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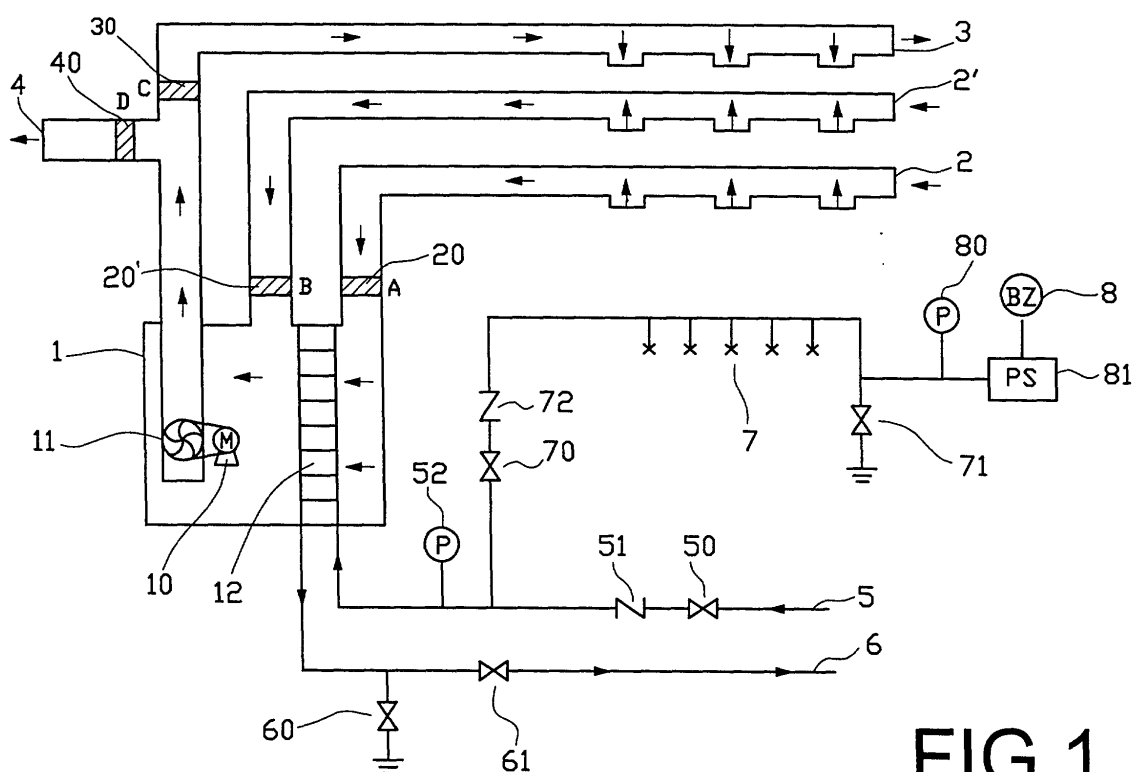
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(54) **Air conditioner having functions of fire preventing, smoke exhausting and water spraying**

(57) An air conditioner having functions of fire preventing, smoke exhausting and water spraying is provided with a sensor (25) at a proper location for sensing smoke and alternations of temperature in a room, and reacting to control opening and closing of a wind-intake gate (20), a smoke-sucking gate (20'), a wind-releasing gate (30), a smoke-exhausting gate (40), water-spraying nozzles (7), and an alarm (8). Smoke in a room

sensed by the sensor can be immediately sucked into a smoke-sucking inlet and then get into an air conditioning box through the smoke-sucking gate. Then, smoke is exhausted out of a smoke-exhausting outlet through the smoke-exhausting gate, and at the same time, the water-spraying nozzles and the alarm are started to operate, thus acquiring functions of fire preventing, smoke exhausting and water spraying to ensure public security.

**FIG.1****EP 1 367 332 A1**

Description

BACKGROUND OF THE INVENTION

[0001] This invention relates to an air conditioner having functions of fire preventing, smoke exhausting and water spraying, particularly to one using a common air conditioner additionally provided with a sensor, which can sense alterations of indoor vapor or temperature so as to control a wind-intake gate, a smoke-sucking gate, a wind-releasing gate, a smoke-exhausting gate, a water-spraying nozzle and an alarm, obtaining functions of air conditioning, fire preventing, smoking exhausting and water spraying, and accordingly elevating public security.

[0002] As commonly known, high buildings have been increasingly built year by year, and air conditioners have become absolutely necessary to be installed in a high building. And it is prescribed by the fire-preventing law that smoke-exhausting devices must be provided in high buildings. In general, the smoke-exhausting device, the air conditioning and the water-spraying device in a building are equipped at the same time, but function independently, not related to one another at all.

[0003] Besides, an air conditioner nowadays is only provided with a water inlet, a water outlet, an air conditioning box, a wind inlet and a wind outlet, with the air conditioning box provided with a cooler, a motor and a fan. Thus, icy water gets to the cooler through the water inlet and then gets out of the water outlet, and at the same time, the fan is driven by the motor to draw in wind through the wind inlet and then the wind gets out of the wind outlet through the cooler, achieving effect of air conditioning.

[0004] As can be noted, the conventional way of air conditioning has no functions of smoke exhausting or water spraying, so in case a fire should happen indoors, one can simply use the smoke-exhausting device alone to remove the smoke out of the room and give out alarm signals, or use the water-spraying device alone for spraying water to put out the fire. Under such condition, an air conditioner, a smoke-exhausting device and a water-spraying device have to be installed respectively in a room, not only costing lots of money and taking too much space in a room, but also failing to operate synchronously with quickness in case of a fire and increasing trouble in maintenance.

SUMMARY OF THE INVENTION

[0005] The objective of this invention is offer an air conditioner having functions of fire preventing, smoke exhausting and water spraying and giving out alarm signals at the same time.

[0006] One feature of the invention is that an air conditioning box is provided with a motor at one inner side, a fan connected with the motor, and a condenser at another inner side. A wind inlet is connected to the con-

denser of the air conditioning box, having a wind-intake gate. A smoke-sucking inlet is connected to a proper location in the air conditioning box, having a smoke-sucking gate. A wind outlet is connected to the fan of the air conditioning box, having a wind-releasing gate. Then, a smoke outlet is connected to the fan of the air conditioning box and provided with a smoke exhausting gate. A water inlet is connected to the condenser of the air conditioning box and provided with a water-stopping valve, a backpressure valve and a pressure gauge. Further a water outlet is connected to the condenser of the air conditioning box, having a water exhausting valve and a water-stopping valve. Furthermore, a water-spraying nozzle is positioned between the backpressure valve and the pressure gauge of the water inlet, and connected to the water-stopping valve as well as to the condenser valve. An alarm is installed between the water spraying nozzle and the water-stopping valve, and connected to another pressure gauge and a pressure switch.

[0007] Another feature of the invention is that a power terminal is connected to three no-fuse switches connected orderly to three normally open contacts and two motor overload protective circuits and a motor. Then, between one of the no-fuse switches and one of the normally-open contacts is a fuse connected to a reset switch connected in parallel to a yellow light, a timer contact, a plurality of normally-closed contacts and normally-open contacts, a motor forced-switch, and a transforming and rectifying circuit.

[0008] A first normally-closed contact has one end connected in series to a second normally-closed contact and a first motor switch, and the first motor switch has one end connected in parallel to a normally-open contact and a second motor switch. Then, the normally open contact and the second motor switch have their other end connected to one end of the timer contact, a motor coupler and a red light. The motor coupler has one end connected to a motor overload protective contact connected to one end of the yellow light. Then, a third normally-closed contact is connected in series to a fourth normally-closed contact having one end connected in parallel to a wind-intake gate, a smoke-sucking gate, a wind-releasing gate and a smoke-exhausting gate. Besides, the normally open contact and the motor forced-switch are connected in parallel to the wind-intake gate, the smoke-sucking gate, the wind-releasing gate, the smoke-exhausting gate, a timer, an alarm and a relay. Between one of the no-fuse switches and one of the normally-open contacts are connected the motor overload protective contact, the red light, the wind-intake gate, the smoke-sucking gate, the wind-releasing gate, the smoke-exhausting gate, the timer, the alarm, one end of the relay and a transforming and rectifying circuit, thus making up a circuit. Additionally, the transforming and rectifying circuit has one end connected to another relay and a sensor.

BRIEF DESCRIPTION OF DRAWINGS

[0009] This invention will be better understood by referring to the accompanying drawings, wherein:

Fig. 1 is a distribution diagram of the components of an air conditioner having functions of fire preventing, smoke exhausting and water spraying in the present invention; and,

Fig. 2 is a circuit diagram of the air conditioner having functions of fire preventing, smoke exhausting and water spraying in the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0010] An air conditioner having functions of smoke exhausting and water spraying in the present invention, as shown in Fig. 1, includes an air conditioning box 1, a wind inlet 2, a wind outlet 3, a smoke outlet 4, a water inlet 5, a water outlet 6, a water spraying nozzle 7 and an alarm 8 as main components combined together.

[0011] The air conditioning box 1 has a motor 10 installed at an inner side. The motor 10 is connected to a fan 11 and has the other end connected to a condenser 12. The wind inlet 2 is connected to the condenser 12 of the air conditioning box 1, having a wind-intake gate 20. The smoke-sucking inlet 2' is connected to a proper location in the air conditioning box 1, having a smoke-sucking gate 20'. A wind outlet 3 is connected to the fan 11, having a wind-releasing gate 30, and a smoke outlet 4 is connected to the fan 11 of the air conditioning box 1, having a smoke-exhausting gate 40. A water inlet 5 is connected to the condenser 12, having a water-stopping valve 50, a backpressure valve 51 and a pressure gauge 52. A water outlet 6 is connected to the condenser 12, having a water-exhausting valve 60 and a water-stopping valve 61. The water-spraying nozzle 7 is connected between the back-pressure valve 51 and the pressure gauge 52 and provided with two water-stopping valves 70, 71 and a backpressure valve 72 respectively at opposite sides. The alarm 8 is connected between the water-spraying nozzle 7 and the water-stopping valve 71 and provided with a pressure gauge 80 and a pressure switch 81.

[0012] The circuit of this invention, as shown in Fig. 2, includes a power terminal 9 connected to no-fuse switches 90, 90', 90" respectively connected to normally open contacts 910, 911, 912 of a motor coupler 91 and then to the motor 10. Between the motor 10 and the normally-open contacts 910, 912 are respectively provided motor overload protective circuits 100, 101, while between the no-fuse switch 90 and the normally-open contact 910 is connected a fuse 92 connected to a reset switch 93, which is connected in parallel to a yellow light (YL), the timer contact (T1) of a timer (T), the normally-closed contacts (X1, X2) of a relay (X) and the normally-open contact (X3) of the relay (X), the normally-open

contact (T2) of the timer (T), a motor forced-switch 102, and a transforming and rectifying circuit.

[0013] Then, the normally-closed contact (X1) is connected in series to the normally-closed contact (R1) of another relay (R) and a motor switch 103, which is connected in parallel to the normally-open contact 913 of the motor coupler 91 and a motor switch 104. The normally open contact 913 and the motor switch 104 connected to one end of the timer switch (T1), the motor coupler 91 and a red light (RL), and the motor coupler 91 is connected to a motor overload protective contact 105 connected to the yellow light (YL).

[0014] Besides, the normally-closed contact (X2) is connected in series to the normally-closed contact (R2) of the relay (R), which is connected in parallel to a wind-intake gate 20, the smoke-sucking gate 20', the wind-releasing gate 30 and the smoke-exhausting gate 40. The normally open contacts (X3), (T2) and the motor forced-switch 102 are connected in parallel to the wind-intake gate 20, the smoke sucking gate 20', the wind-releasing gate 30, the smoke-exhausting gate 40, the timer (T), the alarm 8 and the relay (R).

[0015] Further, between the no-fuse switch 90' and the normally-open contact 911 are connected the motor overload protective contact 105, the red light (RL), the wind-intake gate 20, the smoke-sucking gate 20', the wind-releasing gate 30, the smoke-exhausting gate 40, the timer (T), the alarm 8, one end of the relay (R), and the transforming and rectifying circuit 94, thus making up a circuit. Additionally, the transforming and rectifying circuit 94 has one end connected to another relay (X) and a sensor 95.

[0016] In assembling and using, as shown in Figs. 1 and 2, the sensor 95 is installed at a proper location of an air conditioner. In case of no fire and the air conditioner operating normally, only press the motor switch 104 to make electric connection to let the motor coupler 91 excite magnet and control the normally-open contacts 910, 911, 913 to be short-circuited (conducted), and simultaneously the power terminal 9 supplies power to drive the motor 10, letting one electric current get to the fuse 92 and flow through the reset switch 93, the normally-closed contacts (X1), (R1), the motor switches 103, 104 and the red light (RL), making the red light (RL) lit up.

[0017] Synchronously, another electric current flows through the normally-closed contacts (X2), (R2) to the wind-intake gate 20, the smoke-sucking gate 20', the wind-releasing gate 30 and the smoke-exhausting gate 40, with the wind-intake gate 20 and the wind-releasing gate 30 being open, and the smoke-sucking gate 20' and the smoke-exhausting gate 40 being closed at this time, letting the normally-closed contacts (X1), (X2), (R1), (R2) of the relays (X), (R) form a short circuit (conducted).

[0018] Meanwhile, a third electric current flows through the normally-open contacts (X3), (T2) and the motor forced switch 102 to the transforming and rectify-

ing circuit 94, making the normally-open contacts (X3), (T2) and the motor forced switch 102 form an open circuit (not conducted). The third electric current, after transformed and rectified, can keep the relay (X), the sensor 95 and the integral circuit operating normally and conform to the return voltage of the sensor 95, which is a direct current (DC) of 24 volts, to activate the fan 11 to function when the motor 10 is operating.

[0019] At this time, icy water will get into the water inlet 5 and, after controlled by the water stopping valve 50 as well as the backpressure valve 51 and with its pressure indicated by the pressure gauge 52, then flow into the condenser 12, get out of the other end of the condenser 13 and flow out of the water outlet 6 through the control of the water-exhausting valve 60 and the water-stopping valve 61. Thus, when the motor 10 rotates the fan 11, wind is sucked into the wind inlet 2 and then gets into the air conditioning box 1 through the wind-intake gate 20, and afterward cold wind is sent out of the air conditioning box 1 through the condenser 12, and gets out of the wind outlet 3 through the wind-releasing gate 30, acquiring effect of air conditioning.

[0020] When the motor 10 is operating, and if the motor switch 103 is turned off to form an open circuit and stop the motor 10, electric current will flow through the fuse 92, the reset switch 93, the yellow light (YL) to the motor overload protective contact 105 and make yellow light (YL) lit up due to overload. At this time, the red light (RL) is not lit up and the motor coupler 91 fails to excite magnet, so the motor 10 stops operating. Further, when a disorder is corrected, the yellow light (YL) is not lit up, but the sensor 95 still remains operating normally whether the motor 10 operates or not.

[0021] When a fire happens and gives rise to much smoke and high temperature indoor, the sensor 95 will immediately sense them and react to make the relay (X) excite magnet to control the normally closed contacts (X1), (X2) to form an open circuit and stop the motor 10. Thus, the electric current will flow through the normally open contacts (X3), (T2) and the motor forced-switch 102 to the transforming and rectifying circuit 94. Meanwhile, the normally open contact (X3) is in a short-circuit condition to permit the electric to flow through the normally open contact (X3) to the wind-intake gate 20, the smoke sucking gate 20', the wind-releasing gate 30 and the smoke-exhausting gate 40. At this time, the wind-intake gate 20 and the wind-releasing gate 30 are closed, while the smoke-sucking gate 20' and smoke-exhausting gate 40 are open.

[0022] Simultaneously, the alarm 8 will function to give out warning sounds, and the timer (T) excite magnet to control the normally-open contact (T2) in a short-circuit condition and start timing. As soon as time is up, the timer contact (T1) will form a short circuit to let the electric current flow through the motor coupler 91 to control the normally-open contacts 910, 911 under a short-circuit condition and make the motor 10 operate and drive the fan 11 to suck the smoke into the smoke-suck-

ing inlet 2' and then it passes through the smoke-sucking gate 20' and gets into the air conditioning box 1.

[0023] At the same time, the icy water, with its pressure indicated by the pressure gauge 52 and controlled by the water-stopping valve 50 and the back-pressure valve 51, will fully flow through the water-stopping valve 70 and the backpressure valve 72 to the water-spraying nozzles 7 and the water-stopping valve 71, and then, controlled by the water-stopping valves 70, 71 and the backpressure valve 72, spray out through the water-spraying nozzles 7 to put out the fire and lower the high temperature in the room. At this time, no icy water flows into the condenser 12, and the remaining icy water in the condenser 12 is released out through control of the water-releasing valve 60 and the water-stopping valve 61, while the smoke sucked in the air conditioning box 1 is exhausted out of the smoke outlet 4 through the smoke-exhausting gate 40, thus achieving effect of smoke exhausting.

[0024] In addition, the warning sounds of the alarm 8 can be controlled by means of indication of the pressure gauge 80 and control by the pressure switch 81, but, if the reset switch 93 is pressed down, electric current is turned off and all operation stops.

[0025] In another case, should a fire happen, but the sensor 95 doesn't sense or react to the fire, just press down immediately the motor forced-switch 102 manually to make electric connection to let electric current flow through the motor forced-switch 102, the wind-intake gate 20, the smoke-sucking gate 20', the wind-releasing gate 30, the smoke-exhausting gate 40, the timer (T), the alarm 8 and the relay (R) to force the motor 10 operate, the timer (T) start timing and the alarm 8 give out warning sounds. At the same time, the relay (R) starts to excite magnet to control the normally-closed contacts (R1), (R2) into an open-circuit condition, and the normally-open contact (X3), (T2) in a short-circuit condition, making the wind-intake gate 20 and the wind-releasing gate 30 closed, and the smoke-sucking gate 20' and the smoke-exhausting gate 40 open, equally obtaining effect of smoke exhausting, water spraying and fire warning.

[0026] In the same way, if the water-spraying nozzles 7 carry on spraying water, and the fire is put out, with the high temperature lowered down and the smoke exhausted out, but the sensor 95 does not react successively, the water-spraying nozzles 7 and the alarm 8 can be controlled to stop functioning so as to recover the air conditioner to operate normally.

[0027] As can be noted from the above description, this invention has the following advantages.

1. The air conditioner has functions of fire preventing, smoke exhausting and water spraying, able to ensure public security.
2. It is needless to independently install an air conditioner, a smoke-exhausting device and a water-spraying device, not only reducing cost of equip-

ment, but also effectively making use of an indoor space.

3. It is easy and convenient in using, maintenance and in repair.

4. In case a plurality of air conditioners are used, each air conditioner can be additionally provided with a control circuit connected to a monitoring center.

[0028] While the preferred embodiment of the invention has been described above, it will be recognized and understood that various modifications may be made therein and the appended claims are intended to cover all such modifications that may fall within the spirit and scope of the invention.

Claims

1. An air conditioner having functions of fire preventing, smoke exhausting and water spraying comprising:

an air conditioning box installed inside with a motor connected with a fan on one side, and a condenser on another side;

a wind inlet connected to said condenser of said air conditioning box and provided with a wind-intake gate;

a smoke-sucking inlet provided at a proper location in said air conditioning box and having a smoke-sucking gate;

a wind outlet connected to said fan of said air conditioning box and provided with a wind-releasing gate;

a smoke-exhausting outlet connected to said fan of said air conditioning box and having a smoke-exhausting gate;

a water inlet connected to said condenser of said air conditioning box, provided with a water-stopping valve, a backpressure valve and a first pressure gauge;

a water outlet connected to said condenser of said air conditioning box, having a water-releasing valve and a water-stopping valve;

water spraying nozzles provided between said back-pressure valve and said pressure gauge, and connected to two water-stopping valves and another backpressure valve;

an alarm installed between said water-spraying nozzles and said water-stopping valve, and connected with a second pressure gauge and a pressure switch; and,

a sensor installed at a proper location of said air conditioner, said sensor sensing smoke and alternations of temperature in a room, said sensor reacting and controlling opening and closing of said wind-intake gate, said smoke-suck-

ing gate, said wind-releasing gate, said smoke-exhausting gate, said water-spraying nozzles and said alarm, indoor smoke sensed by said sensor and sucked immediately into said smoke-sucking inlet and getting into said air conditioning box through said smoke-sucking gate and flowing out of said smoke outlet through said smoke-exhausting gate, said water-spraying nozzles and said alarm started to operate at the same time, achieving effects of fire preventing, smoke exhausting and water spraying.

2. An air conditioner having functions of fire preventing, smoke exhausting and water spraying comprising a power terminal connected to no-fuse switches, said no-fuse switches respectively connected to normally-open contacts and then to a motor, between said motor and said normally-open contacts respectively provided two motor overload protective circuits, between said no-fuse switches and said normally-open contact connected a fuse, said fuse connected to a reset switch, said reset switch connected in parallel to a yellow light, a timer contact, normally-closed contacts, a normally-open contact, a motor forced-switch, and a transforming and rectifying circuit, one of said normally-closed contacts connected in series to another of said normally-closed contacts and a motor switch, said motor switch connected in parallel to a normally-open contact and another motor switch, said normally-open contact and said another motor switch having their ends connected to said timer contact, a motor coupler and a red light, said motor coupler connected to a motor overload protective contact, said motor overload protective contact connected to said yellow light, one of said normally-open contacts connected in series to a normally-closed contact, said normally closed contact connected in parallel to said wind-intake gate, said smoke-sucking gate, said wind-releasing gate and said smoke-exhausting gate, said normally-open contacts and said motor forced-switch connected in parallel to said wind-intake gate, said smoke-sucking gate, said wind-releasing gate, said smoke-exhausting gate, said timer, said alarm and a relay, between one of said no-fuse switches and one of said normally-open contacts connected said motor overload protective contact, said red light, said wind-intake gate, said smoke-sucking gate, said wind-releasing gate, said smoke-exhausting gate, said timer, said alarm, said relay and said transforming and rectifying circuit to make up a circuit, said transforming and rectifying circuit having one end connected to another relay and said sensor.

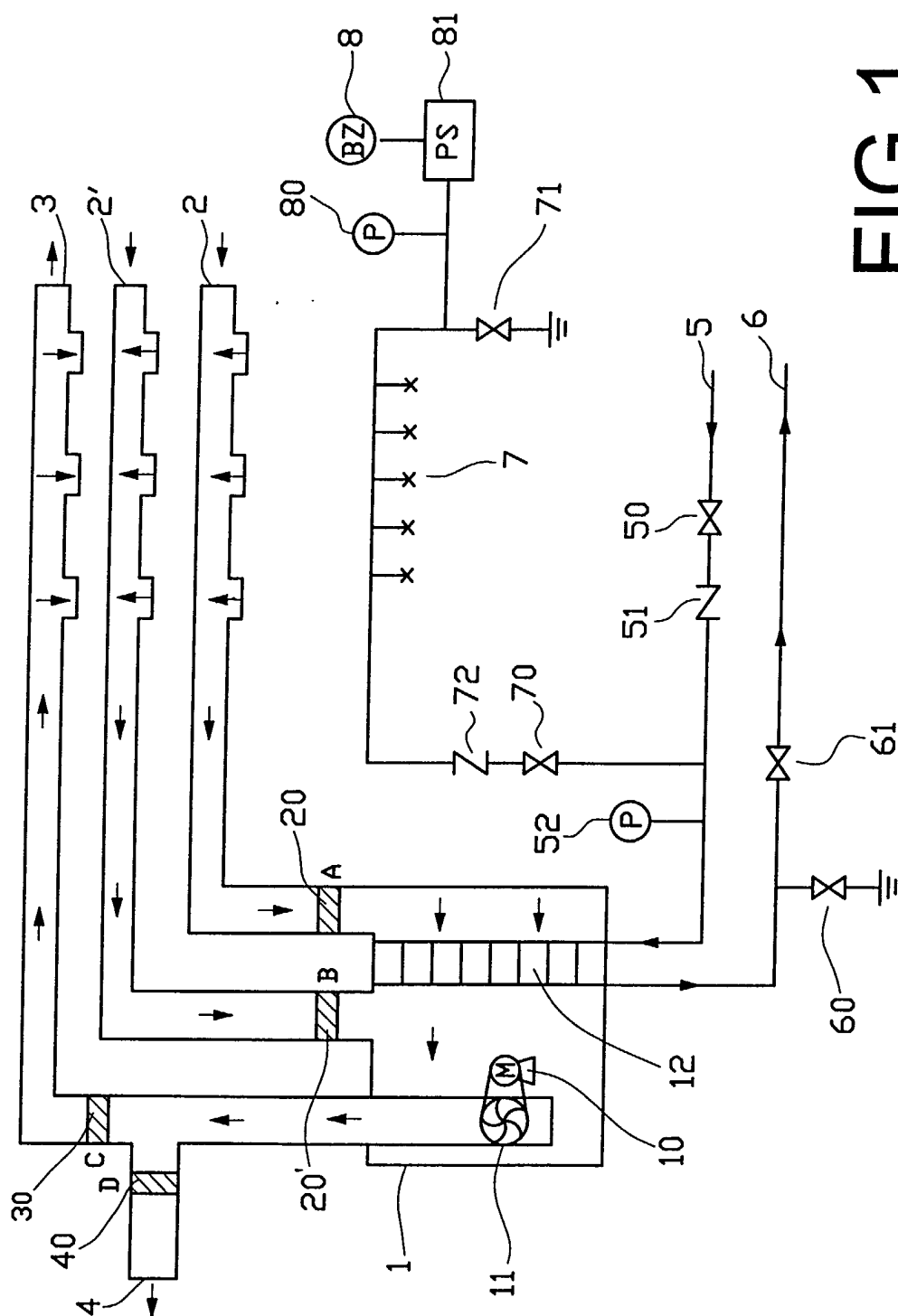
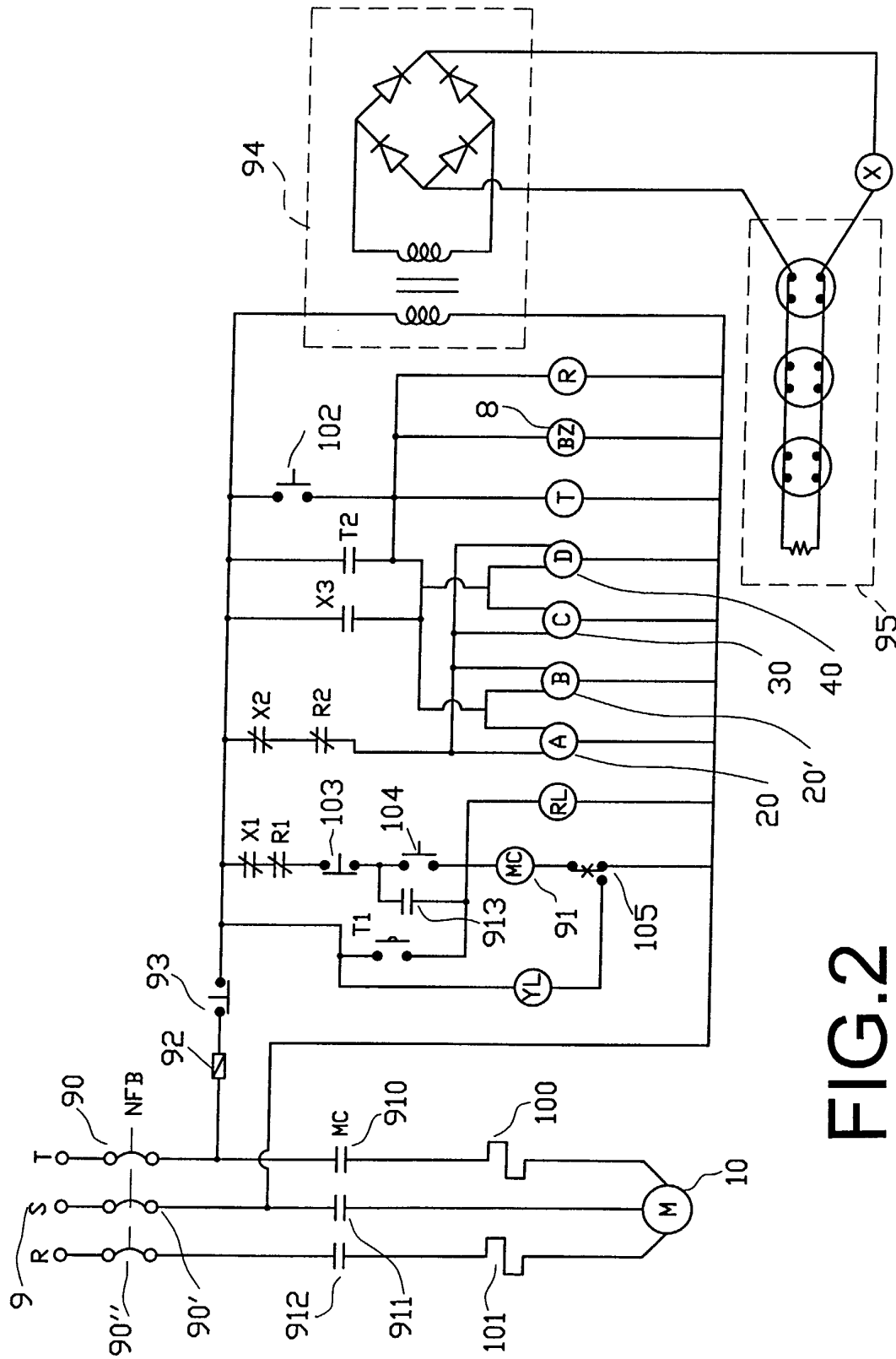


FIG. 1





European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 02 01 1371

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Place of search MUNICH		Date of completion of the search 2 October 2002	Examiner Lienhard, D
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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