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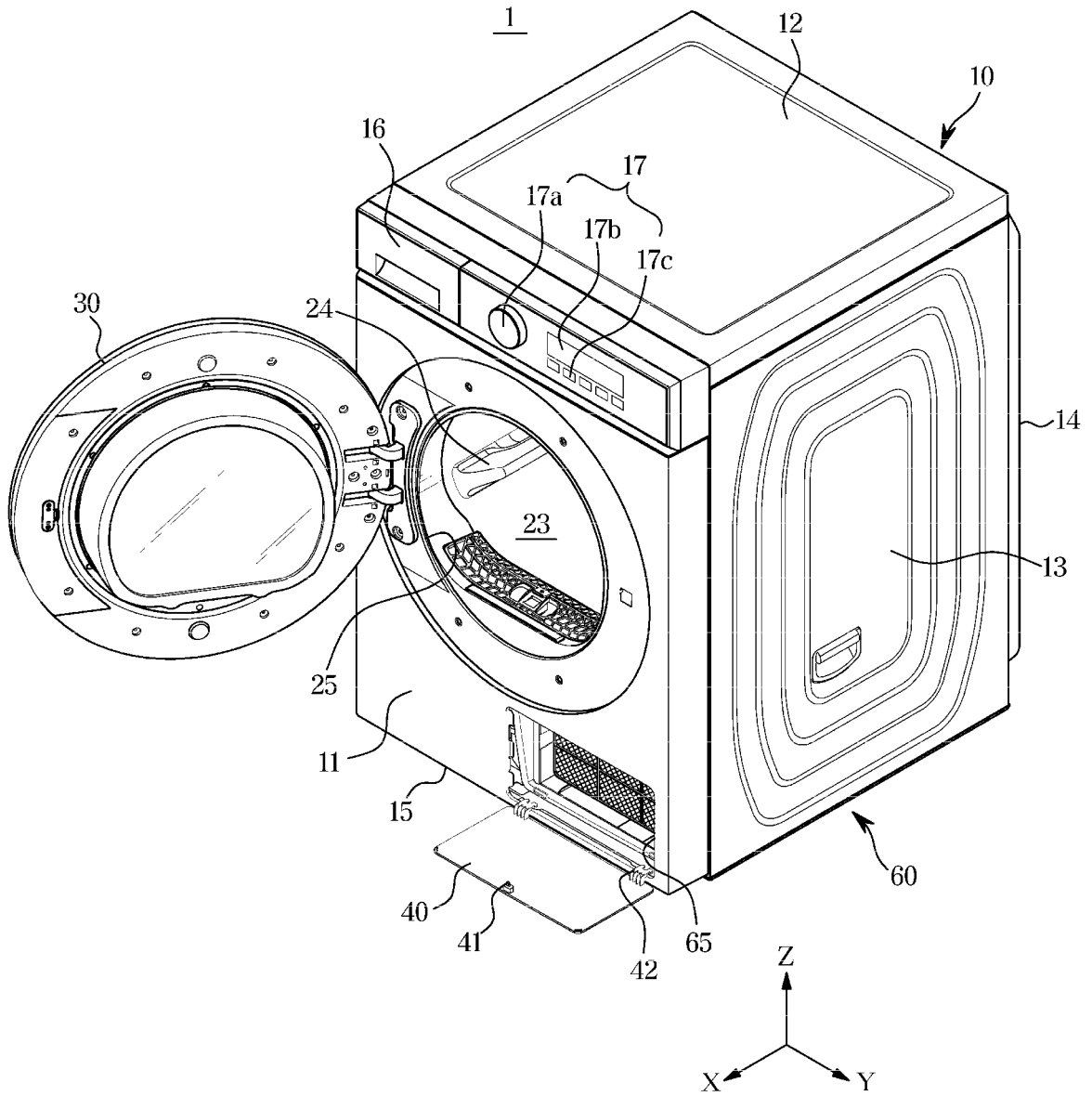
(54) **DRYER AND METHOD FOR CONTROLLING SAME**

(57) According to an aspect of the disclosure, a dryer includes a main body, a drum arranged in the main body for receiving an object to be dried, a driving motor configured to rotate the drum, an input module configured to receive an input of a dry mode or a dehumidification mode from a user, a heat exchanger arranged in the main body,

and a controller configured to control the driving motor to rotate the drum at a first rotation speed in response to the dry mode being input, and control the driving motor to rotate the drum at a second rotation speed different from the first rotation speed in response to the dehumidification mode being input.

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FIG. 1



Description

[Technical Field]

[0001] The disclosure relates to a dryer, and more particularly, to a dryer for dehumidifying air outside the dryer in addition to drying an object to be dried.

[Background Art]

[0002] A dryer is an apparatus for drying clothes (hereinafter, referred to as an object to be dried) by spinning a drum that accommodates the object to be dried and supplying hot air into the drum.

[0003] The existing dryer is installed and used in a washing room or a utility room separately partitioned off in the house, but the washing room or the utility room has no window and is narrow and small, thereby having bad ventilation. When the washing room or the utility room has high humidity, the dryer installed therein is more likely to be corroded, giving an unpleasant feeling to the user going in and out of the space. An extra dehumidifier may be installed in the space where the dryer is installed, but it is inefficient in terms of costs and spatial use.

[0004] In the meantime, heat pump dryers may dry the object to be dried using a refrigerant cycle. The aforementioned problems may be solved all at once by properly utilizing characteristics of the refrigerant cycle, although an essential function of the dryer is to dry the object to be dried.

[Disclosure]

[Technical Problem]

[0005] The disclosure provides a dryer that uses a function already equipped in the dryer to have better dehumidification efficiency.

[Technical Solution]

[0006] According to an aspect of the disclosure, a dryer includes a main body; a drum arranged in the main body for receiving an object to be dried; a driving motor configured to rotate the drum; an input module configured to receive an input of a dry mode or a dehumidification mode from a user; a heat exchanger arranged in the main body; and a controller configured to control the driving motor to rotate the drum at a first rotation speed in response to the dry mode being input, and control the driving motor to rotate the drum at a second rotation speed different from the first rotation speed in response to the dehumidification mode being input.

[0007] The controller may control the driving motor to rotate the drum at a second rotation speed lower than the first rotation speed in the dehumidification mode.

[0008] The controller may control the driving motor to rotate the drum at a second rotation speed higher than

the first rotation speed in the dehumidification mode.

[0009] The controller may rotate the drum for air brought in from outside to reach an inner surface of the drum in response to receiving a command to select the dehumidification mode through the input module.

[0010] The dryer may further include a compressor configured to produce hot air, and the controller may control the compressor for temperature in the drum to be the first temperature in the dry mode, and control the compressor for temperature in the drum to be the second temperature different from the first temperature in the dehumidification mode.

[0011] The controller may control the compressor for the temperature in the drum to be a second temperature lower than the first temperature in the dehumidification mode.

[0012] The dryer may further include a fan configured to form a flow path through which air flows in from outside and air having passed the heat exchanger and the drum flows out.

[0013] The controller may generate a control signal to drive the fan in response to receiving a command to select the dehumidification mode through the input module.

[0014] According to an aspect of the disclosure, a method of controlling a dryer includes receiving a command to select a dehumidification mode; controlling a fan to form a flow path to force air brought in from outside to pass a drum and flow out; and controlling a driving motor to rotate the drum at a second rotation speed in the dehumidification mode, wherein the second rotation speed is different from a first rotation speed at which the drum rotates in a dry mode.

[0015] The controlling of the driving motor may include controlling the driving motor to rotate the drum at a second rotation speed lower than the first rotation speed in the dehumidification mode.

[0016] The controlling of the driving motor may include controlling the driving motor to rotate the drum at a second rotation speed higher than the first rotation speed in the dehumidification mode.

[0017] The controlling of the driving motor may include rotating the drum for the air brought in from outside to reach an inner surface of the drum.

[0018] The method of controlling the dryer may further include controlling a compressor for temperature in the drum to be a first temperature in the dry mode, and controlling the compressor for the temperature in the drum to be a second temperature different from the first temperature in the dehumidification mode.

[0019] The controlling of the compressor may include controlling the compressor for the temperature in the drum to be a second temperature lower than the first temperature in the dehumidification mode.

[0020] The controlling of the driving motor may include generating a control signal to drive a fan in response to receiving a command to select the dehumidification mode through an input module.

[Advantageous Effects]

[0021] According to the disclosure, dehumidification efficiency of a dryer may increase by preventing condensation of steam in the dryer by rotating a drum for dehumidification.

[Description of Drawings]

[0022]

FIG. 1 is an exterior view of a dryer, according to an embodiment.

FIG. 2 is a side cross-sectional view of a dryer in a dry mode, according to an embodiment.

FIG. 3 is a side cross-sectional view of a dryer in a dehumidification mode, according to an embodiment.

FIG. 4 illustrates rotation of a drum while a dryer is in a dehumidification mode, according to an embodiment.

FIG. 5 illustrates a base of a dryer, according to an embodiment.

FIG. 6 is a control block diagram of a dryer, according to an embodiment.

FIG. 7 is a flowchart of a method of controlling a dryer, according to an embodiment.

FIG. 8 is a flowchart of a method of controlling a dryer, according to another embodiment.

[Modes of the Invention]

[0023] Like numerals refer to like elements throughout the specification. Not all elements of embodiments of the disclosure will be described, and description of what are commonly known in the art or what overlap each other in the embodiments will be omitted. The term 'unit, module, member, or block' may refer to what is implemented in software or hardware, and a plurality of units, modules, members, or blocks may be integrated in one component or the unit, module, member, or block may include a plurality of components, depending on the embodiment of the disclosure.

[0024] It will be further understood that the term "connect" or its derivatives refer both to direct and indirect connection, and the indirect connection includes a connection over a wireless communication network.

[0025] The term "include (or including)" or "comprise (or comprising)" is inclusive or open-ended and does not exclude additional, unrecited elements or method steps, unless otherwise mentioned.

[0026] Throughout the specification, when it is said that a member is located "on" another member, it implies not only that the member is located adjacent to the other member but also that a third member exists between the two members.

[0027] It will be understood that, although the terms first, second, third, etc., may be used herein to describe

various elements, components, regions, layers and/or sections, these elements, components, regions, layers and/or sections should not be limited by these terms. These terms are only used to distinguish one element, component, region, layer or section from another region, layer or section.

[0028] It is to be understood that the singular forms "a," "an," and "the" include plural references unless the context clearly dictates otherwise.

[0029] Reference numerals used for method steps are just used for convenience of explanation, but not to limit an order of the steps. Thus, unless the context clearly dictates otherwise, the written order may be practiced otherwise.

[0030] Reference will now be made in detail to embodiments of the disclosure, which are illustrated in the accompanying drawings. A dryer 1 according to the disclosure may be used to dry and/or manage clothing, shoes, miscellaneous items, etc.

[0031] Referring to FIG. 1, a direction along the X-axis may be defined as a front-back direction, a direction along the Y-axis may be defined as a left-right direction, and a direction along the Z-axis may be defined as an up-down direction. The terms "front-back direction", "left-right direction", "up-down (vertical) direction", etc., as herein used are defined with respect to the drawings, but the terms may not restrict the shapes and positions of the respective components.

[0032] FIG. 1 is an exterior view of a dryer, according to an embodiment. FIG. 2 is a side cross-sectional view of a dryer in a dry mode, according to an embodiment, FIG. 3 is a side cross-sectional view of a dryer in a dehumidification mode, according to an embodiment, FIG. 4 illustrates rotation of a drum while a dryer is in a dehumidification mode, according to an embodiment, and FIG. 5 illustrates a base of a dryer, according to an embodiment.

[0033] Referring to FIG. 1, a dryer 1 according to an embodiment of the disclosure may include a main body 10. The main body 10 may include a front plate 11, a top plate 12, side plates 13, a rear plate 14, and a bottom plate 15, which may form into an almost rectangular shape. The main body 10 may constitute a main frame of the dryer 1.

[0034] A returnable bottle 16 may be arranged in the main body 10. Specifically, the returnable bottle 16 may be arranged in an upper portion on the front plate 11 of the main body 10. The returnable bottle 16 may store condensate water produced from the operation of a refrigerant cycle, which will be described later.

[0035] There may be an input module 17 provided on the main body 10 to operate the dryer. Specifically, the input module 17 may be arranged on an upper portion of the front plate 11 of the main body 10. The input module 17 may include at least one of a turnable switch 17a, a display 17b, and buttons 17c. The turnable switch 17a may be arranged for the user to select a mode of the dryer 1 by grasping and turning the tunable switch 17a.

The display 17b may be arranged to display an operation state and/or a user manipulation state of the dryer 1. The display 17b may be provided to enable touch inputs. The buttons 17c may be arranged for the user to select a mode of the dryer 1 by pressing the button. It is not, however, limited thereto, and there may be various manipulation methods.

[0036] The main body 10 may include a base 60. The base 60 may be arranged at the bottom of the main body 10, forming the bottom plate 15. There may be legs 19 (see FIG. 2) at the bottom plate 15 to support the main body 10.

[0037] The dryer 1 may include a drum 20 arranged to receive an object to be dried (also referred to simply as an object). The drum 20 may include an entrance of the drum, through which to throw in the object. The drum 20 may be rotationally arranged in the main body 10.

[0038] The dryer 1 may include a driver to rotate the drum 20. Referring to FIG. 5, the driver may include a driving motor 31 settled on the base 60, a pulley 32 rotated by the driving motor 31, and a belt (not shown) that connects the pulley 32 to the drum 20 for transferring power of the driving motor 31 to the drum 20.

[0039] In the meantime, in an embodiment, the dryer 1 may suck in humid outside air while the door 30 is open, and dehumidify outdoor space by discharging the air dried by the refrigerant cycle of a heat exchanger 70. In this case, as the door 30 of the dryer 1 is open, an open flow path may be formed. Furthermore, in an embodiment, the dryer 1 may further include a dehumidification unit 100 that may form the open flow path even while the door 30 is closed.

[0040] Referring to FIG. 2, the drum 20 may include a flow-in port 21 through which air flows to the inside 23 of the drum, and a flow-out port 22 through which air flows out of the drum from the inside 23 of the drum. The flow-in port 21 may be formed on one side of the drum 20 and the flow-out port 22 may be formed on the other side of the drum 20. Specifically, the flow-in port 21 may be a rear opening of the drum 20, and the flow-out port 22 may be a front opening of the drum 20. For example, the front opening of the drum 20 may be an entrance of the drum 20.

[0041] Hot and dry air may flow into the drum 20 through the flow-in port 21, and dry the object contained in the drum 20. Furthermore, the air that has gotten to contain lots of water after the drying of the object may get out of the drum 20 through the flow-out port 22.

[0042] A plurality of lifters 24 may be arranged inside the drum 20. The lifters 24 may lift and drop the object so that the object contacts hot air while drifting in the space in the drum 20.

[0043] To throw the object into the drum 20, a first opening (or inlet) 25 may be formed on the front of the main body 10, and a door 30 may be installed to open or close the first opening 25. The door 30 may be hinged to one side of the first opening 25 to pivot from the one side.

[0044] The base 60 (see FIG. 5) may be arranged at the bottom of the drum 20. Referring to FIG. 5, a heat exchanger 70, a compressor 73, an expansion device 74, etc., which constitute the refrigerant cycle, may be settled on the base 60. A fan 80, the driving motor 31, the pulley 32, etc., may also be settled on the base 60. A base cover 75 may be arranged above the base 60 to cover the heat exchanger 70 and so on. For example, the base cover 75 and the base 60 may form a duct structure.

[0045] The fan 80 may be arranged on the base 60. The fan 80 may form an air flow path by generating wind power. For example, the fan 80 may discharge air in a radial direction. For this, the fan 80 may include a rotation shaft 83 formed at the center, and a plurality of blades 84 formed in a circumferential direction centered on the rotation shaft 83.

[0046] Referring to FIG. 2, in a dry mode, a closed flow path may be formed in the main body 10 of the dryer 1. Herein, the closed flow path may be an air movement path (see arrows in FIG. 2) arranged for air in the cabinet to circulate through the heat exchanger 70 and the drum 20. The closed flow path may not be connected to the outside of the main body 10 to prevent the outside air from flowing in or out. That is, a flow of air may form a closed loop.

[0047] Referring to FIG. 2, a filter unit 50 may be detachably installed in the dryer 1. Specifically, the filter unit 50 may be detachably installed in the main body 10 through a second opening 65. The filter unit 50 may be attached to or detached from a unit receiver 61. The filter unit 50 may prevent air from leaking out of the closed flow path. In other words, the filter unit 50 may prevent declining of dry efficiency of the dryer 1. The filter unit 50 may be placed on the base 60.

[0048] Referring both FIGS. 2 and 3, when the filter unit 50 is removed and the dehumidification unit 100 is mounted in the dryer 1, the closed flow path may be changed to an open flow path. Accordingly, the dryer 1 may perform a dehumidification operation (dehumidification mode). That is, the dryer may be switched from the dry mode to the dehumidification mode.

[0049] Referring to FIGS. 3 and 4, the dehumidification mode creates an open flow path for air brought in from outside to pass through the heat exchanger 70 and the drum 20 and flow back to the outside. Air flows in the dehumidification mode and air flows according to drum control in the dehumidification mode will now be described with reference to FIGS. 3 and 4.

[0050] Referring to FIG. 3, the dehumidification unit 100 may be arranged on the base 60. Specifically, the dehumidification unit 100 may be detachably mounted on the base 60.

[0051] Especially, as the dehumidification unit 100 is installed in the dryer 1, the dryer 1 may have an open flow path. The open flow path may be an air movement path (see arrows of FIG. 3) formed for the outside air to be sucked into the dryer 1, pass through the heat ex-

changer 70 and the drum 20, and be discharged out of the dryer 1. Alternatively, the open flow path may be an air movement path formed for the outside air to be sucked into the dryer 1, pass through the heat exchanger 70, and be discharged out of the dryer 1. An inlet port (not shown) and an outlet port (not shown) at both ends of the dehumidification unit 100 are connected to the outside of the main body 10, forming an open loop of a flow of air.

[0052] Humid outside air, i.e., air before dehumidification, may flow to the inside of the body 110 of the dehumidification unit 100 through the inlet port of the dehumidification unit 100. The air brought in may pass through an outlet (not shown) along a flow-in path formed in the body 110. The air having passed through the outlet may pass through the heat exchanger 70. Specifically, the air having passed the outlet may exchange heat with an evaporator 71 and a condenser 72 while passing through the evaporator 71 and the condenser 72. Accordingly, the air that has passed through the heat exchanger 70 may turn hot and dry air. Herein, 'hot' means having relatively high temperature than the air before passing through the heat exchanger 70 and does not mean absolutely hot. The air from which moisture is removed while passing the heat exchanger 70 may pass the flow-in port 21 of the drum 20, the inside 23 of the drum and the flow-out port 22, and flow into the body 110 of the dehumidification unit 100 through a flow-in port 112 of the dehumidification unit 100. In this case, the fan 80 may be arranged in a flow path connecting between the flow-out port 22 of the drum 20 and the flow-in port of the dehumidification unit 110. The fan 80 may facilitate the dehumidified air to move smoothly. The air flowing into the body 110 may pass through the outlet port along a discharge flow path (not shown) of the dehumidification unit 100, and may be discharged out of the main body 10. As a result, the air before dehumidification flows into the dryer 1 from outside and may be dehumidified by exchanging heat with the heat exchanger 70, and the dehumidified air may be discharged out of the dryer 1. With the flows of air, the humidification operation (humidification mode) may be performed.

[0053] Referring to FIG. 4, the dryer 1 according to the disclosure controls the driving motor 31 to rotate the drum 20 in the dehumidification mode. In general, the dryer 1 rotates the drum 20 to lift and drop the object with the plurality of lifters 24 so that the object contacts hot air while drifting in the space in the drum 20 in the dry mode.

[0054] Assuming that the drum 20 is rotated at a first rotation speed in the dry mode, the dryer 1 controls the driving motor 31 to rotate the drum 20 at a second rotation speed in the dehumidification mode. For example, in the dehumidification mode, the rotation speed of the drum 20 may be 30 revolutions per minute (rpm) to 60 rpm. However, it is noted that the rotation speed in the dehumidification mode is not always different from the speed in the dry mode or limited to the aforementioned examples of numerical values but may be various rotation

speeds depending on the temperature and outside environment (indoor temperature, indoor humidity) in the drum 20.

[0055] As shown in FIG. 4, the drum 20 may be rotated in the dehumidification mode 20. Assuming that the drum 20 is in the stopped state in the dehumidification mode, the air flowing out through the flow-in port 21 is concentrated on a certain place on the surface of the drum 20. However, when the drum 20 is rotated, the air flowing in through the flow-in port 21 is uniformly distributed on the surface of the drum 20 due to the rotation of the drum 20.

[0056] FIG. 6 is a control block diagram of a dryer, according to an embodiment.

[0057] The input module 17 allows the user to select a mode through rotation of a dial, a button input, or a display touch input. In the embodiment, the input module 17 may provide an interface to select the dry mode or the dehumidification mode. Upon receiving a selection of the dry mode or the dehumidification mode from the user, the input module 17 sends a corresponding control signal to a controller 400.

[0058] The display 17b displays an operation state and/or a user manipulation state of the dryer 1.

[0059] The controller 400 may include a memory (not shown) for storing a program and data for controlling operation of the dryer 1, and a processor (not shown) for generating control signals to control the operation of the dryer 1 according to the program and data stored in the memory.

[0060] Upon receiving a command for the dehumidification mode through the input module 17, the controller 400 determines whether outside air is allowed to flow in through a flow path formed by the fan 80. For example, the controller 400 may determine through a door sensor 410 that the door 30 is in an open state, and may generate a control signal to form the open flow path to perform the dehumidification mode. Furthermore, when the dehumidification unit 100 is installed in the dryer 1 and the door 30 is closed, the controller 400 may determine through a guide sensor 430 whether the dehumidification unit 100 has formed the open flow path. In this case, the controller 400 may generate a control signal to perform the dehumidification mode.

[0061] When the controller 400 determines that the open flow path is formed in the dryer 1 to allow the dehumidification mode to be performed, the controller 400 may control the drum 20, the heat exchanger 70 and/or the fan 80 to be operated.

[0062] When the dehumidification mode is performed, the controller 400 controls the drum 20 to be rotated by providing a current to the driving motor 31 (see FIG. 5). As the drum 20 is rotated, the temperature in the drum 20 rises, thereby increasing dehumidification effects.

[0063] The controller 400 applies a current to the driving motor 31 for a preset period of time to rotate the drum 20 until the end of the dehumidification mode.

[0064] The fan 80 may share the driving power of the driving motor 31 supplied to the drum 20, and may be

rotated along with the rotation of the drum 20. Alternatively, by adding a device such as an extra clutch (not shown) onto the base 60 or arranging the driving motor 31 in the plural, the fan 80 may be arranged to be separately rotated from the drum 20.

[0065] The heat exchanger 70 may exchange heat with air and may include the evaporator 71 (see FIG. 5) and the condenser 72 (see FIG. 5).

[0066] When the dehumidification mode is performed, the controller 400 may dehumidify humid outside air through the refrigerant cycle of the heat exchanger 70. In this case, the controller 400 may control a rate of the compressor 73 (see FIG. 5) to control the temperature in the drum 20.

[0067] When the dehumidification mode is performed, the controller 400 may control the compressor 73 such that the temperature in the drum 20 has a lower value than in the dry mode. For example, the compressor 73 may be controlled such that the temperature in the drum 20 is 60 degrees when the dryer 1 is in the dry mode and 40 degrees in the dehumidification mode. The controller 400 may control the temperature in the drum 20 to be maintained at a relatively low value, so that the temperature outside the dryer 1 does not deviate from the room temperature if possible. Such a temperature is merely an example, and may be set to various values depending on the external environment (temperature or humidity) of the dryer 1.

[0068] Furthermore, when the dehumidification mode is performed, the controller 400 may control the driving motor 31 such that the rotation speed of the fan 80 has a lower value than in the dry mode. For example, the magnitude of a current applied to the driving motor 31 may be controlled such that the rotation speed of the driving motor 31 is XXX in the dry mode and YYY in the dehumidification mode. As described above, as the drum 20 shares the driving power from the driving motor 31, a driving source for the fan 80, with the fan 80, the rotation speed of the drum 20 may depend on the rotation speed of the fan 80.

[0069] The controller 400 may control the rotation speed of each of the drum 20 and the fan 80 to have a lower value than in the dry mode, thereby preventing the outside temperature from deviating from the room temperature. Specifically, as the rotation speed of the drum 20 increases, the temperature in the drum 20 rises and the air discharged out of the dryer 1 may have a higher temperature value than the room temperature. Furthermore, as the rotation speed of the fan 80 increases, the volume of air discharged through the flow path increases, contributing to a rise in temperature outside the dryer 1.

[0070] Accordingly, when the dehumidification mode is performed, the controller 400 controls the driving motor 31 such that the rotation speed of the driving motor 31 has a lower value than the rotation speed in the dry mode. Such a condition is merely an example, and may be set to have various values depending on the external environment (temperature or humidity) of the dryer 1.

[0071] The compressor 73 compresses the refrigerant, and convey the compressed refrigerant to the condenser 72. The compressor 73 may be implemented as an inverter compressor having variable dry volume, without being limited thereto. For example, the compressor 73 is operated by rotating a motor equipped therein based on an operation frequency provided from the controller 400.

[0072] Increasing the number of revolutions of the compressor 73 may produce hot air sooner. The controller 400 may control the operation frequency of the compressor 73 based on at least one of a setting of a dry course, a drying period of time, temperature of air in the drum 20 and temperature of the compressor.

[0073] Configuration and associated operations of the dryer 1 have thus far been described with reference to FIGS. 1 to 6. Based on the aforementioned configuration, a control procedure for performing the dehumidification mode of the dryer 1 will now be described in detail.

[0074] FIG. 7 is a flowchart of a method of controlling a dryer, according to an embodiment.

[0075] The controller 400 receives a dehumidification mode, in 701. The input module 17 receives an input from the user to perform the dehumidification mode and sends a control signal for the dehumidification mode to the controller 400.

[0076] On receiving a command to select the dehumidification mode from the user, the controller 400 controls the fan 80 to force the air brought in from outside to pass the drum 20 and flow out, in 702. Air flows in such a manner that humid outside air flows through an open flow path back to the outside through a dehumidification procedure of the dryer. The air may flow in various paths. In this case, the paths have in common that humid outside air passes the drum 20 via the heat exchanger 70, but may slightly differ depending on whether the dehumidification unit 100 is installed. Specifically, when the dehumidification unit 100 is not installed, the air is moved and discharged in a direction from the front opening of the drum 20 to the heat exchanger 70 to the flow-in port 21 to the drum 20 to the front opening. When the dehumidification unit 100 is installed, the air is moved and discharged from an inlet port 121 of the dehumidification unit 100 to the heat exchanger 70 to the flow-in port 21 to the drum 20 to an outlet port 122.

[0077] The controller 400 controls the driving motor 31 to rotate the drum 20 when the dehumidification mode of the dryer 1 is started. The humid air brought in from outside is subject to a stirring action of being mixed with dry air inside due to rotation of the drum 20. Hence, remaining moisture in the drum 20 may be evaporated faster than when the drum 20 is not rotated. Furthermore, when the drum 20 is rotated, temperature in the drum 20 rises and thus, humidity in the drum 20 may be evaporated at relatively high speed.

[0078] The air that has passed the heat exchanger 70 is concentrated on a certain area on the surface of the drum 20 through the flow-in port 21 when the drum 20 is

not rotated, but the air may be uniformly distributed on the entire surface of the drum 20 when the drum 20 is rotated.

[0079] The controller 400 controls the driving motor 31 to rotate the drum 20 at a preset speed. In this case, the preset speed may be set based on the rotation speed of the drum 20 in the dry mode.

[0080] In an embodiment, the controller 400 may control the driving motor 31 to rotate the drum 20 at a second rotation speed in the dehumidification mode, which is lower than a first rotation speed in the dry mode. The temperature in the drum 20 may increase as the drum 20 rotates faster. Taking this into account, the controller 400 may control the temperature in the drum 20 to be maintained at a relatively low value, so that the temperature outside the dryer 1 does not deviate from the room temperature if possible. Furthermore, the dryer 1 may have lower noise from rotation of the drum in the dehumidification mode than in the dry mode.

[0081] Moreover, in an embodiment, the controller 400 may control the driving motor 31 to rotate the drum 20 at a second rotation speed in the dehumidification mode, which is higher than the first rotation speed in the dry mode. In this case, the dryer 1 may allow the air in the drum 20 to be discharged relatively faster.

[0082] The drum 20 continues to rotate until the end of the dehumidification mode for a preset period of time from when the dehumidification is started by being selected by the user. When the preset period of time has elapsed in 704, the dehumidification mode is terminated along with stopping of the drum 20.

[0083] In the meantime, in the disclosure, in addition to controlling rotation of the drum 20 to increase the dehumidification efficiency, the compressor may be controlled to increase the temperature in the drum 20. This will be further described with reference to FIG. 8.

[0084] FIG. 8 is a flowchart of a method of controlling a dryer, according to another embodiment.

[0085] The controller 400 receives the dehumidification mode, in 701. The input module 17 receives an input from the user to perform the dehumidification mode and sends a control signal for the dehumidification mode to the controller 400. Operations of the fan 80 related to air flows in the dehumidification mode are the same as what are described above in connection with FIGS. 4 and 7.

[0086] On receiving a command to select the dehumidification mode from the user, the controller 400 controls the driving motor 31 at a second rotation speed lower than a first rotation speed, which is the rotation speed of the drum in the dry mode, in 802. The temperature in the drum 20 may increase as the drum 20 rotates faster. Taking this into account, the controller 400 may control the temperature in the drum 20 to be maintained at a relatively low value, so that the temperature outside the dryer 1 does not deviate from the room temperature if possible. Furthermore, the dryer 1 may have lower noise from rotation of the drum in the dehumidification mode than in the dry mode.

[0087] While the dehumidification mode goes on by rotation of the drum 20, the controller 400 controls the compressor 73 to control the temperature in the drum 20.

[0088] Specifically, the controller 400 may control the compressor to control the temperature in the drum 20 to be a second temperature lower than a first temperature, which is the temperature in the drum 20 in the dry mode, in 803. The temperature in the dryer 1 is generally higher than the room temperature, and this temperature difference may cause the air in the dryer 1 to be condensed into steam. Hence, in the embodiment, the dryer 1 may perform additional compressor control to reduce the temperature in the drum 20 during the dehumidification mode.

[0089] Furthermore, the controller 400 may control the temperature in the drum 20 by controlling the compressor 73 based on the difference between the temperature in the drum 20 and the room temperature. When the difference between the temperature in the drum 20 and the room temperature is big, the controller 400 may control the compressor 73 to reduce the difference. Specifically, the controller 400 may control heat produced by the compressor 73 by controlling the operation frequency of the compressor motor that drives the compressor 73.

[0090] Furthermore, the controller 400 may control the compressor 73 to control the temperature in the drum 20 to be a second temperature higher than the first temperature, which is the temperature in the drum 20 in the dry mode. Unlike in 803, the operation frequency of the compressor 73 is controlled to be higher than in the dry mode to control the temperature in the drum 20 to be relatively high. For example, when the outside humidity is higher than usual, the dryer 1 may increase dehumidification efficiency of the drum 20 by increasing the temperature in the drum 20.

[0091] The drum 20 continues to rotate until the end of the dehumidification mode for a preset period of time from when the dehumidification is started by being selected by the user. When the preset period of time has elapsed in 704, the dehumidification mode is terminated along with stopping of the drum 20 and the compressor 73.

[0092] Although not shown in FIGS. 7 and 8, the controller 400 may control the dryer 1 not to perform the dehumidification mode when there is an object to be dried in the drum 20. The controller 400 does not generate a control signal to drive the fan 80 while the drum 20 contains the object. When there is the object in the drum 20, moisture contained in the outside air may permeate into the object. Furthermore, when the moisture that has evaporated from the object is supplied back to the outside, it makes the dehumidification inefficient. Accordingly, when the current flowing to the driving motor 31 exceeds a predetermined current magnitude (a current applied when there is nothing in the drum), the controller 400 may hold off the dehumidification mode.

[0093] Meanwhile, the embodiments of the disclosure may be implemented in the form of a recording medium

for storing instructions to be carried out by a computer. The instructions may be stored in the form of program codes, and when executed by a processor, may generate program modules to perform operations in the embodiments of the disclosure. The recording media may correspond to computer-readable recording media.

[0094] The computer-readable recording medium includes any type of recording medium having data stored thereon that may be thereafter read by a computer. For example, it may be a read only memory (ROM), a random access memory (RAM), a magnetic tape, a magnetic disk, a flash memory, an optical data storage device, etc.

[0095] The embodiments of the disclosure have thus far been described with reference to accompanying drawings. It will be obvious to those of ordinary skill in the art that the disclosure may be practiced in other forms than the embodiments of the disclosure as described above without changing the technical idea or essential features of the disclosure. The above embodiments of the disclosure are only by way of example, and should not be construed in a limited sense.

Claims

1. A dryer comprising:

a main body;
 a drum arranged in the main body for receiving an object to be dried;
 a driving motor configured to rotate the drum;
 an input module configured to receive an input of a dry mode or a dehumidification mode from a user;
 a heat exchanger arranged in the main body; and
 a controller configured to control the driving motor to rotate the drum at a first rotation speed in response to the dry mode being input, and control the driving motor to rotate the drum at a second rotation speed different from the first rotation speed in response to the dehumidification mode being input.

2. The dryer of claim 1, wherein the controller is configured to control the driving motor to rotate the drum at a second rotation speed lower than the first rotation speed in the dehumidification mode.

3. The dryer of claim 1, wherein the controller is configured to control the driving motor to rotate the drum at a second rotation speed higher than the first rotation speed in the dehumidification mode.

4. The dryer of claim 1, wherein the controller is configured to rotate the drum for air brought in from outside to reach an inner surface of the drum in response to receiving a command to select the dehu-

midification mode through the input module.

5. The dryer of claim 1, further comprising:

a compressor configured to produce hot air, wherein the controller is configured to control the compressor for temperature in the drum to be the first temperature in the dry mode, and control the compressor for temperature in the drum to be the second temperature different from the first temperature in the dehumidification mode.

6. The dryer of claim 5, wherein the controller is configured to control the compressor for the temperature in the drum to be a second temperature lower than the first temperature in the dehumidification mode.

7. The dryer of claim 1, further comprising:

a fan configured to form a flow path through which air flows in from outside and air having passed the heat exchanger and the drum flows out.

8. The dryer of claim 8, wherein the controller is configured to generate a control signal to drive the fan in response to receiving a command to select the dehumidification mode through the input module.

9. A method of controlling a dryer, the method comprising:

receiving a command to select a dehumidification mode;
 controlling a fan to form a flow path to force air brought in from outside to pass a drum and flow out; and
 controlling a driving motor to rotate the drum at a second rotation speed in the dehumidification mode, wherein the second rotation speed is different from a first rotation speed at which the drum rotates in a dry mode.

10. The method of claim 9, wherein the controlling of the driving motor comprises controlling the driving motor to rotate the drum at a second rotation speed lower than the first rotation speed in the dehumidification mode.

11. The method of claim 9, wherein the controlling of the driving motor comprises controlling the driving motor to rotate the drum at a second rotation speed higher than the first rotation speed in the dehumidification mode.

12. The method of claim 9, wherein the controlling of the driving motor comprises rotating the drum for air brought in from outside to reach an inner surface of

the drum.

- 13.** The method of claim 19, further comprising:
controlling the compressor for temperature in the
drum to be a first temperature in the dry mode, and 5
controlling the compressor for the temperature in the
drum to be a second temperature different from the
first temperature in the dehumidification mode.
- 14.** The method of claim 13, wherein the controlling of 10
the compressor comprises controlling the compres-
sor for the temperature in the drum to be a second
temperature lower than the first temperature in the
dehumidification mode. 15
- 15.** The method of claim 1, wherein the controlling of the
driving motor comprises generating a control signal
to drive a fan in response to receiving a command
to select the dehumidification mode through the input
module. 20

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FIG. 1

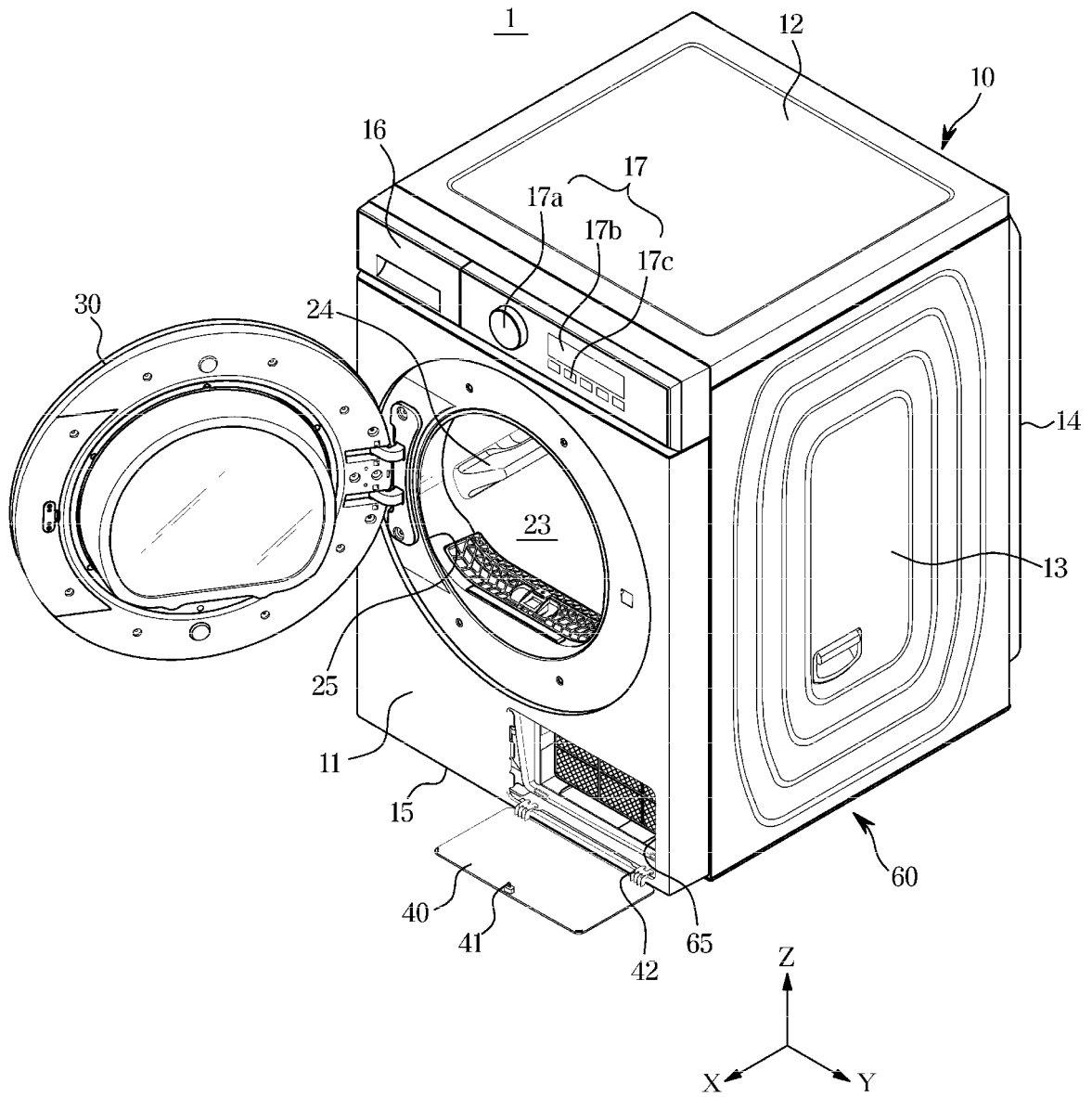


FIG. 2

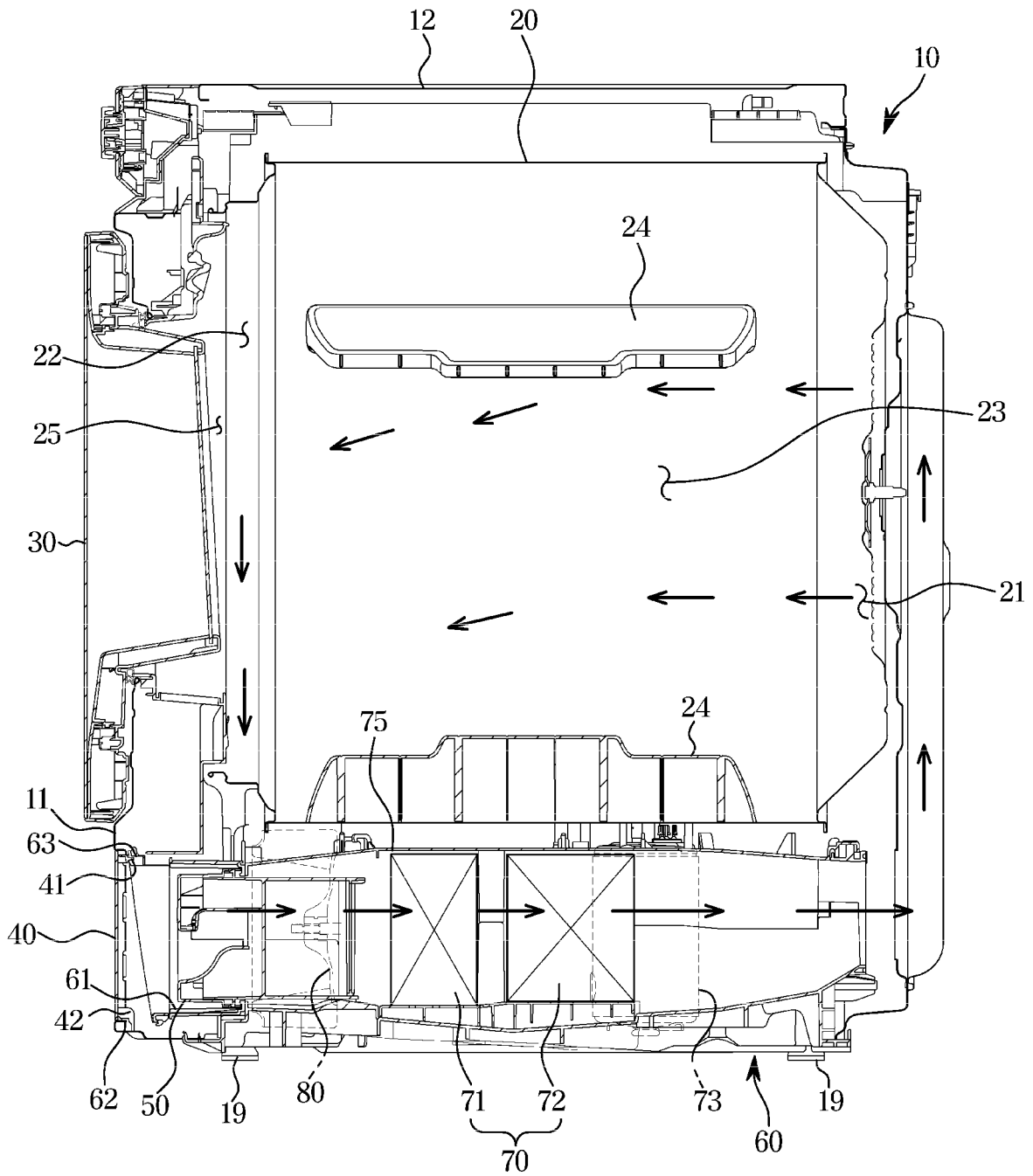


FIG. 3

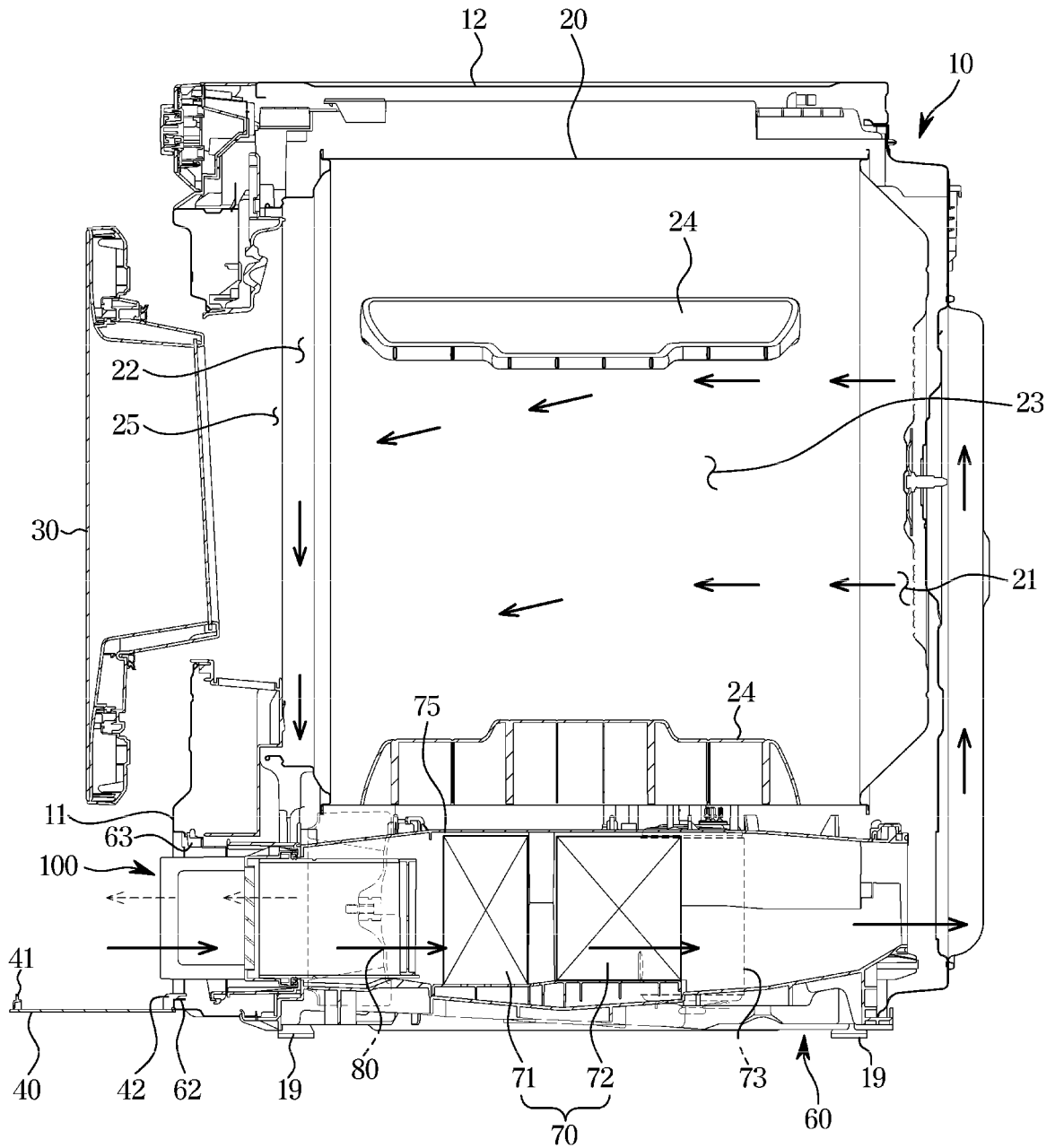


FIG. 5

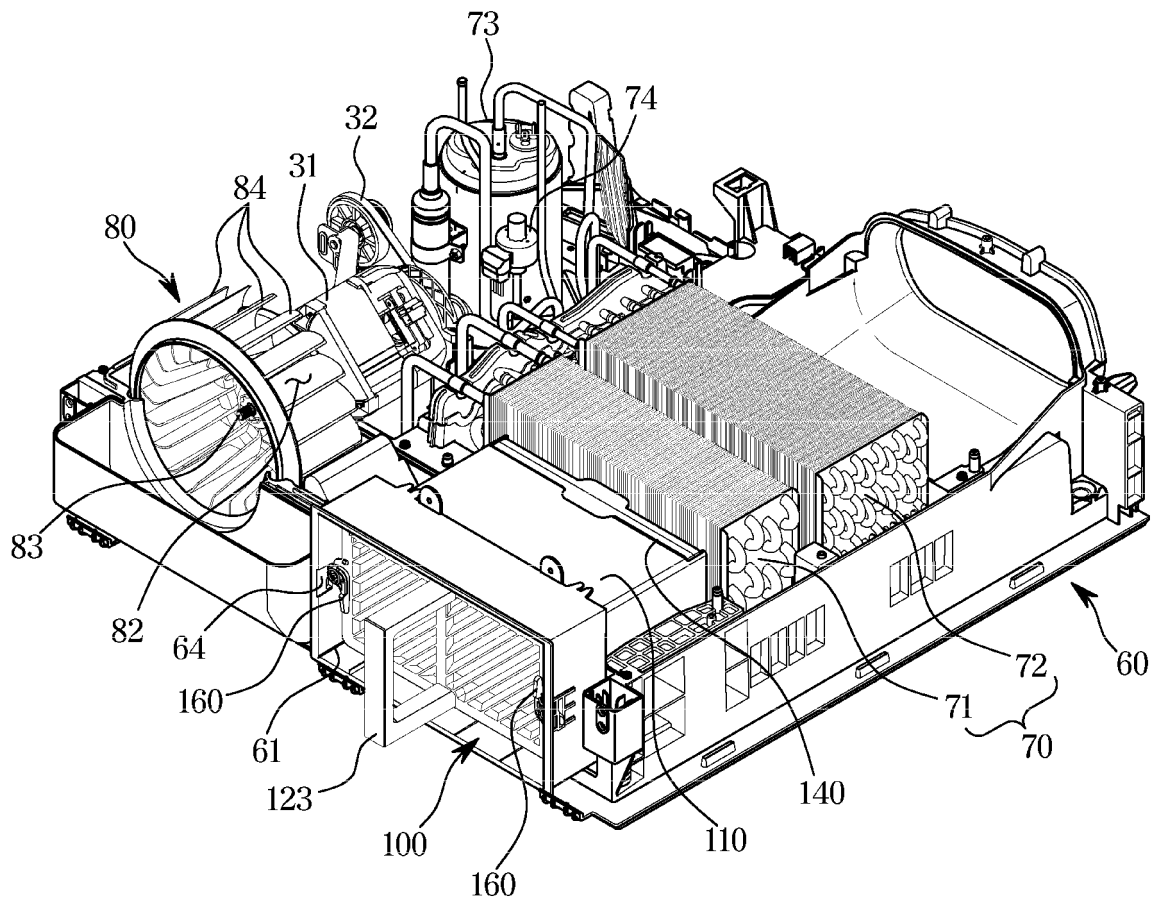


FIG. 6

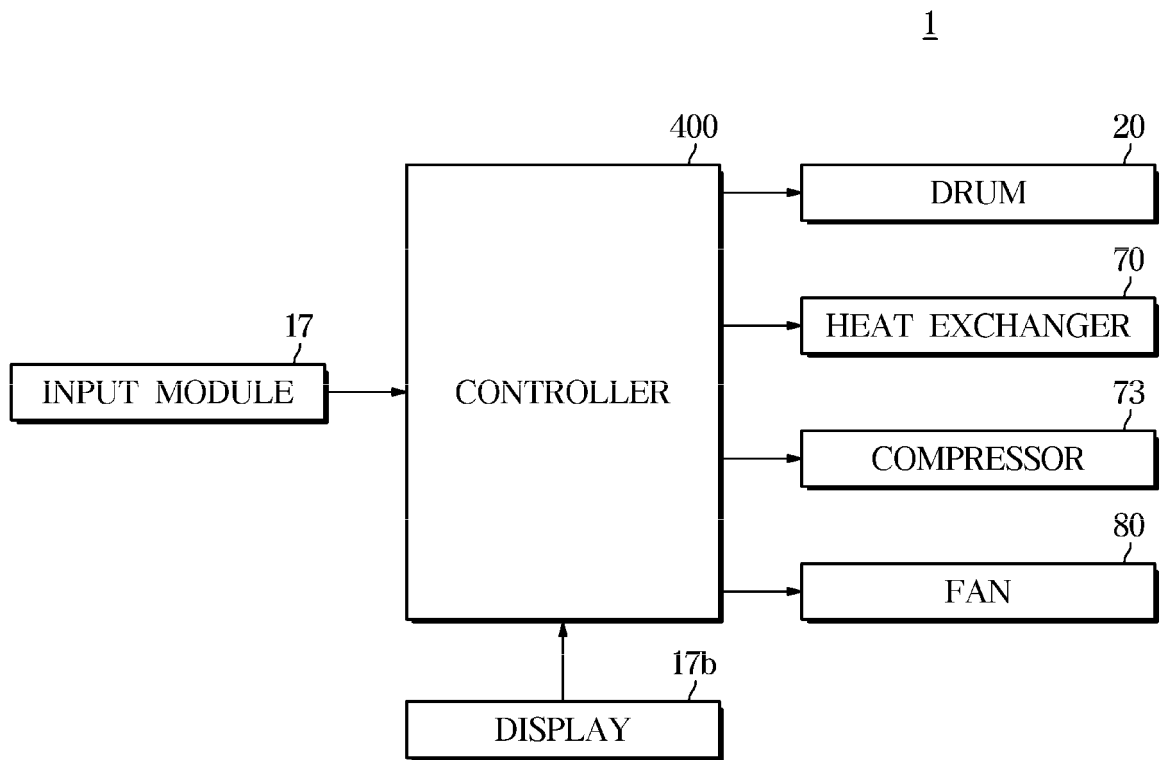


FIG. 7

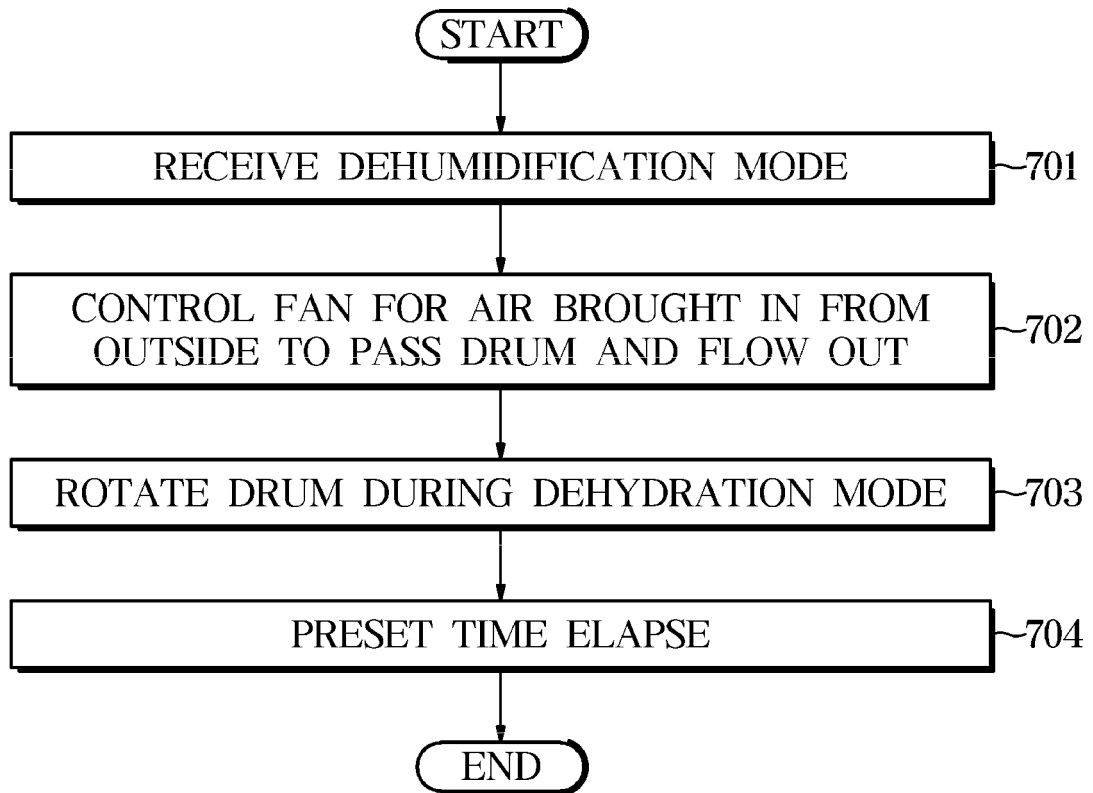
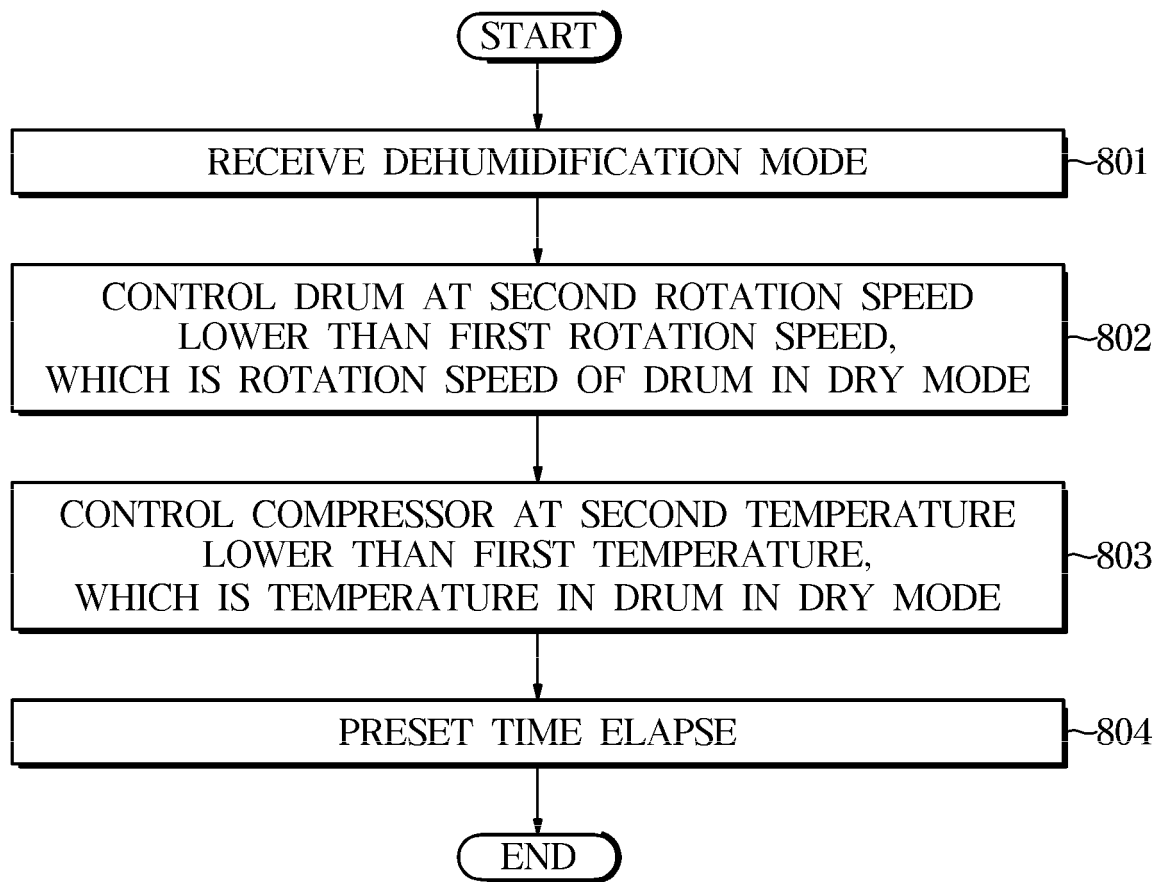


FIG. 8



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2021/013405

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A. CLASSIFICATION OF SUBJECT MATTER D06F 58/24(2006.01)i; D06F 58/04(2006.01)i; F24F 3/14(2006.01)i According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols) D06F 58/24(2006.01); D06F 58/04(2006.01); D06F 58/10(2006.01); D06F 58/20(2006.01); D06F 58/26(2006.01); D06F 58/28(2006.01)		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Korean utility models and applications for utility models: IPC as above Japanese utility models and applications for utility models: IPC as above		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) eKOMPASS (KIPO internal) & keywords: 건조기(dryer), 제습(dehumidification), 드럼(drum), 분당 회전수(revolutions per minute, RPM)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 2002-066197 A (TOKYO GAS CO., LTD.) 05 March 2002 (2002-03-05) See paragraphs [0006], [0015] and [0017], claims 1-2, 5 and 8 and figures 1-2.	1-4,9-12
Y		5-8,13-15
Y	KR 10-2019-0127440 A (LG ELECTRONICS INC.) 13 November 2019 (2019-11-13) See paragraph [0058], claim 1 and figure 2a.	5-8,13-15
A	KR 10-2013-0005724 A (WINIAMANDO INC.) 16 January 2013 (2013-01-16) See claims 1-3 and figures 2a-2b.	1-15
A	KR 10-2018-0084545 A (LG ELECTRONICS INC.) 25 July 2018 (2018-07-25) See claims 1 and 6 and figures 6-7.	1-15
A	KR 10-2019-0127421 A (LG ELECTRONICS INC.) 13 November 2019 (2019-11-13) See claims 1-4 and figure 6.	1-15
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "D" document cited by the applicant in the international application "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search 26 January 2022		Date of mailing of the international search report 27 January 2022
Name and mailing address of the ISA/KR Korean Intellectual Property Office Government Complex-Daejeon Building 4, 189 Cheongsaro, Seo-gu, Daejeon 35208 Facsimile No. +82-42-481-8578		Authorized officer Telephone No.

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No. PCT/KR2021/013405

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KR 10-2013-0005724 A	16 January 2013	None	
KR 10-2018-0084545 A	25 July 2018	None	
KR 10-2019-0127421 A	13 November 2019	None	