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(54) **AIR DISTRIBUTION DEVICE AND METHOD APPLICABLE TO PATIENT SUPPORT SYSTEM**

(57) Air distribution device and method applicable to a patient support system are provided. The air distribution device connects an air supply source and patient support device. The patient support device includes first air cells and second and third air cells disposed thereon. The air distribution device includes a base and an air distribution dial rotatably disposed thereon. When air distribution dial is rotated to a first angle, first, second and third holes of the base come into communication with an air supply hole of the base through an air admitting portion of air distribution dial to perform inflation preparation process or inflation process. When air distribution dial is rotated to a second angle, second hole comes into communication with a deflation hole of the base, but first hole does not communicate with second and third holes, such that second air cells undergo deflation process and then stop deflating process.

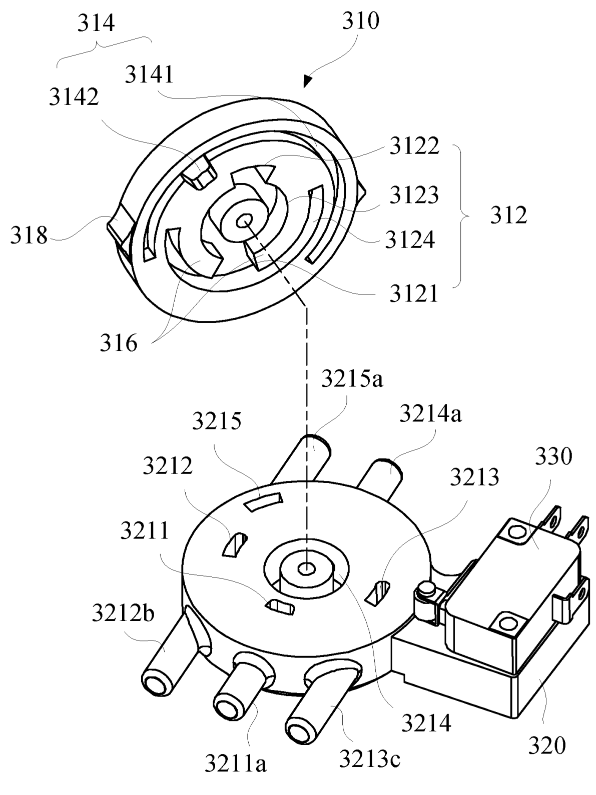

FIG.5

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Description

BACKGROUND OF THE INVENTION

FIELD OF THE INVENTION

[0001] The present disclosure relates to air distribution devices and methods and, more particularly, to an air distribution device and method applicable to a patient support system.

DESCRIPTION OF THE PRIOR ART

[0002] Bedridden patients are so immobile that their skin is always under compression. If the patients are unable to turn or move, the weight of the patients' bodies presses the skin for a long period of time; as a result, blood flow to the patients' skin and soft tissue decreases or even stops. Consequently, the patients' skin and soft tissue undergo ischemia and thus necrosis to finally develop pressure ulcers (also known as decubitus ulcers, commonly known as bedsores). Once pressure ulcers develop, not only do the patients feel uncomfortable, but caretaking is also difficult. Furthermore, pressure ulcers are likely to admit germs and, when severely, even lead to life-threatening sepsis. Therefore, prevention of pressure ulcers is of vital importance. In this regard, caretakers have to turn the patients regularly or use an auxiliary apparatus to preclude lengthy compression of the same part of the patients' skin, with a view to lowering the chance of developing pressure ulcers.

[0003] Common auxiliary apparatuses include patient support systems, such as medical air mattresses, which are widely used in caretaking. Internal pressure of air cells of an air mattress is controlled, for example, by alternately inflating and deflating the air cells or keeping the internal pressure therein low and uniform, to ensure that pressure (known as interface pressure) between the air mattress and the patients' skin remains in an optimal state. Moreover, given the differential control over the internal pressure of the air cells, the recumbent patients' bodies can be tilted and thus turned to avoid lengthy compression of the patients' skin and subcutaneous tissue and resultant poor blood circulation, so as to prevent pressure ulcers.

[0004] However, conventional patient support systems are uncomfortable for two reasons. First, to prevent recumbent patients from coming into contact with the bed base or bed frame (i.e., a phenomenon known as bottom-out) when the air cells are deflated, the conventional patient support systems are designed to keep lower air-filled layers at constant, high internal pressure. As a result, pressure reduction achievable by the conventional patient support systems is restricted to upper air-filled layers, reducing the buffer space otherwise conducive to enhancement of comfortableness of the conventional patient support systems. Additional buffer space requires additional air cells and thus additional cost. Second, pressure difference caused by alternate inflation and deflation of air cells is too large to allow the patients to have a good rest or sleep well.

SUMMARY OF THE INVENTION

[0005] It is an objective of the present disclosure to enhance comfortableness of a patient support system.

[0006] Another objective of the present disclosure is to integrate various air distribution modes conducive to enhancement of comfortableness into an air distribution device.

[0007] In order to achieve the above and other objectives, the present disclosure provides an air distribution device applicable to a patient support system, for connect an air supply source and a patient support device. The patient support device comprises first air cells as well as second and third air cells disposed above the first air cells. The air distribution device comprises a base and an air distribution dial. The base comprises a first hole, a second hole, a third hole, an air supply hole and a deflation hole. The first hole is in communication with the first air cells. The second hole is in communication with the second air cells. The third hole is in communication with the third air cells. The air supply hole is in communication with the air supply source. The deflation hole is for use in deflation. The air distribution dial is rotatably disposed on the base. The air distribution dial comprises an air admitting portion, a deflation portion and stop portion. When the air distribution dial rotates to a first angle, all the first hole, the second hole, and the third hole of the base are in communication with the air supply hole of the base via the air admitting portion of the air distribution dial. When the air distribution dial rotates to a second angle, the second hole of the base is in communication with the deflation hole of the base via the deflation portion of the air distribution dial, and the stop portion of the air distribution dial covers the first hole of the base, so as to prevent the first hole from coming into communication with any one of the second hole, the third hole, the air supply hole and the deflation hole. Therefore, when the second air cells of the patient support device are deflated, the first air cells in communication with the first hole are not in communication with the third air cells in communication with the third hole.

[0008] In an embodiment of the present disclosure, after the air distribution dial has rotated to the second angle and stayed at the second angle for a predetermined time period, the air distribution dial rotates to a third angle, such that the first hole, the second hole and the third hole of the base come into communication with the air supply hole of the base through the air admitting portion of the air distribution dial, thereby allowing the first air cells, the second air cells and the third air cells to come into communication with each other. The first angle ranges from 358 degree to 2 degree. The second angle ranges from 42 degree to 47 degree. The third angle ranges from 178 degree to 182 degree.

[0009] In an embodiment of the present disclosure, on the base, the first hole and the air supply hole are separated by first distance, the second hole and the air supply hole by second distance, and the third hole and the air supply hole by third distance, wherein both the second distance and the third distance are greater than the first distance.

[0010] In an embodiment of the present disclosure, the deflation hole and the air supply hole are separated by fourth distance, the first hole and the air supply hole by first distance, the second hole and the air supply hole by second distance, and the third hole and the air supply hole by third distance, wherein the first distance, the second distance and the third distance are less than the fourth distance.

[0011] In an embodiment of the present disclosure, the second distance is equal to the third distance.

[0012] In an embodiment of the present disclosure, a top surface of the base is divided into a first segment, a second segment, a third segment and a fourth segment, arranged from center to periphery, which are annular and concentric outward from the center, with the air supply hole disposed at the first segment, the first hole at the second segment, the second and third holes at the third segment, and the deflation hole at the fourth segment.

[0013] In an embodiment of the present disclosure, the air distribution dial is rotatably disposed on the top surface of the base, wherein a surface of the air distribution dial faces the top surface of the base and has the air admitting portion, the stop portion, and the deflation portion. The air admitting portion has an air admitting channel, a first communication recess, a second communication recess and an air distribution channel. The first communication recess is connected to the air admitting channel and the air distribution channel. The second communication recess is connected to the air admitting channel but not to the air distribution channel. The air admitting channel corresponds in position to the first segment of the base. The first communication recess and the second communication recess correspond in position to the second segment of the base. The air distribution channel corresponds in position to the third segment of the base. The stop portion is disposed between the first communication recess and the second communication recess and corresponds in position to the second segment of the base. The deflation portion has a deflation channel and a deflation recess. The deflation channel corresponds in position to the fourth segment of the base. The deflation recess is spaced apart from the air distribution channel, is connected to the deflation channel, and corresponds in position to the third segment of the base. The stop portion comes into contact with the top surface of the base and thus closes the first hole when the air distribution dial is rotated to cause the stop portion to be positioned above the first hole. The first hole comes into communication with the second hole and the third hole simultaneously through the air distribution channel when the air distribution dial is rotated to cause the first communication recess or the second communication recess to correspond in position to the first hole.

[0014] In an embodiment of the present disclosure, the air distribution device further comprises a control element and two positioning elements disposed on two opposing, lateral sides of the air distribution dial adapted to trigger the control element, wherein the air admitting channel comes into communication with the first hole, the second hole and the third hole simultaneously when the air distribution dial is rotated to cause any one of the two positioning elements to trigger the control element.

[0015] In an embodiment of the present disclosure, the first hole is disposed between the second hole and the third hole.

[0016] In order to achieve the above and other objectives, the present disclosure further provides an air distribution method applicable to a patient support system, using a control unit to drive an air supply source and the air distribution device, the air distribution device being connected between the air supply source and a patient support device, the patient support device comprising first air cells, second air cells disposed above the first air cells, and third air cells disposed above the first air cells. The air distribution method comprises an inflation preparation process, an inflation process, a deflation process, and a stop deflating process. The inflation preparation process causes the first air cells, the second air cells and the third air cells to come into communication with each other simultaneously, thereby attaining equilibrium of internal pressure of the first air cells, the second air cells and the third air cells. The inflation process inflates the first air cells, the second air cells and the third air cells to a predetermined level of internal pressure. The deflation process deflates the second air cells for a predetermined time period, wherein the first air cells are not deflated and are spaced apart from the air supply source. The stop deflating process stops the deflation of the second air cells, wherein the first air cells are not deflated and are spaced apart from the air supply source.

[0017] In an embodiment of the present disclosure, the air distribution method further comprises a fine deflation mode and a full deflation mode. The predetermined time period of the deflation process in the fine deflation mode is a first value. The predetermined time period of the deflation process in the full deflation mode is a second value. The first value is less than the second value.

[0018] In an embodiment of the present disclosure, the air distribution method further comprises a full deflation mode, wherein the second air cells are deflated to 1 atm by the deflation process in the full deflation mode.

[0019] Therefore, according to the embodiments of the present disclosure, air cells and holes of an air distribution device come into communication with each other to not only allow an air distribution dial to rotate and thus switch the air distribution device between air distribution modes but also accordingly inflate and deflate lower air cells connected to a patient support device, so as to enhance comfortableness of a patient support system.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020]

FIG. 1 is a schematic view of a patient support system according to an embodiment of the present disclosure.

FIG. 2 is a schematic view of a patient support device operating in one state according to an embodiment of the present disclosure.

FIG. 3 is a schematic view of the patient support device shown in FIG. 2 and operating in another state according to an embodiment of the present disclosure.

FIG. 4 is a structural schematic view of an air distribution device according to an embodiment of the present disclosure.

FIG. 5 is a structural schematic view of an air distribution dial and a base according to an embodiment of the present disclosure.

FIG. 6 is a schematic view of segmentation of the base shown in FIG. 5.

FIG. 7 is a first schematic view of an air distribution mode according to an embodiment of the present disclosure.

FIG. 8 is a second schematic view of the air distribution mode shown in FIG. 7.

FIG. 9 is a third schematic view of the air distribution mode shown in FIG. 7.

FIG. 10 is a fourth schematic view of the air distribution mode shown in FIG. 7.

FIG. 11 is a fifth schematic view of the air distribution mode shown in FIG. 7.

FIG. 12 is a sixth schematic view of the air distribution mode shown in FIG. 7.

FIG. 13 is a flowchart of an air distribution method in an alternating mode according to an embodiment of the present disclosure.

FIG. 14 is a flowchart of the air distribution method in a fine alternating mode of the alternating mode according to an embodiment of the present disclosure.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0021] Objectives, features, and advantages of the present disclosure are hereunder illustrated with specific embodiments, depicted with drawings, and described below.

[0022] In the disclosure, descriptive terms such as "a" or "one" are used to describe the unit, component, structure, device, system, portion or region, and are for illustration purposes and providing generic meaning to the scope of the present invention. Therefore, unless otherwise explicitly specified, such description should be understood as including one or at least one, and a singular number also includes a plural number.

[0023] In the disclosure, descriptive terms such as "include, comprise, have" or other similar terms are not for merely limiting the essential elements listed in the disclosure, but can include other elements that are not explicitly listed and are however usually inherent in the units, components, structures, devices, systems, portions or regions.

[0024] In the disclosure, the terms similar to ordinals such as "first" or "second" described are for distinguishing or referring to associated identical or similar components or structures, and do not necessarily imply the orders of these components, structures, portions or regions in a spatial aspect. It should be understood that, in some situations or configurations, the ordinal terms could be interchangeably used without affecting the implementation of the present invention.

[0025] Referring to FIG. 1, there is shown a schematic view of a patient support system according to an embodiment of the present disclosure. The patient support system comprises a patient support device 100, air distribution device 300, air supply source 400, and control host 500. The patient support device 100 has a plurality of first air cells 101, second air cells 102 and third air cells 103. As shown in FIG. 1, the first, second and third air cells 101, 102, 103 are each in the number of one to serve an exemplary purpose. The air supply source 400 is controlled by the control host 500 and thus selectively supplies or does not supply air to the air distribution device 300. When the air supply source 400 does not supply air to the air distribution device 300, the air supply passage is set to a closed state to prevent air from escaping from the air distribution device 300 via the air supply source. The air distribution device 300 connects the air supply source 400 and the patient support device 100. The air distribution device 300 adjusts gaseous communication between the air supply source 400 and the patient support device 100, so as to configure the inflated/deflated states of the first air cells 101, second air cells 102 and third air cells 103 of the patient support device 100. The control host 500 controls the air distribution device 300 and the air supply source 400. The air distribution device 300, the air supply source 400 and the control host 500 are integrated to become one single apparatus or mounted in place inside the same casing as needed but are not limited to the disclosure shown in FIG. 1.

[0026] The patient support device 100 is, for example, an air mattress provided in an embodiment of the present disclosure. Air cells disposed in the air mattress are typically arranged in two different patterns, namely cell-in-cell and cell-on-cell. The air cells are alternately inflated and deflated (i.e., in alternate states) or have low, uniform internal pressure (in a static state) to reduce the chance that recumbent patients will develop pressure ulcers.

[0027] The cell-on-cell pattern has advantages as follows: upper air cells are closer to the recumbent patient than lower air cells; the upper and lower air cells serve different supportive purposes; lower air cells can function as buffer for preventing the patient from undergoing bottom-out; the inflation and deflation processes of lower air cells enables the combination of upper and lower air cells to have greater difference and thus further enhances comfortableness of the patient support system. The cell-in-cell pattern has an advantage as follows: the inner air cells in the cell-in-cell pattern are similar to the lower air cells in the cell-on-cell pattern, and the inflation and deflation processes of the inner air cells enable the combination of inner and outer air cells to have greater difference.

[0028] Referring to FIG. 2, there is shown a schematic view of a patient support device operating in one state according to an embodiment of the present disclosure. The patient support device 100 comprises first air cells 101, second air cells 102 and third air cells 103. A recumbent person 200, such as a patient, imposes his or her body weight on the patient support device 100, whereas the patient support device 100 provides a supporting force and causes variations in the supporting force.

[0029] Referring to FIG. 3, there is shown a schematic view of the patient support device shown in FIG. 2 and operating in another state according to an embodiment of the present disclosure. In this embodiment, second air cells 102 in the patient support device 100 are deflated, but third air cells 103 in the patient support device 100 are not deflated, such that alternating supporting forces are generated. Variations in the supporting forces preclude lengthy compression of the recumbent patients' skin and subcutaneous tissue. Since second air cells 102 and third air cells 103 are deflated alternately, first air cells 101 are deflated to a certain extent after deflation of second air cells 102 or deflation of third air cells 103, so as to increase the distance by which the patient support device 100 can be pushed downward and enhance comfortableness of the patient support system. The passage below describes how to deflate first air cells 101.

[0030] The air distribution device 300 is hereunder described first. Referring to FIG. 4, there is shown a structural schematic view of an air distribution device according to an embodiment of the present disclosure. The air distribution device 300 comprises an air distribution dial 310, base 320, control element 330, upper pad 341, lower pad 342, resilient element 350, and motor 360. FIG. 4 shows only essential components but omits minor components, such as fastening components. The motor 360 has an axle and is connected to the air distribution dial 310 by the axle; thus, the rotating axle of the motor 360 drives the air distribution dial 310 and changes the angle of the air distribution dial 310, so as to effect the selection of air distribution modes. The resilient element 350 is, for example, a spring disposed below the base 320 and adapted to exert a resilient force under which the spring abuts against the base 320, such that the upper surface of the base 320 is close to the lower surface of the air distribution dial 310, so as to increase the airtightness between the base 320 and the air distribution dial 310. The upper pad 341 and the lower pad 342 are disposed above and below the resilient element 350, respectively, to limit the position of the resilient element 350 in operation. The control element 330 detects the rotational position of the air distribution dial 310; thus, the control host 500 shown in FIG. 1 can control the air distribution device 300, for example, adjust air distribution modes. In this embodiment, the control element 330 is a microswitch which operates in conjunction with a positioning element of the air distribution dial 310 to detect the rotational position of the air distribution dial 310, but the present disclosure is not limited thereto. In a variant embodiment, the control element 330 is an optical switch or any other switch.

[0031] Refer to FIG. 5 and FIG. 6. FIG. 5 is a structural schematic view of an air distribution dial and a base according to an embodiment of the present disclosure. FIG. 6 is a schematic view of segmentation of the base shown in FIG. 5. In this embodiment, the base 320 comprises a first hole 3211, a second hole 3212, a third hole 3213, an air supply hole 3214 and a deflation hole 3215, which are disposed on the upper surface of the base 320 and adapted to match the outline of the lower surface of the air distribution dial 310. The base 320 is designed to allow the first hole 3211 to be in communication with a first pipe 3211a, the second hole 3212 to be in communication with a second pipe 3212b, the third hole 3213 to be in communication with a third pipe 3213c, the air supply hole 3214 to be in communication with an air supply pipe 3214a, and the deflation hole 3215 to be in communication with a deflation pipe 3215a. The pipes are in communication with the holes on the upper surface of the base 320, respectively, such that all the gaseous passages lead to the base 320. This, coupled with the operation of the air distribution dial 310, achieves air distribution and thus effects the inflation and deflation processes of the air cells.

[0032] The pipe-like structures shown in FIG. 5 and FIG. 6 merely serve an exemplary purpose rather than restrictive purpose, and thus whatever communication structures are applicable to the embodiments of the present disclosure.

[0033] The first pipe 3211a is connected to first air cells 101 (air cells A shown in FIG. 2 and FIG. 3) of the patient support device 100. The second pipe 3212b is connected to second air cells 102 (air cells B shown in FIG. 2 and FIG. 3) of the patient support device 100. The third pipe 3213c is connected to third air cells 103 (air cells C shown in FIG. 2 and FIG. 3) of the patient support device 100. The pipes are in communication with air cells through subsequent branch pipelines (not shown), respectively. Furthermore, air supply pipe 3214a is connected to air supply source 400 shown in FIG. 1, and the deflation pipe 3215a is connected to an appropriate air-discharging position.

[0034] The air distribution dial 310 in this embodiment comprises an air admitting portion 312, a deflation portion 314 and a stop portion 316. The air admitting portion 312 has an air admitting channel 3123, first communication recess 3121, second communication recess 3122 and air distribution channel 3124. The deflation portion 314 has a deflation channel 3141 and deflation recess 3142. The stop portion 316 surrounds the air admitting channel 3123 and is disposed between the first communication recess 3121 and the second communication recess 3122.

[0035] As shown in FIG. 6, the top surface of the base 320 is divided into a first segment N1, a second segment N2, a third segment N3 and a fourth segment N4, which are annular and concentric outward from the center. The air supply hole 3214 is at the first segment N1. The first hole 3211 is at the second segment N2. The second hole 3212 and third hole 3213 are at the third segment N3. The deflation hole 3215 is at the fourth segment N4.

[0036] As shown in FIG. 6, the first hole 3211 and the air supply hole 3214 are separated by first distance d1, the second hole 3212 and the air supply hole 3214 are separated by second distance d2, the third hole 3213 and the air supply hole 3214 are separated by third distance d3, the deflation hole 3215 and the air supply hole 3214 are separated by fourth distance d4. Both second distance d2 and third distance d3 are greater than first distance d1. In addition, first distance d1, second distance d2 and third distance d3 are less than fourth distance d4. Furthermore, second distance d2 is equal to third distance d3. The first hole 3211 is disposed between the second hole 3212 and the third hole 3213. All the holes described above in this embodiment serve an exemplary purpose and are conducive to setting subsequent air distribution modes.

[0037] As shown in FIG. 5, the first communication recess 3121 is connected to the air admitting channel 3123 and the air distribution channel 3124, whereas the second communication recess 3122 is connected to the air admitting channel 3123 but is not connected to the air distribution channel 3124. The air admitting channel 3123 corresponds in position to the first segment N1 of the base 320 (see FIG. 6). The first communication recess 3121, second communication recess 3122 and stop portion 316 correspond in position to the second segment N2 of the base 320 (see FIG. 6). The air distribution channel 3124 corresponds in position to the third segment N3 of the base 320 (see FIG. 6). Therefore, the supply gas received by the air distribution device 300 is transferred, via the air supply hole 3214 corresponding in position to the first segment N1, to the air admitting channel 3123 so as to enter the air distribution region of the air distribution dial 310. After that, the gas is delivered from the first communication recess 3121 to a corresponding hole or the air distribution channel 3124 or from the second communication recess 3122 to a corresponding hole.

[0038] As shown in FIG. 5, the deflation recess 3142 and the air distribution channel 3124 are spaced apart. Furthermore, the deflation recess 3142 is connected to the deflation channel 3141. The deflation recess 3142 corresponds in position to the third segment N3 of the base 320. The deflation channel 3141 corresponds in position to the fourth segment N4 of the base 320. Therefore, with the air distribution dial 310 being set to different angles, gas is transferred to a corresponding region to thereby carry out the inflation and deflation processes of the air cells in various modes.

[0039] Referring to FIG. 7 through FIG. 12, there are shown six schematic views of the respective air distribution modes according to an embodiment of the present disclosure. FIG. 7 through FIG. 12 depict the base 320 from above and show see-through outlines of the channels and communication recesses of the air distribution dial 310, so as to illustrate how to distribute air at different angles of the air distribution dial 310. Furthermore, as shown in FIG. 7 through FIG. 12, the gas passages attained with the air distribution dial 310 are presented and distinguished in the form of sparsely distributed dots and densely distributed dots.

[0040] Two positioning elements 318 are disposed on two opposing, lateral sides of the air distribution dial 310, respectively, and adapted to trigger the control element 330. The air distribution dial 310 is rotated to cause any one of the two positioning elements 318 to trigger the control element 330, thereby generating a specific signal. The specific signal can be set to a specific air distribution mode defined, for example, as follows: at this point in time, the air admitting channel 3123 is in communication with the first hole 3211, the second hole 3212 and the third hole 3213 simultaneously (See the description about the schematic views of air distribution modes below.)

[0041] Referring to FIG. 7, the air distribution dial 310 is set to the first angle. The first hole 3211 of the base 320 comes into communication with the air supply hole 3214 through the second communication recess 3122 and air admitting channel 3123 corresponding in position to the air distribution dial 310. The second hole 3212 of the base 320 comes into communication with the air supply hole 3214 through the air distribution channel 3124 and first communication recess 3121 corresponding in position to the air distribution dial 310. The third hole 3213 of the base 320 comes into communication with the air supply hole 3214 through the air distribution channel 3124 and first communication recess 3121 corresponding in position to the air distribution dial 310. The first hole 3211, the second hole 3212, and the third hole 3213 of the base 320 come into communication with the air supply hole 3214 of the base 320 through the air admitting portion 312 of the air distribution dial 310.

[0042] As shown in FIG. 7, when gas is transferred from the air supply pipe 3214a to the base 320, the air distribution dial 310 which is set to the first angle enables the gas to be output from the first pipe 3211a, second pipe 3212b, and third pipe 3213c. At this point in time, the first air cells 101, second air cells 102 and third air cells 103 of the patient support device 100 (shown in FIG. 2 and FIG. 3) are inflated in the (gas transfer) directions indicated by the arrows shown in FIG. 7.

[0043] As shown in FIG. 7, in the absence of any gas transferred from the air supply pipe 3214a, all the first pipe 3211a, second pipe 3212b, and third pipe 3213c are in communication with each other and are in equilibrium, and thus the first air cells 101, second air cells 102 and third air cells 103 of the patient support device 100 (shown in FIG. 2 and FIG. 3) are in communication with each other and are in equilibrium.

[0044] Referring to FIG. 8, the air distribution dial 310 is driven by the motor 360 (shown in FIG. 4) clockwise and set to a second angle. The first hole 3211 of the base 320 is closed by the stop portion 316 (shown in FIG. 5), such that the first hole 3211 corresponding in position to the first air cells 101 of the patient support device 100 cannot come into communication with any one of the second hole 3212, the third hole 3213, the air supply hole 3214 and the deflation hole 3215. However, the third hole 3213 of the base 320 can still be in communication with the air supply hole 3214 through the air distribution channel 3124 and first communication recess 3121. The second hole 3212 of the base 320 is in communication with the deflation hole 3215 through the deflation recess 3142 and deflation channel 3141.

[0045] The second air cells 102 (air cells B shown in FIG. 2 and FIG. 3) of the patient support device 100 are deflated in the (gas transfer) directions indicated by the arrows shown in FIG. 8. Therefore, in the state of the second angle, first air cells 101 in communication with the first hole 3211 are not in communication with third air cells 103 in communication with the third hole 3213 when second air cells 102 of the patient support device 100 are deflated. In the state of the second angle, the extent of deflation of second air cells 102 is determined according to how long the state lasts (for example, a predetermined time period).

[0046] Referring to FIG. 9, the air distribution dial 310 is driven by the motor 360 (shown in FIG. 4) clockwise and set to exiting the second angle. Therefore, the second angle of the air distribution dial 310 enables second air cells 102 to be deflated. Referring to FIG. 9, the air distribution mode is attained when the air distribution dial 310 is driven to continue to rotate clockwise and thus exit the second angle. As shown in FIG. 9, the first hole 3211 of the base 320 is continuously closed by the stop portion 316 (shown in FIG. 5). The third hole 3213 of the base 320 can still be in communication with the air supply hole 3214 through the air distribution channel 3124 and first communication recess 3121. The second hole 3212 of the base 320 no longer corresponds in position to the deflation recess 3142, and the second hole 3212 is at the third segment N3 on the top surface of the base 320. The deflation channel 3141 corresponds in position to the fourth segment N4 of the base 320. The second hole 3212 cannot be in communication with the deflation channel 3141 directly but must be in communication with the deflation channel 3141 through the deflation recess 3142. Therefore, as shown in FIG. 8 and FIG. 9, in an embodiment serving an exemplary purpose, as soon as the second hole 3212 stops being in communication with the deflation recess 3142, the second hole 3212 becomes closed, and thus second air cells 102 (air cells B shown in FIG. 2 and FIG. 3) corresponding in position to the second hole 3212 stop being deflated.

[0047] Referring to FIG. 10, the air distribution dial 310 is driven by the motor 360 (shown in FIG. 4) clockwise and set to a third angle. Once again, the first hole 3211 of the base 320 comes into communication with the air supply hole 3214 through the second communication recess 3122 and air admitting channel 3123. The second hole 3212 of the base 320 exits the closed state shown in FIG. 9 to come into communication with the air supply hole 3214 once again through the air distribution channel 3124 and first communication recess 3121. The third hole 3213 of the base 320 is continuously in communication with the air supply hole 3214 through the air distribution channel 3124 and first communication recess 3121. Once again, not only do the first hole 3211, the second hole 3212 and the third hole 3213 of the base 320 come into communication with the air supply hole 3214 of the base 320 through the air admitting portion 312 of the air distribution dial 310, but the first air cells 101, second air cells 102 and third air cells 103 also come into communication with each other.

[0048] Referring to FIG. 10, similarly, when gas is transferred from the air supply pipe 3214a to the base 320, the air distribution dial 310 which is set to the third angle enables the gas to be output from the first pipe 3211a, second pipe 3212b, and third pipe 3213c. At this point in time, the first air cells 101, second air cells 102 and third air cells 103 of the patient support device 100 (shown in FIG. 2 and FIG. 3) are inflated in the (gas transfer) directions indicated by the arrows shown in FIG. 10. By contrast, in the absence of any gas transferred from the air supply pipe 3214a, all the first pipe 3211a, second pipe 3212b, and third pipe 3213c are in communication with each other and are in equilibrium, and thus the first air cells 101, second air cells 102 and third air cells 103 of the patient support device 100 (shown in FIG. 2 and FIG. 3) are in communication with each other and are in equilibrium.

[0049] Referring to FIG. 11, the air distribution dial 310 is driven continuously by the motor 360 (shown in FIG. 4) clockwise and set to a fourth angle. The first hole 3211 of the base 320 is closed by the stop portion 316 (shown in FIG. 5), such that the first hole 3211 corresponding in position to the first air cells 101 of the patient support device 100 cannot come into communication with any one of the second hole 3212, the third hole 3213, the air supply hole 3214 and the deflation hole 3215. The second hole 3212 of the base 320 can still be in communication with the air supply hole 3214 through the air distribution channel 3124 and first communication recess 3121. The third hole 3213 of the base 320 is in communication with the deflation hole 3215 through the deflation recess 3142 and deflation channel 3141. Both FIG. 8 and FIG. 11 illustrate air distribution modes and serve exemplary purposes. Unlike FIG. 8, FIG. 11 shows that the second hole

3212 or third hole 3213 is in communication with the deflation hole 3215 to effect the deflation of second air cells 102 (air cells B shown in FIG. 2 and FIG. 3) or third air cells 103 (air cells C shown in FIG. 2 and FIG. 3) of the patient support device 100, thereby achieving alternate inflation and deflation and reducing the chance that recumbent patients will develop pressure ulcers.

[0050] Referring to FIG. 12, the air distribution dial 310 is driven by the motor 360 (shown in FIG. 4) clockwise and set to exiting the fourth angle. Therefore, the fourth angle of the air distribution dial 310 enables third air cells 103 to be deflated. After the air distribution dial 310 has been driven to continuously rotate clockwise and thus exit the fourth angle, the air distribution mode illustrated by FIG. 12 is attained. As shown in FIG. 12, the first hole 3211 of the base 320 is continuously closed by the stop portion 316 (shown in FIG. 5). The second hole 3212 of the base 320 can still be in communication with the air supply hole 3214 through the air distribution channel 3124 and first communication recess 3121. The third hole 3213 of the base 320 no longer corresponds in position to the deflation recess 3142, and the third hole 3213 is at the third segment N3 on the top surface of the base 320. The deflation channel 3141 corresponds in position to the fourth segment N4 of the base 320. The third hole 3213 cannot be in communication with the deflation channel 3141 directly but must be in communication with the deflation channel 3141 through the deflation recess 3142. Therefore, given the operating principle illustrated by FIG. 11 and FIG. 12 which serve exemplary purposes, once the third hole 3213 stops being in communication with the deflation recess 3142, the third hole 3213 becomes closed, and thus third air cells 103 (air cells C shown in FIG. 2 and FIG. 3) corresponding in position to the third hole 3213 stop being deflated.

[0051] In the embodiments illustrated by FIG. 7 through FIG. 12, both the air distribution channel 3124 and deflation channel 3141 disposed on the air distribution dial 310 follow curved paths. The angle by which the deflation channel 3141 turns is greater than 180 degrees. The angle by which the air distribution channel 3124 turns is around 180 degrees. Therefore, the air distribution dial 310 rotates to attain different air distribution modes. Under the aforesaid operating principle, FIG. 7 and FIG. 10 show that the air distribution dial 310 can be set to different angles (the first and third angles) in the same air distribution mode, and the two angles can differ by around 180 degrees.

[0052] The positioning elements 318 arranged oppositely trigger the control element 330 to inform the control host 500 of the position of the air distribution dial 310 and enable the control host 500 to confirm the air distribution mode. For instance, when the air distribution dial 310 is rotated to cause any one of the two positioning elements 318 to trigger the control element 330, the air admitting channel 3123 comes into communication with the first hole 3211, the second hole 3212 and the third hole 3213 (shown in FIG. 7 and FIG. 10) simultaneously.

[0053] In another air distribution mode achievable in an embodiment of the present disclosure, when the air distribution dial 310 is rotated to cause the first communication recess 3121 or second communication recess 3122 to correspond in position to the first hole 3211, the first hole 3211 comes into communication with the second hole 3212 and third hole 3213 (shown in FIG. 7 and FIG. 10) simultaneously through the air distribution channel 3124.

[0054] In the embodiment illustrated by FIG. 10 through FIG. 12, the deflation function of the second hole can be switched to the third hole. Owing to the single configuration of the air distribution dial 310, the embodiment of the present disclosure is effective in achieving the alternate inflation and deflation function of the patient support device 100, controlling lower air cells (air cells A shown in FIG. 2 and FIG. 3), and enhancing the comfortableness of the patient support system. The ordinal numbers "second" and "third" regarding the second hole and third hole are merely intended to illustrate this embodiment. In practice, the second hole and third hole can be swapped for each other; for example, the hole to become communicable first can be either the second hole or the third hole. Furthermore, the air distribution dial 310 in the embodiments of the present disclosure is disk-shaped to serve an exemplary purpose, but the present disclosure is not limited thereto. In a variant embodiment, an air distribution dial in any form can work well, provided that it comes into communication with each hole to attain any one of the aforesaid air distribution modes.

[0055] As shown in FIG. 7 through FIG. 12, the first hole 3211, the second hole 3212, the third hole 3213, the air supply hole 3214, the deflation hole 3215, the first communication recess 3121, the second communication recess 3122 and the deflation recess 3142 each have a width (also known as allowance). Therefore, despite a possible angular variation within a specific range of angles, the air distribution dial 310 stays in the same air distribution mode rather than switches to another air distribution mode. As a result, the first to fourth angles can each vary by a range of degrees, for example, around 3-5 degrees.

[0056] In the embodiment illustrated by FIG. 7 through FIG. 12, the first angle ranges from 358 degree to 2 degree, the second angle ranges from 42 degree to 47 degree, and the third angle ranges from 178 degree to 182 degree. For instance, the first angle and the second angle differ by 42 degrees to 48 degrees, the second angle and the third angle by 42 degrees to 48 degrees, and the third angle and the fourth angle by 42 degrees to 48 degrees.

[0057] Regarding the air distribution method applicable to the patient support system, a control unit (for example, the control host 500 shown in FIG. 1 which serves an exemplary purpose) drives the air supply source 400 and the air distribution device 300 to exercise control over the air cells in the patient support device 100. The air distribution method comprises an inflation preparation process, an inflation process, a deflation process, and a stop deflating process. With the management of the control unit, the air cells in the patient support device 100 operate in the respective air distribution modes to provide appropriate recumbent modes and enhance the comfortableness of the patient support system.

[0058] Referring to FIG. 13, there is shown a flowchart of an air distribution method in an alternating mode according to an embodiment of the present disclosure.

[0059] The control unit has to confirm the position of the air distribution dial 310 of the air distribution device 300 from the very beginning, and thus the air distribution method starts with step S100 to confirm the position of the air distribution dial 310, by rotating the air distribution dial 310 until any one of the positioning elements 318 triggers the control element 330. After that, the air distribution dial 310 is at the position shown in FIG. 7 or FIG. 10.

[0060] In step S200, wait for pressure equilibrium. In this step, the inflation preparation process does not allow the air supply source 400 to transfer gas from the air supply pipe 3214a to the air distribution dial 310 but allows first air cells 101, second air cells 102 and third air cells 103 (shown in FIG. 2 and FIG. 3) to come into communication with each other and thus attain pressure equilibrium therebetween. At this point in time, the air distribution dial 310 still keeps the position shown in FIG. 7 or FIG. 10.

[0061] In step S300, inflate to attain a predetermined level of internal pressure. In this step, the inflation process entails inflating the first air cells 101, second air cells 102 and third air cells 103 (shown in FIG. 2 and FIG. 3) which are in communication with each other until the first air cells 101, second air cells 102 and third air cells 103 attain a predetermined level of internal pressure. At the end of the inflation process, the inflation is stopped by stopping the air supply operation of the air supply source 400. The levels of the pressure in the air cells are detected with pressure sensors (not shown) disposed in the air cells or with pressure sensors (not shown) disposed at gas passages connected between the air distribution device 300 and air supply source 400 to effect communication therebetween.

[0062] Step S400 involves performing a deflation process. In this step, the air distribution dial 310 is rotated until the second air cells 102 or third air cells 103 are deflated. The air distribution dial 310 is now at the position shown in FIG. 8 but is at the position shown in FIG. 7 before its rotation begins. Likewise, the air distribution dial 310 is now at the position shown in FIG. 11 but is at the position shown in FIG. 10 before its rotation begins. FIG. 8 is about deflation of second air cells 102. FIG. 11 is about deflation of third air cells 103.

[0063] In step S500, rotate the air distribution dial to stop the deflation process, after a predetermined time period has elapsed. In this step, a stop deflating process is carried out, after second air cells 102 or third air cells 103 have been deflated for the predetermined time period, to rotate the air distribution dial 310 until second air cells 102 or third air cells 103 are no longer in communication with the deflation hole 3215. In step S400 and step S500, first air cells 101 are not deflated and are spaced apart from the air supply source 400. At this point in time, the air distribution dial 310 is at the position shown in FIG. 9 or FIG. 10.

[0064] Next, while the inflation mode remains unchanged, the process flow of the air distribution method goes back to step S100 to continuously perform subsequent steps with a view to effecting the alternating mode. As shown in FIG. 10 and FIG. 12, alternate inflation and deflation of the other air cells take place while the clockwise rotation of the air distribution dial 310 is underway, so as to effect the alternating mode continuously.

[0065] Upon returning to step S100, the first hole 3211, the second hole 3212 and the third hole 3213 are in communication with each other, such that the first air cells 101, second air cells 102 and third air cells 103 come into communication with each other once again. Therefore, the deflated second air cells 102 or third air cells 103 are replenished with gas from the other air cells, and the replenishment speed depends on the recumbent patients' body weight imposed on the air cells, thereby allowing the first air cells 101, second air cells 102 and third air cells 103 to attain the same level of internal pressure. At the end of this step, the first air cells 101 no longer have a constant internal pressure but vary in internal pressure by being in communication with the deflated second air cells 102 or third air cells 103 above. Therefore, the present disposure has advantages as follows: increased buffer space of the patient support device 100; enhanced comfortableness of the patient support system; and a low chance of bottom-out, which is rendered possible because the first air cells 101 still keeps part of the gas.

[0066] Referring to FIG. 14, there is shown a flowchart of the air distribution method in a stop deflating process according to an embodiment of the present disclosure. The stop deflating process is carried out in either a fine deflation mode or a full deflation mode. The patients or caretakers set the fine deflation mode and the full deflation mode in advance according to different usage needs, such that the fine deflation mode or the full deflation mode can be carried out accordingly when the patient support system begins to perform the deflation process. For instance, patients' low risk of developing pressure ulcers or a preference for not disturbing patients' rest justifies expectations of a little difference arising from alternate inflation and deflation of air cells; thus, to this end, the fine deflation mode is the choice. By contrast, in case of a preference for more pressure relief, for example, to allow the compressed skin to release more pressure, the full deflation mode will be the choice.

[0067] In the fine deflation mode, step S500 includes step S511 and step S521. In step S511, deflation lasts the predetermined time period of a first value, for example, 0 ~ 1 minute. In step S521, the air distribution dial 310 is rotated to a first position. When the air distribution dial 310 is at the first position, the second air cells 102 or third air cells 103 are no longer in communication with the deflation hole 3215.

[0068] In the full deflation mode, step S500 includes step S512 and step S522. In step S512, deflation lasts the predetermined time period of a second value, for example, 5 ~ 15 minutes. In step S522, the air distribution dial 310 is rotated to a second position. When the air distribution dial 310 is at the second position, the second air cells 102 or third air cells 103 are no longer in communication with the deflation hole 3215.

[0069] The first value is less than the second value. Therefore, the fine deflation mode enables second air cells 102 or third air cells 103 (but not both) to be deflated transiently and by an amount less than the full deflation mode does. In an embodiment, the full deflation mode enables second air cells 102 or third air cells 103 (but not both) to be deflated to 1 atm, whereas the fine deflation mode enables second air cells 102 or third air cells 103 (but not both) to be deflated to an internal pressure level greater than 1 atm.

[0070] In the fine deflation mode, the recumbent patients find the patient support system comfortable and do not perceive any great difference otherwise arising from the full deflation mode in which the air cells alternate between full inflation and full deflation. Therefore, given the configuration of the air distribution dial 310, the air distribution dial 310 is, in step S521, rotated to the first position as opposed to the second position in the full deflation mode. The first position can be the position shown in FIG. 9 or FIG. 12 which serves an exemplary purpose. For instance, the air distribution dial 310 is rotated to a position which differs from an initialized position by around 90 degrees (such as 85 to 95 degrees). The initialized position is the position at which the air distribution dial 310 enables the first hole 3211, the second hole 3212 and the third hole 3213 to be in communication with each other.

[0071] When the air distribution dial 310 is at the first position, the air cells (second air cells 102 or third air cells 103) which have not been deflated can still be in communication with the air supply hole 3214 and thus can continuously receive gas from the air supply source 400. Consequently, in the fine deflation mode, variations which occur to the internal pressure of the air cells and are perceived by the recumbent patients are placed under good control, thereby further enhancing the comfortableness of the patient support system. Conversely, when the air distribution dial 310 is at the second position, i.e., corresponding to the state shown in FIG. 7 or FIG. 10, the inflation preparation process begins immediately. Consequently, compared with the second position, the first position in the air distribution modes enables the recumbent patients to be less likely to perceive the difference arising from alternate inflation and deflation of the air cells, thereby further enhancing the comfortableness of the patient support system.

[0072] In addition to the state where the first hole 3211, the second hole 3212 and the third hole 3213 are in communication with each other, the first hole 3211 of the base 320 is hermetically sealed because of the rotation of the air distribution dial 310, and the internal pressure of the first air cells 101 is placed under good control. Thus, to initialize the patient support system, different, appropriate levels of pressure can be accurately determined in accordance with the body weight of different patients. Taiwan patent 1529508 discloses how to determine different, appropriate levels of pressure in accordance with the body weight of different patients in order to initialize a patient support system.

[0073] In conclusion, the present disclosure provides an air distribution device and method applicable to a patient support system. The air distribution device comprises an air distribution dial and a base. Pressure variations of lower air cells can be effectuated on the air distribution dial, and the need for a fine deflation mode and full deflation mode can be met, thereby further enhancing the comfortableness of the patient support system.

[0074] The present disclosure is illustrated by various aspects and embodiments. However, persons skilled in the art understand that the various aspects and embodiments are illustrative rather than restrictive of the scope of the present disclosure. After perusing this specification, persons skilled in the art may come up with other aspects and embodiments without departing from the scope of the present disclosure. All equivalent variations and replacements of the aspects and the embodiments must fall within the scope of the present disclosure. Therefore, the scope of the protection of rights of the present disclosure shall be defined by the appended claims.

Claims

1. An air distribution device applicable to a patient support system, for connecting to an air supply source (400) and a patient support device (100), the patient support device (100) comprising first air cells (101), second air cells (102) disposed above the first air cells (101), and third air cells (103) disposed above the first air cells (101), the air distribution device comprising:

    a base (320) comprising a first hole (3211), a second hole (3212), a third hole (3213), an air supply hole (3214) and a deflation hole (3215), the first hole (3211) being in communication with the first air cells (101), the second hole (3212) being in communication with the second air cells (102), the third hole (3213) being in communication with the third air cells (103), the air supply hole (3214) being in communication with the air supply source (400), and the deflation hole (3215) being for use in deflation; and

    an air distribution dial (310) rotatably disposed on the base (320) and comprising an air admitting portion (312), a deflation portion (314) and a stop portion (316),

wherein, when the air distribution dial (310) rotates to a first angle, the first hole (3211), the second hole (3212), and the third hole (3213) of the base (320) come into communication with the air supply hole (3214) of the base (320) through the air admitting portion (312) of the air distribution dial (310),

wherein, when the air distribution dial (310) rotates to a second angle, the second hole (3212) of the base (320) comes into communication with the deflation hole (3215) of the base (320) through the deflation portion (314) of the air distribution dial (310), and the stop portion (316) of the air distribution dial (310) covers the first hole (3211) of the base (320) to prevent the first hole (3211) from coming into communication with any one of the second hole (3212), the third hole (3213), the air supply hole (3214) and the deflation hole (3215), such that the first air cells (101) in communication with the first hole (3211) are not in communication with the third air cells (103) in communication with the third hole (3213) when the second air cells (102) of the patient support device (100) are deflated.

2. The air distribution device applicable to a patient support system according to claim 1, wherein, after the air distribution dial (310) has rotated to the second angle and stayed at the second angle for a predetermined time period, the air distribution dial (310) rotates to a third angle, such that the first hole (3211), the second hole (3212) and the third hole (3213) of the base (320) come into communication with the air supply hole (3214) of the base (320) through the air admitting portion (312) of the air distribution dial (310), thereby allowing the first air cells (101), the second air cells (102) and the third air cells (103) to come into communication with each other.

3. The air distribution device applicable to a patient support system according to claim 2, wherein the first angle ranges from 358 degree to 2 degree, the second angle from 42 degree to 47 degree, and the third angle from 178 degree to 182 degree.

4. The air distribution device applicable to a patient support system according to claim 1, wherein, the first hole (3211) and the air supply hole (3214) are separated by first distance (d1), the second hole (3212) and the air supply hole (3214) by second distance (d2), and the third hole (3213) and the air supply hole (3214) by third distance (d3), wherein both the second distance (d2) and the third distance (d3) are greater than the first distance (d1).

5. The air distribution device applicable to a patient support system according to claim 1, wherein the deflation hole (3215) and the air supply hole (3214) are separated by fourth distance (d4), the first hole (3211) and the air supply hole (3214) by first distance (d1), the second hole (3212) and the air supply hole (3214) by second distance (d2), and the third hole (3213) and the air supply hole (3214) by third distance (d3), wherein the first distance (d1), the second distance (d2) and the third distance (d3) are less than the fourth distance (d4).

6. The air distribution device applicable to a patient support system according to claim 4 or 5, wherein the second distance (d2) is equal to the third distance (d3).

7. The air distribution device applicable to a patient support system according to claim 1, wherein a top surface of the base (320) is divided into a first segment (N1), a second segment (N2), a third segment (N3) and a fourth segment (N4), which are annular and concentric outward from the center, with the air supply hole (3214) disposed at the first segment (N1), the first hole (3211) at the second segment (N2), the second and third holes (3212,3213) at the third segment (N3), and the deflation hole (3215) at the fourth segment (N4).

8. The air distribution device applicable to a patient support system according to claim 7, wherein, the air distribution dial (310) is rotatably disposed on the top surface of the base (320), wherein a surface of the air distribution dial (310) faces the top surface of the base (320) and has:

the air admitting portion (312) having an air admitting channel (3123), a first communication recess (3121), a second communication recess (3122) and an air distribution channel (3124), the first communication recess (3121) being connected to the air admitting channel (3123) and the air distribution channel, and the second communication recess (3122) being connected to the air admitting channel (3123) but not to the air distribution channel, with the first segment (N1) of the base (320) corresponding in position to the air admitting channel (3123), the second segment (N2) of the base (320) corresponding in position to the first communication recess (3121) and the second communication recess (3122), and the third segment (N3) of the base (320) corresponding in position to the air distribution channel (3124);

the stop portion (316) disposed between the first communication recess (3121) and the second communication recess (3122) and corresponding in position to the second segment (N2) of

the base (320); and
the deflation portion (314) having a deflation channel (3141) and a deflation recess (3142), the deflation channel (3141) corresponding in position to the fourth segment (N4), and the deflation recess (3142) being spaced apart from the air distribution channel (3124), being connected to the deflation channel (3141), and corresponding in position to the third segment (N3) of the base (320),
wherein the stop portion (316) comes into contact with the top surface of the base (320) and thus closes the first hole (3211) when the air distribution dial (310) is rotated to cause the stop portion (316) to be positioned above the first hole (3211), and the first hole (3211) comes into communication with the second hole (3212) and the third hole (3213) simultaneously through the air distribution channel (3124) when the air distribution dial (310) is rotated to cause the first communication recess (3121) or the second communication recess (3122) to correspond in position to the first hole (3211).

9. The air distribution device applicable to a patient support system according to claim 1, further comprising a control element (330) and two positioning elements (318) disposed on two opposing, lateral sides of the air distribution dial (310) adapted to trigger the control element (330), wherein the air admitting channel (3123) comes into communication with the first hole (3211), the second hole and the third hole simultaneously when the air distribution dial is rotated to cause any one of the two positioning elements (318) to trigger the control element (330).

10. The air distribution device applicable to a patient support system according to claim 1, wherein the first hole (3211) is disposed between the second hole (3212) and the third hole (3213).

11. An air distribution method applicable to a patient support system, using a control unit (500) to drive an air supply source (400) and the air distribution device (300) of any one of claims 1-10, the air distribution device (300) being connected between the air supply source (400) and a patient support device (100), the patient support device (100) comprising first air cells (101), second air cells (102) disposed above the first air cells (101), and third air cells (103) disposed above the first air cells (101), the air distribution method comprising:

an inflation preparation process for causing the first air cells (101), the second air cells (102) and the third air cells (103) to come into communication with each other simultaneously, thereby attaining equilibrium of internal pressure of the first air cells (101), the second air cells (102) and the third air cells (103);
an inflation process for inflating the first air cells (101), the second air cells (102) and the third air cells (103) to a predetermined level of internal pressure;
a deflation process for deflating the second air cells (102) for a predetermined time period, wherein the first air cells (101) are not deflated and are spaced apart from the air supply source (400); and
a stop deflating process for stopping the deflation of the second air cells (102), wherein the first air cells (101) are not deflated and are spaced apart from the air supply source (400).

12. The air distribution method applicable to a patient support system according to claim 11, further comprising a fine deflation mode and a full deflation mode, wherein the predetermined time period of the deflation process in the fine deflation mode is a first value, and the predetermined time period of the deflation process in the full deflation mode is a second value, wherein the first value being less than the second value.

13. The air distribution method applicable to a patient support system according to claim 11, further comprising a full deflation mode, wherein the second air cells are deflated to 1 atm by the deflation process in the full deflation mode.

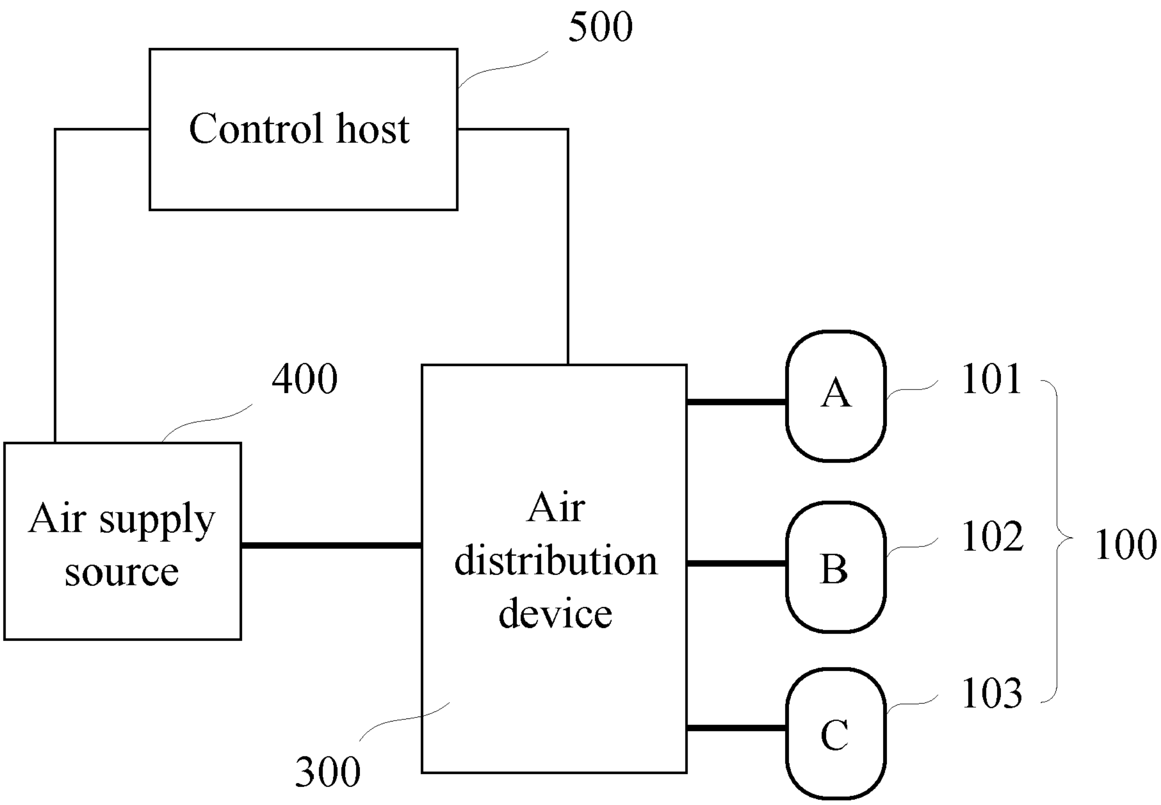

500
Control host
400
Air supply source
Air distribution device
300
A
B
C
101
102
103
100

FIG.1

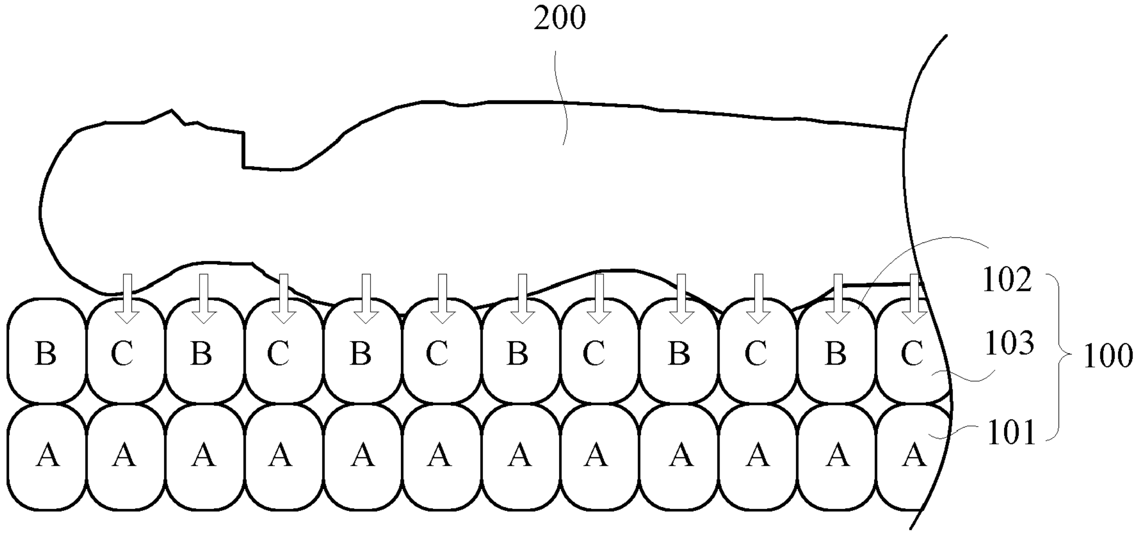


FIG.2

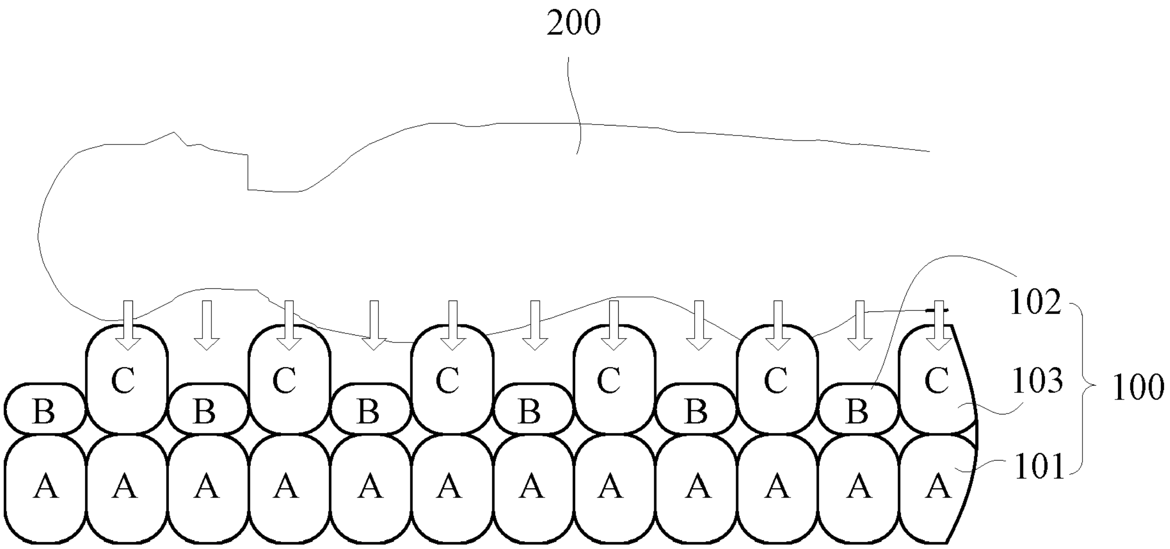


FIG.3

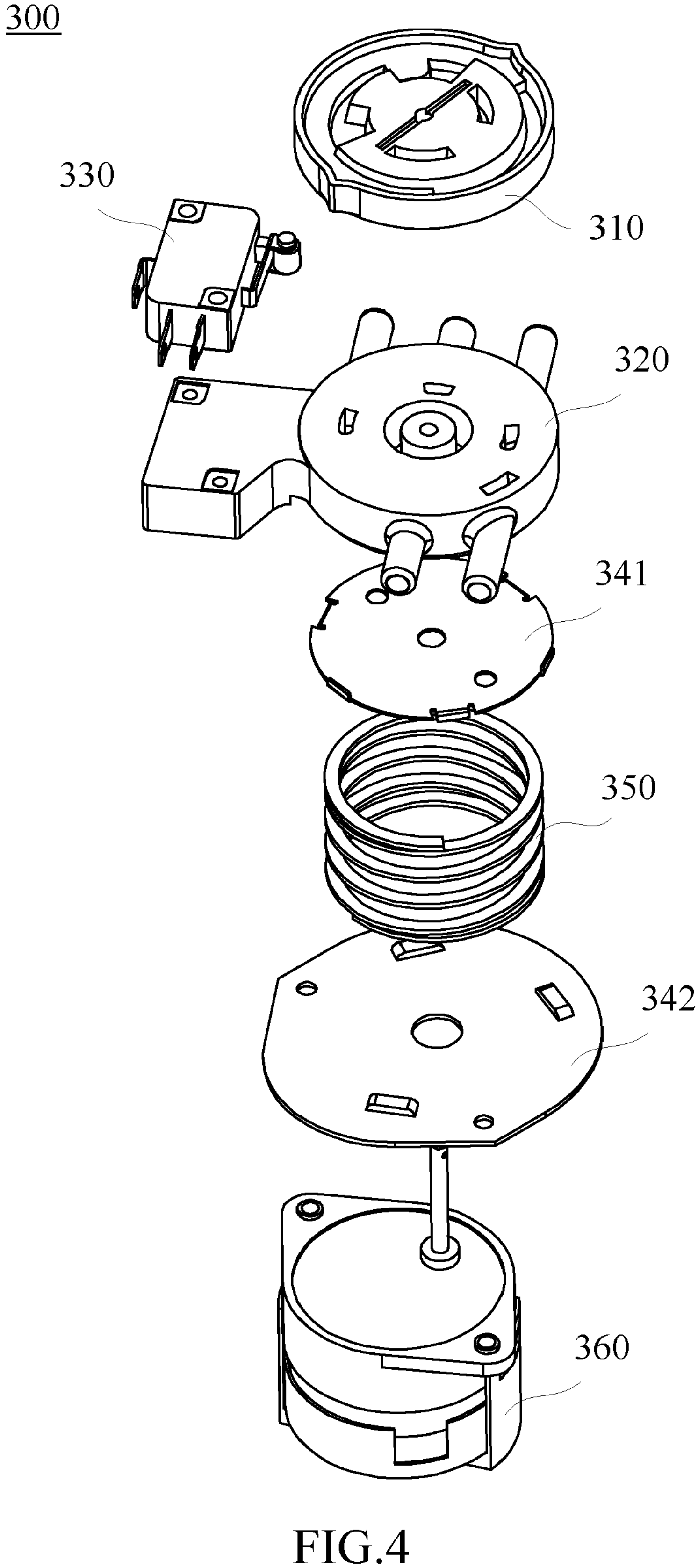
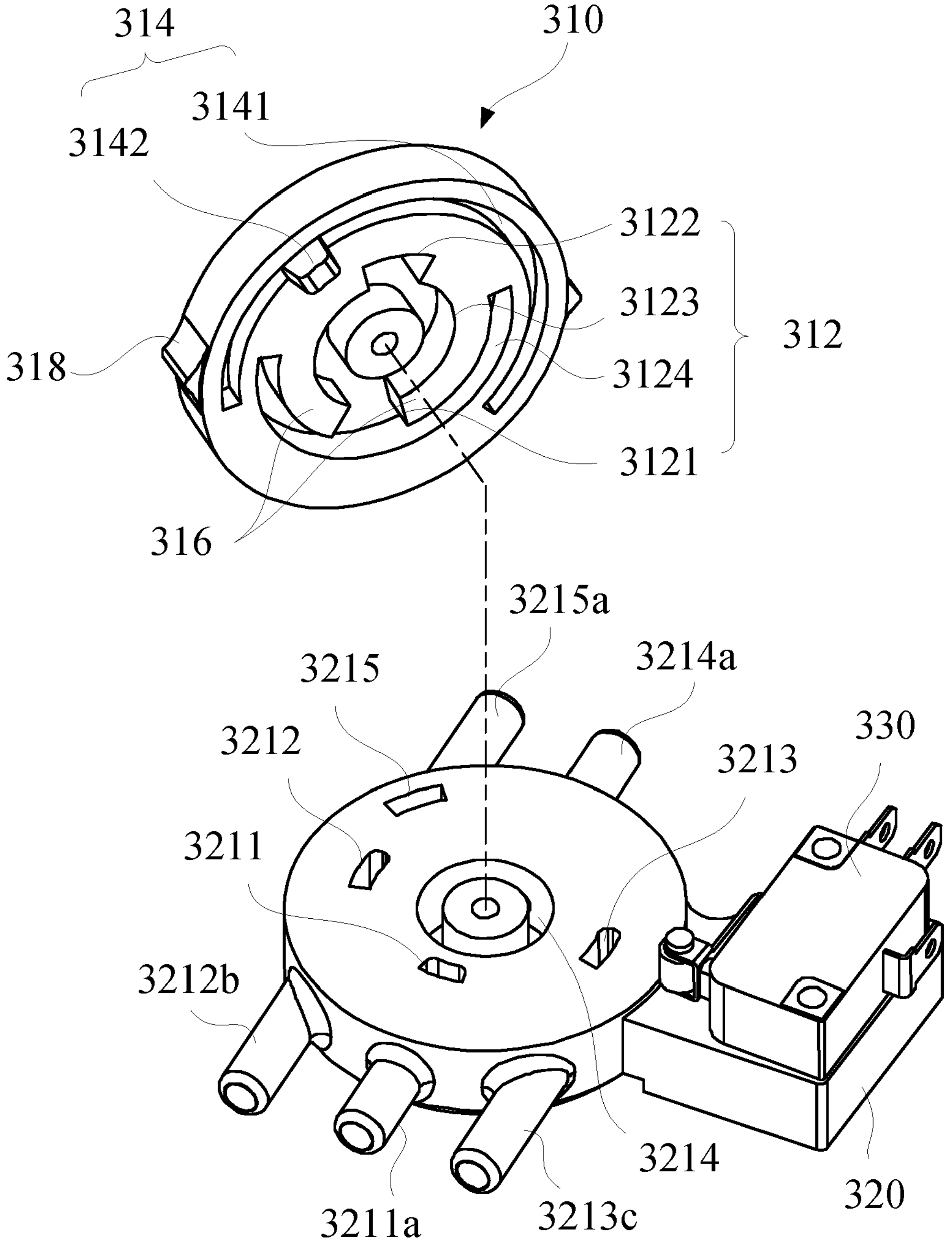


FIG.4


314
310
3141
3142
3122
3123
312
318
3124
3121
316
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3214a
3215
330
3212
3213
3211
3212b
3214
320
3211a
3213c

FIG.5

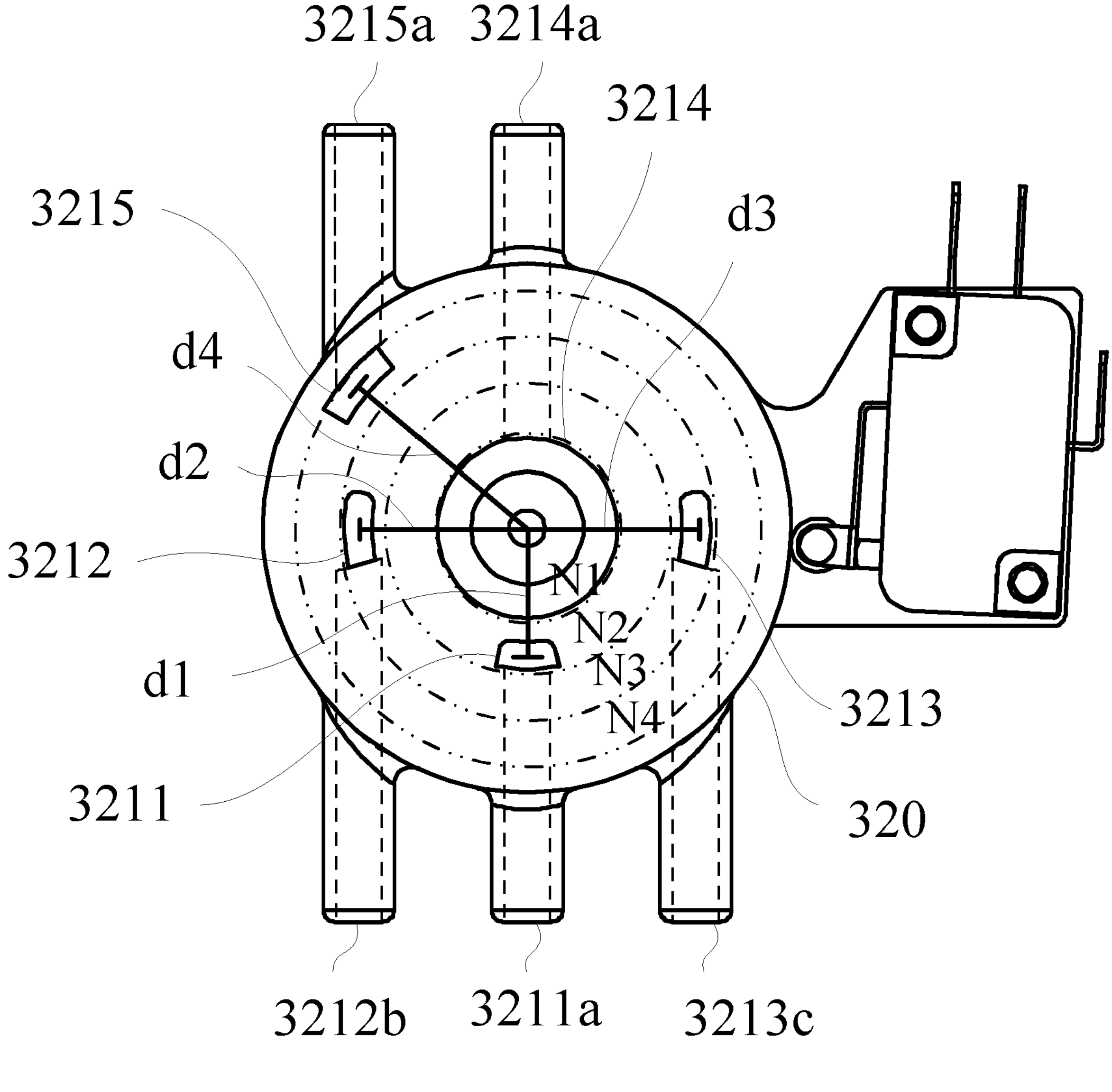
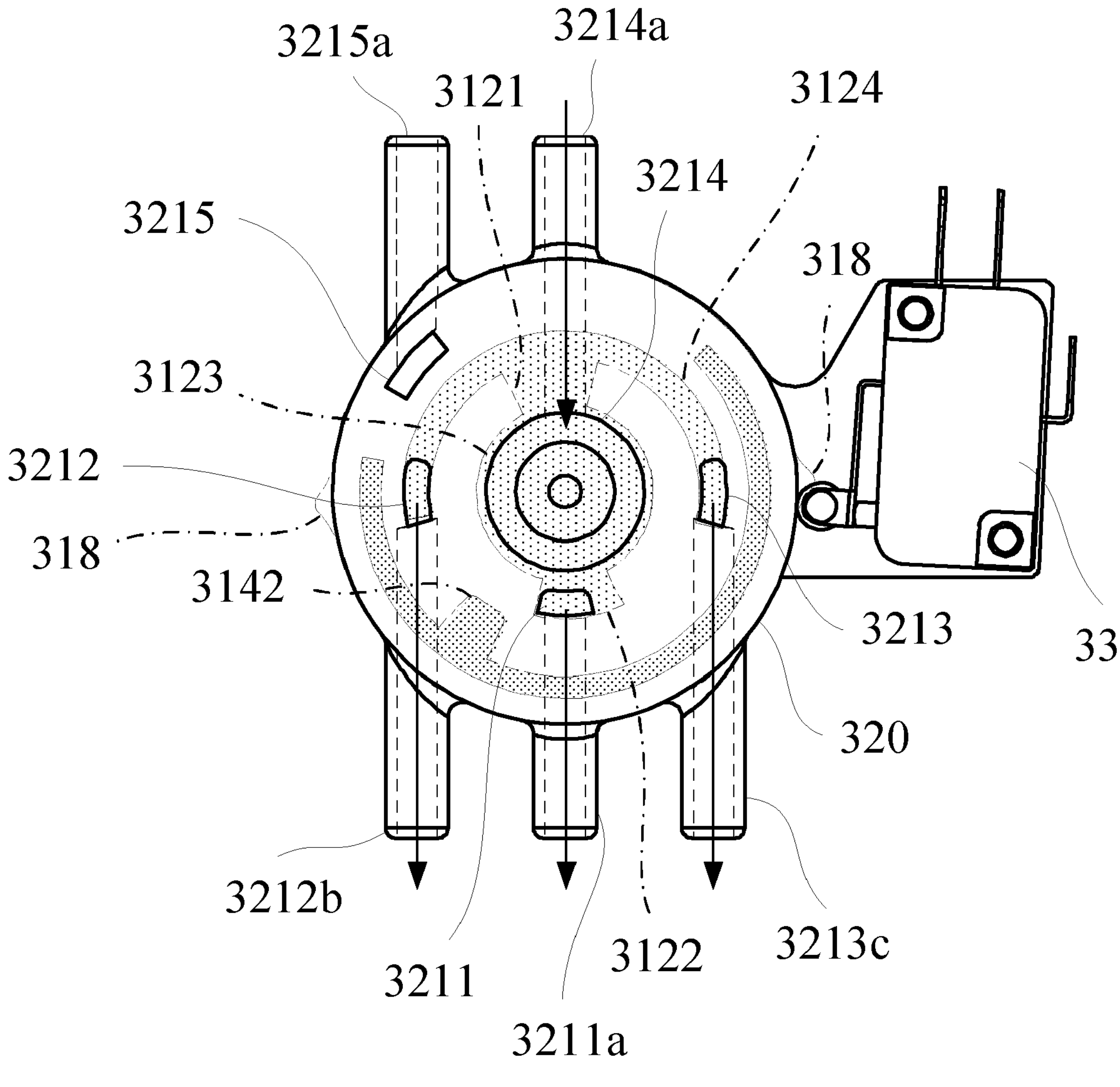

3215a
3214a
3214
3215
d3
d4
d2
3212
N1
N2
d1
N3
N4
3213
3211
320
3212b
3211a
3213c

FIG.6


3215a
3214a
3121
3124
3214
3215
318
3123
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3142
3213
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320
3212b
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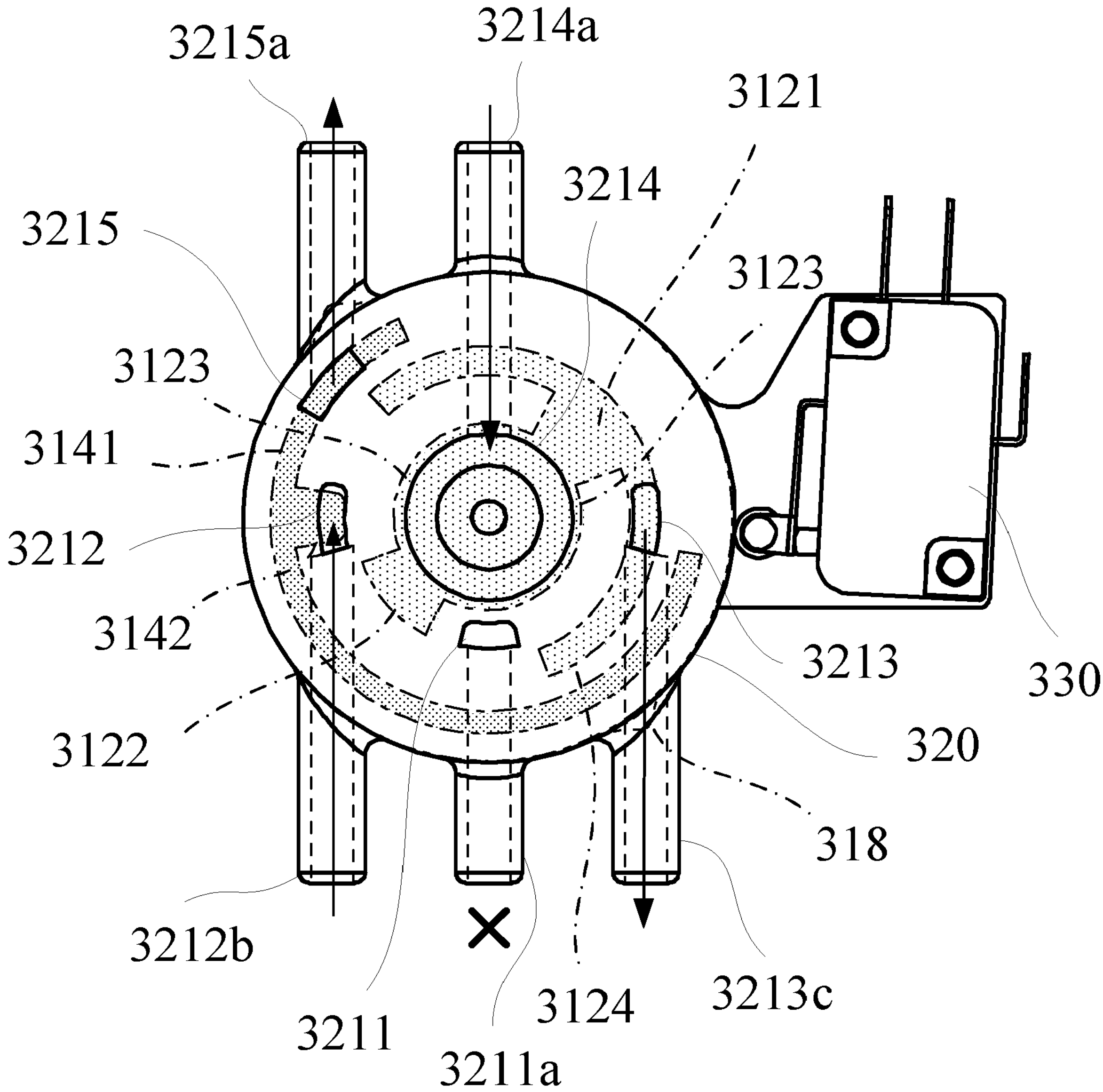
3213c
3211a

FIG.7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3214
3215
3123
3123
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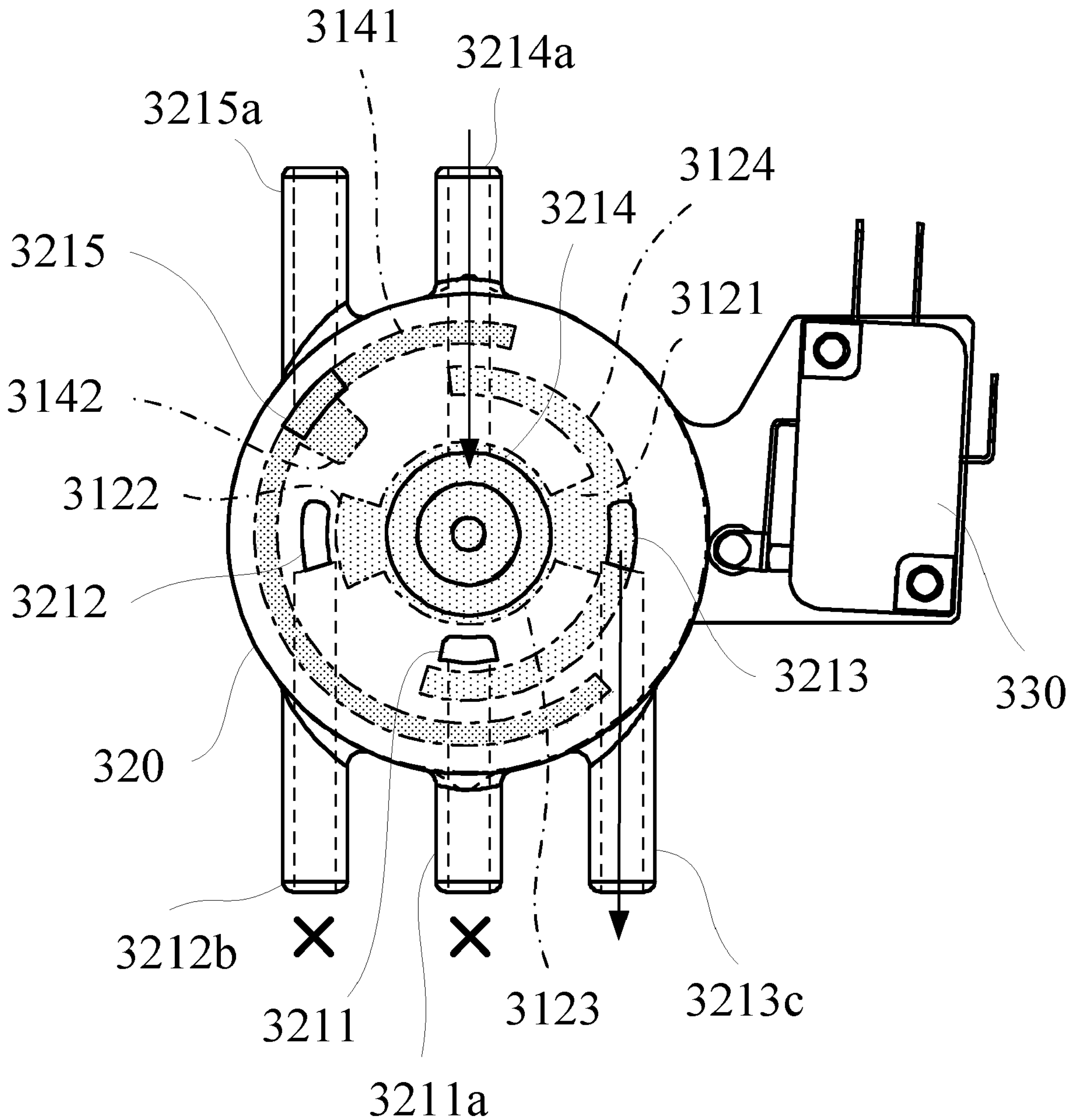
3211
3211a
3124
3213c

FIG.8


3141
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3215a
3124
3214
3215
3121
3142
3122
3212
3213
330
320
3212b
3211
3123
3213c
3211a

FIG.9

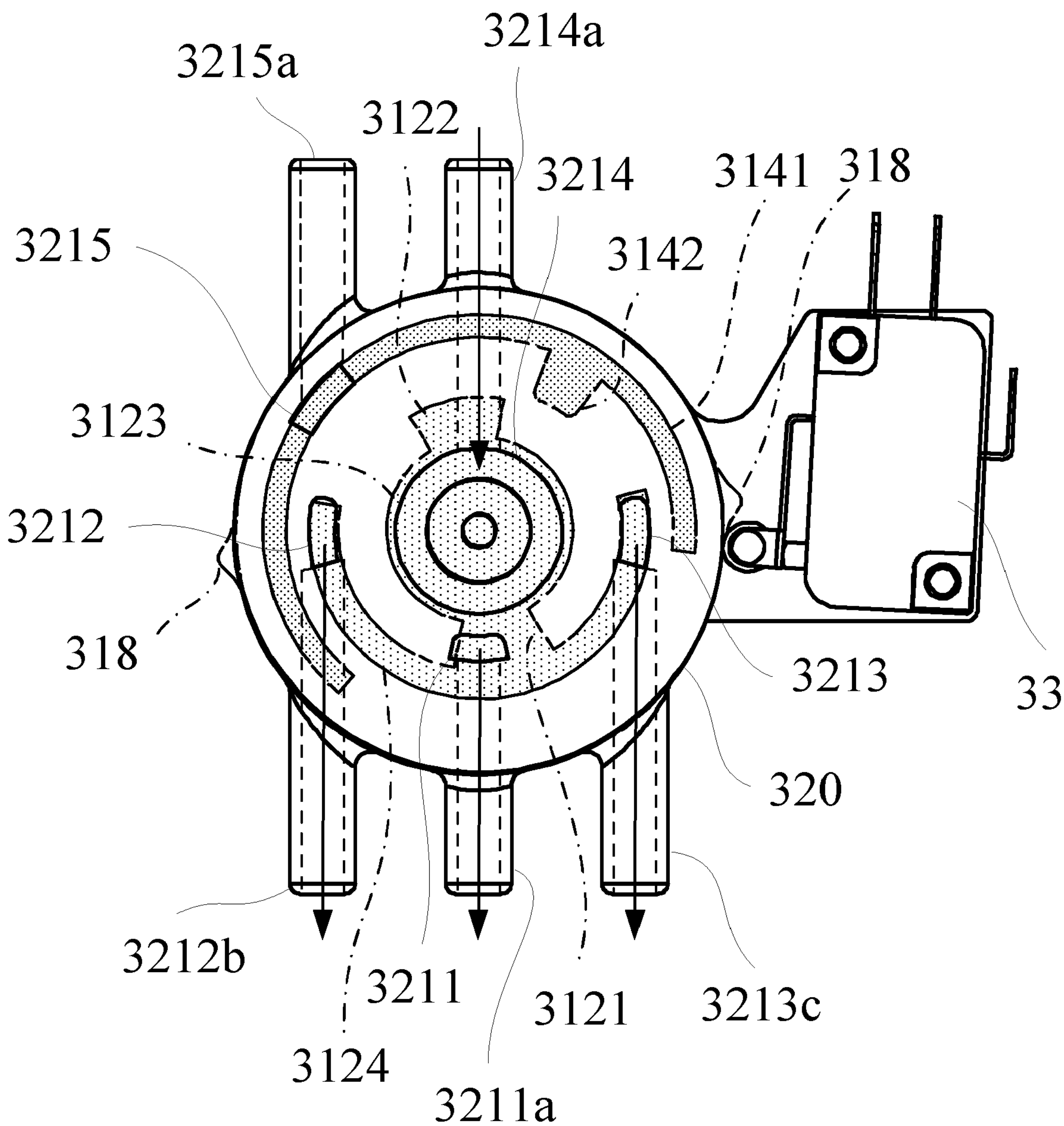
3214a
3215a
3122
3214
3141
318
3215
3142
3123
3212
318
3213
330
320
3212b
3211
3121
3213c
3124
3211a

FIG.10

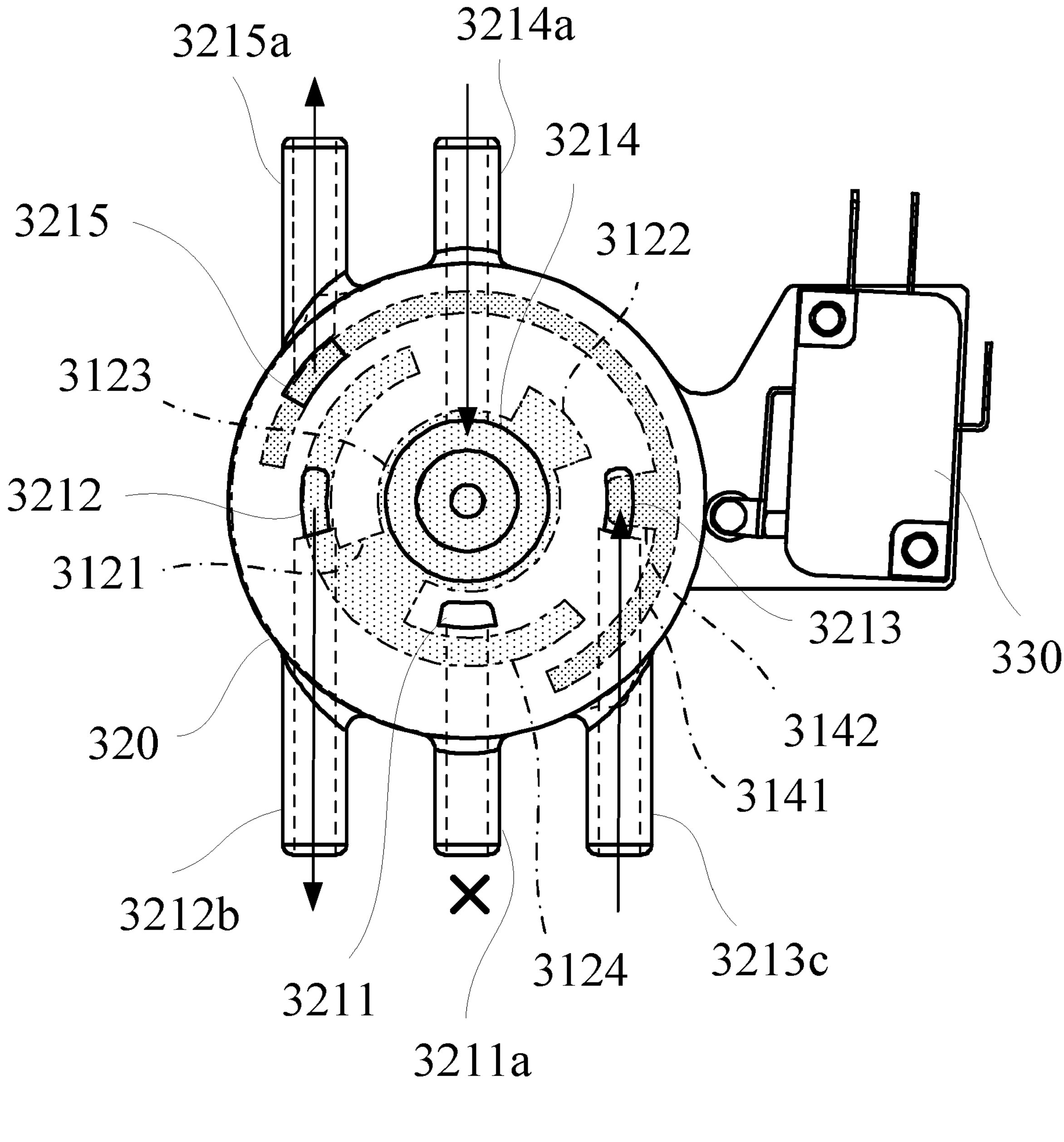
3215a
3214a
3214
3215
3122
3123
3212
3121
3213
330
3142
320
3141
3212b
3213c
3124
3211
3211a

FIG.11

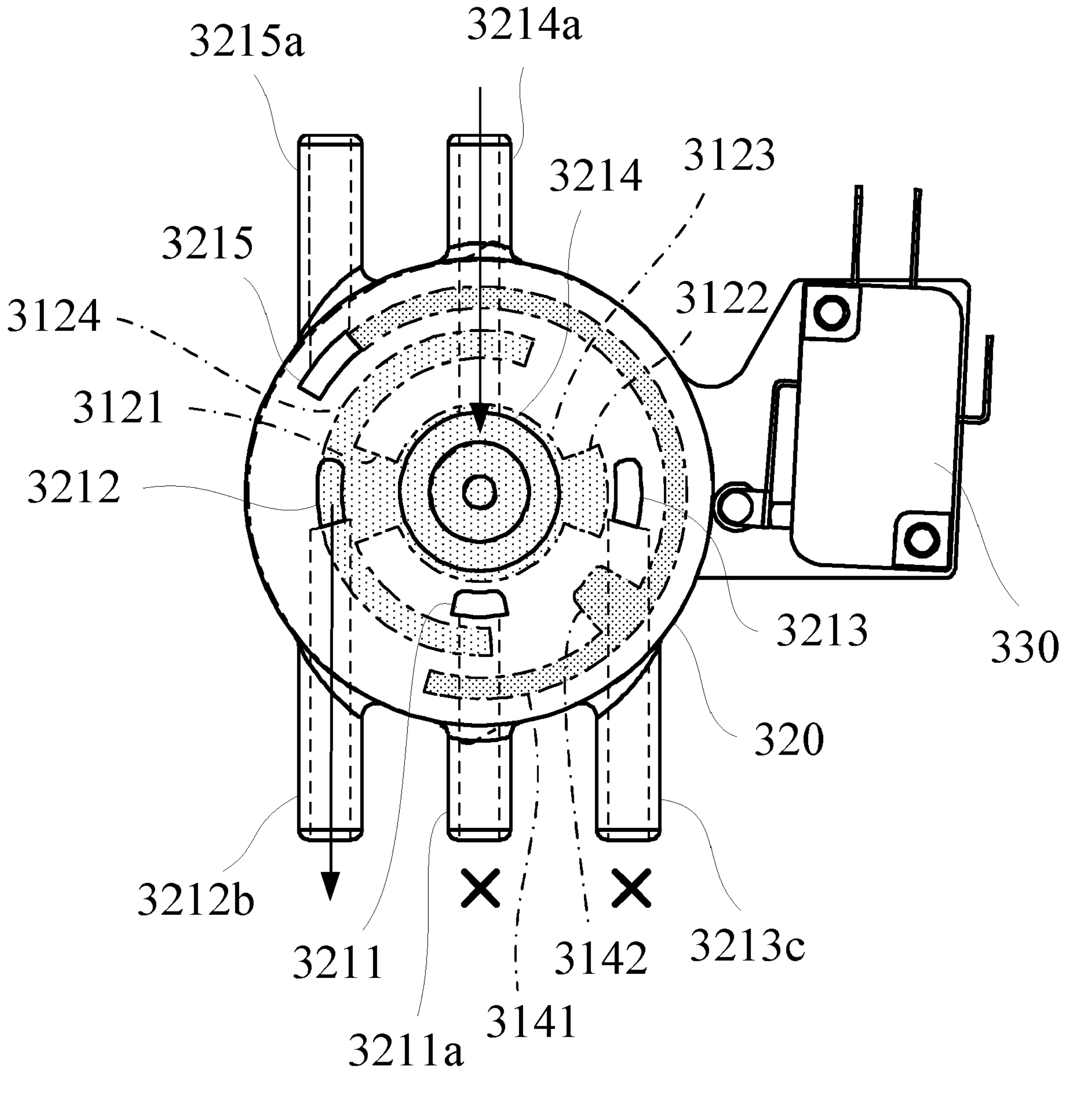
3215a
3214a
3214
3123
3215
3124
3122
3121
3212
3213
330
320
3212b
3211
3142
3213c
3211a
3141

FIG.12

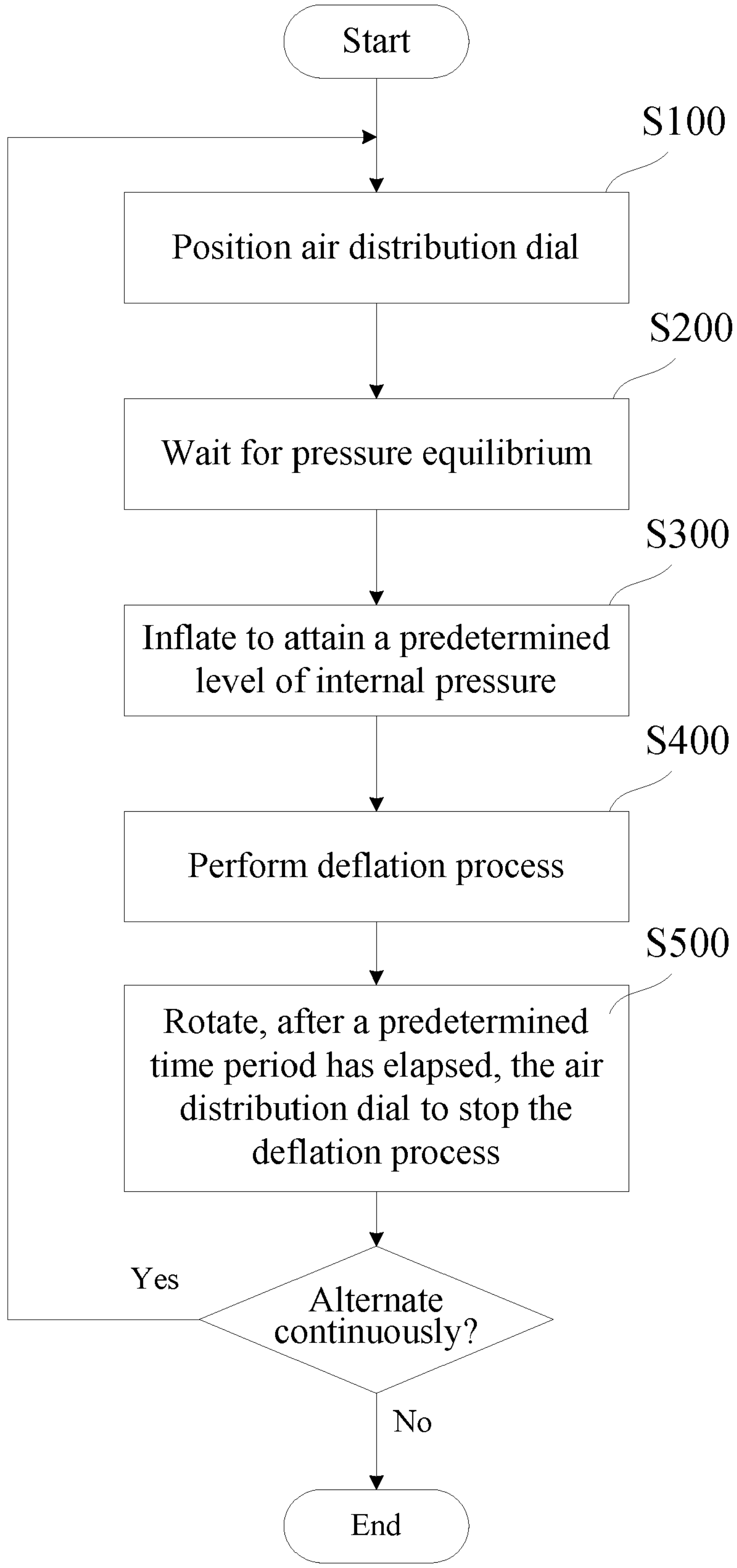
Start
S100
Position air distribution dial
S200
Wait for pressure equilibrium
S300
Inflate to attain a predetermined level of internal pressure
S400
Perform deflation process
S500
Rotate, after a predetermined time period has elapsed, the air distribution dial to stop the deflation process
Yes
Alternate continuously?
No
End

FIG.13

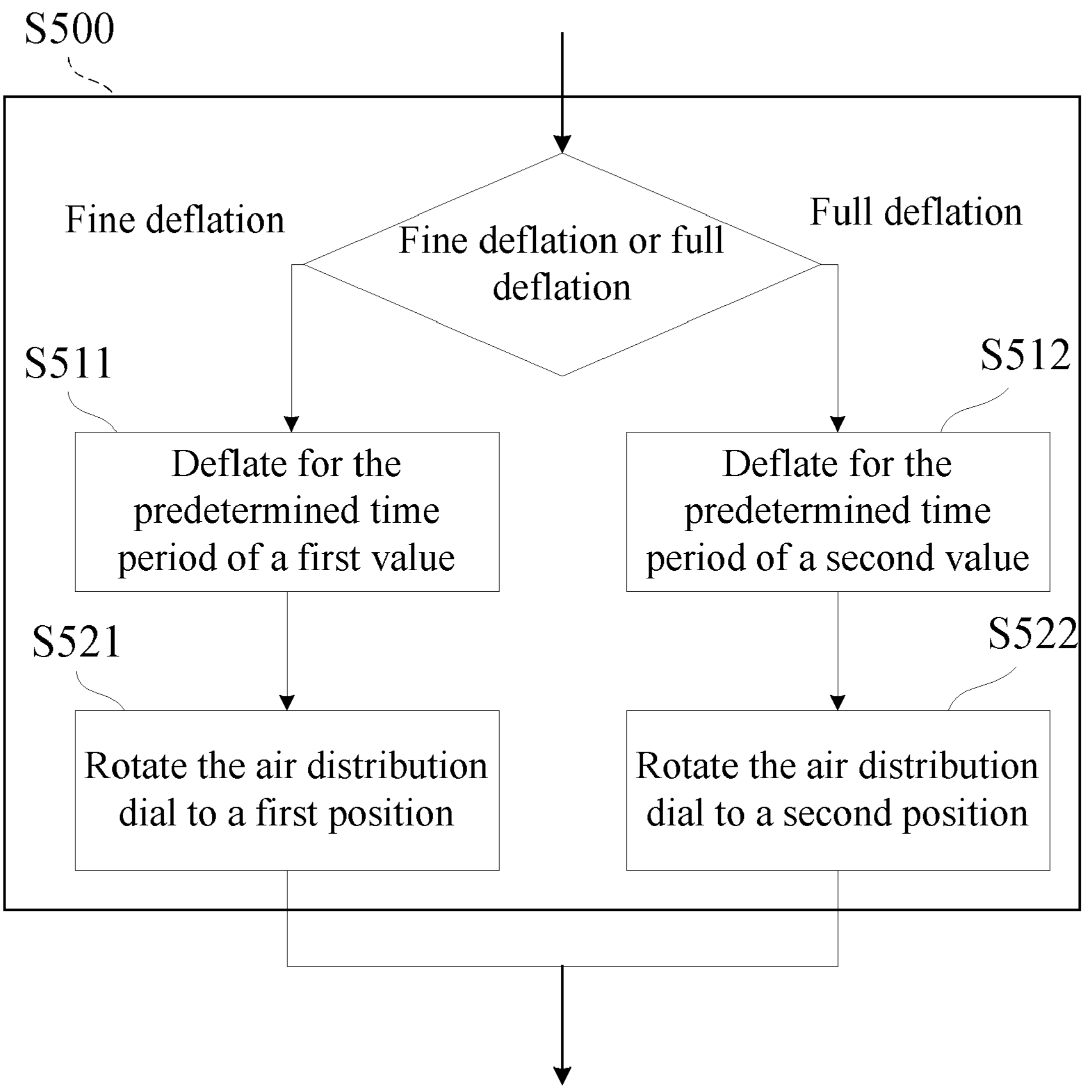
S500
Fine deflation
Fine deflation or full deflation
Full deflation
S511
S512
Deflate for the predetermined time period of a first value
Deflate for the predetermined time period of a second value
S521
S522
Rotate the air distribution dial to a first position
Rotate the air distribution dial to a second position

FIG.14

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EUROPEAN SEARCH REPORT

Application Number
EP 20 19 5548

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y A	US 6 152 176 A (LIN JOENNE [TW]) 28 November 2000 (2000-11-28) * column 2, line 25 - column 4, line 49 * * figures 1-14 *	1-11,13 12	INV. A61G7/057
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The present search report has been drawn up for all claims

1

Place of search	Date of completion of the search	Examiner
The Hague	16 February 2021	Ong, Hong Djien

CATEGORY OF CITED DOCUMENTS

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16-02-2021

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