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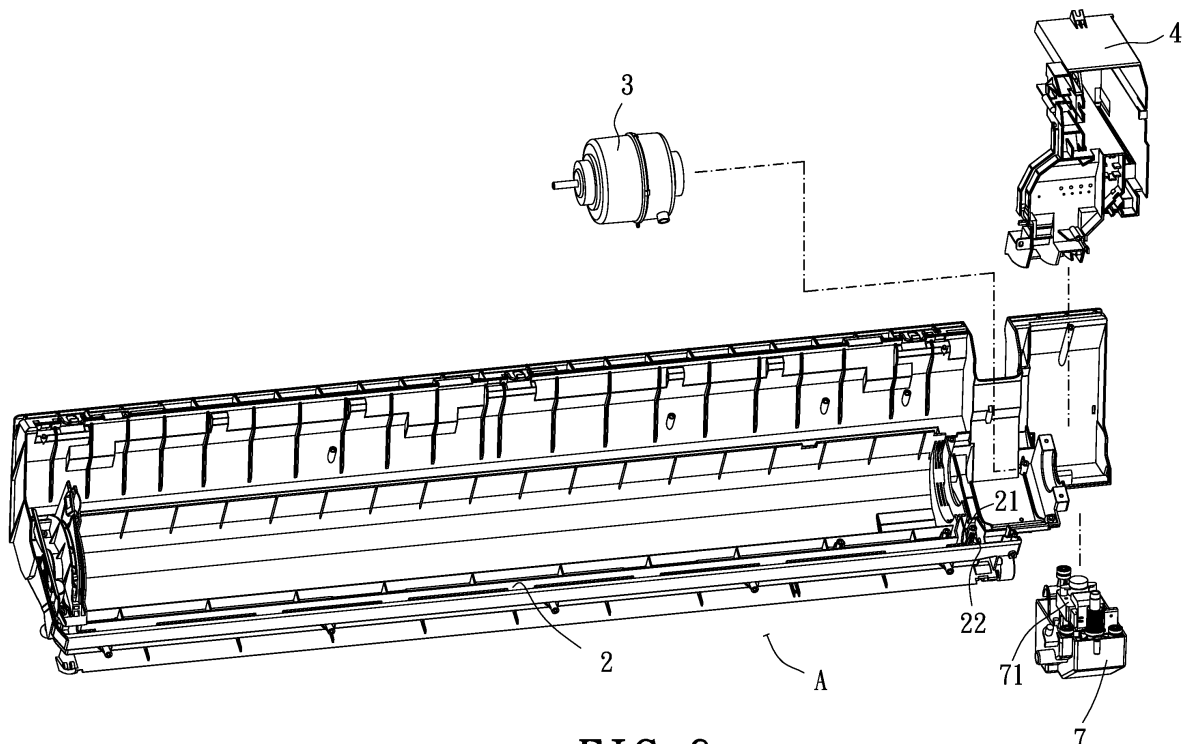
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67024 Strasbourg Cedex 1 (FR)**(54) **Room air conditioner of a split type air conditioner system**

(57) A room air conditioner (A) of a split type air conditioner system includes a water pan (2) having a drain hole (21) and a side hole (22) connected by a connection tube (6) to a water tank (7) that has a water pump (71) and a water level sensor (72) respectively linked to the compressor of the outdoor unit such that on/off operation of the water pump (71) is synchronous to on/off operation of the compressor or the water pump (71) is delayed off after off of the compressor. The compressor is off when the water level sensor (72) detects a full-level signal. The

side hole (22) can be blocked for enabling collected condensed water to be carried away through the drain hole (21) and the connected drain pipe (5). Alternatively, the drain hole (22) can be blocked for enabling collected condensed water to be guided into the water tank (7) and then pumped out of the water tank (7) to the outside by the water pump (71). The split type air conditioner system is powered off when water level sensor (72) detects a full-level signal after the compressor is off and the water pump (71) is delayed-off.

**FIG. 6****EP 2 270 401 A1**

Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to air conditioner system and more particularly, to a room air conditioner of a split type air conditioner system that allows drainage of condensed water selectively through a drain hole and a drain pipe in the installation place, or through an internal water tank subject to the operation of a water pump. The split type air conditioner system is automatically powered off when the water level is abnormally high.

2. Description of the Related Art

[0002] FIG. 1 illustrates the room air conditioner **a** of a conventional split type air conditioner system. According to this design, the room air conditioner comprises an evaporator **10**, a water pan **20**, a fan motor **30** and an electric control box **40**. The water pan **20** is set beneath the evaporator **10**, having a drain hole **201** at one lateral side (see FIG. 2) for the connection of a drain pipe **50** to guide out collected condensed water (see FIG. 3). The fan motor **30** and the electric control box **40** are provided at one lateral side relative to the evaporator **10** (see FIG. 1). Because water flows downwards, the drain pipe **50** must be extended downwards to carry away condensed water smoothly. Thus, the positioning of the drain pipe must match. Due to this reason, the installation of the room air conditioner **a** is constrained to certain limitations, and indoor decoration may be affected.

[0003] Further, people skilled in the art may use a drain pipe **50** to connect a water tank **60** to the room air conditioner **a** (see FIG. 4). The water tank **60** uses power source separately and has installed therein a water pump **601** and a water level sensor **602**. The water pump **601** is started up to pump water out of the water tank **60** to the outside subject to detection operation of the water level sensor **602**. By means of the attached water tank **60**, it is not necessary to extend the drain pipe **50** downwards during installation of the room air conditioner **a**. However, because the water tank **60** is a separate member disposed outside the room air conditioner **a**, it obstruct the sense of beauty of the surroundings.

[0004] Taiwan Patent Publication Number 581226 teaches the use of a water pump in a room air conditioner. The water pump is connected to one end of the drain pipe and received inside the room air conditioner for synchronous operation with on/off status of the room air conditioner. This method has the water pump kept from sight, however collected condensed water can only be carried away from the water pan through the drain hole, the drain pipe and the water pump. If the room air conditioner fits the installation place where the drain pipe extends downwards, the water pump will be turned on synchronously when the room air conditioner is started up, wasting much

power supply. Further, because the operation of the water pump is synchronous to the room air conditioner. When the room air conditioner is powered on, the water pump is started up. A delay switch may be used to delay on/off of the water pump. However, the compressor of the outdoor unit is repeatedly turned on and off during operation of the split type air conditioner system. According to this design, the water pump is kept in action either the compressor is on or off, i.e., the water pump is powered on when the split type air conditioner system is powered on. Thus, the working life of the water pump is greatly shortened. Therefore, this design has the drawback of waste of power supply and short working life.

[0005] Taiwan Patent Publication Number 440672 teaches the arrangement of a water collector in a split type air conditioner system. According to this design, the water collector has installed therein a water pump and a water level sensor. When the water level reaches a predetermined high level, the water pump is started up to pump water out of the water collector. When the water level reaches a predetermined low level, the water pump is stopped. This design has the automatic water drainage system be kept from sight and enables water is carried away by force. However, if the water pump is damaged, the water level sensor will have no effect, and water may flow over the water collector into the indoor space when the compressor works continuously.

SUMMARY OF THE INVENTION

[0006] The present invention has been accomplished under the circumstances in view.

[0007] It is one object of the present invention to provide a room air conditioner for a split type air conditioner system, which allows the consumer or installer to select the water drain path, has a water tank with an attached water pump be set on the inside and kept from sight for synchronous operation with the compressor of the outdoor unit, and enables the split type air conditioner system to be powered off when the water level is abnormally high.

[0008] To achieve this and other objects of the preset invention, a room air conditioner of a split type air conditioner system in accordance with the present invention comprises an evaporator, a water pan provided beneath said evaporator, a fan motor and an electric control box located on one lateral side relative to the water pan, and a water tank disposed beneath the electric control box at one lateral side. The water pan has a drain hole at one lateral side thereof for the connection of a drain pipe to guide out collected condensed water, and a side hole connected to the water tank through a connection tube. The water tank has installed therein a water level sensor adapted for detecting the level of water in the water tank, and a water pump adapted to pump water out of the water tank after the drain hole has been blocked to let water flow from the water pan into the water tank. The water pump and the water level sensor are respectively linked

to the compressor of the outdoor unit of the split type air conditioner system such that on/off operation of the water pump is synchronous to on/off operation of the compressor, and the water level sensor outputs a signal to turn off the air compressor when detected a full-level signal.

[0009] Further, when the water level sensor detects a full-level signal after the compressor is off and the water pump is delayed-off, the split type air conditioner system is powered off.

[0010] Instead of a refrigerant type air conditioner, the room air conditioner can be made in the form of a chiller type. In this case, the room type air conditioner has a space defined between the evaporator and the electric control box for the installation of a water valve. The water valve is connected with the evaporator, having at least one water inlet pipe and at least one water outlet pipe. The room air conditioner further comprises a fan set between the water pan and the evaporator, and a partition block set between the water valve and the fan. Thus, the water valve is disposed above the partition block and the fan motor, and kept inside the housing of the room air conditioner.

[0011] Thus, the room air conditioner allows the user to select the drain path subject to the condition of the installation place. When the water pump is used for pumping water out of the room air conditioner, it is kept inside the housing of the room air conditioner, maintaining sense of beauty of the room air conditioner. Further, the water pump is linked to the compressor so that the water pump can be turned on/off synchronously with on/off operation of the compressor. Alternatively, the water pump can be synchronously started up with the compressor, and turned off a predetermined time delay after the compressor has been stopped. The water pump is turned off a predetermined time delay after the compressor is off, saving power consumption, assuring positive drainage of water and prolonging the working life.

[0012] Further, the water level sensor is adapted to detect a full-level signal and has no concern with the pumping of the water pump. When the water level sensor detects a full-level signal, the control program stops the compressor. When the full-level signal is continuously detected after the compressor is off and the water pump is delayed off, the control program powers off the split type air conditioner system, avoiding an overflow of water.

[0013] Further, a water valve may be set in an inside space between the evaporator and the electric control box and kept inside the housing of the room air conditioner so that the room air conditioner is changed to a chiller type.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014]

FIG. 1 is a perspective view of a room air conditioner of a split type air conditioner system according to the

prior art.

FIG. 2 is an enlarged view of a part of FIG. 1 after removal of the evaporator.

FIG. 3 is an enlarged view of a part of FIG. 1, showing a drain pipe connected to the drain hole.

FIG. 4 is a schematic plain view of a room air conditioner of another structure of split type air conditioner system according to the prior art.

FIG. 5 is a perspective view of a room air conditioner of a split type air conditioner system according to the present invention.

FIG. 6 is an exploded view of the room air conditioner in accordance with the present invention after removal of the evaporator.

FIG. 7 is an enlarged view of a part of the room air conditioner in accordance with the present invention.

FIG. 8 is an enlarged view of a part of the present invention, showing the arrangement of the drain hole and side hole of the water pan and the connection and the connection of a drain pipe to the drain hole.

FIG. 9 is an elevational view of a part of the present invention, showing the structure of the water tank.

FIG. 10 is a schematic drawing of the present invention, showing the control function of the compressor and the water pump.

FIG. 11 is a schematic drawing of the present invention, showing the control function of the compressor, the water pump and the water level sensor.

FIG. 12 is a perspective view of an alternate form of the present invention, showing the room air conditioner prepared in a chiller type.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0015] Referring to FIGS. 5-6, a room air conditioner **A** of a split type air conditioner system in accordance with the present invention has installed therein an evaporator **1**, a water pan **2**, a fan motor **3** and an electronic control box **4**. The water pan **2** is provided beneath the evaporator **1**, having a drain hole **21** at one lateral side thereof (see FIGS. 7 and 8; FIG. 8 is the back side view of FIG. 7) for the connection of a drain pipe **5** to guide out collected condensed water. The fan motor **3** and the electric control box **4** are located on one lateral side relative to the water pan **2**. The water pan **2** further has a side hole **22** (see FIGS. 7 and 8) for the connection of a connection tube **6** that is connected to a water tank **7** at one lateral side in the room air conditioner **A** (see FIG. 8). The water tank **7** is provided beneath the electric control box **4**, having installed therein a water pump **71** and a water level sensor **72** (see FIG. 9).

[0016] The main feature of the present invention is that the water pump **71** and the water level sensor **72** are respectively linked to the compressor (the compressor is installed in the outdoor unit, not shown in the drawing). The water pump **71** can be turned on/off synchronously with on/off operation of the compressor. Alternatively, the

water pump **71** can be synchronously started up with the compressor, and turned off a predetermined time delay after the compressor has been stopped (the control function is as shown in FIG. 10 in which C: the control function of compressor; P: the control function of water pump; the predetermined time delay is 60 seconds). Further, the water level sensor **72** is adapted to detect a full-level signal, i.e., the water level sensor **72** detects a signal when the water level in the water tank **7** reaches the full reservoir level. When the water level sensor **72** detects a full-level signal, it immediately informs the program control to stop the compressor (the control function is as shown in FIG. 11 in which S: the control function of the water level sensor). Further, if it is still at the full reservoir level status when the compressor is stopped and the water pump **71** is turned off after a predetermined time delay, power off the split type air conditioner system.

[0017] Further, if the room air conditioner **A** fits the installation place where the downward drain pipe fits the drain hole **21** of the room air conditioner **A**, the water tank **7** can be omitted. In this case, block the side hole **22** of the water pan **2** to let collected condensed water be directly guided out of the water pan **2** through the drain hole **21** into the drain pipe **5**. Further, if the room air conditioner **A** is to be installed in a place where the existing downward drain pipe does not fit the drain hole **21** of the room air conditioner **A**, the water tank **7** must be installed inside the room air conditioner **A**. At this time, block the drain hole **21** for enabling collected condensed water to be guided into the water tank **7**, and then connect a drain pipe **5** to the output port of the water pump **71** for drainage of collected condensed water (see FIG. 9). After start-up of the compressor and the water pump **71** synchronously, the compressor and the water pump **71** can be turned off synchronously or, the water pump **71** can be turned off a predetermined time delay after the compressor is off, enabling collected condensed water be carried away. Further, by means of the functioning of the water level sensor **72** to detect a full reservoir level when the water level in the water tank **7** is full, at this time, it means that the water pump **71** fails (otherwise collected condensed will be carried away smoothly and the full reservoir level will never reach) when the water level sensor **72** detects a full-level signal, thus the compressor can be stopped in time, avoiding continuous generation of condensed water. If the status of full reservoir level still in presence after the compressor is stopped and the water pump **71** is shut off, the split type air conditioner system will be powered off, and the room air conditioner **A** can be started up again only after reset of power.

[0018] Subject to the aforesaid structural composition and application, the water tank **7** is an optional accessory of the improved structure of room air conditioner of the present invention, and the consumer (installer) can decide if to use the water tank **7** or not. If the room air conditioner **A** fits the installation place having a downward drain pipe that fits the drain hole **21** of the room air conditioner **A** (i.e., there is no installation problem), the

water tank **7** can be omitted, avoiding extra power consumption of the water pump **71**. If the downward drain pipe in the installation place does not fit the drain hole **21** of the room air conditioner **A**, the water tank **7** enables collected condensed water to be carried away. Further, because the water tank **7** is provided inside the room air conditioner **A** and linked to the operation of the compressor, the water pump **71** has extended working life. Further, by means of the functioning of the water level sensor **72**, the compressor will be stopped or the split type air conditioner system will be powered off in time when an abnormal high water level condition is detected, avoiding overflow of condensed water and eliminating the drawback of the prior art design.

[0019] Further, as shown in FIG. 12, an inside space **S** is left in the room air conditioner **A** between one lateral side of the evaporator **1** and the electric control box **4**, and a water valve **9** is set in the space **S** and connected with the evaporator **1**. The water valve **9** has connected thereto at least one water inlet pipe **91** and one water outlet pipe **92**. Further, a fan **8** is mounted in the room air conditioner **A** between the water pan **2** and the evaporator **1**, and a spacer block **A1** is set between the water valve **9** and the fan **8**. The water valve **9** is disposed above the spacer block **A1** and the fan motor **3**. The water valve **9** is electrically controlled to switch the water flowing direction (letting water in or letting water out). At this time, no refrigerant piping is necessary, and the room air conditioner is prepared in the form of a chiller type air conditioner, and the water valve **9** is concealed inside the housing of the air conditioner and kept from sight.

[0020] A prototype of room air conditioner has been constructed with the features of FIGS. 5~12. The room air conditioner functions smoothly to provide all of the features disclosed earlier.

[0021] Although a particular embodiment of the invention has been described in detail for purposes of illustration, various modifications and enhancements may be made without departing from the spirit and scope of the invention. Accordingly, the invention is not to be limited except as by the appended claims.

Claims

1. A room air conditioner (**A**) of a split type air conditioner system, comprising an evaporator (**1**), a water pan (**2**) provided beneath said evaporator (**1**), a fan motor (**3**) and an electric control box (**4**) located on one lateral side relative to said water pan (**1**), and a water tank (**7**) disposed beneath said electric control box (**4**) at one lateral side, said water pan (**2**) having a drain hole (**21**) at one lateral side thereof for the connection of a drain pipe (**5**) to guide out collected condensed water and a side hole (**22**) connected to said water tank (**7**) through a connection tube (**6**), said water tank (**7**) having installed therein a water level sensor (**72**) adapted for detecting the level of

water in said water tank (7) and a water pump (71) adapted to pump water out of said water tank (7) after said drain hole (21) has been blocked to let water flow from said water pan (2) into said water tank (7);

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wherein said water pump (71) and said water level sensor (72) are respectively linked to a compressor of an outdoor unit of said split type air conditioner system such that on/off operation of said water pump (71) is synchronous to on/off operation of said compressor; said water level sensor (72) outputs a signal to turn off said air compressor when detected a full-level signal.

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2. The room air conditioner as claimed in claim 1, wherein said water pump (71) is started up with said compressor synchronously, and turned off a predetermined time delay after said compressor is stopped.

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3. The room air conditioner as claimed in claim 2, wherein when said water level sensor (72) detects a full-level signal after said compressor is off and said water pump (71) is delayed-off, the split type air conditioner system is powered off.

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4. The room air conditioner as claimed in claim 3, further comprising a water valve (9) set in an inside space (S) thereof between said evaporator (1) and said electric control box (4) and connected with said evaporator (1), said water valve (9) having at least one water inlet pipe (91) and at least one water outlet pipe (92).

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5. The room air conditioner as claimed in claim 4, further comprising a fan (8) set between said water pan (2) and said evaporator (1), and a partition block (A1) set between said water valve (9) and said fan (8).

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6. The room air conditioner as claimed in claim 5, wherein when said water valve (9) is disposed above said partition block (A1) and said fan motor (3).

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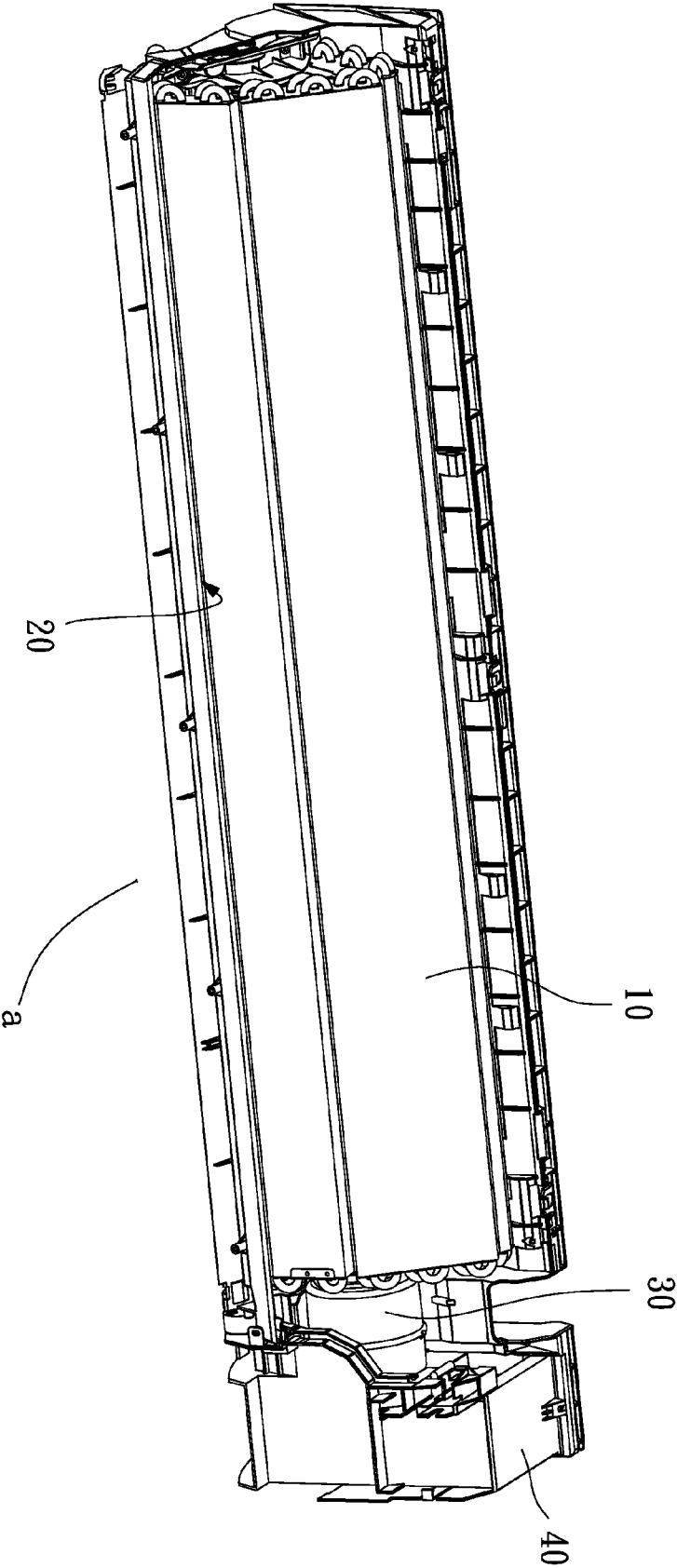


FIG. 1 (PRIOR ART)

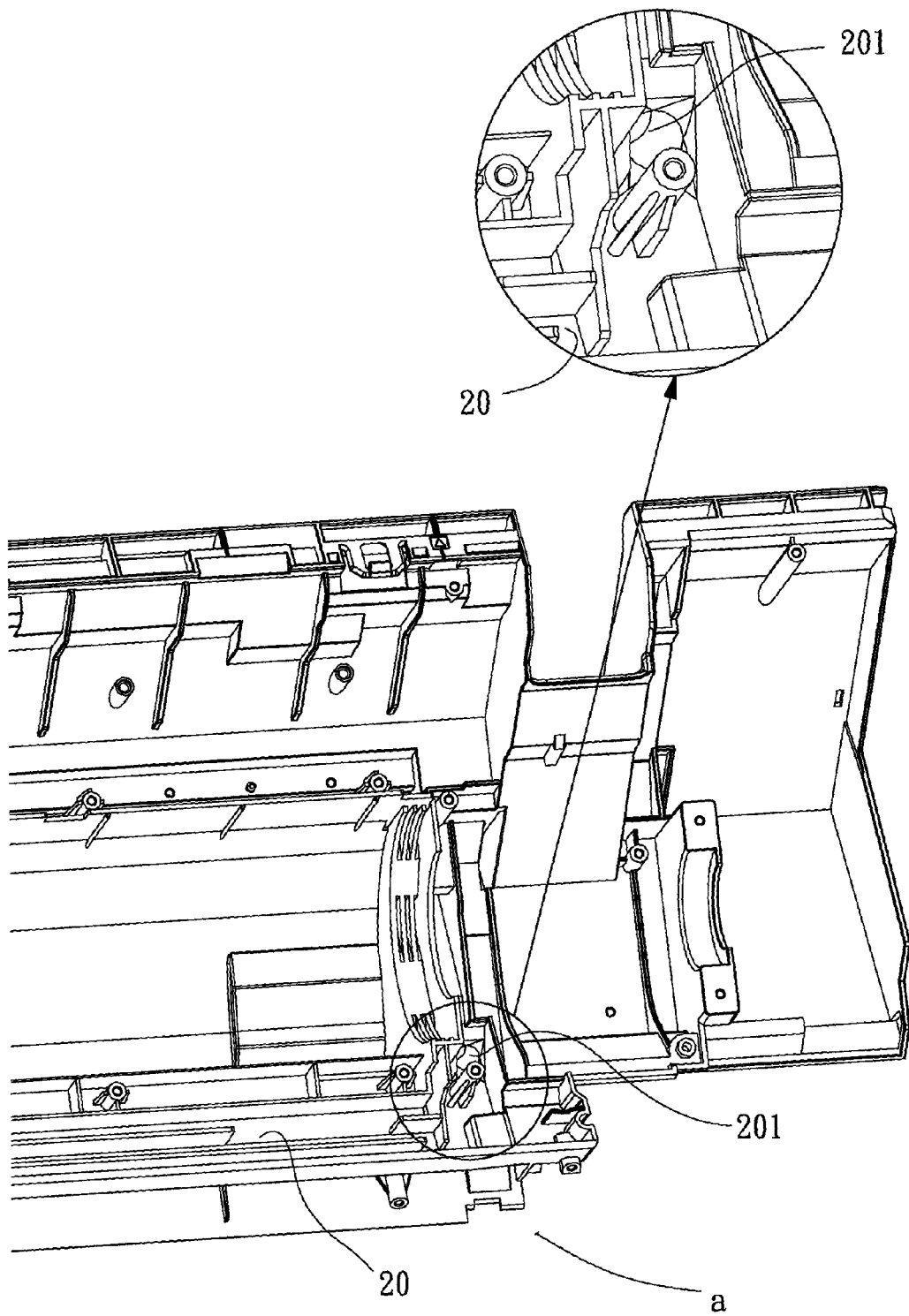


FIG. 2 (PRIOR ART)

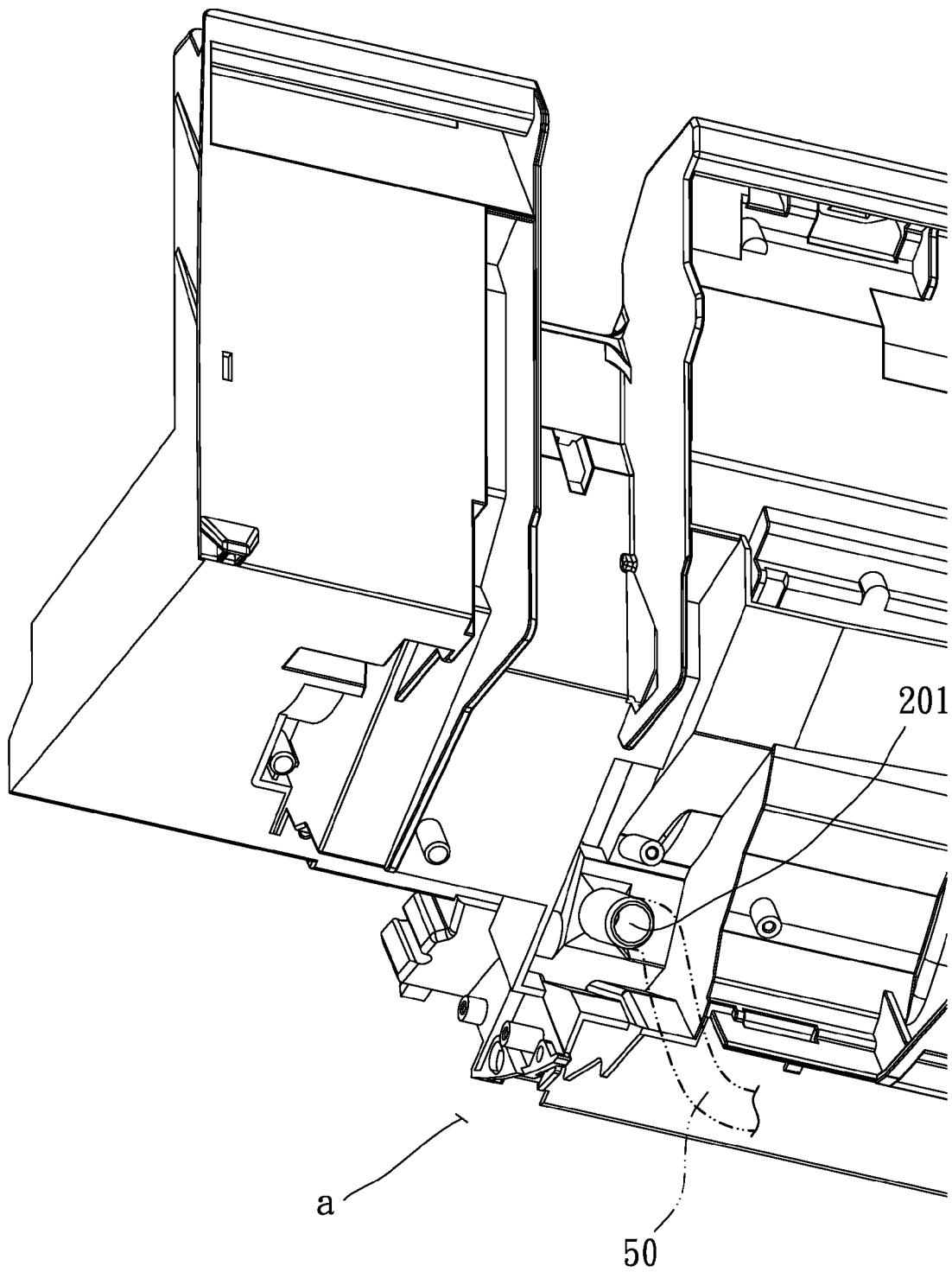


FIG. 3 (PRIOR ART)

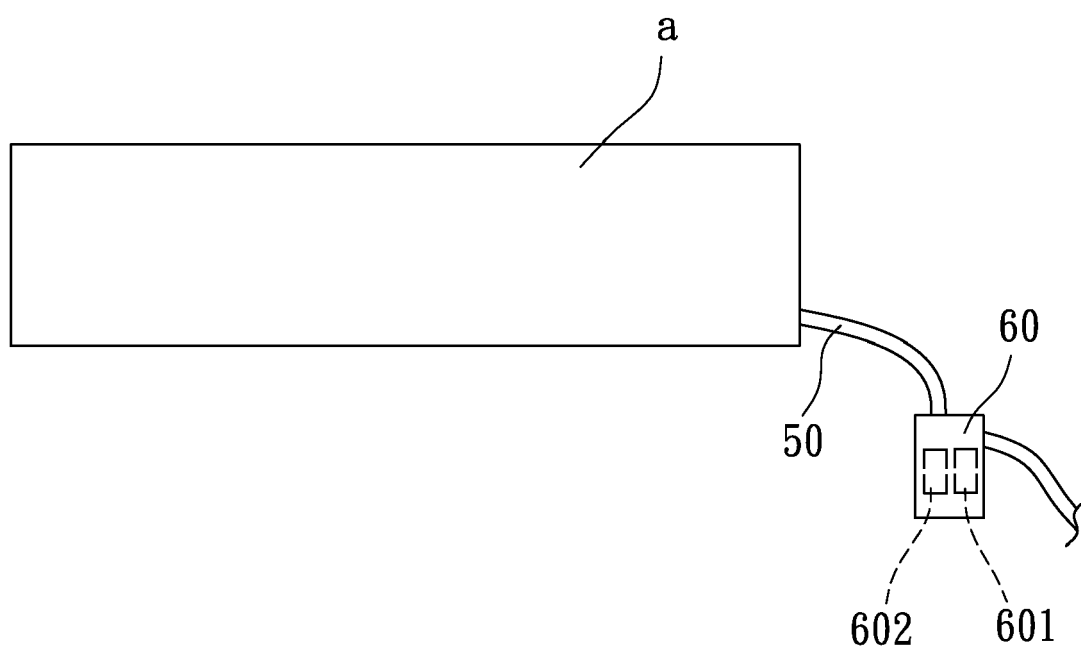


FIG. 4 (PRIOR ART)

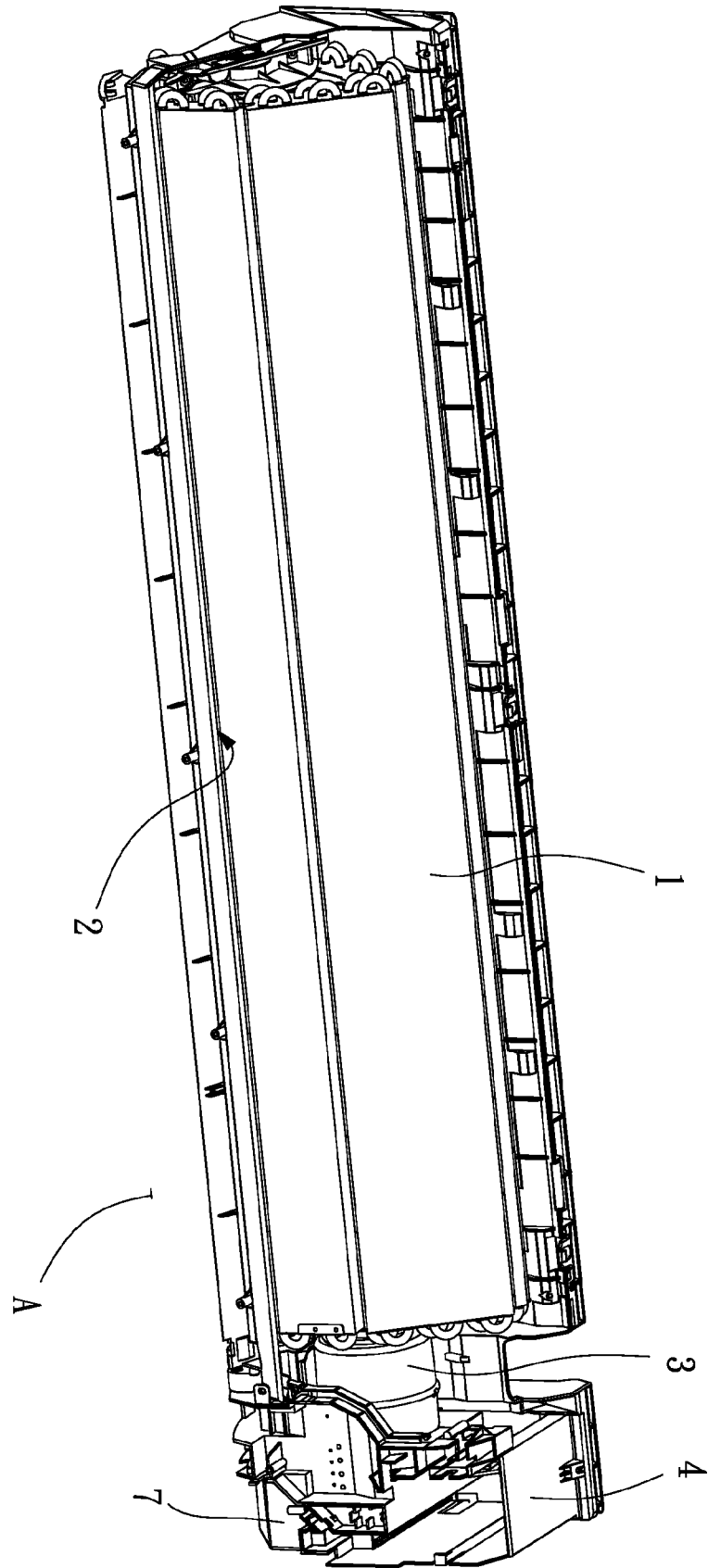
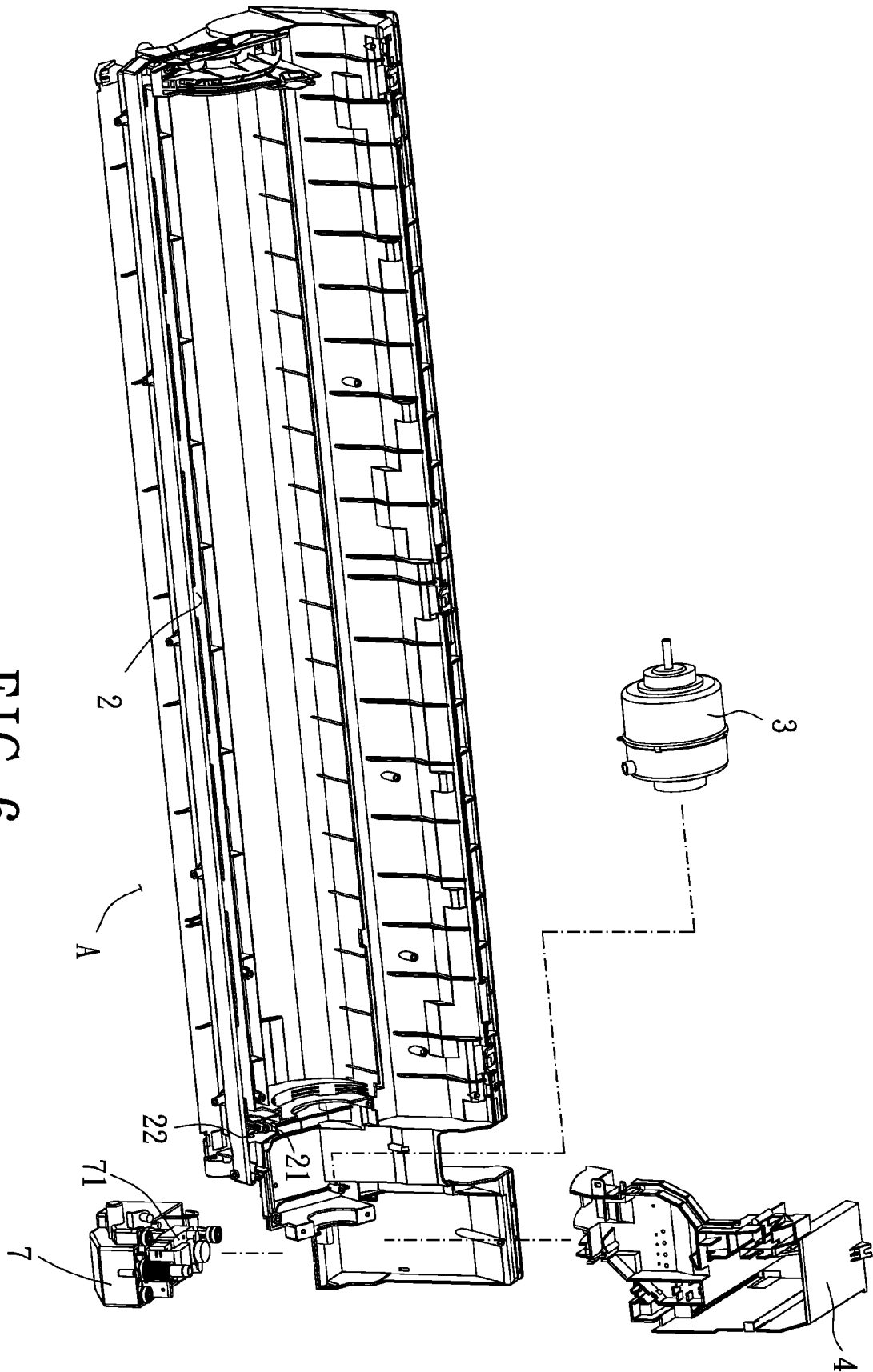


FIG. 5

FIG. 6



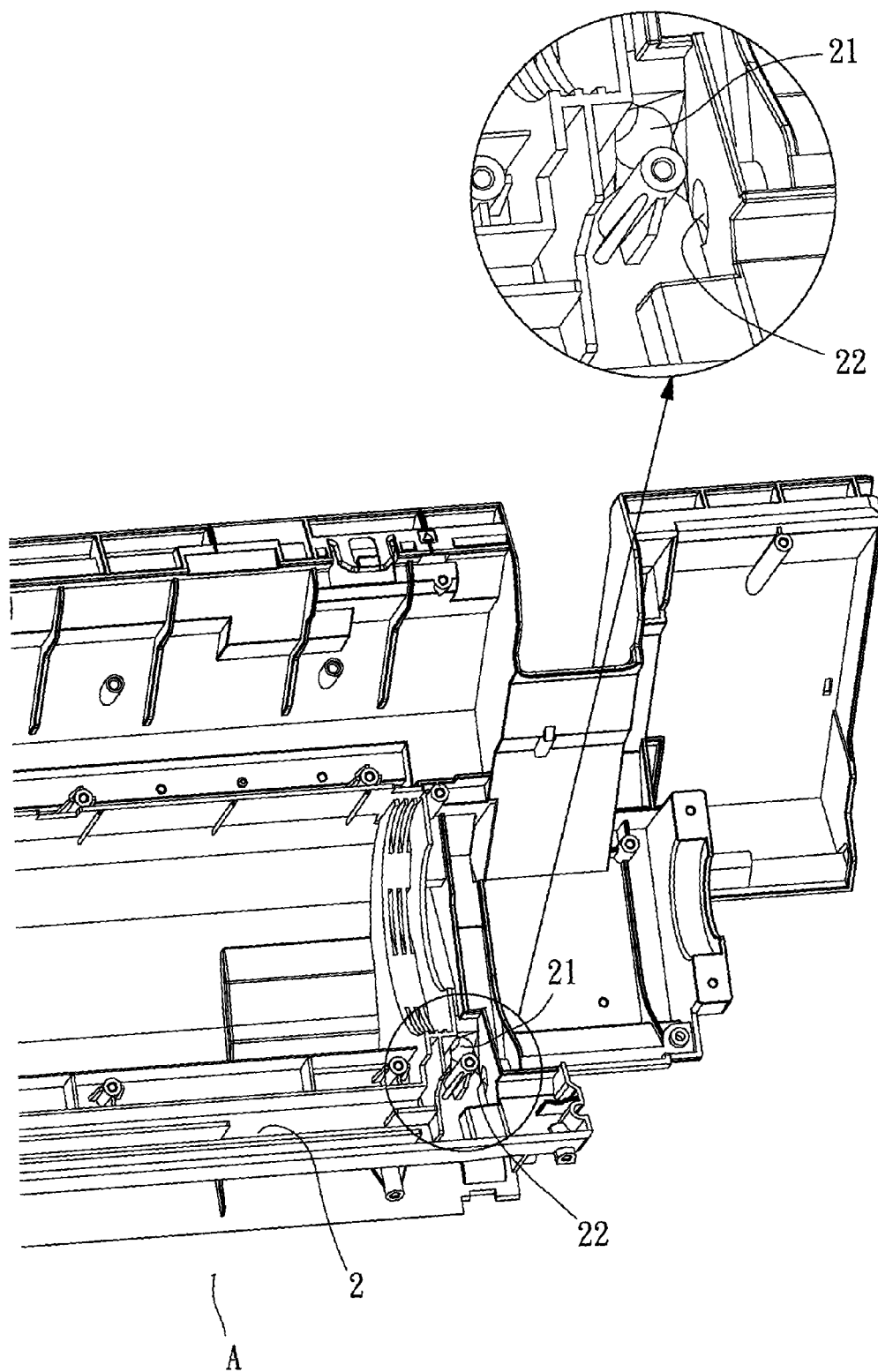


FIG. 7

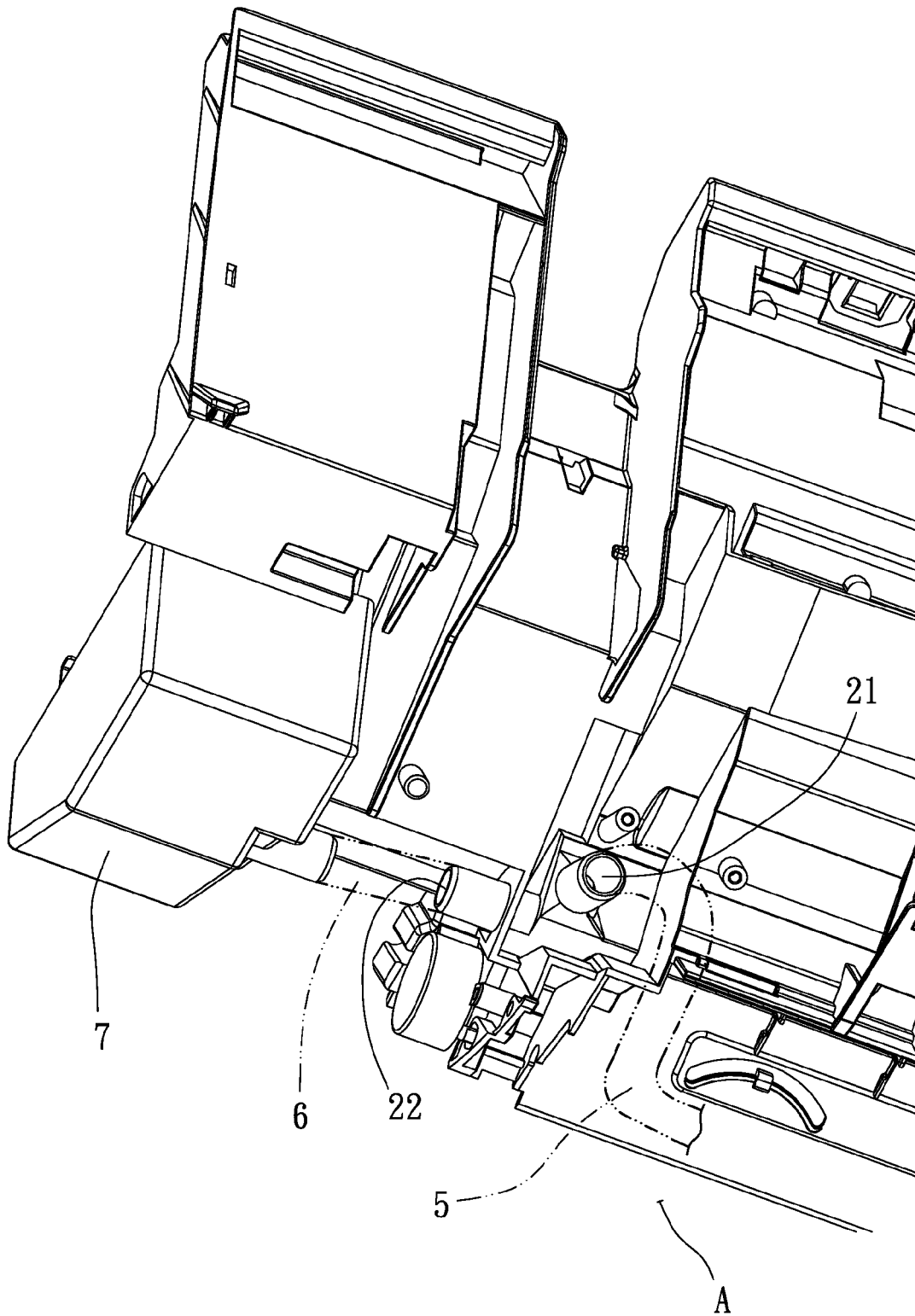


FIG. 8

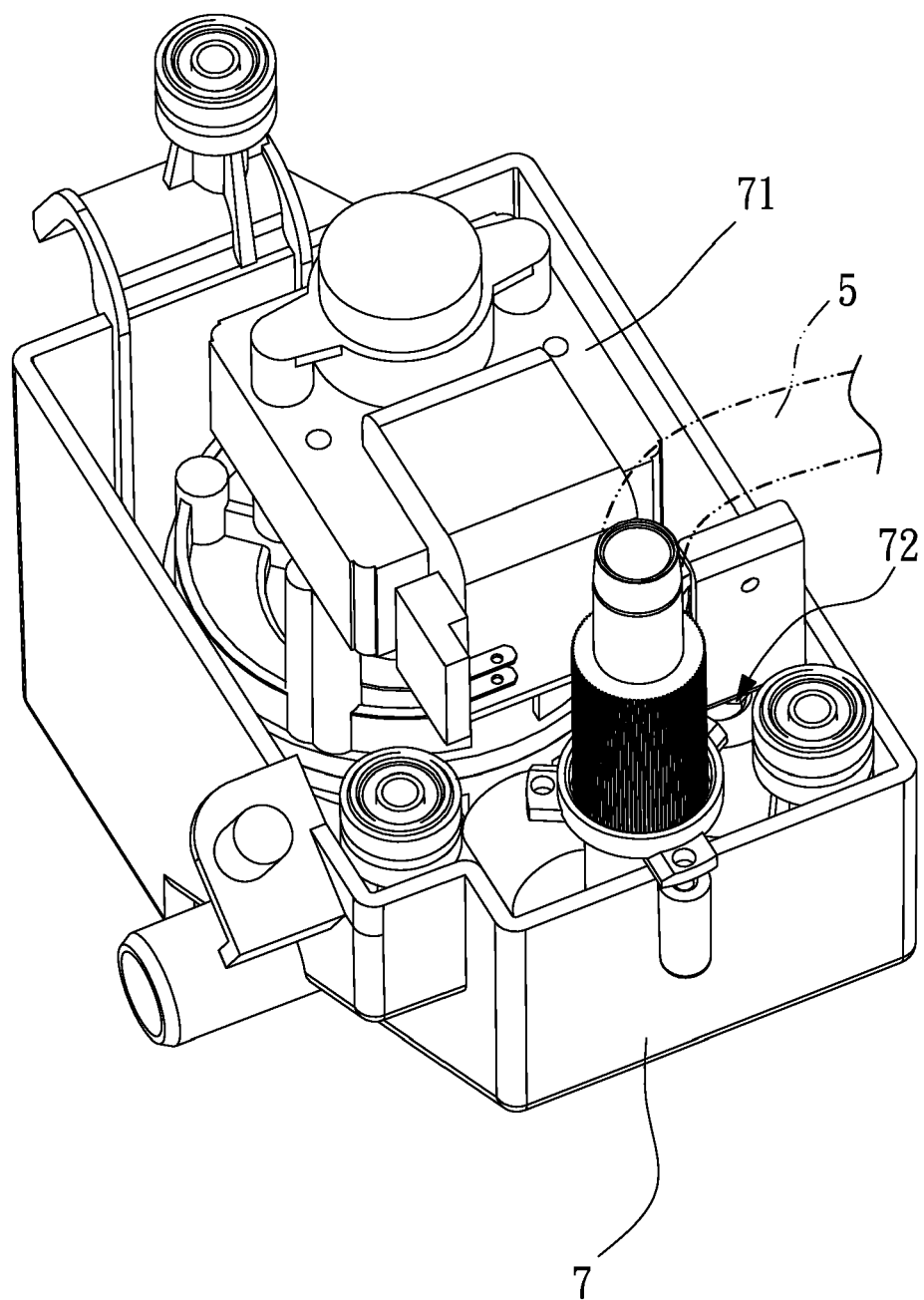


FIG. 9

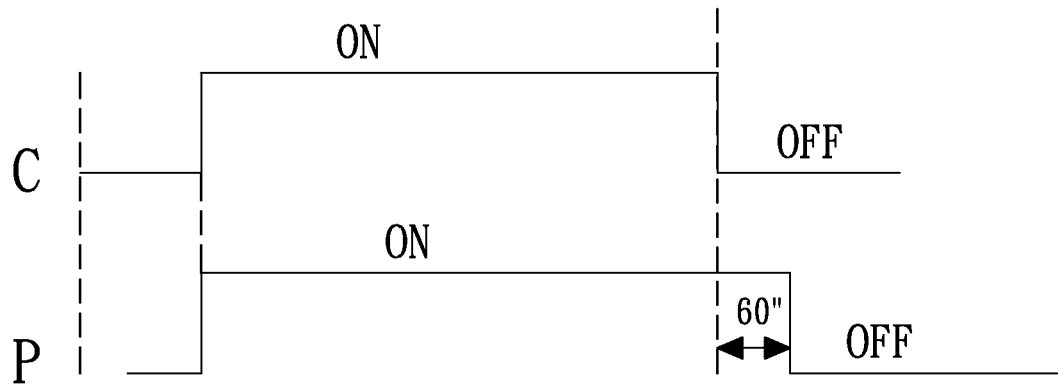


FIG. 10

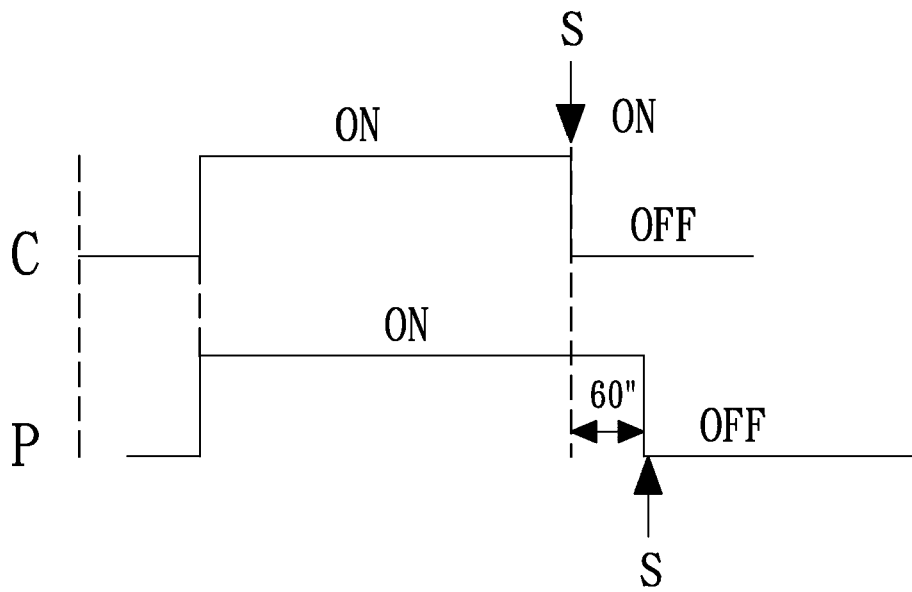


FIG. 11

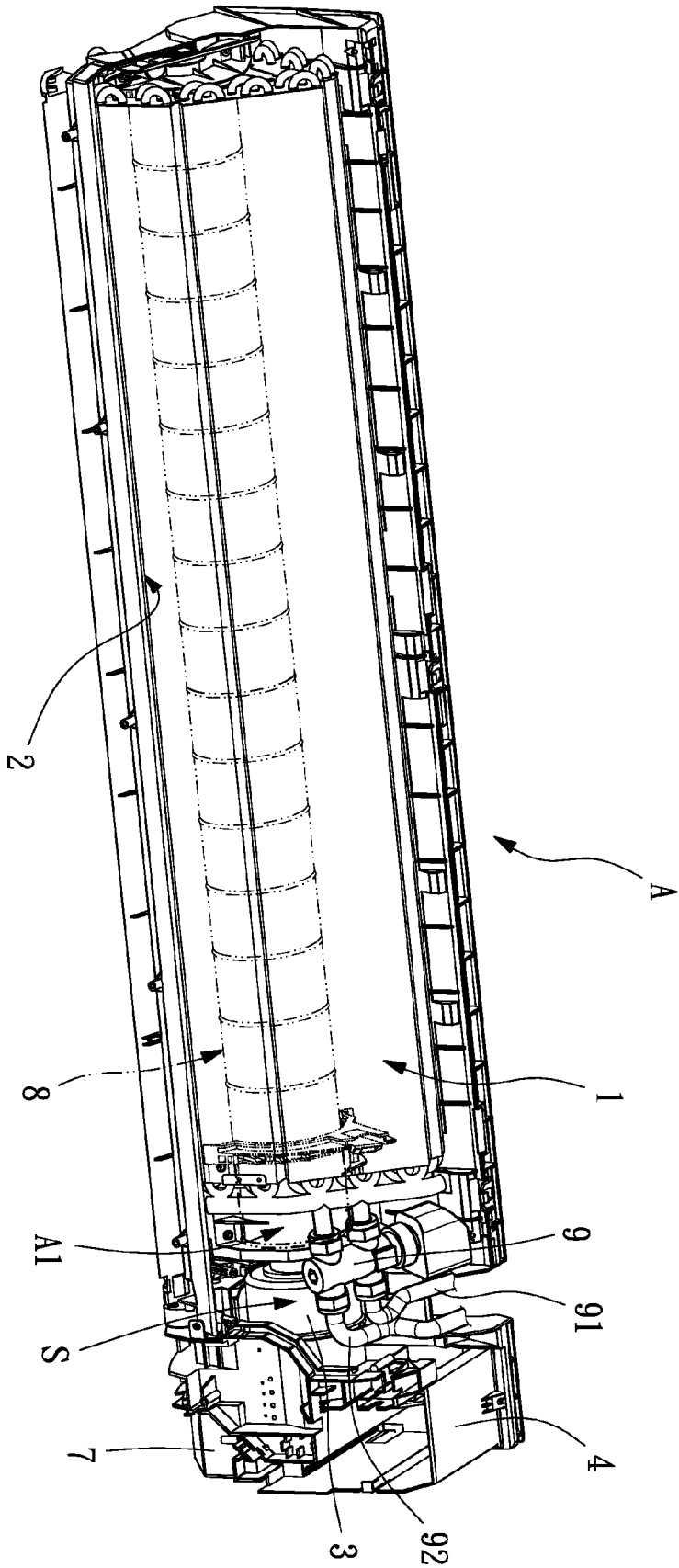


FIG. 12



EUROPEAN SEARCH REPORT

Application Number
EP 09 16 2178

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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 10 November 2009	Examiner Lienhard, Dominique
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EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 09 16 2178

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10-11-2009

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