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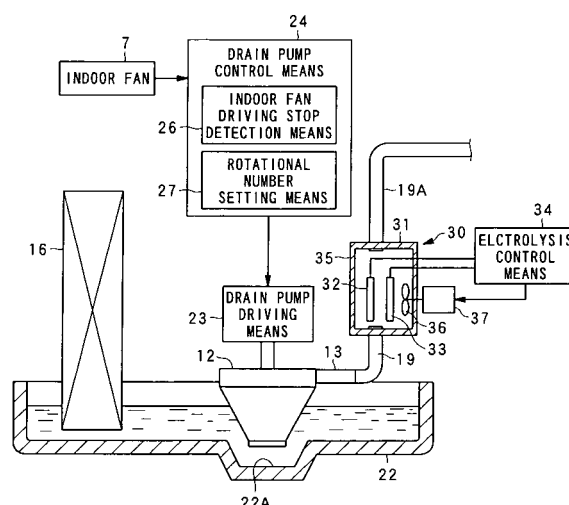
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(54) **Air conditioner**

(57) An air conditioner including a heat exchanger (16), a drain pan (22) for receiving drain water generated in the heat exchanger (16), a drain pump (12) for pumping drain water stocked in the drain pan (22) and discharging the pumped drain water through a drain hose (19) to the outside, and an electrolyzing unit (30, 50) having an electrode (32, 33, 52, 53) for electrolyzing the drain water and generating active oxygen species that is disposed at at least one of a suction port and a discharge port of the drain pump (12), the drain water thus electrolyzed by the electrolyzing unit being returned to the drain pan again.

FIG. 3



Description**BACKGROUND OF THE INVENTION**

1. Field of the Invention

[0001] The present invention relates to an air conditioner having a drain pan for receiving drain water.

2. Description of the Related Art

[0002] There is generally known an air conditioner having a heat exchanger and a drain pan for receiving drain water generated in the heat exchanger. In this type of air conditioner, slime easily occurs in the drain water stocked in the drain pan, and causes clog of the drain pan and a drain hose.

[0003] In order to overcome this trouble, there has been proposed an air conditioner in which a slime occurrence preventing agent is disposed in the drain pan (for example, see JP-A-6-159710).

[0004] In the above construction of the air conditioner, medical agent is blended with the drain water and occurrence of slime is chemically suppressed. Therefore, when the infiltrated medical agent lacks, the preventing effect is lost, and thus this air conditioner has difficulties in durability, that is, sustention of suppressing occurrence of slime.

SUMMARY OF THE INVENTION

[0005] Therefore, the present invention has been implemented to solve the above problem, and has an object to provide an air conditioner in which occurrence of slime in a drain pan can be permanently suppressed.

[0006] According to a first aspect of the present invention, there is provided an air conditioner comprising a heat exchanger, a drain pan for receiving drain water generated in the heat exchanger and a drain pump for pumping drain water stocked in the drain pan and draining off the pumped drain water through a drain hose to the outside, wherein an electrolyzing unit having an electrode for electrolyzing the drain water and generating active oxygen species is disposed at at least one of a suctionport and a discharge port of the drain pump, and the drain water thus electrolyzed by the electrolyzing unit is returned to the drain pan again.

[0007] In this case, the drain hose may be equipped with an upwardly-extending erection portion, and the electrolyzed drain water in the erection portion and the electrolyzing unit may be returned to the drain pan in connection with stop of the driving of the drain pump. Furthermore, the air conditioner may be further equipped with an electrolysis controller for controlling driving the drain pump and also controlling the electrolyzing unit to electrolyze the drain water supplied to the electrolyzing unit during cooling operation or dehumidifying operation or after the driving operation is finished.

[0008] Furthermore, the electrolyzing unit or the drain hose may be equipped with a thermal storage unit for storing cold heat owned by the drain water and cooling drain water supplied in the next electrolysis operation and the subsequent electrolysis operations by the cold heat. Still furthermore, the electrolysis controller may detect whether drain water is supplied into the electrolyzing unit and starts the electrolysis of the drain water when it detects the supply of the drainwater into the electrolyzing unit. The electrolyzing unit may be equipped with a stirring unit for stirring the drain water flowing into the electrolyzing unit. Furthermore, the polarity of the electrode may be periodically or irregularly inverted.

[0009] According to a second aspect of the present invention, there is provided an air conditioner comprising a heat exchanger, a drain pan for receiving drain water generated in the heat exchanger and a drain pump for pumping drain water stocked in the drain pan and draining the pumped drain water through a drain hose to the outside, wherein a pumping pump for pumping the drain water is disposed in the drain pan, an electrolyzing unit having an electrode for electrolyzing the drain water and generating active oxygen species is disposed at least one of a suction port and a discharge port of the pumping pump and the drain water electrolyzed in the electrolyzing unit is returned to the drain pan again.

[0010] In this case, the electrolyzing unit may be equipped with an electrode that can generate ozone.

[0011] According to the present invention, occurrence of slime in the drain pan can be permanently suppressed.

BRIEF DESCRIPTION OF THE DRAWINGS**[0012]**

Fig. 1 is a cross-sectional view showing an embodiment of an air conditioner according to the present invention;
 Fig. 2 is a bottom diagram of the air conditioner shown in Fig. 1;
 Fig. 3 is a block diagram showing an electrode arrangement;
 Fig. 4 is a diagram showing the relationship between water temperature and ozone water concentration under

electrolysis;

Fig. 5 is a flowchart showing the procedure of the electrolyzing operation;

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

Fig. 7 is a diagram showing the construction of another embodiment.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0013] A preferred embodiment according to the present invention will be described hereunder with reference to the accompanying drawings.

[0014] Fig. 1 is a cross-sectional view showing an air conditioner main body and a face panel, and Fig. 2 is a bottom diagram showing the main body of an air conditioner.

[0015] In Fig. 1, reference numeral 1 represents an air conditioner. The air conditioner 1 is combined with an outdoor unit (not shown) to have a refrigerating cycle including a compressor, an outdoor heat exchanger, etc. As shown in Fig. 1, the air conditioner 1 is fixedly suspended in the ceiling space 41. Figs. 1 and 2 show an embodiment of a four-way in-ceiling cassette type air conditioner 1. This air conditioner 1 includes 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 be vertically downwardly extend from a building (housing or the like) 40, and these four bolts 42 are fixed to hanging rings 43 of the air conditioner main body 2.

[0016] In the air conditioner main body 2 are disposed a fan motor 6, an indoor fan 7 (turbo fan), a partition plate 8, a drain pump 12, a drain port 13, a refrigerant pipe 14, an electric component box 15 having control devices such as drain pump control means, electrolysis control means, etc., a heat exchanger 16, etc.

[0017] The indoor fan 7 is disposed so as to face a fan nozzle 17. The heat exchanger 16 is bent substantially in a rectangular shape, and disposed in the neighborhood of the air blow-out ports 5 at the four sides so as to surround the indoor fan 7. The partition plate 8 connects pipe plates 21 of the heat exchanger 16 so that an outer space 20 and an inner space are formed through the partition plate 8 with respect to the heat exchanger 16. The drain pump 12, the drain port 13, an indoor mechanical valve 18, etc. are accommodated in the outer space 20. The partition plate 8 prevents air from leaking out from the indoor fan 7 during operation, and existence of the partition plate 8 makes it possible to accurately blow out heat-exchanged air from the four-side air blow-out ports 5 into a room R.

[0018] Fig. 3 shows a drain pan. In Fig. 3, a drain pan 22 is provided below the heat exchanger 16. A depressed drain pool 22A is formed at the bottom portion of the drain pan 22, and the drain pump 12 is disposed in the drain pool 22A. Drain pump driving means 23 such as a DC motor or the like is connected to the drain pump 12, and drain pump control means 24 for controlling the rotational number of the pump driving means 23 is connected to the pump driving means 23.

[0019] The drain pump control means 24 is equipped with an indoor fan driving stop detecting means 26 for detecting whether the indoor fan 7 operates or not (hereinafter referred to as fan driving detection means), and rotational number setting means 27 for setting the rotational number of the drain pump 12.

[0020] When the fan driving detection means 26 detects that the indoor fan 7 is operating, the rotational number setting means 27 sets the drain pump 12 to the maximum rotational number and outputting it to the drain pump driving means 23. After the fan driving detection means 26 detects the stop of the indoor fan 7, the rotational number setting means 27 outputs the drainable minimum rotational number to the drain pump driving means 23. The drain pump driving means 23 drives the drain pump 12 at the rotational number output from the rotational number setting means 27.

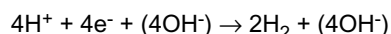
[0021] Furthermore, a drain hose 19 for draining drain water to the outside of the air conditioner is connected to the drain port 13 of the drain pump 12. The drain hose 19 is equipped with a rising portion 19A extending upwardly, and drain water remaining in the rising portion 19A is returned onto the drain pan 22 when the driving of the drain pump 12 is stopped.

[0022] In this embodiment, an electrolyzing unit 30 for electrolyzing drain water and generate active oxygen species (for example, ozone) is disposed in the rising portion 19A of the drain hose 19. The electrolyzing unit 30 is equipped with an electrolytic tank 31 having a larger diameter than the drain hose 19 and a pair of electrodes 32 and 33 disposed in the electrolytic tank 31, and these electrodes are connected to electrolysis control means 34. The electrodes 32 and 33 can electrolyze drain water flowing into the electrolytic tank 31 and generate active oxygen species (ozone) when supplied with current.

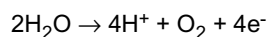
[0023] Here, the active oxygen species are defined by oxygen molecules having higher oxidation activation than normal oxygen and relating materials, and they may contain so-called strictly defined active oxygen species such as super-oxide anion, singlet oxygen, hydroxyl radical or hydrogen peroxide, and also broadly-defined active oxygen such as ozone, hypo-halogenous acid such as hypochlorous acid or the like.

[0024] The active oxygen species prevent occurrence of slime, so that slime hardly occurs in the drain pan 22 and the drain hose 19. It is desirable to use electrode material which can electrolyze drain water (containing no chlorine unlike tap water) and generate active oxygen species. For example, those materials which can generate ozone, hydrogen peroxide, radicals or the like may be used, and specifically platinum, lead oxide, platinum tantalum or the like is suitably

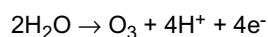
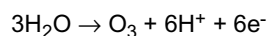
used. In these elements, the platinum tantalum electrode can stably generate ozone drain water having rare ion species with high efficiency by electrolysis, and thus it is most preferable. At this time, at the cathode electrode, the following reaction occurs:



[0025] At the anode electrode, the following reaction occurs:



Simultaneously with the above reaction, the following reaction occurs:



[0026] As described above, ozone (O_3) generated at the anode electrode is quickly dissolved in the drain water, and the slime preventing effect is achieved by the drain water dissolved with ozone (hereinafter referred to as ozone water). Specifically, the ozone water is returned onto the drain pan 22 in connection with the stop of the drain pump 12, and thus the occurrence of the slime at the drain pan 22 can be prevented. Furthermore, ozone water discharged to the outside through the drain hose 19 prevents occurrence of slime in the drain hose 19.

[0027] A thermal storage member 35 is disposed inside the electrolytic tank 31 of the electrolyzing unit 30. The thermal storage member 35 stores cold heat possessed by the drain water generated under cooling operation. Here, the reason why the thermal storage member 35 is provided will be described.

[0028] It is generally known that solubility of ozone in water is higher as the water temperature is reduced as shown in Fig. 4. Therefore, when drain water is electrolyzed, it is desirable to create ozone water having a high ozone concentration by keeping the water temperature of the drain water low.

[0029] However, the drain water stocked on the drain pan 22 is warmed by the atmospheric temperature with time lapse. Therefore, in this construction, by providing the thermal storage member 35 to the electrolytic tank 31, the cold heat of the drain water discharged to the outside is stocked in the thermal storage member 35 at the electrolysis time just after the cooling operation, and the drain water supplied to the electrolytic tank 31 is cooled by the above cold heat at the next and subsequent electrolysis time, whereby ozone water having a high ozone concentration can be easily generated.

[0030] Furthermore, the electrolyzing unit 30 is equipped with a stirring vane (stirring means) 36 for stirring drain water flowing into the electrolytic tank 31. Stirring vane driving means (hereinafter referred to as vane driving means) 37 such as a DC motor the like is connected to the stirring vane 36. The vane driving means 37 operates the stirring vane 36 at the electrolysis time under the control of the electrolysis control means 34, thereby stirring the drain water in the electrolytic tank 31 and efficiently performing electrolysis. As described above, the DC motor is used as the stirring vane driving means 37, however, the stirring vane 36 may be controlled by using the flow of the drain water as a driving source.

[0031] Next, the operation of the drain pump control means 24 will be described.

[0032] 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 driving detection means 26 of the drain pump control means 24 detects that the indoor fan 7 is under operation, the rotational number setting means 27 sets the drain pump 12 to the maximum rotational number, and the drain pump driving means 23 drives the drain pump 12 at the maximum rotational number. By driving the drain pump 12, the drain water stocked in the drain pan 22 is pumped up and discharged to the outside of the air conditioner.

[0033] When the cooling operation is stopped and the compressor and the indoor fan stops the operation, the fan driving detection means 26 detects the stop of the driving of the indoor fan 7. Since the indoor fan 7 is stopped, the rotational number setting means 27 sets the rotational number of the drain pump driving means 23 to the drainable minimum rotational number, and the drain pump driving means 23 operates the drain pump 12 at this rotational number. The drain pump 12 is driven at the drainable minimum rotational number, and thus noise such as webbing sound or the like of the drain pump 12 can be minimized. In addition, drain water which adheres to the heat exchanger 16, etc. and falls down to be stocked in the drain pan 22 can be drained even when the compressor and the indoor fan 7 are stopped.

[0034] 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 stocked in the drain pan 22, and thus the driving of the drain pump 12 is stopped. With respect to the stop timing of the drain pump 12, the driving of the drain pump 12 may be stopped at the stage that it is operated for about 20 minutes after the stop of the indoor fan 7. Alternatively, a sensor such as a water level sensor (not shown) or the like may be provided in the drain pan 22 so that the driving of the drain pump 12 is stopped at the stage that the water level

of the drain pan is reduced to the drainable minimum water level.

[0035] When the driving of the drain pump 1 is stopped, the drain water remaining in the rising portion 19A of the drain hose 19 is returned to the drain pan 22 by its own weight. Therefore, after cooling operation, the drain pan 22 falls into a state that drainwater is stocked in the drain pan 22. In this embodiment, the drain water stocked in the drain pan 22 is pumped up to the electrolyzing unit 30 by the drain pump 12, and electrolyzed in the electrolyzing unit 30. Thereafter, the drain water thus electrolyzed is returned to the drain pan 22 as ozone water again, thereby preventing occurrence of slime.

[0036] Here, the electrolysis operation of drain water stocked in the drain pan 22 will be described. In this embodiment, the electrolysis operation is intermittently (for example, every three hours) carried out at the stop time of the operation of the air conditioner.

[0037] The drain pump control means 24 drives the drain pump 12 (step S1). In this case, the drain pump 12 is driven at the minimum rotational number, thereby minimizing the noise such as the webbing sound or the like.

[0038] Subsequently, the electrolysis control means 34 judges whether the water level of drain water supplied into the electrolytic tank 31 of the electrolyzing unit 30 rises up to a predetermined position (step S2). Specifically, this predetermined position corresponds to a position at which the upper end portions of the electrodes 32 and 33 disposed in the electrolytic tank 31 are immersed in the drain water, and this position is detected by a water level sensor (not shown).

[0039] If it is judged that the water level of the drain water rises up to the predetermined position (step S2; Yes), the electrolysis control means 34 starts to supply current to the electrodes 32 and 33 (step S3) and electrolyze the drain water, thereby generating ozone water dissolved with ozone as active oxygen species. In this case, in connection with the current supply to the electrodes 32 and 33, the electrolysis control means 34 operates the vane driving means 37 to drive the stirring vane 36.

[0040] Here, the thermal storage means 35 stocks cold heat possessed by the drain water supplied at the electrolysis time just after cooling operation, and supplies this cold heat to drain water which is supplied in the next and subsequent electrolysis operations, thereby cooling the drain water supplied in the next and subsequent electrolysis operations. Accordingly, ozone water having a high ozone concentration can be easily generated.

[0041] Subsequently, the electrolysis control means 34 judges whether a predetermined time elapses from the time when the current is supplied to the electrodes 32 and 33 (in this embodiment, five minutes) (step S4). If the predetermined time has elapsed (step S4; Yes), the driving of the drain pump 12 is stopped through the drain pump control means 24 (step S5). In this embodiment, when the driving of the drain pump 12 is stopped, the ozone water (drain water) in the electrolytic tank 31 of the electrolyzing unit 30 and the rising portion 19A of the drain hose are returned to the drain pan 22.

[0042] Subsequently, the electrolysis control means 34 judges whether the water level of the ozone water in the electrolytic tank 31 is lower than the predetermined position (step S6). If it is judged that the water level of the ozone water is lower than the predetermined position (step S6; Yes), the current supply to the electrodes 32 and 33 is stopped, and also the driving of the stirring vane 36 is stopped (step S7). Accordingly, current is prevented from being supplied under the state that no water is supplied into the electrolytic tank 31, and thus the lifetime of the electrodes 32 and 33 can be lengthened.

[0043] According to this embodiment, the ozone water generated by the electrolysis is returned to the drain pan 22, so that occurrence of slime can be prevented. In this construction, slime does not permanently occur in the drain water stocked in the drain pan 22, and also the drain pan 22 is purified and also a deodorizing effect works. By making this drain water through the drain pipe 19, occurrence of slime in the drain pipe 19 can be permanently suppressed. From this viewpoint, the maintenance free state of the drain pan 22 can be achieved.

[0044] Furthermore, according to this embodiment, after cooling operation is finished, the electrolysis control means 34 can generate ozone water having a high concentration in a short time in order to electrolyze drain water remaining in the rising portion 19A of the drain hose 19, and occurrence of slime in the drain pan 22 can be prevented by the ozone water.

[0045] Still furthermore, according to this embodiment, the electrolytic tank 31 of the electrolyzing unit 30 is equipped with the thermal storage means 35 for cooling drain water supplied in the next and subsequent electrolysis operations. Therefore, the drain water temperature can be kept to low temperature in the next and subsequent electrolysis operations, and the high-concentration ozone water can be generated. Still furthermore, the electrolyzing unit 30 is equipped with the stirring vane 36 for stirring the drain water flowing into the electrolytic tank 31, and thus the electrolysis can be efficiently performed.

[0046] According to the air conditioner in which the electrodes are installed, not only the trouble of the drain system can be reduced and the maintenance can be easily performed, but also the inside of the air conditioning equipment is purified. Therefore, it contributes to implementation of more comfortable air conditioning, and it is particularly effective by setting up the air conditioner in a building such as a school, a hospital, a convenience store or the like in which an unspecified number of people gather together.

[0047] Fig. 6 shows another embodiment.

[0048] In this embodiment, an electrolyzing unit 50 is disposed at the suction port of the drain pump 12. The electrolyzing unit 50 is equipped with an electrolytic tank 51 connected to the suction port of the drain pump 12 and electrodes 52

and 53 accommodated in the electrolytic tank 51. These electrodes 52 and 53 are connected to electrolysis control means 54, and the other construction is the same as the embodiment shown in Fig. 3. However, in this embodiment, the electrolyzing unit 50 is disposed so as to be immersed in drain water, and thus the thermal storage means and the stirring vane are not adopted.

[0049] In this embodiment, ozone water generated by electrolysis is returned to the drain pan 22 to thereby prevent occurrence of slime. Therefore, slime does not permanently occur in the drain water stocked in the drain pan 22, the drain pan 22 is purified and also the deodorizing effect can be achieved. Furthermore, the drain water flows through the drain pipe 19, whereby occurrence of slime in the drain pipe 19 can be permanently suppressed. From this viewpoint, the maintenance free of the drain pan 22 can be established.

[0050] Fig. 7 shows another embodiment.

[0051] In this embodiment, a pump-up pump 61 for pumping up drain water is provided separately from the drain pump 12, and an electrolyzing unit 70 is connected to the discharge port 62 of the pump-up pump 61. The pump-up pump 61 is disposed in juxtaposition with the drain pump 12 in the drain pool 22A of the drain pan 22. Pump-up driving means 63 such as a DC motor or the like is connected to the pump-up pump 61, and pump-up pump control means 64 which can control the rotational number of the pump-up driving means 63 is connected to the pump-up driving means 63.

[0052] The electrolyzing unit 70 is equipped with an electrolytic tank 71 and electrodes 72 and 73 accommodated in the electrolytic tank 71. These electrodes 72 and 73 are connected to electrolysis control means 74. In this embodiment, the size of the electrolytic tank 71 is set so that the water amount (for example, 800ml) of the drain water to be returned to the drain pan 22 by its own weight can be accommodated in the electrolytic tank 71 when the drain pump 12 is stopped.

[0053] Furthermore, a thermal storage member 75 is disposed in the electrolytic tank 71, and also a stirring vane (stirring means) 76 for stirring drain water flowing into the electrolytic tank 71 is provided in the electrolytic tank 71. Furthermore, stirring vane driving means 77 such as a DC motor or the like is connected to the stirring vane 76. The other construction and operation are substantially the same as the embodiment shown in Fig. 3, and thus the description thereof is omitted.

[0054] According to this embodiment, ozone water generated by electrolysis is returned to the drain pan 22 to thereby prevent occurrence of slime. Therefore, no slime permanently occurs in the drain water stocked in the drain pan 22, and thus the drain pan 22 is purified. In addition, the deodorizing effect can be achieved. From this viewpoint, the maintenance free of the drain pan 22 is established.

[0055] In this embodiment, the electrolyzing unit 70 is disposed at the discharge port 62 of the pump-up pump 61 is disposed. However, the electrolyzing unit may be provided to the suction port of the pump-up pump.

[0056] The present invention is not limited to the above embodiments. For example, in the above embodiments, the electrolysis operation is carried out every predetermined time. However, the concentration of ozone on the drain pan-may be detected, and the electrolysis operation may be carried out when the concentration is equal to a predetermined value or less.

[0057] Furthermore, in the above embodiments, the electrolysis operation is carried out only when the cooling operation of the air conditioner 1 is stopped. However, when the drain pump is operated during cooling operation, current may be supplied to the electrodes to electrolyze the drain water. In this case, the ozone water generated by the electrolysis is discharged through the drain hose 19 to the outside of the air conditioner. However, slime in the drain hose 19 is removed by the ozone water, and thus the drain hose 19 can be kept clean. When the drain pump is stopped, the ozone water in the drain hose 19 and the electrolytic tank is returned to the drain pan. Therefore, occurrence of slime of the drain pan 22 can be suppressed, and the drain pan 22 can be kept clean.

[0058] In the above embodiments, the electrolytic tank 31, 71 is provided with the thermal storage member 35, 75. However, such a thermal storage member may be provided to the drain hose 19.

[0059] In the above embodiments, ozone is generated as active oxygen species. However, active oxygen species other than ozone may be generated by changing the electrodes to proper ones.

[0060] Furthermore, when scale deposits on the electrode (cathode) through the electrolysis of drain water, the electric conduction is lowered, and thus it is difficult to continuously electrolyze the drain water. In this case, it is effective to invert the polarity of the electrodes (the plus and minus electrodes are switched to each other). That is, by setting the cathode electrode to the anode electrode and then electrolyzing the drain water, scale deposited on the cathode electrode can be removed. The polarity inverting control described above may be periodically carried out by using a timer, for example, or, it may be carried out irregularly, for example, every time the operation is started. Furthermore, the rise-up of the electrolytic resistance (reduction in electrolytic current or increase in electrolytic voltage) may be detected, and the polarity may be inverted on the basis of the detection result. Still furthermore, the drain water stocked in the drain pan 22 may be electrolyzed not only under cooling operation, but also under dehumidifying operation under which drain water is generated.

Claims

1. An air conditioner including a heat exchanger (16) and a drain pan (22) for receiving drain water generated in the heat exchanger (16), **characterized by** further comprising:

a drain pump (12) for pumping drain water stocked in the drain pan (22) and discharging the pumped drain water through a drain hose (19) to the outside; and
 an electrolyzing unit (30, 50) having an electrode (32, 33, 52, 53) for electrolyzing the drain water and generating active oxygen species that is disposed at at least one of a suction port and a discharge port of the drain pump (12), the drain water thus electrolyzed by the electrolyzing unit being returned to the drain pan again.

2. The air conditioner according to claim 1, wherein the drain hose (19) is equipped with an upwardly-extending erection portion, and the electrolyzed drain water in the erection portion and the electrolyzing unit is returned to the drain pan in connection with stop of the driving of the drain pump.

3. The air conditioner according to claim 1, further comprising an electrolysis controller (34, 54, 74) for controlling driving the drain pump and also controlling the electrolyzing unit to electrolyze the drain water supplied to the electrolyzing unit during cooling operation or dehumidifying operation or after the driving operation is finished.

4. The air conditioner according to claim 4, wherein one of the electrolyzing unit and the drain hose is equipped with a thermal storage unit (35, 75) for storing cold heat owned by the drain water and cooling drain water supplied in the next electrolysis operation and the subsequent electrolysis operations by the cold heat.

5. The air conditioner according to claim 3 or 4, wherein the electrolysis controller detects whether drain water is supplied into the electrolyzing unit and starts the electrolysis of the drain water when detecting the supply of the drain water into the electrolyzing unit.

6. The air conditioner according to claim 1, wherein the electrolyzing unit is equipped with a stirring unit (36, 76) for stirring the drain water flowing into the electrolyzing unit.

7. The air conditioner according to claim 1, wherein the polarity of the electrode is periodically or irregularly inverted.

8. An air conditioner including a heat exchanger (16) and a drain pan (22) for receiving drain water generated in the heat exchanger, **characterized by** comprising:

a drain pump (12) for pumping drain water stocked in the drain pan and draining the pumped drain water through a drain hose to the outside;
 a pump-up pump (61) for pumping the drain water that is disposed in the drain pan (22);
 an electrolyzing unit (70) that has an electrode (72, 73) for electrolyzing the drain water and generating active oxygen species and is disposed at least one of a suction port and a discharge port of the pump-up pump (61), the drain water electrolyzed in the electrolyzing unit being returned to the drain pan again.

9. The air conditioner according to claim 1 or 8, wherein the electrolyzing unit (30, 50, 70) is equipped with an electrode for generating ozone.

FIG. 1

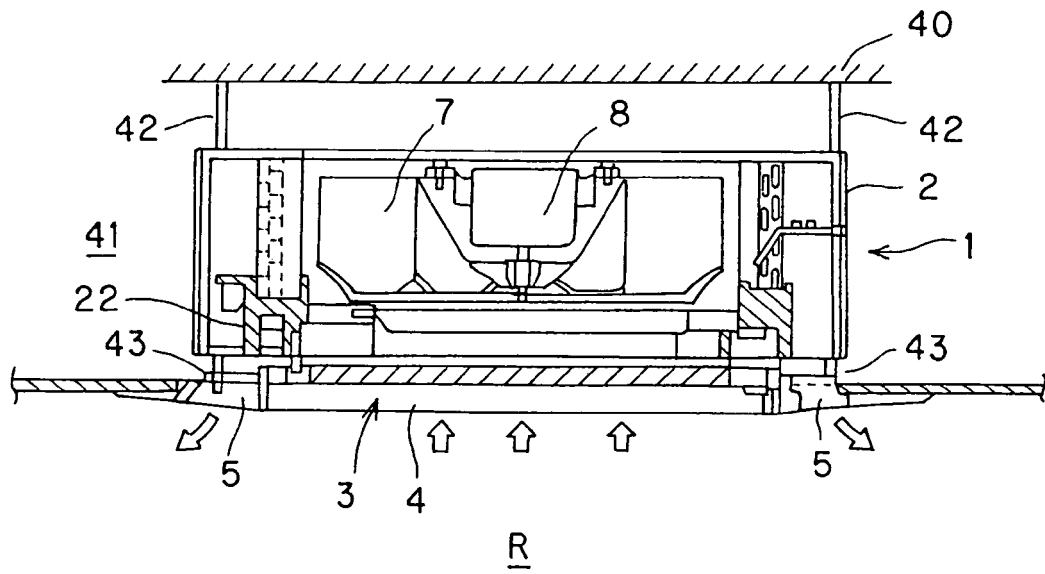


FIG. 2

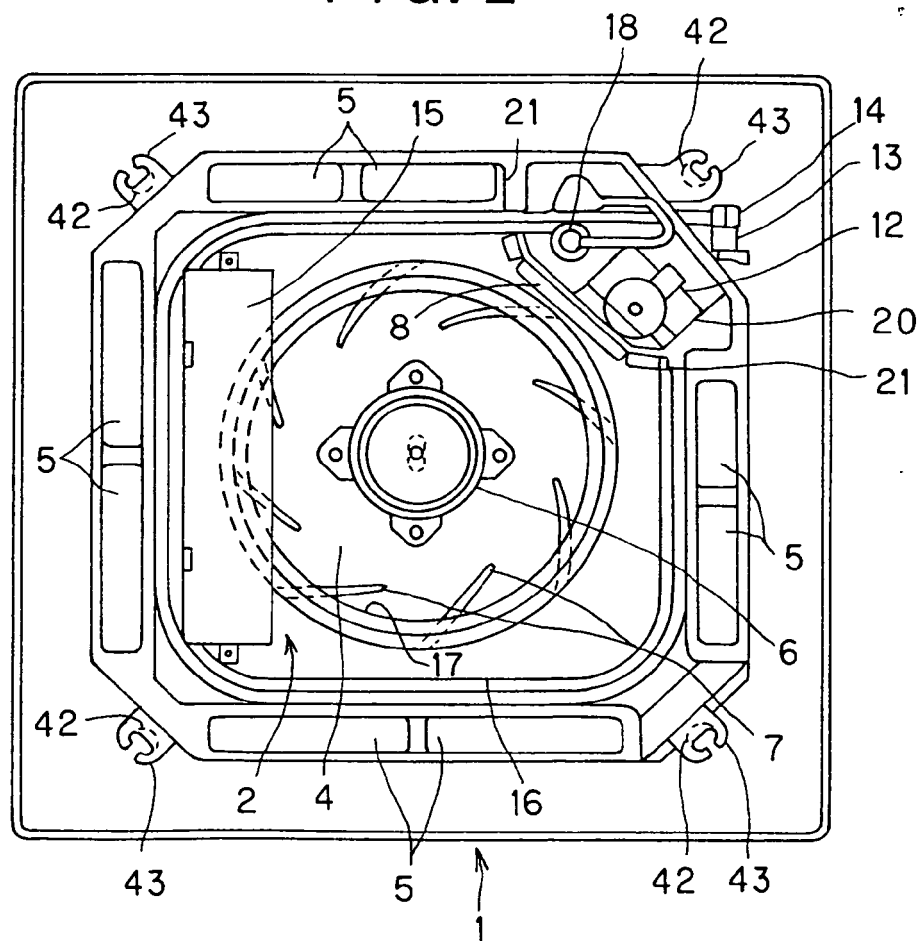


FIG. 3

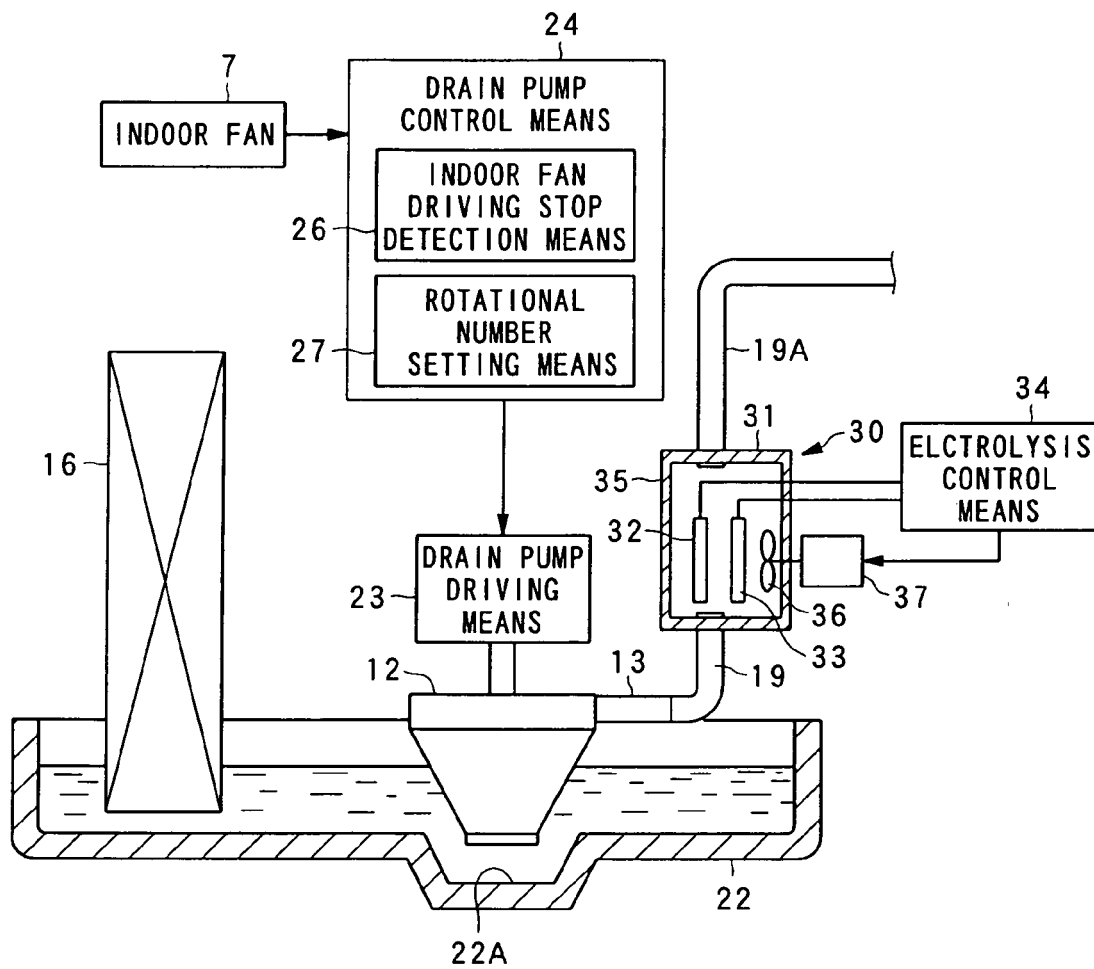


FIG. 4

WATER TEMPERATURE °C	TIME min	OZONE WATER CONCENTRATION mg/L
20	3	0.08
24	3	0.06
25	3	0.05
27	3	0.04
30	3	0.04
40	3	0.02

FIG. 5

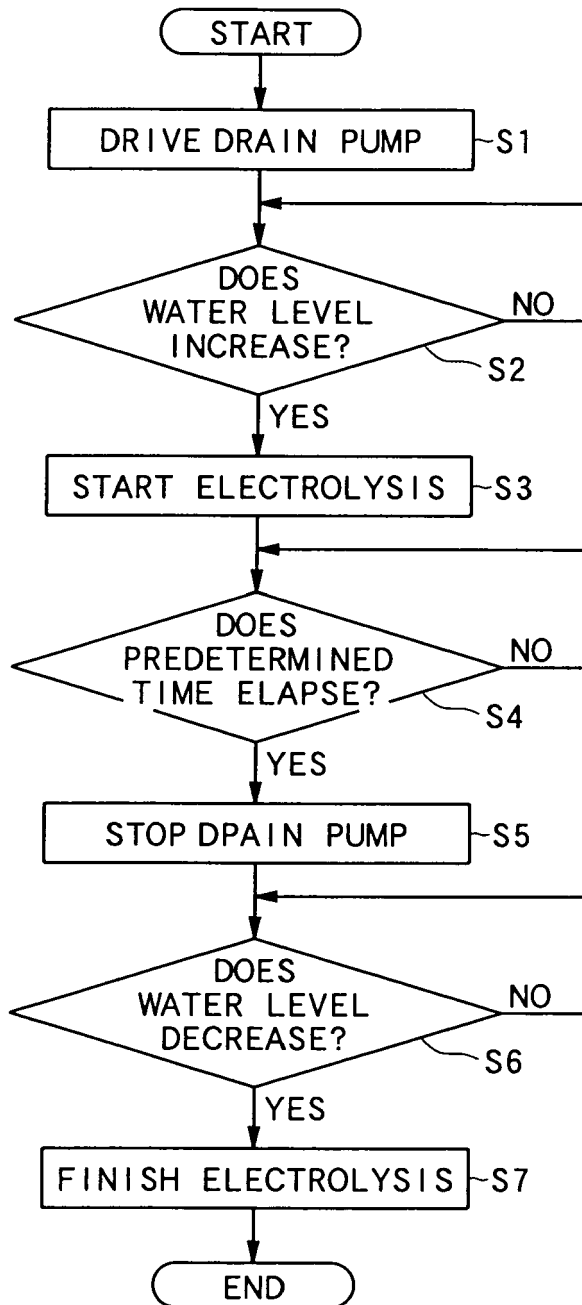


FIG. 6

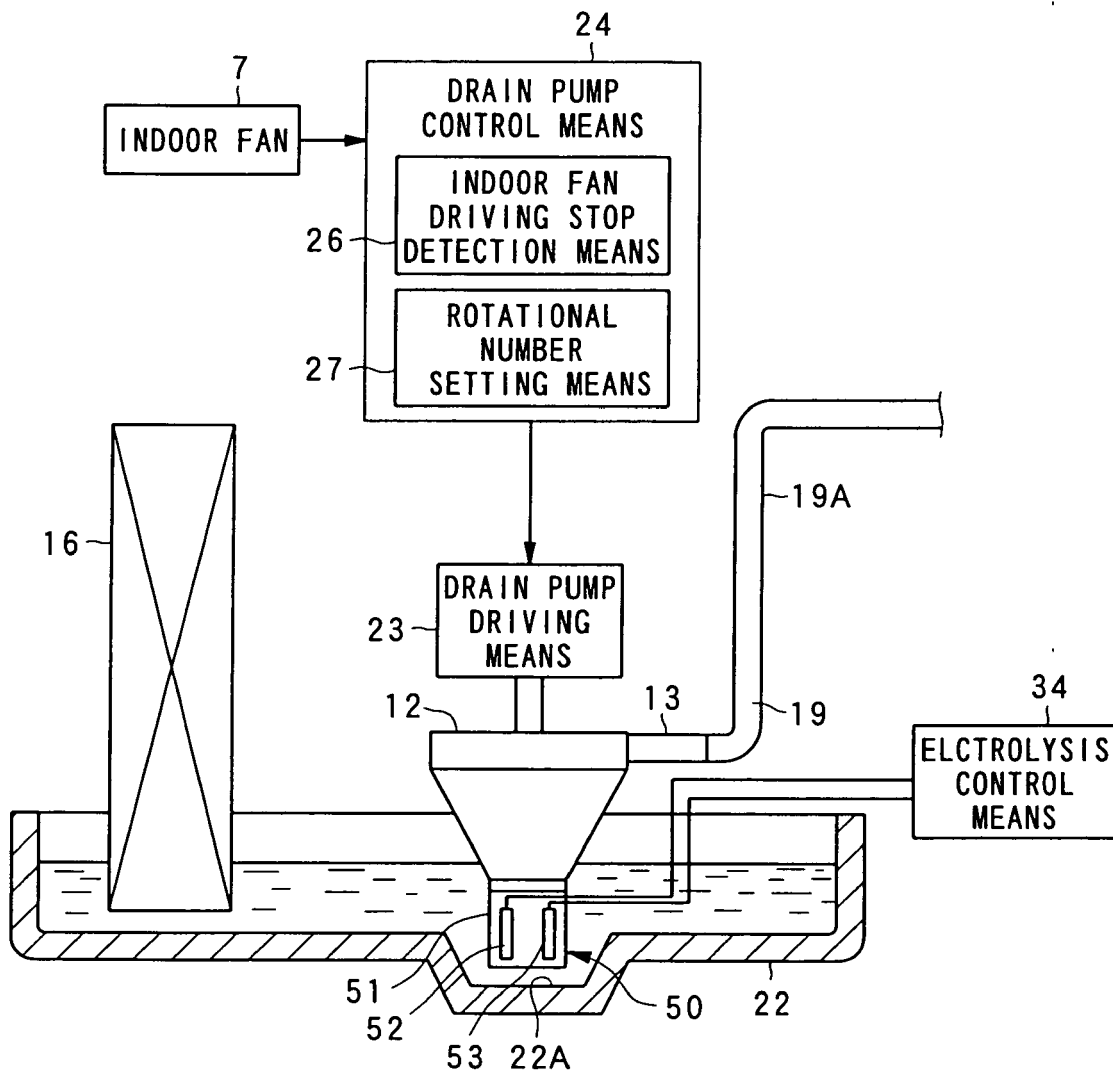
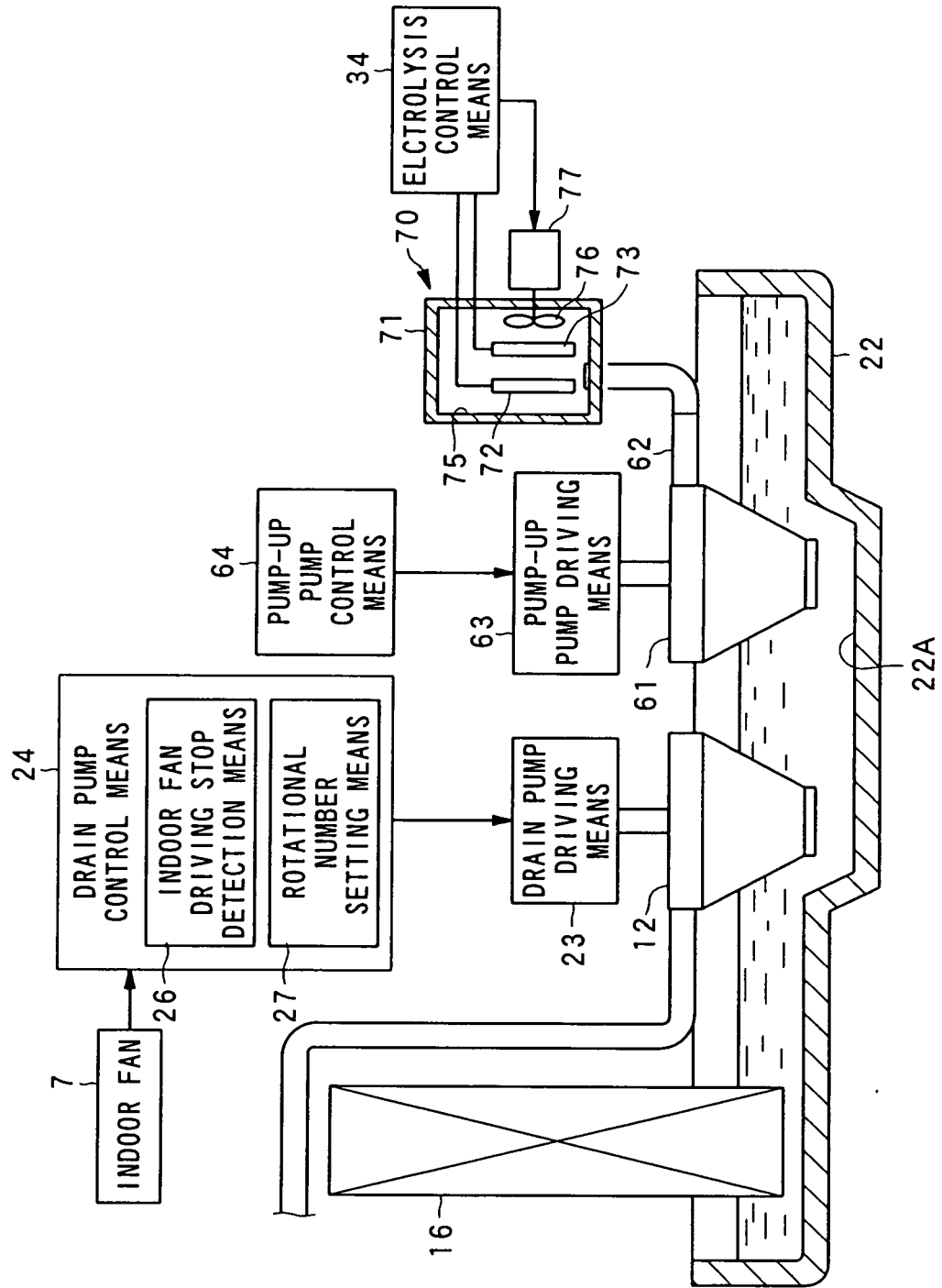


FIG. 7



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 6159710 A [0003]