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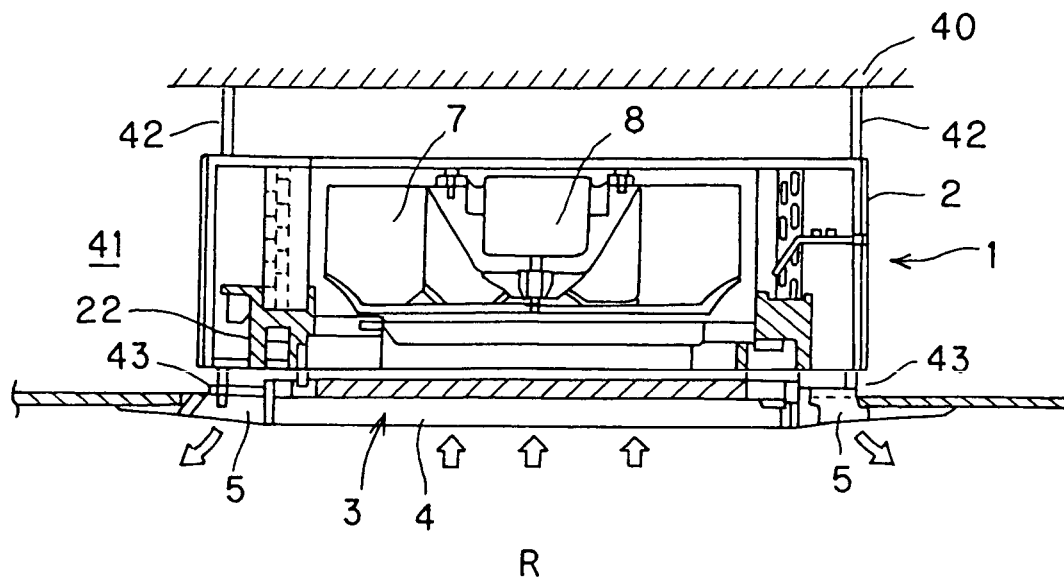
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(54) **Refrigeration machine having drain pan**

(57) A refrigeration machine (1) comprising an air blower (7), a heat exchanger (16), a drain pan (22) for receiving and stocking drain water generated in the heat

exchanger (16) and an active oxygen species generating unit for electrolyzing at least one of the drain water stocked in the drain pan (22) and tap water to generate active oxygen species.

FIG.1



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Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to a refrigeration machine having a drain pan for receiving drain water.

2. Description of the Related Art

[0002] An air conditioner or a refrigeration machine such as a showcase or the like is known to be equipped with an air blower, a heat exchanger and a drain pan for receiving drain water generated by the heat exchanger. In this type of machine, slime is liable to occur in drain water stocked in the drain pan or drain water flowing through a drain hose pipe, and it causes the drain pan and the drain pipe to be clogged.

[0003] In order to overcome this problem, there have been hitherto proposed an air conditioner equipped with a slime-occurrence preventing agent disposed in a drain pan, an air conditioner equipped with a slime-occurrence preventing agent disposed in a drain hose pipe, etc. (for example, JP-A-6-159710, JP-A-6-257776).

[0004] According to the conventional techniques described above, chemical agent is mixed with drain water to chemically suppress occurrence of slime. Therefore, the effect of suppressing occurrence of slime would be lost if the chemical agent thus impregnated is consumed, and thus these techniques have a problem in durability.

SUMMARY OF THE INVENTION

[0005] Therefore, the present invention has an object to overcome the foregoing problem of the conventional techniques been implemented in view of the foregoing problem of the above-described techniques, and also provide a refrigeration machine that can suppress occurrence of slime permanently.

[0006] In order to attain the above object, according to the present invention, there is provided a refrigeration machine equipped with an air blower, a heat exchanger and a drain pan for receiving drain water generated in the heat exchanger, characterized in that the drain pan is equipped with an active oxygen species generating unit for generating active oxygen species. The active oxygen species generating unit may be an electrode unit for conducting electrolysis on water to generate active oxygen species. The water may contain at least one of the drain water and tap water.

[0007] In the above-described refrigeration machine, the drain water stocked in the drain pan may be pumped up by a pump and drained through a drain hose pipe to the outside. The active oxygen species unit may generate active oxygen species such as ozone, hydrogen peroxide, superoxide anion, etc. by conducting electrolysis on at least one of the drain water or tap water, for example.

[0008] In this case, tap water may be introduced into the drain pan to be mixed with the drain water, and the mixture of the drain water and the tap water is subjected to electrolysis to generate active oxygen species by the active oxygen species generating unit (the electrode unit).

[0009] Furthermore, tap water may be introduced into the drain pan to be mixed with the drain water, and the mixture of the drain water and the tap water may be pumped up by a pump and drained through a drain hose pipe to the outside. In addition, the drain water mixed with the tap water may be subjected to electrolysis by the active oxygen species generating unit (the electrode unit) to generate active oxygen species. The active oxygen species generating unit (electrode unit) may generate active oxygen species such as hypohalous acid, etc. by conducting electrolysis on water containing halogen ions. Furthermore, when the active oxygen species generating unit is the electrode unit, the polarity of the electrode unit may be inverted periodically or irregularly.

[0010] According to the present invention, the drain pan is equipped with the electrode unit for conducting electrolysis on drain water to generate active oxygen species, and thus the occurrence of slime can be permanently suppressed.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011]

Fig. 1 is a cross-sectional view showing an embodiment of a refrigeration machine according to the present invention;

Fig. 2 is a bottom view showing the embodiment of the refrigeration machine;

Fig. 3 is a diagram showing the construction of an electrode unit;

Fig. 4 is a diagram showing the construction of another embodiment;

Fig. 5 is a diagram showing the construction of another embodiment;

Fig. 6 is a diagram showing the construction of another embodiment;

Fig. 7 is a diagram showing an example to which a low-temperature showcase is applied; and

Fig. 8 is a diagram showing the construction of the electrode unit.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0012] Preferred embodiments according to the present invention will be described hereunder with reference to the accompanying drawings.

[0013] Fig. 1 is a cross-sectional view showing the main body of an air conditioner and a face panel, and Fig. 2 is a bottom view showing the main body of the air conditioner.

[0014] In Figs. 1 and 2, reference numeral 1 represents an air conditioner as a refrigeration machine, and the air conditioner 1 is combined with an outdoor unit (not shown) to form a refrigeration cycle including a compressor, an outdoor heat exchanger, etc. As shown in Fig. 1, the air conditioner is fixedly suspended in a ceiling space 41 of a building 40. Figs. 1 and 2 show an example of the four-way ceiling cassette type air conditioner 1. The air conditioner 1 has an air conditioner main body 2 and a face panel 3. An air suction port 4 is formed at the center of the face panel 3, and air blow-out ports 5 are formed around the air suction port 4 of the face panel 3. Four bolts 42 are provided so as to extend from the building 40 in the vertical downward direction, and the four bolts 42 are respectively fixed to lifting lugs 43 of the air conditioner main body 2.

[0015] In the air conditioner main body 2 are arranged a fan motor 6, an indoor fan 7 (turbo fan), a partition plate 8, a drain pump 12, a drain outlet 13, a refrigerant pipe 14, an electric component box 15 including a controller such as a drain pump control unit, etc., a heat exchanger 16, etc.

[0016] The indoor fan 7 is disposed in connection with a fan nozzle 17. The heat exchanger 16 is bent substantially rectangularly, and disposed so as to be near to the four-way air blow-out ports 5 and surround the indoor fan 7. The partition plate 8 connects both the pipe plates 21 of the heat exchanger 16, and the drain pump 12, the drain outlet 13, an indoor mechanical valve 18, etc. are accommodated in an outer space 20 of the heat exchanger 16 which is partitioned from an inner space of the heat exchanger 16 by the partition plate 8. The partition plate 8 serves to prevent leakage of air from the indoor fan 7 under operation, and heat-exchanged air is surely blown out from the four-way air blow-out ports 5 into the room R by existence of the partition plate 8.

[0017] Fig. 3 is a diagram showing the construction of the drain pan. In Fig. 3, a drain pan 22 is provided at the lower side of the heat exchanger 16, a drain pump 12 is disposed in the drain pan 22, and a drain hose pipe 19 for draining drain water to the outside of the refrigeration machine is connected to the drain outlet 13 of the drain pump 12. The drain pump 12 is connected to a drain pump driving unit 23 such as a DC motor or the like (hereinafter merely referred to as driving unit), and also the driving unit 23 is connected to a drain pump control unit 24 (hereinafter merely referred to as control unit) that can control the rotational number of the driving unit 23.

[0018] The control unit 24 is equipped with an indoor fan operation stop detecting unit 26 (hereinafter merely referred to as fan operation detecting unit) for detecting whether the indoor fan 7 operates or not, and a rotational number setting unit 27 for setting the rotational number of the drain pump 12.

[0019] When the fan operation detecting unit 26 detects that the indoor fan 7 is under operation, the rotational number setting unit 27 sets the maximum rotational number to the drain pump 12 and outputs it to the driving

unit 23. After the fan operation detecting unit 26 detects the stop of the indoor fan 7, the rotational number setting unit 27 outputs the drainage-possible minimum rotational number to the driving unit 23. Then, the driving unit 23 drives the drain pump 12 at the rotational number output from the rotational number setting unit 27.

[0020] In this construction, a recess portion 22A is formed at the bottom portion of the drain pan 22 so as to be lowered from the bottom portion of the drain pan 22 by one step, and a pair of electrodes 51 and 52 are disposed in the recess portion 22A so as to be connected to an electrode control unit 53. Here, when current is supplied to the electrodes 51 and 52, the drain water stocked in the drain pan 22 is subjected to electrolysis and active oxygen species are generated.

[0021] Here, the active oxygen species are oxygen molecules and related substance which have higher oxidation activity than normal oxygen, and they cover not only so-called narrowly-defined active oxygen such as superoxide anion, singlet oxygen, hydroxyl radical, hydrogen peroxide, etc., but also so-called broadly-defined active oxygen such as ozone, hypohalous acid, etc.

[0022] The active oxygen species prevent occurrence of slime, so that slime hardly occurs in the drain pan 22 and the drain hose pipe 19. As an electrode material is preferably used a material that generates active oxygen species by conducting electrolysis on drain water (containing no chloride unlike tap water). For example, any material generating ozone, hydrogen peroxide, radical or the like may be used. Specifically, platinum, lead oxide, platinum-tantalum or the like is suitably used. Of these materials, platinum-tantalum electrodes are most preferable because they can generate active oxygen species from even drain water containing rare ion species highly efficiently and stably by electrolysis. At this time, at the cathode electrode, the reaction $[4H^+ + 4e^- + (4OH^-) \rightarrow 2H_2 + (4OH^-)]$ occurs, and at the anode electrode, the reaction $[2H_2O \rightarrow 4H^+ + O_2 + 4e^-]$ and at the same time the reaction $[3H_2O \rightarrow O_3 + 6H^+ + 6e^-]$, $2H_2O \rightarrow O_2 + 4H^+ + 4e^-]$ occur.

[0023] As described above, ozone (O_3) generated at the anode electrode is quickly dissolved in the drain water, and thus it exerts the slime preventing effect.

[0024] The operation of the control unit of the air conditioner thus constructed will be described.

[0025] When the cooling operation of the air conditioner 1 is started, the compressor and the indoor fan 7 start to operate. When the indoor fan 7 starts to operate, the fan operation detecting unit 26 of the control unit 24 detects that the indoor fan 7 is under operation, the rotational number setting unit 27 sets the maximum rotational number to the drain pump 12, and the driving unit 23 drives the drain pump 12 at the maximum rotational number. By operating the drain pump 12, drain water stocked in the drain pan 22 is pumped up and drained to the outside of the refrigeration machine.

[0026] When the cooling operation is stopped and the compressor and the indoor fan 7 stop to operate, the fan

operation detecting unit 26 detects that the operation of the indoor fan 7 is stopped. By stopping the indoor fan 7, the rotational number setting unit 27 sets the rotational number of the driving unit 23 to the minimum rotational number at which drainage is possible (hereinafter referred to as "drainable minimum rotational number"), and the driving unit 23 operates the drain pump 12 at this minimum rotational number. By operating the drain pump 12 at the drainable minimum rotational number, noise such as water paddling noise or the like of the drain pump 12 can be minimized, and also drain water which adheres to the heat exchanger 16, etc., trickles down and then stays in the drain pan 22 even when the compressor and the indoor fan are stopped can be drained.

[0027] Subsequently, when the water level of the drain pan 22 is equal to a fixed value or less, the drain pump 12 cannot drain the drain water, and thus the operation of the drain pump 12 is stopped. The stop timing of the drain pump 12 may be set so that after the indoor fan 7 is stopped, the drain pump 12 is operated for about 20 minutes and then it is stopped. Alternatively, a sensor such as a water level sensor (not shown) or the like may be provided in the drain pan 22, and the operation of the drain pump 12 may be stopped when it is detected by the sensor that the water level of the drain pan 22 is equal to the lowest water level at which the drain water can be drained.

[0028] At any rate, the drain water is stocked in the drain pan 22. In this construction, when current is supplied to the pair of electrodes 51 and 52, the drain water stocked in the drain pan 22 is electrolyzed and active oxygen species (electrolytic water) are generated. Occurrence of slime is prevented by the active oxygen species. In this construction, no slime permanently occurs in the drain water stocked in the drain pan 22, and the drain pan 2 is cleaned. In addition, by making the drain water flow down through the drain hose pipe 19, slime in the drain hose pipe 19 can be permanently suppressed. Accordingly, from this viewpoint, maintenance of the drain pan 22 is unnecessary.

[0029] When airborne bacteria invades into the drain water, some time is needed for the breeding of the airborne bacteria. Accordingly, in this construction, it is unnecessary, to continuously carry out the electrolysis based on the electrodes 51 and 52. Accordingly, for example, after current is supplied for a fixed time, for example, one minute and active oxygen species thus generated are diffused in the drain water, the current supply is stopped for a while and then the current supply is started again, thereby keeping the bacteria elimination effect. This control is executed by the electrode control unit 53. Accordingly, the lifetime of the electrodes 51 and 52 can be enhanced, and the reliability can be also enhanced.

[0030] With respect to the control of the current supply rate, for example, the following control may be adopted. That is, a concentration sensor (not shown) is immersed in the drain water to detect the concentration of the active oxygen species generated through the electrolysis, and

the current supply is stopped when the concentration of the active oxygen species is equal to a specific concentration (for example, 0.1PPM). Thereafter, when reduction of the concentration of the active oxygen species is detected and the concentration is reduced to a predetermined value or less, the current supply is resumed. Furthermore, the electrolysis control may be carried out according to a predetermined current supply rate or according to a current supply rate determined by an operation condition of equipment. Under any control, it is desirable to carry out the current supply to the electrodes 51 and 52 while the drain pump 22 is stopped. If the water is drained under electrolysis, the bacteria elimination effect is reduced.

[0031] Furthermore, when scale is deposited on the electrode (cathode) by the electrolysis of the drain water, the electric conductivity is lowered, and it is difficult to continuously conduct electrolysis.

[0032] In this case, it is effective to invert the polarity of the electrolysis (switch the plus and minus electrodes to each other). By conducting electrolysis while the cathode electrode is used as the anode electrode, the scale deposited on the cathode electrode is removed. In this polarity inverting control, the inversion may be periodically carried out, for example by using a timer, or the inversion may be irregularly carried out like the inversion is carried out every time the operation is started. Furthermore, increase of the electrolytic resistance (decrease in electrolytic current or increase of electrolytic voltage) may be detected and the polarity may be inverted on the basis of the detection result.

[0033] The air conditioner having the above-described electrodes (electrode unit) can not only reduce the troubles of the drain system and facilitate the maintenance, but also clean the inside of the air conditioning equipment, so that it contributes to implement more comfortable air conditioning. Accordingly, the air conditioner is particularly effectively set up in a building in which general public gathers, for example, a school, a hospital, a convenience store or the like.,

[0034] Fig. 4 shows another embodiment.

[0035] In this embodiment, as compared with the embodiment shown in Fig. 3, no recess portion is formed at the bottom portion of the drain pan 22, and the pair of electrodes 51 and 52 are disposed at a lower position than the suction port 12A of the drain pump 12. Here, a predetermined slope is provided to the bottom portion of the drain pan 22 so that the drain water gathers beneath the drain pump 12. The other construction is substantially the same as the above-described embodiment. For example, when the distance δ between the suction port 12A of the drain pump 12 and the bottom portion of the drain pan 22 is set to 6mm, drain water of, for example, at least 90cc is not drained to the outside of the refrigeration machine, but stocked in the drain pan 22. The drain water thus stocked is electrolyzed by current supply to the electrodes 51 and 52 to generate active oxygen species, and occurrence of slime is suppressed by the generated ac-

tive oxygen species.

[0036] Fig. 5 shows another embodiment.

[0037] In this embodiment, as compared with each embodiment described above, tap city (containing chloride ions) is introduced from the outside of the refrigeration machine through a pipe 55 into the drain pan 22. A pair of electrodes 151 and 152 for electrolyzing drain water and generating active oxygen species are disposed in the drain pan 22, and the electrodes are connected to an electrode control unit 153. The other construction is substantially the same as the above-described embodiment.

[0038] The electrodes 151, 152 comprise two electrode plates formed of a base of Ti (titan) and a coating layer of Ir (iridium), Pt (platinum), and current of 40 milliamperes is supplied to the electrodes to generate free residual chlorine having a predetermined concentration (for example, 1PPM), thereby achieving a bacteria elimination, antifouling effect (bacteria elimination action). In order to enhance the durability, current supply to the electrodes 151, 152 may be carried out while the polarities thereof are periodically switched to each other.

[0039] When current is supplied to the drain water in the drain pan 22 by the electrodes 151 and 152, at the cathode electrode, the reaction $[4H^+ + 4e^- + (4OH^-) \rightarrow 2H_2 + (4OH^-)]$ occurs, and at the anode electrode, the reaction $[2H_2O \rightarrow 4H^+ + O_2 + 4e^-]$ occurs. At the same time, chlorine contained in water (added in tap water in advance) reacts like $[2Cl \rightarrow Cl_2 + 2e^-]$, and further Cl_2 reacts with water like $[Cl_2 + H_2O \rightarrow HClO + HCl]$.

[0040] In this construction, by supplying current to the electrodes 151 and 152, HClO (hypochlorous acid) having great sterilizing power is generated, so that occurrence of slime is suppressed and also breeding of Legionella bacteria, coliform bacteria and other fungi can be prevented.

[0041] Fig. 6 shows another embodiment.

[0042] This embodiment is equipped with an electrolyzing unit 71. The electrolyzing unit 71 is equipped with a housing 73, and a pair of electrodes 75 and 77 accommodated in the housing 73. Two pipes 79 and 81 are connected to the housing 73. An electrode control unit 83 is connected to the pair of electrodes 75 and 77, and the other construction is substantially the same as the embodiment of Fig. 4. Tapwater is supplied from the outside of the refrigeration machine through the pipe 79 into the housing 73, electrolyzed in the housing 73 to generate HClO (hypochlorous acid), and then introduced into the drain pan 22 through the pipe 81, so that occurrence of slime is suppressed. According to this embodiment, nothing but preparation of only the electrolyzing unit 71 is required, and thus this embodiment can be easily applied to an air conditioner which has been already set up.

[0043] Fig. 7 shows an example in which the present invention is applied to a low-temperature showcase.

[0044] A low-temperature showcase 101 is set up in a shop such as a supermarket, a convenience store or the like, and it is a freezing open showcase for displaying and selling frozen dessert such as ice cream, etc., for

example. The low-temperature showcase 101 comprises an adiabatic wall 102 having a substantially U-shaped section and side plates 105 fixed to both the sides of the adiabatic wall 102, and an adiabatic partition wall 103 having a substantially U-shaped section is secured inside the adiabatic wall 102 so that a gap is formed between the adiabatic wall 102 and the adiabatic partition wall 103. A partition plate 104 is secured to the back surface and the inside of the upper surface of the adiabatic partition wall 103 so that a gap is formed between the partition plate 104 and each of the back and upper surfaces. Shelf support posts are provided to both the sides portion (and the center portion) of the partition plate 104. Reference numeral 129 represent shelves.

[0045] The lower ends of the shelf support posts 106 and the partition plate 104 are fixed to and supported by a shelf support post fixing metal fitting 107 whose ends are fixed to both the side frames (not shown) of the adiabatic wall 102 directly or through another member. In addition, a deck pan 108 is secured in front of the lower end of the partition plate 104 and above the bottom wall 103A of the adiabatic partition wall 103 so that a gap is formed between the bottom wall 103A and the deck pan 108. A storage room 109 opened at the front side thereof is constructed in the inner space surrounded by the partition plate 104 and the deck pan 108. An outer layer duct 111 is constructed between the adiabatic wall 102 and the adiabatic partition wall 103, and an inner layer duct 112 continuous with the upper side, back side and lower side of the storage room 109 is constructed in the space defined by the adiabatic partition plate 103, the partition plate 104 and the deck pan 108. A cooler 113 contained in a cooling device is provided in the inner layer duct 112 so as to be vertically mounted.

[0046] The upper ends of the inner and outer layer ducts 112 and 111 intercommunicate with an inner layer discharge port 124 and an outer layer discharge port 126 which are formed at the upper edge of the opening of the storage room 109, and the inner layer discharge port 124 is formed at the rear side of the outer layer discharge port 126. Furthermore, an inner layer suction port 127 and an outer layer suction port 128 are formed at the rear and front sides of the lower edge of the opening of the storage room 109, respectively. The inner layer suction port 127 intercommunicates with the inner layer duct 112, and the outer layer suction port 128 intercommunicates with the outer layer duct 111.

[0047] Furthermore, a suction type air blower 114 (for the inner layer) is disposed at the front portion of the inner layer duct 112 below the deck pan 108, and a suction type air blower 116 (for the outer layer) is also disposed at the lower side of the outer layer duct 111.

[0048] A drain pan 118 is formed on the upper surface of the bottom wall 3A of the adiabatic partition wall 3. The drain pan 118 is designed to be gradually inclined in a downward direction (for example, a slope of about 4 degrees) toward the lower side of the air blower 114. A drain outlet 117 is formed at the tip portion of the inclined drain

pan 118 of the drain pan 118, and a recess portion 118A is formed at the lowest position of the drain pan 118 in front of the drain outlet 117. As shown in Fig. 8, a pair of electrodes 251 and 252 are disposed in the recess portion 118A, and connected to an electrode control unit 253. The electrodes 251 and 252 have the same construction as the above-described embodiment, and they electrolyze the drain water stocked in the drain pan 118 to generate active oxygen species.

[0049] As described above, the cleaning of the drain water is also applicable to the showcase 101, and further it may be broadly applied to a dehumidifier, a humidifier, etc.

[0050] The present invention is not limited to the above-described embodiments, and various modifications may be made without departing from the subject matter of the present invention. The drain pan of the refrigerating machine is preferably equipped with a structure for temporarily stocking drain water to electrolyze the drain water (for example, dam or the like), and the dam portion (water stocking portion) is preferably disposed in the neighborhood of the drain outlet of the drain pan.

[0051] In the electrolysis of drain water by using platinum-tantalum electrodes, ozone water (ozone is dissolved in drain water) can be generated highly efficiently.

[0052] In general, the solubility of ozone gas into water is low, and the distribution coefficient to water (gas-phase ozone concentration/liquid-phase ozone concentration) is equal to about 0.3 (20°C). Therefore, the shift from the liquid-phase (ozone water) to the gas-phase (ozone gas) is liable to occur. In this construction, ozone water is generated, and thus a minute amount of ozone gas is trapped in the equipment, so that the bacteria elimination effect of the parts in the equipment (the fin of the heat exchanger, the air blowing fan) can be achieved. When ozone electrodes are used, not only slime prevention and removal, but also the bacteria elimination effect in the air conditioner can be achieved.

[0053] In place of introduction of tap water, chemical agent (tablet type chemical agent) for generating chloride ions may be poured in the drain pan, or the drain pan may be subjected a surface treatment to achieve the same effect, thereby introducing chlorine ions into drain water. In this case, platinum iridium is suitably used as the electrode material, for example. Particularly when an air conditioner or the like is set up in a clean room or the like, drain water contains a relatively small amount of impurities. Accordingly, it is desirable that a tablet which continuously elutes a minute amount of mineral ion is poured as an electrolysis assisting agent in the drain pan or a surface treatment achieving the same effect is conducted on the drain pan.

[0054] Not in an in-ceiling embedded type air conditioner such as the above-described four-way ceiling cassette type or the like, but in a ceiling-suspended type air conditioner, a wall-mount type air conditioner, a floor-mount type air conditioner, etc., a drain pipe is directly

connected to a drain pan and drain water is drained by free fall based on its own weight without using any drain pump. In this case, slime can be prevented and removed by disposing electrodes in the drain pan. The above-described embodiments are described independently of one another, however, two or more of these embodiments may be combined.

[0055] For example, electrolytic hypochlorous acid is used If tap water can be supplemented, and electrolytic ozone is used if there is only drain water, whereby occurrence of slime can be prevented. Therefore, from the viewpoint of cleaning of the drain pan, "maintenance-free" can be implemented, the maintenance control cost can be reduced, and also the quality of the indoor air can be improved by the bacteria elimination of the airblowing path.

[0056] In the above-described embodiments, the active oxygen species are generated by electrolyzing water (drain water) with two electrodes (electrode unit). However, the present invention is not limited to these embodiments, and any active oxygen species generating unit may be adopted insofar as it generates active oxygen species to prevent and remove slime occurring in the drain pan, etc.

Claims

1. A refrigeration machine (1) comprising an air blower (7), a heat exchanger (16) and a drain pan (22) for receiving and stocking drain water generated in the heat exchanger (16), **characterized by** further comprising an active oxygen species generating unit for electrolyzing at least one of the drain water stocked in the drain pan (22) and tap water to generate active oxygen species.
2. The refrigeration machine according to claim 1, further comprising a pump (12) for pumping the drain water stocked in the drain pan and a drain hose pipe (19) through which the pumped drain water is discharged to the outside.
3. The refrigeration machine according to claim 1, wherein the active oxygen species generating unit comprises a pair of electrodes (51, 52; 151, 152; 252, 252) that are supplied with current to electrolyze at least one of the drain water and the tap water.
4. The refrigeration machine according to claim 3, wherein the electrodes are disposed in the drain pan.
5. The refrigeration machine according to claim 4, wherein the polarities of the electrodes are periodically or irregularly inverted.
6. The refrigeration machine according to claim 5, wherein the drain pan is provided with a recess por-

tion (22A) at the bottom portion thereof, and the electrodes are disposed in the recess portion (22).

7. The refrigeration machine according to claim 1, further comprising a tap water supplying unit (55, 79) for supplying tap water to the drain pan to add the tap water to the drain water. 5
8. The refrigeration machine according to claim 7, wherein the active oxygen species generating unit electrolyzes the mixture of the drain water and the tap water supplied from the tap water supplying unit to generate the active oxygen species. 10
9. The refrigeration machine according to claim 7, wherein the active oxygen species generating unit is disposed between the tap water supplying unit and the drain pan and electrolyzes the tap water from the tap water supplying unit to generate the active oxygen species before the tap water is supplied into the drain pan. 15 20
10. The refrigeration machine according to claim 1, wherein the active oxygen species generating unit electrolyzes at least one of the drain water and tap water to generate ozone, hydrogen peroxide and superoxide anion. 25
11. The refrigeration machine according to claim 1, wherein at least one of the drain water and the tap water contains halogen ions, and the active oxygen species generating unit generates hypochlorous acid by electrolyzing the at least one of the drain water and the tap water. 30 35

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FIG.1

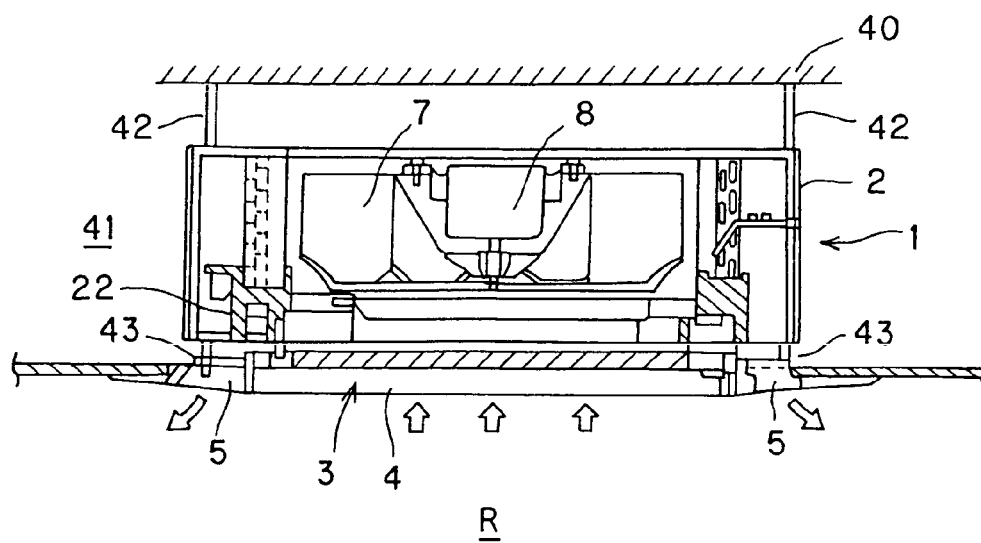


FIG.2

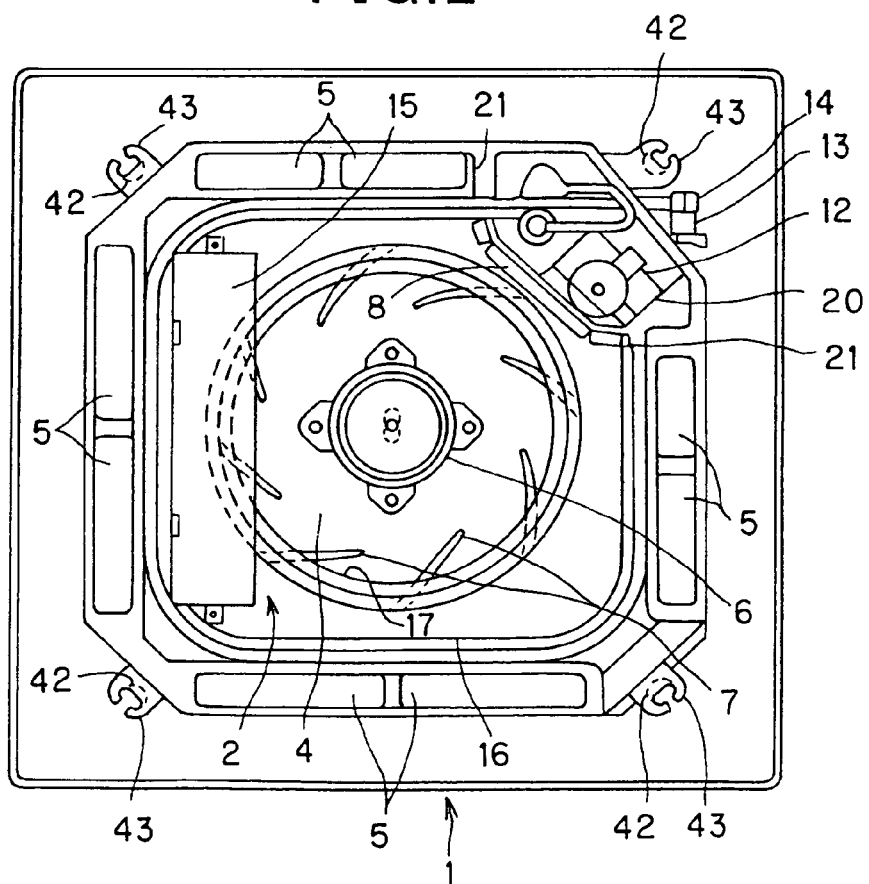


FIG.3

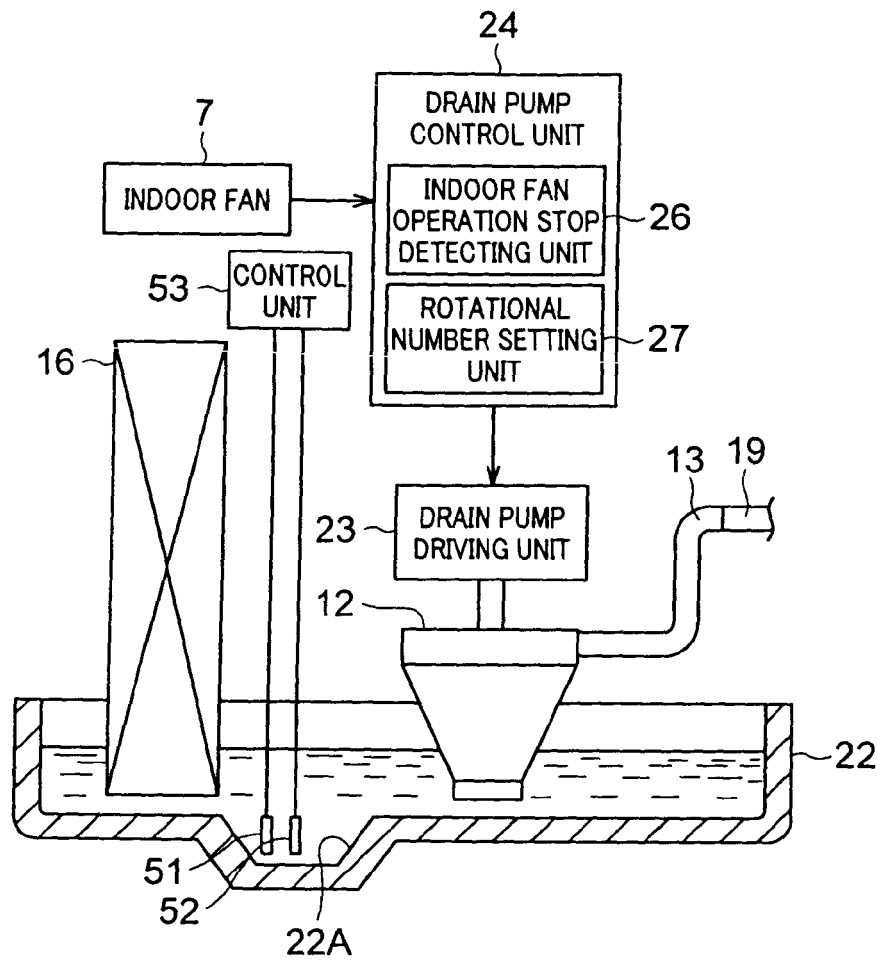


FIG.4

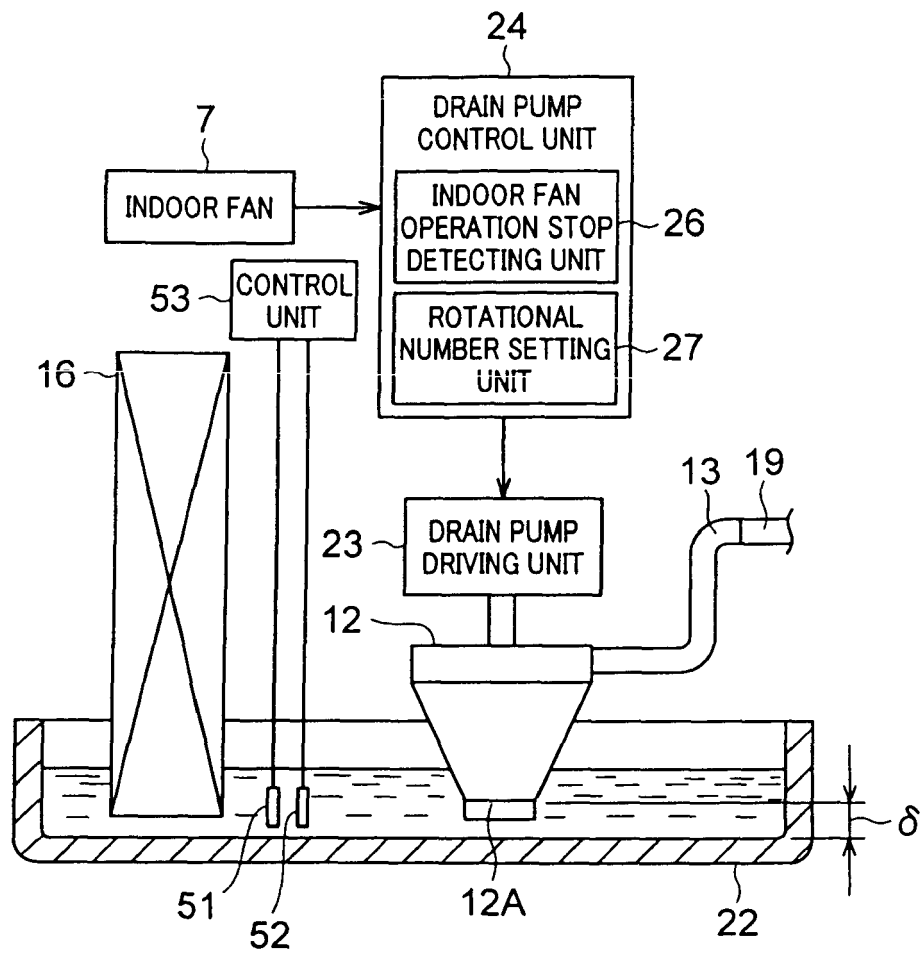


FIG.5

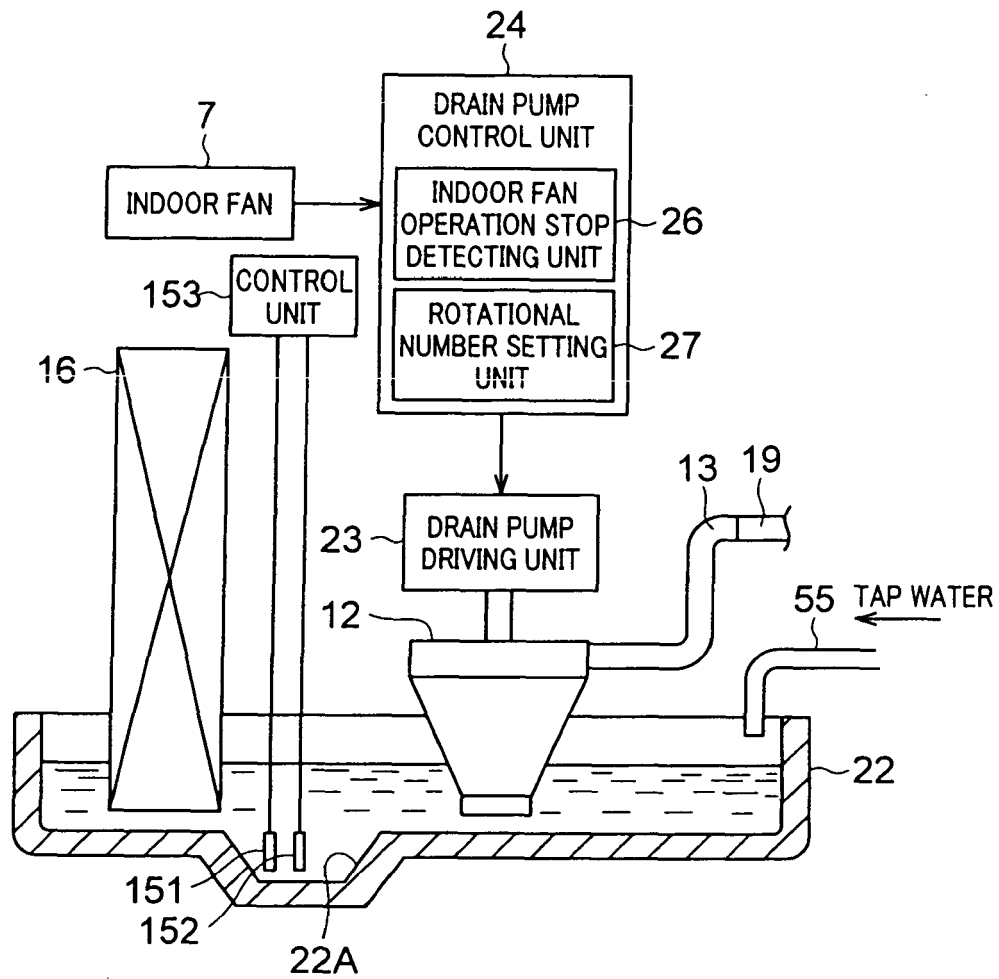


FIG.6

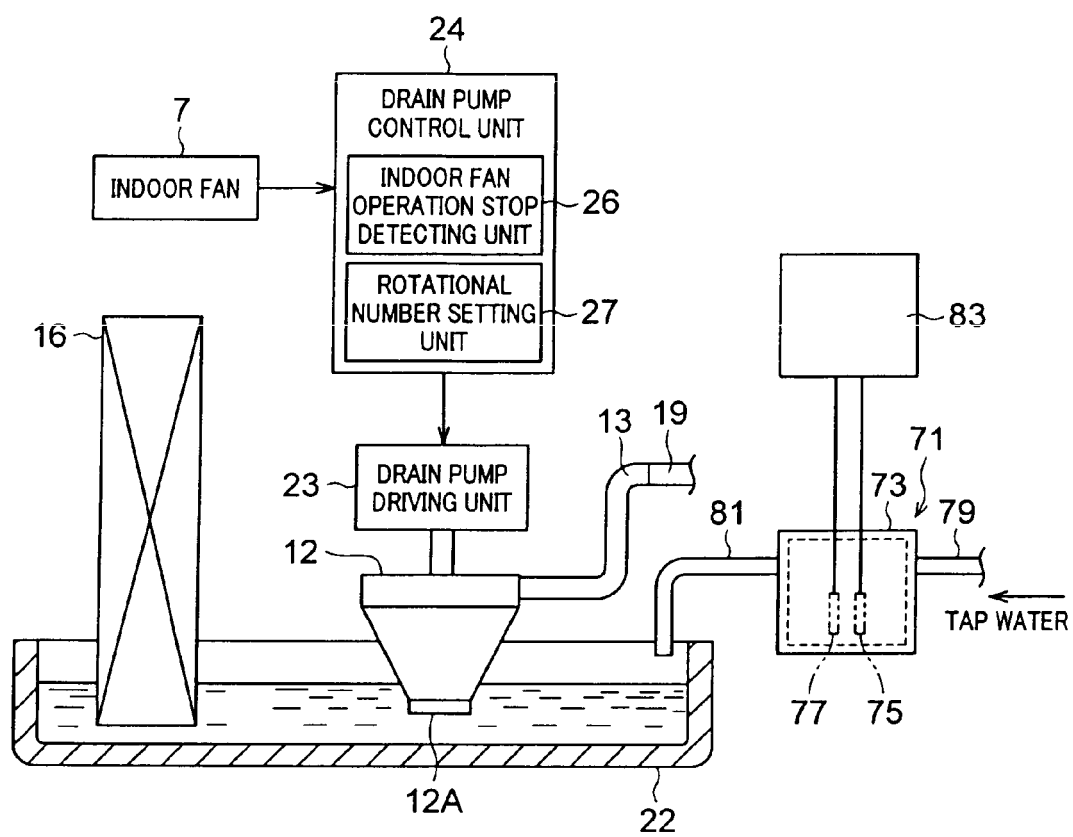


FIG. 7

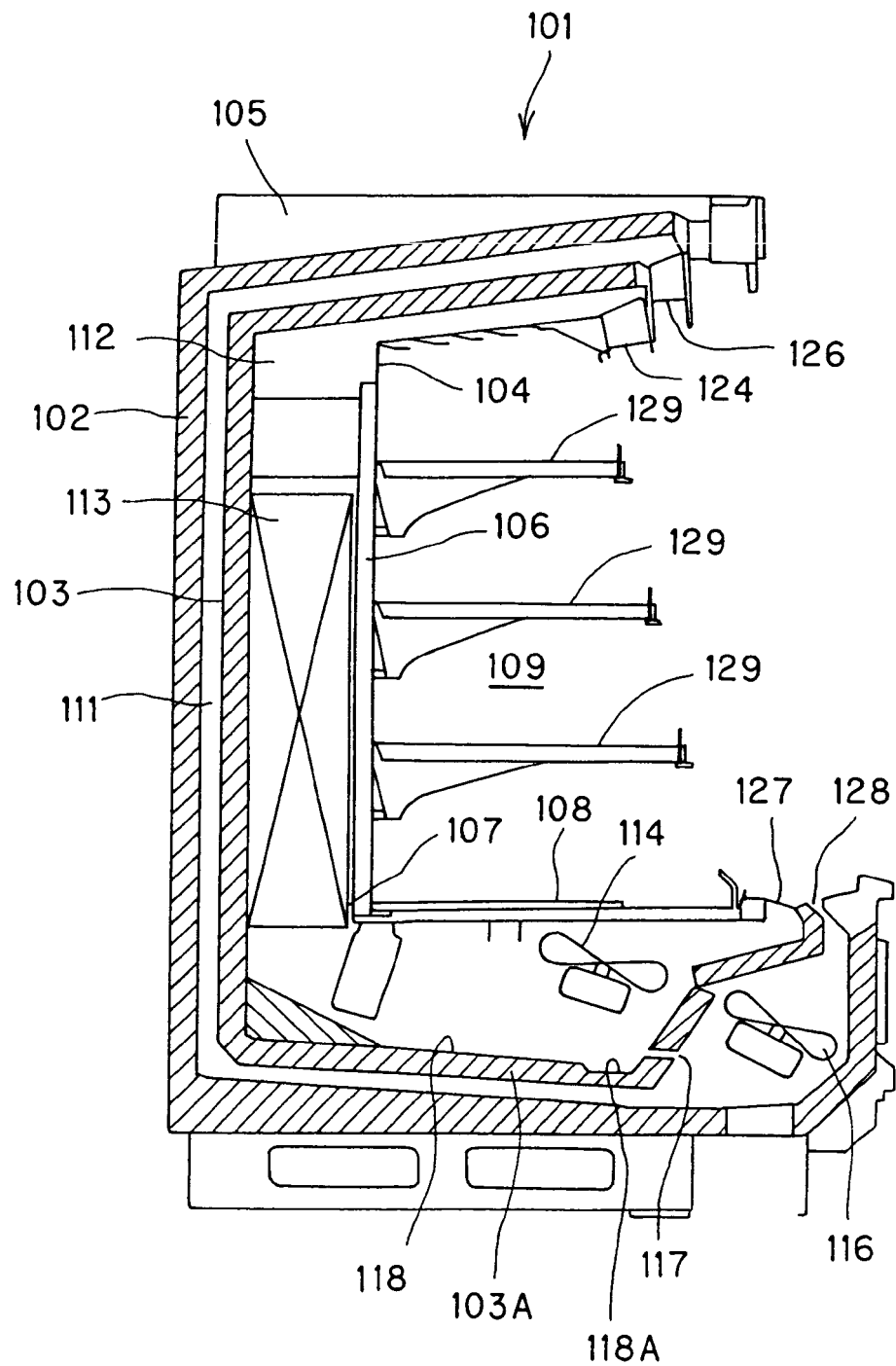
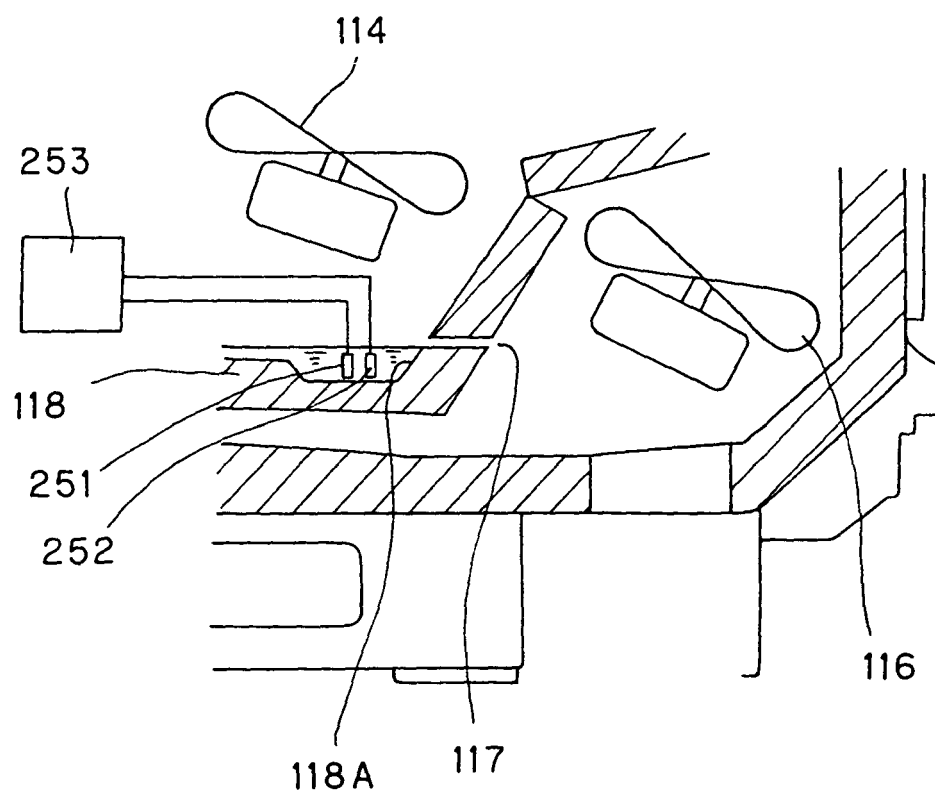


FIG.8





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 06 00 7836

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	PATENT ABSTRACTS OF JAPAN vol. 1998, no. 12, 31 October 1998 (1998-10-31) & JP 10 185494 A (ASAHI KOGYOSHA:KK), 14 July 1998 (1998-07-14) * abstract *	1,7,9,10	INV. F25D21/14 F24F1/00 F24F13/22 A47F3/04
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