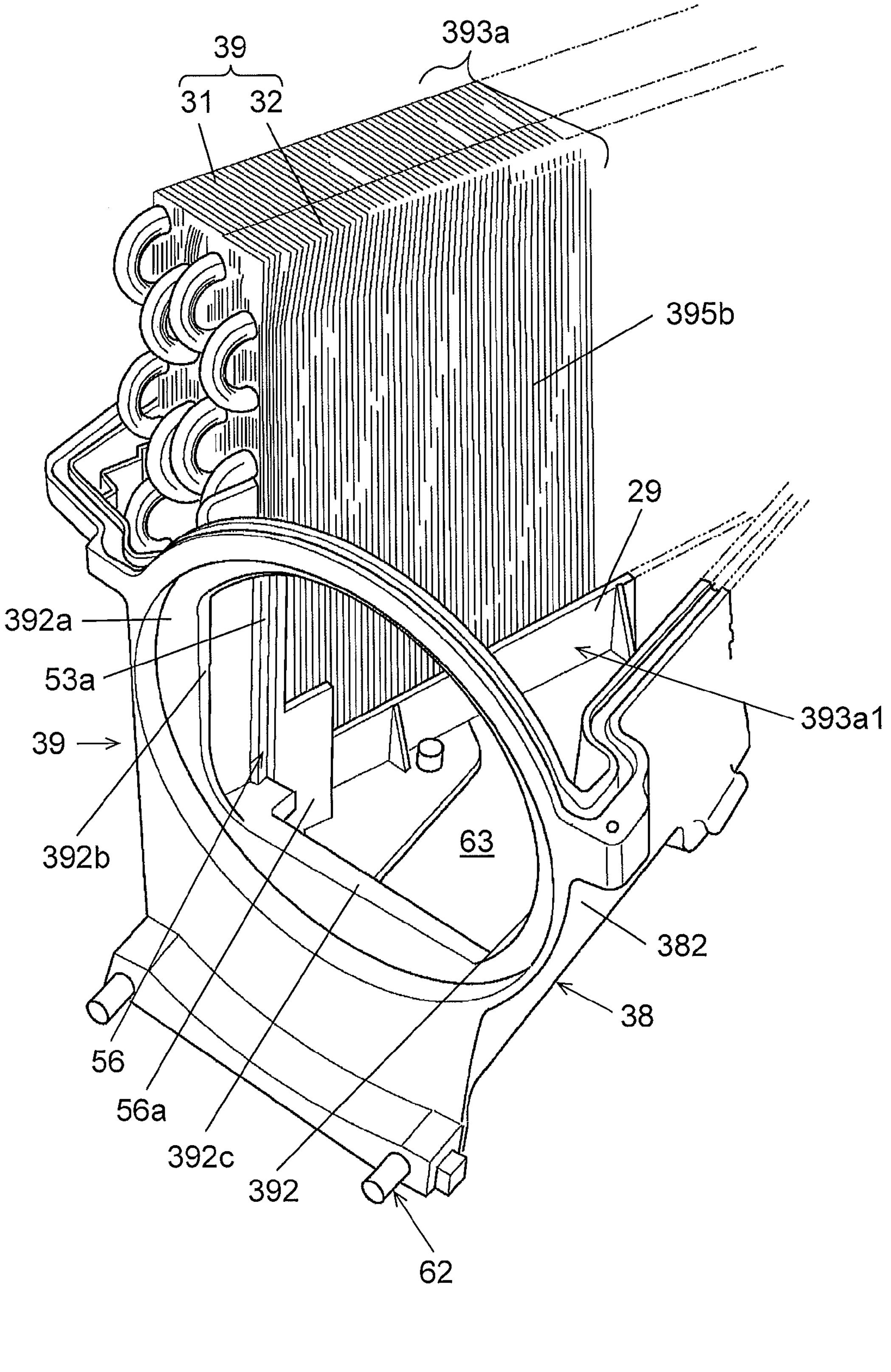
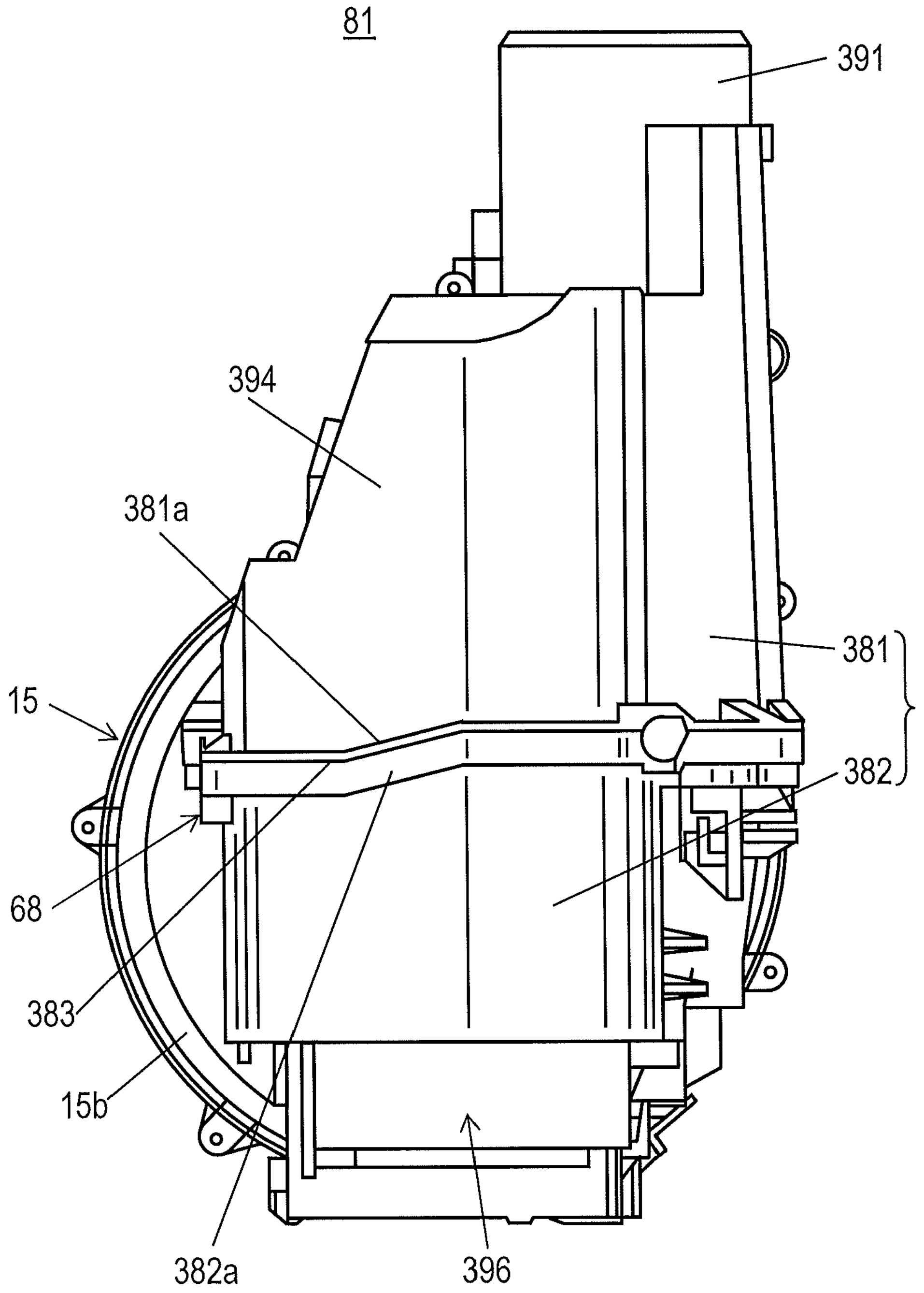


FIG. 14



39
31
32
393a
395b
29
392a
53a
393a1
39
392b
63
382
38
56
56a
392c
392
62

FIG. 15



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Patent documents cited in the description

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