

(11)

EP 4 772 073 A1

(12)

EUROPEAN PATENT APPLICATION
published in accordance with Art. 153(4) EPC

(43) Date of publication:
08.07.2026 Bulletin 2026/28

(51) International Patent Classification (IPC):
A47C 7/02 (2006.01)

(21) Application number: **24790091.3**

(52) Cooperative Patent Classification (CPC):
A47C 27/00; A47C 27/08; A47C 27/10; A61G 7/057

(22) Date of filing: **10.10.2024**

(86) International application number:
PCT/KR2024/096295

(87) International publication number:
WO 2026/079548 (16.04.2026 Gazette 2026/16)

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA
Designated Validation States:
GE KH MA MD TN

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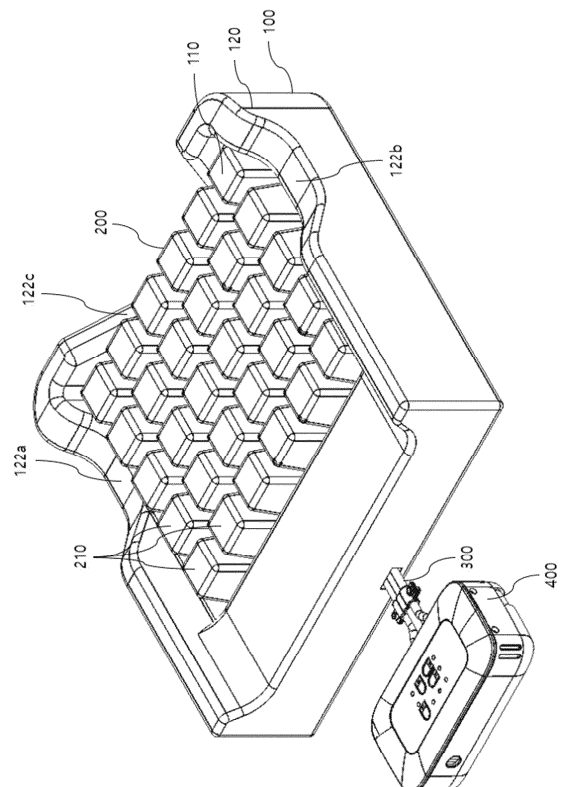
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(54) **CUSHION-TYPE BEDSORE PREVENTION DEVICE HAVING HYBRID STRUCTURE**

(57) A sitting mat according to an embodiment of the present disclosure may include a base portion comprising a first base configured to define a seating portion and a second base formed around the seating portion, and an air mat surrounded by the second base, in which the air mat includes at least one air cell configured to be changed in volume by air pressure, thereby allowing a hybrid structure to stably support a buttock and a femur and maximizing a pressure dispersion effect.

Figure 1



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Description

[Document of Related Art]

BACKGROUND OF THE DISCLOSURE

[Patent Document]

Field of the Disclosure

5 **[0006]** US 10722041 B2 (published on July 28, 2020)

[0001] The present disclosure relates to a sitting mat-type decubitus ulcer prevention device having a hybrid structure, and more particularly, to a sitting mat-type decubitus ulcer prevention device capable of maximizing a pressure dispersion effect while stably supporting a buttock and a femur by using a hybrid structure.

SUMMARY OF THE DISCLOSURE

Description of the Related Art

10 **[0007]** The present disclosure has been made in an effort to solve the above-mentioned problem, and an object of the present disclosure is to further improve a pressure dispersion effect while stably supporting a buttock and a femur, unlike a decubitus ulcer prevention sitting mat in the related art.

[0002] A decubitus ulcer refers to damage to skin or tissue caused by continuously applied pressure. The decubitus ulcers occur in persons who are sitting or lying down for long periods of time. The decubitus ulcers are mainly caused by stagnant blood circulation and classified into a redness stage (or stage 1), an epidermal damage stage (or stage 2), a dermis damage stage (or stage 3), and a deep tissue damage stage (or stage 4) depending on the progress or severity. In the case of the deep tissue damage stage that is the most severe stage, the decubitus ulcer may expand into deep tissue, including muscles or bone, and ligaments and even internal organs, resulting in their exposure, which causes a high risk of serious infection.

15 **[0008]** The technical solutions to be achieved by the present disclosure are not limited to the technical solutions described above, and may include various technical solutions within a range obvious to those skilled in the art from the following description.

[0003] Therefore, in order to prevent bedsores and effectively treat decubitus ulcers, it is very important to remove continuous and excessive pressure applied to a particular site. A representative method of dispersing pressure, which is applied to skin or tissue, to prevent a decubitus ulcer and increase a therapeutic effect uses a sitting mat (or mattress) into which air is injected.

20 **[0009]** A sitting mat according to an embodiment of the present disclosure includes: a base portion including a first base configured to define a seating portion and a second base formed around the seating portion; and an air mat surrounded by the second base, in which the air mat includes at least one air cell configured to be changed in volume by air pressure.

[0004] A decubitus ulcer prevention sitting mat, which is used in a state in which air is injected into the decubitus ulcer prevention sitting mat, includes air cells having a volume that is changed by air pressure. The decubitus ulcer prevention sitting mat equally disperses a user's body weight and prevents pressure from being continuously applied to skin and tissue, thereby preventing a decubitus ulcer.

25 **[0010]** The sitting mat according to the embodiment of the present disclosure may further include: a cover configured to surround the base portion and the air mat.

[0005] However, in the case of the decubitus ulcer prevention sitting mat in the related art, it is difficult to identify whether the consistent injection of air for preventing a decubitus ulcer is maintained. For this reason, when air is discharged, a body protruding portion, particularly, a gluteal region or a great trochanter region is grounded, which causes a risk of the occurrence of a decubitus ulcer. In addition, older adults, disabled persons, and patients, who are at risk of decubitus ulcers because they have difficulty in autonomously supporting themselves, are at risk of the occurrence of subsidiary problems such as pelvic deformation due to imbalanced postures.

30 **[0011]** The base portion may be made of a material having elasticity.

[0012] According to the embodiment, at least two depressed portions may be formed in the first base, at least one of the depressed portions may be formed at a position corresponding to a user's left ischial trochanteric surface, and at least another depressed portion may be formed at a position corresponding to the user's right ischial trochanteric surface.

35 **[0013]** According to the embodiment, the second base may include at least two non-pressing portions, and the non-pressing portion may have a shape formed to be lower in height than another constituent element of the second base adjacent to the non-pressing portion or a shape recessed outward from the second base.

40 **[0014]** At least one of the non-pressing portions may be positioned to correspond to at least one of a user's coccyx or left and right great trochanter regions.

45 **[0015]** In addition, at least one air cell may have an internal space partially or entirely filled with a filling material to adjust the amount of change in volume made by air pressure. In this case, at least one air cell is plural, and the amounts of the filling material, which fills internal spaces of some of the plurality of air cells, may be different from one another.

50 **[0016]** In addition, the plurality of air cells may define a matrix structure with five rows and six columns.

[0017] The air mat of the sitting mat according to the embodiment may include a plurality of air pockets, and

each of the air pockets may be connected to at least one air cell to apply air pressure to the air cell.

[0018] The plurality of air pockets may be connected to a single air pump through different nozzles and supplied with air pressure.

[0019] The sitting mat according to the embodiment may further include an atmospheric pressure adjustment part configured to adjust air pressure supplied to the air pocket in conjunction with the air pump.

[0020] The atmospheric pressure adjustment part may include: an input unit having at least one user input device; and a valve configured to open or close the air pump.

[0021] In addition, the atmospheric pressure adjustment part may further include: a power supply unit; a display unit configured to inform a user of a state of pressure currently applied to the sitting mat; and a control unit configured to control the display unit and the valve by receiving an input signal from the input unit by receiving electric power from the power supply unit.

[0022] In addition, the atmospheric pressure adjustment part may further include at least one pressure sensor configured to measure pressure applied to the air pocket.

[0023] According to the embodiment of the present disclosure, the decubitus ulcer prevention sitting mat may assist in treating a decubitus ulcer while preventing damage to tissue such as a decubitus ulcer by dispersing pressure applied to the user's body while the user sits over a long period of time. The decubitus ulcer prevention sitting mat provides the user with psychological and physical comfort and allows older adults, disabled persons, and patients, who are unable to support themselves, to independently use the decubitus ulcer prevention sitting mat without a caregiver.

[0024] The embodiment of the present disclosure may provide the innovative decubitus ulcer prevention effect by deriving the single mechanical structure designed collectively in consideration of three aspects of stability, floatation, and off-loading.

[0025] In particular, according to the embodiment of the present disclosure, the five most problematic points of the decubitus ulcer when the patient sits may be taken into account, thereby effectively preventing stagnant blood circulation that is the cause of the decubitus ulcer.

BRIEF DESCRIPTION OF THE DRAWINGS

[0026]

FIG. 1 is a perspective view illustrating a sitting mat according to an embodiment of the present disclosure.

FIG. 2 is a perspective view illustrating a sitting mat according to another embodiment of the present disclosure.

FIG. 3 is a view illustrating a base portion according to the embodiment of the present disclosure.

FIG. 4 is a view illustrating a base portion according to the embodiment different from the embodiment in FIG. 3.

FIG. 5 is a view illustrating an air mat according to the embodiment of the present disclosure.

FIG. 6 is a cross-sectional view of the air mat according to the embodiment of the present disclosure.

FIG. 7 is a view illustrating the air mat, a nozzle, and an atmospheric pressure adjustment part according to the embodiment of the present disclosure.

FIG. 8 is a view illustrating an interior of the atmospheric pressure adjustment part according to the embodiment of the present disclosure.

FIG. 9 is a view illustrating the atmospheric pressure adjustment part according to the embodiment of the present disclosure.

FIG. 10 is a view illustrating an input unit and a display unit according to the embodiment of the present disclosure.

FIG. 11 is a block diagram illustrating an interaction between constituent elements of the atmospheric pressure adjustment part according to the embodiment of the present disclosure.

DETAILED DESCRIPTION OF THE DISCLOSURE

[0027] Advantages and features of the present disclosure and methods of achieving the advantages and features will be clear with reference to embodiments described in detail below together with the accompanying drawings. However, the present disclosure is not limited to the embodiments disclosed herein but will be implemented in various forms. The embodiments of the present disclosure are provided so that the present disclosure is completely disclosed, and a person with ordinary skill in the art can fully understand the scope of the present disclosure. The present disclosure will be defined only by the scope of the appended claims.

[0028] Shapes, sizes, ratios, angles, numbers, and the like illustrated in the drawings for explaining the embodiments of the present disclosure are just exemplarily illustrated, and the present disclosure is not limited to the contents illustrated in the drawings. Throughout the specification, the same reference numerals denote the same constituent elements. In addition, in the description of the present disclosure, the specific descriptions of publicly known related technologies will be omitted when it is determined that the specific descriptions may unnecessarily obscure the subject matter of the present disclosure. The terms "comprise," "have," or "include" used in the present specification may mean that other constituent elements can be added unless these terms are used with the term "only". Unless otherwise particularly and clearly stated, the singular expressions used herein are intended to include the plural expressions.

[0029] Unless otherwise separately and explicitly stated, analyses of constituent elements are interpreted as including error ranges.

[0030] In the description of a positional relationship, for example, when a positional relationship between two components is described by using terms 'on,' 'above,' 'below,' 'at a lateral side of,' and the like, one or more components may be positioned between the two components when term 'immediately,' or 'directly' is not used.

[0031] Terms "first", "second", and the like may be used to describe various constituent elements, but the constituent elements are not limited by these terms. These terms are merely used to distinguish one constituent element from another constituent element. Therefore, the first constituent element mentioned hereinafter may be the second constituent element within the technical spirit of the present disclosure.

[0032] As used in the present disclosure, the terms "A or B," "at least one of A and/or B," or "one or more of A and/or B" may include all possible combinations of A and B listed together. For example, "A or B," "at least one of A and B," "at least one of A or B" may indicate all of (1) including at least one A, (2) including at least one B, or (3) including at least one A and at least one B.

[0033] Throughout the specification, the same or similar reference numerals denote the same constituent elements.

[0034] The size and thickness of each component illustrated in the drawings are shown for ease of description, but the present disclosure is not necessarily limited to the size and thickness of the illustrated component.

[0035] Respective features of several embodiments of the present disclosure may be partially or entirely coupled to or combined with each other, and as sufficiently appreciated by those skilled in the art, various technical cooperation and operations may be made. The respective embodiments may be carried out independently of each other or carried out together correlatively.

[0036] In the present disclosure, elasticity is the property in which a shape is changed by applied pressure, and the shape is restored to an original shape or partially restored to the original shape when the pressure is eliminated. Therefore, a material having elasticity refers to a solid material or a material having an outer side surrounded by a solid that is changed in shape by applied pressure and restored to an original state or partially restored to the original state when the pressure is eliminated. The solid may include rubber, sponge, carbon fiber, springs, silicone, and the like.

[0037] Hereinafter, exemplary embodiments according to the present invention will be described in detail with reference to the accompanying drawings. The plurality of embodiments described below may be applied in duplicate as long as the embodiments do not conflict with one another.

[0038] FIG. 1 is a perspective view illustrating a sitting mat according to an embodiment of the present disclosure.

[0039] With reference to FIG. 1, the sitting mat according to the embodiment of the present disclosure includes a base portion 100 and an air mat 200. The air mat 200

includes a plurality of air cells 210 configured to be changed in volume by air pressure. With the hybrid shape including the base portion 100 and the air mat 200, the base portion 100 may support a user's body, and the air mat 200 may adjust air pressure to provide comfort to the user and assist blood circulation to prevent a decubitus ulcer.

[0040] The air cell 210 may change in volume in such a way that the air cell 210 expands when air is injected into the air cell 210, and the air cell 210 contracts when air is discharged. According to the embodiment, the air cells 210 are disposed in a matrix shape on the air mat 200. In more detail, a total of thirty air cells 210 having a matrix structure with five rows and six columns may be disposed on the air mat 200. All the volumes of the air cells 210 may be equal to one another but may be different from one another according to the embodiment. The base portion 100, particularly, a second base stably supports the user's buttock and femur while the air mat 200 and the air cells 210 disperse pressure applied to the user's gluteal region while expanding and contracting, thereby providing stable usage properties and preventing subsidiary symptom or diseases caused by deformation of postures, in comparison with the sitting mat only configured as an air mat.

[0041] An interior of the air cell 210 may be filled with a fluid, a filling material, or a combination thereof, and an outer surface of the air cell 210 may be made of a material having flame resistance and a high melting point. In addition, the material may be resistant to an external impact and thus hardly damaged or torn. Polyurethane foam or memory foam may be used as the filling material for the air cell 210.

[0042] The second base 120 may include a plurality of non-pressing portions 122a, 122b, and 122c. When the user is seated on the sitting mat, the non-pressing portions 122a, 122b, 122c, and 122d are positioned to correspond to the user's body protruding portions, particularly, the user's right great trochanter region, left great trochanter regions, and coccyx. In this case, the non-pressing portions 122a, 122b, and 122c are formed to have smaller heights than adjacent portions, which reduces pressure that may be applied to the user's body protruding portions. The first non-pressing portion 122a corresponds to the right great trochanter region, the second non-pressing portion 122b corresponds to the left great trochanter region, and the third non-pressing portion 122c corresponds to the coccyx. In addition, the second base 120 may include a leg support portion 124 corresponding to a rear surface of the thigh.

[0043] In FIG. 4 to be described below, non-pressing portions 121, 122, 123, 111a, and 111b may be formed in shapes recessed outward from the second base or the base portion 100 and prevent a decubitus ulcer that may occur on the user's body protruding portions.

[0044] In addition, the sitting mat according to the embodiment of the present disclosure may further include an atmospheric pressure adjustment part 400 con-

nected to the air mat 200 by means of a nozzle 300. In the embodiment, the sitting mat may include three nozzles 300 that may be connected to three air pockets in the air mat. In addition, the atmospheric pressure adjustment part 400 may include a battery and charge the battery by being supplied with electrical energy from the outside. In this case, the battery may be a lithium-ion battery, a lithium-polymer battery, a nickel-cadmium (NiCd) battery, a nickel-metal hydride (NiMH) battery, a lead-oxide battery, a hydrogen fuel cell, or the like.

[0045] FIG. 2 is a perspective view illustrating a sitting mat according to another embodiment of the present disclosure.

[0046] With reference to FIG. 2, the sitting mat according to another embodiment of the present disclosure includes a cover 500 configured to surround the base portion 100 and the air mat 200. The cover 500 may include a hole through which the nozzle 300 or the atmospheric pressure adjustment part 400 is exposed. An upper surface of the cover 500, which is configured to come into direct contact with the user's body, may be made of a soft material or a waterproof material in consideration of usage properties, and the upper surface or a lateral surface of the cover 500 may be made of a material with high breathability to maximize an effect of preventing a decubitus ulcer. A lower surface of the cover 500 may be made of an anti-slip material or additionally include an anti-slip part to prevent the sitting mat from slipping on a floor, a chair, or a wheelchair, thereby achieving the user's safety. The upper surface of the cover 500 may be made of a flame resistant material to additionally ensure the user's safety. When the sitting mat includes the cover 500 as described above, convenient usage properties may be implemented, and the management, such as washing, is convenient. In addition, the cover 500 may further include a fixing portion so that the sitting mat according to the embodiment is coupled to the wheelchair and used.

[0047] The non-pressing portions 121, 122, and 123 may be formed to correspond to body protruding surfaces. In more detail, as illustrated in FIG. 2, the non-pressing portions 121, 122, and 123 correspond to the right great trochanter region, the left great trochanter region, and the coccyx. In addition, the leg support portions 124 may be formed to correspond to positions of a right thigh rear surface portion and a left thigh rear surface portion.

[0048] FIG. 3 is a view illustrating the base portion according to the embodiment of the present disclosure.

[0049] The base portion 100 may include a first base 110 and the second base 120. The second base 120 may be at least made of a material with elasticity, for example, a material such as memory foam or rubber. Alternatively, the first base 110, which defines a seating portion constituting the base portion 100, and the second base 120, which is formed around the seating portion, may be made of different materials. In this case, a material of the base portion 100 or two or more types of materials of the first

base 110 and the second base 120 may be less deformed by temperatures. In addition, a shape may be changed by applied pressure. However, the shape may be restored to an original shape within a short time without being greatly affected by a magnitude or duration time of the pressure when the pressure is eliminated.

[0050] As illustrated in FIG. 3, the first base 110 may include two depressed portions 111a and 111b. A first depressed portion 111a is formed at a position corresponding to a left ischial trochanteric surface, and a second depressed portion 111b is formed at a position corresponding to a right ischial trochanteric surface. Like the first to third non-pressing portions 122a, 122b, and 122c, the depressed portions serve to relatively mitigate pressure applied to the ischium. That is, because the depressed portion is recessed to be lower than other portions of the first base 110, the pressure applied to the ischium is decreased even though the air is discharged from a portion of the air mat corresponding to the ischium, in comparison with a case in which the user is seated on a typical chair. The depressed portions, together with the non-pressing portions, serve as the five pressure removing points 122a, 122b, 122c, 111a, and 111b and achieve one of the main functions of the sitting mat device according to the embodiment of the present disclosure.

[0051] In addition, the first base 110 may have a groove 115 so that the first base 110 is coupled to the air mat 200. Alternatively, in another embodiment, the groove coupled to the air mat 200 may be formed in the second base 120. The grooves may be formed in both the first base 110 and the second base 120. That is, a protruding portion configured to be coupled to the groove may be formed at a partial point of the air mat 200, and the protruding portion may be bound to the groove.

[0052] Alternatively, the base portion 100 may be coupled to the air mat 200 by a fastener. Alternatively, Velcro fasteners may be coupled to the base portion 100 and the air mat 200, and the first base 110 and the air mat 200 may be coupled by means of the Velcro fasteners. Alternatively, the base portion 100 and the air mat 200 may be coupled in a non-disassemblable manner, such as by thermoforming.

[0053] The first base 110 or the second base 120 may have nozzle arrangement parts 113 corresponding to positions of the nozzles 300. In the embodiment, three nozzle arrangement parts 113 may be formed to correspond to the three nozzles 300. Alternatively, a single nozzle arrangement part 113 may be formed to position several nozzles. Alternatively, two or more nozzle arrangement parts 113 may be formed for one nozzle. For example, in case that one nozzle is in contact with both the first base 110 and the second base 120, a total of two nozzle arrangement parts 113 may be formed so that the nozzle arrangement parts 113 are formed one by one on the first base 110 and the second base 120 for one nozzle.

[0054] In addition, the first base 110 or the second base may have a space 123 in which the atmospheric pressure

adjustment part 400 may be positioned. In this case, the base portion 100 may not cover an input unit 410 and a display unit 420 of the atmospheric pressure adjustment part. The base portion 100 may protect and couple constituent elements, such as a valve 430 or an air pump 450, except for the input unit 410 and the display unit 420 of the atmospheric pressure adjustment part 400. This provides a positive effect in terms of an aesthetic appearance.

[0055] FIG. 4 is a view illustrating base portion according to the embodiment different from the embodiment in FIG. 3.

[0056] With reference to FIG. 4, the first non-pressing portion 122a and the second non-pressing portion 122b may include wall surfaces along an outer periphery of the second base 120. In FIG. 4A, the first non-pressing portion 122a and the second non-pressing portion 122b each have a smaller thickness than the portions adjacent to the second base 120. Alternatively, the first non-pressing portion 122a and the second non-pressing portion 122b are further recessed outward from the sitting mat, the base portion 100, or the second base 120 than the portion adjacent to the second base 120. FIG. 4B illustrates an embodiment in which the first non-pressing portion 122a and the second non-pressing portion 122b are not smaller in thickness than the portion adjacent to the second base 120 but are recessed outward.

[0057] As illustrated in FIG. 4C or 4D, the third non-pressing portion 122c may also include a wall surface along the outer periphery of the second base 120. That is, the third non-pressing portion 122c may be formed in a shape recessed outward from the sitting mat, the base portion 100, or the second base 120.

[0058] In case that the non-pressing portions 122a, 122b, and 122c are made of a material different from or identical to a material of the portion adjacent to the second base 120, the non-pressing portions 122a, 122b, and 122c have a difference in density, the non-pressing portions 122a, 122b, and 122c may have shapes having a smaller height than or recessed outward from the portion adjacent to the second base 120 when pressure is applied even though there is no difference in shape from the portion adjacent to the second base 120 when no pressure is applied.

[0059] FIG. 5 is a view illustrating the air mat according to the embodiment of the present disclosure.

[0060] With reference to FIG. 5, the thirty air cells 210 included in the air mat 200 include a total of ten central air cells 210a including two central air cells disposed at the rearmost rows, and four central air cells disposed forward of the two rows. The central air cell does not include a filling material therein or includes a small amount of filling material. As illustrated in FIG. 5, the central air cell 210a greatly decreases in volume when the central air cell 210a is not supplied with air. In contrast, peripheral air cells 210b include filling materials therein, such that the peripheral air cell 210b does not greatly decrease in volume even though the peripheral air cell 210b is not supplied with air in comparison with the central air cell

210a. In another embodiment, there may be an intentional difference in shape or amount of the included filling material between the peripheral air cells 210b including the filling material therein. In this case, the filling material may be a material having elasticity, such as rubber, sponge, or a plurality of micro-beads. Alternatively, in addition to the difference in amount or shape of the filling material, there may be a difference in density, such that there may be a difference in amount of change in volume made by air pressure between the peripheral air cells 210b. In this case, polyurethane foam or memory foam may be used as a material of the filling material. The number of or arrangement of the central air cell 210a and the peripheral air cell 210b are not limited to the above-mentioned example.

[0061] In the embodiment, a lateral surface of the air cell 210 may be formed in a hexahedral shape with a trapezoidal shape. The air cells 210 may be connected to one another. When one air cell is individually viewed, the air cell may include a lower opening portion 211 through which air is introduced or discharged, four lateral surfaces 212 having a trapezoidal shape, and an upper surface 213 capable of supporting the user's buttock or femur. In order to improve the user's seating quality, first connection surfaces 214, which are flat or curved surfaces, may be formed at four edges at which the upper surface and the lateral surfaces are connected. Likewise, second connection surfaces 215, which are flat or curved surfaces, may each be formed at an edge at which the two lateral surfaces are in contact. Vertex surfaces 216 having an approximately triangular shape may each be formed at a point at which the first connection surface 214 and the second connection surface 215, which are adjacent to each other, meet together. The lateral surface, the upper surface, the connection surface, and the vertex surface are organically changed in shape by the expansion of the air cell and support a part of the user's buttock or femur.

[0062] FIG. 6 is a cross-sectional view of the air mat according to the embodiment of the present disclosure.

[0063] With reference to FIG. 6, the amount or shape of the filling material may vary depending on the air cells. A height of an upper end of the filling material in the air cell may vary depending on the air cells. In the present specification, an imaginary line connecting the upper ends of the air cells for rows and columns is defined as a profile. When a first row, a second row, a third row, a fourth row, and a fifth row are defined from a front side F toward a rear side R of the sitting mat in FIG. 6A, two opposite ends of the profile of the third row may be remarkably high, and portions corresponding to the four central air cells may be remarkably low, as illustrated in FIG. 6B.

[0064] In addition, when a first column, a second column, a third column, a fourth column, a fifth column, and a sixth column are defined from a left side LL toward a right side RR of the sitting mat, a stepped shape may be made in which a front side of the profile of the third column is

remarkably high, and portions corresponding to the three rear air cells are remarkably low, as illustrated in FIG. 6C.

[0065] The central air cell 210a may be filled with a small amount of filling material to remove at least a part of pressure applied to ischium and coccyx at two opposite sides. With this function, the central air cell 210a may be formed at a position approximately corresponding to the third non-pressing portion 122c and the depressed portion 111.

[0066] In the embodiment, different inner filling materials may be used for the air cells. The profiles of the row and the column may be designed to gradually change to more effectively distribute pressure. For example, as illustrated in FIG. 6D, the profile may be shaped to correspond to the user's body structure such as a shape of the gluteal region or a bone structure. As illustrated in FIG. 6E, the profile of the third column or the profiles of the columns may be designed in consideration of a lateral appearance of the user in a sitting posture.

[0067] FIG. 7 is a view illustrating the air mat, the nozzle, and the atmospheric pressure adjustment part according to the embodiment of the present disclosure.

[0068] With reference to FIG. 7, the air mat 200 includes three air pockets 221, 222, and 223. However, the number of air pockets is not limited thereto. The air pockets may be connected to the air pump in the atmospheric pressure adjustment part 400 through the separate nozzles 301, 302, and 303. One or more air pumps may be provided. However, all the three air pockets 221, 222, and 223 may be connected to the single air pump to improve the conformity between a motion of the user's body, a motion of the air pocket, and a motion of the air cell.

[0069] In case that three air pockets or a plurality of air pockets are connected to one air pump as described above, the air pockets may be independently adjusted in addition to the operation of applying equal air pressure to the plurality of air pockets by adjusting the air pressure or the amount of air to be injected into the air pockets by means of the nozzles 301, 302, and 303 and the valve 430, such that it is possible to effectively prevent a decubitus ulcer of a user (e.g., a person with an unbalanced pelvis) who requires customized usage. The configuration of the present disclosure is not limited to the above-mentioned example. A plurality of air pumps may be provided, and in this case, the plurality of air pumps may be respectively connected to the air pockets. In the embodiment, the air pump is positioned in the atmospheric pressure adjustment part 400. However, in another embodiment, the air pump may be positioned outside the atmospheric pressure adjustment part 400.

[0070] The air pockets may include a central air pocket 221, a left air pocket 222, and a right air pocket 223.

[0071] The air pockets and the central air cells 210a may be differently separated. That is, as illustrated in FIG. 7, the central air cells 210a with an approximately smallest amount of filling material may be separated regardless of a boundary between the air pockets. This config-

uration may implement more various combinations changes in volumes of the separate air cells corresponding to the central air cells 210a. In addition, flows of air between the air pockets may massage the user's gluteal region and assist in improving blood circulation in the body protruding portion where pressure is mostly concentrated and a decubitus ulcer easily occurs.

[0072] FIG. 8 is a view illustrating an interior of the atmospheric pressure adjustment part according to the embodiment of the present disclosure.

[0073] With reference to FIG. 8, the atmospheric pressure adjustment part 400 may include at least one valve 430. The valve 430 may include a gate valve configured to operate to open or close a gate in a straight flow, a ball valve configured to control a flow by using a rotary spherical ball, or a butterfly valve configured to adjust a flow by using a rotary disc with a circular plate shape. In the embodiment, the valve may be installed to correspond to the air pocket and control air to be supplied into the air pocket. In addition, in the embodiment, the valve 430 may be a solenoid valve 430 in which a solenoid coil is activated by an electric current, and a flow of air is controlled by a force of a magnetic field occurring on a solenoid.

[0074] The atmospheric pressure adjustment part 400 may further include a pressure sensor 440. The pressure sensor 440 may further include a pressure transducer or a pressure transmitter, a mounting assembly, a protective casing, or various types of calibration and adjustment devices in addition to a fluid pressure sensor or a gas pressure sensor. The pressure sensor 440 may measure air pressure applied to the air pocket to control the display unit 420 and the valve 430. A process of measuring air pressure by the pressure sensor 440 and controlling the display unit and the valve 430 may be performed in a control unit in the atmospheric pressure adjustment part 400.

[0075] The air pump 450 may operate in conjunction with the solenoid valve 430 and the pressure sensor 440 through a hose through which air passes, and the air pump 450 may be positioned inside or outside the atmospheric pressure adjustment part 400. As illustrated in FIG. 8, a power supply unit 460 may be configured in the form of a rechargeable battery to ensure the portability of the sitting mat. Therefore, the power supply unit 460 may be a lithium-ion battery, a lithium-polymer battery, a nickel-cadmium (NiCd) battery, a nickel-metal hydride (NiMH) battery, a lead-oxide battery, a hydrogen fuel cell, or the like. However, the present disclosure is not limited thereto.

[0076] FIG. 9 is a view illustrating the atmospheric pressure adjustment part according to the embodiment of the present disclosure.

[0077] With reference to FIG. 9, the atmospheric pressure adjustment part 400 may include the display unit 420 and the input unit 410 configured to allow the user to make an input and an output. On the basis of data inputted from the input unit 410, the pressure sensor

440, or the power supply unit 460, the control unit in the atmospheric pressure adjustment part 400 may provide a notification such as a warning to the user by controlling the display unit 420 or control air pressure to be applied to the air pocket by controlling the valve 430 or the air pump 450. The valve 430 or the air pump 450 may supply air to the air pockets through the nozzles 301, 302, and 303 and control air pressure in such a way that air is discharged to the outside of the sitting mat through a discharge port 470 included in the atmospheric pressure adjustment part 400.

[0078] In case that the atmospheric pressure adjustment part 400 includes the power supply unit 460, an external power source device and the power supply unit 460 may be connected through a connector 461. In this case, the external power source device may be a power adapter, a power supply unit (PSU), an uninterruptible power supply (UPS), a battery pack, a converter, or a generator. However, the present disclosure is not limited thereto.

[0079] FIG. 10 is a view illustrating the input unit and the display unit according to the embodiment of the present disclosure.

[0080] As illustrated in FIG. 10, the input unit 410 and the display unit 420 may be formed at the same position to provide the convenience for the user. The input unit 410 includes input devices such as a button, dial, a switch, a touch screen, a joystick, a keyboard, a touch pad, and a microphone. The input device may include a power input device 411, air pressure mode manipulation devices 412 and 413, an air amount adjustment device 414, and the like.

[0081] The display unit 420 may include output devices such as a lighting device, a speaker, a text display unit, and a display panel. In the embodiment, the display unit 420 displays a state of pressure, which is currently applied to the sitting mat, to the user in such a way that a light-emitting diode (LED) emits light when a particular condition is satisfied. The output device may include air pressure mode display devices 421 and 422, air amount display devices 423 and 424, supply power display devices 425 and 426, a posture manipulation warning device 427, and the like. In particular, the posture manipulation warning device 427 may operate on the basis of pressure values measured by a plurality of pressure sensors. For example, the posture manipulation warning device 427 may operate when a state in which a difference in pressure between the left air pocket 222 and the right air pocket 223 is a threshold value or more is maintained for a predetermined period of time or longer. The posture manipulation warning device 427 may detect the user's posture imbalance and warn the user. Therefore, the light-emitting diode may enhance a warning effect by using a color different from that of at least one of the other output devices 421, 422, 423, 424, 425, and 426 in the display unit. For example, in case that the air pressure mode display devices 421 and 422 and the air amount display device 423 and 424 use green light, the posture

manipulation warning device 427 may use red light. Alternatively, lighting devices with several colors may be used to cope with stages of the posture manipulation warning.

[0082] In case that the display unit 420 or the posture manipulation warning device 427 includes a voice output device such as a speaker, the posture manipulation warning device 427 may create a voice alarm by means of the voice output device to raise a warn to the user when the sitting mat detects the user's posture imbalance.

[0083] FIG. 11 is a block diagram illustrating an interaction between constituent elements of the atmospheric pressure adjustment part according to the embodiment of the present disclosure.

[0084] In FIG. 11, dotted lines indicate flows of electrical energy and electrical signals, and solid lines indicate flows of air through connected hoses. A control unit 480, which is supplied with electrical energy from the power supply unit 460, displays information related to electrical energy such as a state of charge of a battery on the display unit 420. The user, who has identified that electrical energy has been supplied to the control unit 480 by means of the display unit 420, may control the sitting mat by transmitting an electrical signal to the control unit 480 through the input unit 410. The user may adjust air pressure in the air pocket in a way pre-stored in the control unit by manipulating the air pressure automatic mode manipulation device 412 of the input unit 410.

[0085] In the embodiment, an automatic mode performed by manipulating the air pressure automatic mode manipulation device 412 by the user may be performed by repeating a circulation mode for circulating air between the air pockets by alternately opening or closing the central valve 431 and the left and right valves 432 and 433 when no separate user input is made and a standby mode in which there are no motions of the air pump 450 and the valves 431, 432, and 433. For example, the automatic mode may operate by repeating the circulation mode for 15 minutes and the standby mode for 20 minutes.

[0086] In addition, in the embodiment, a basic mode performed by manipulating the air pressure basic mode manipulation device 413 by the user may allow the user to manually adjust the amount of air by means of the air amount adjustment device 414. The air amount adjustment device 414 may be provided in the form of a button, and the amount of air in the air pockets may be increased or decreased each time the button is pushed. In order to increase the amount of air in the air pockets, the air pump 450 may operate in the state in which the discharge valve 434 is closed. In order to decrease the amount of air in the air pockets, all the valves 431, 432, 433, and 434 may be opened in a state in which the air pump 450 does not operate.

[0087] In order to ensure the user's safety, the pressure sensors 441, 442, and 443 may measure pressure applied to the air pockets, such that the control unit 480 may transfer information such as information for warning the

user to adjust the posture through the display unit 420. In the embodiment, when a state in which the pressure measured by the left pressure sensor 442 and the pressure measured by the right pressure sensor 443 are threshold values or more is maintained for a predetermined period of time or longer, the control unit 480 may warn the user to adjust the posture by operating the posture manipulation warning device 427.

[0088] The posture manipulation warning device 427 may operate when a state in which the user's posture is not changed is maintained for a predetermined period of time or longer. The predetermined period of time may be within 15 minutes and needs to be 30 minutes or shorter to obtain an optimal effect of according to the present disclosure.

[0089] While the exemplary embodiments of the present disclosure have been illustrated and described above, the present disclosure is not limited to the specific exemplary embodiments, and various modifications can of course be made by those skilled in the art to which the present disclosure pertains without departing from the subject matter of the present disclosure as claimed in the claims. Further, the modifications should not be appreciated individually from the technical spirit or prospect of the present disclosure.

Claims

1. A sitting mat comprising:

a base portion comprising a first base configured to form a seating portion and a second base formed around the seating portion; and
an air mat surrounded by the second base,
wherein the air mat comprises at least one air cell configured to be changed in volume by air pressure.

2. The sitting mat of claim 1, further comprising: a cover configured to surround the base portion and the air mat.

3. The sitting mat of claim 1, wherein the base portion is made of a material having elasticity.

4. The sitting mat of claim 3, wherein at least two depressed portions are formed in the first base.

5. The sitting mat of claim 4, wherein at least one of the depressed portions is formed at a position corresponding to a user's left ischial trochanteric surface, and at least another depressed portion is formed at a position corresponding to the user's right ischial trochanteric surface.

6. The sitting mat of claim 3, wherein the second base comprises at least two non-pressing portions, and

the non-pressing portion has a shape formed to be lower in height than another constituent element of the second base adjacent to the non-pressing portion or a shape recessed outward from the second base.

7. The sitting mat of claim 6, wherein at least one of the non-pressing portions is positioned to correspond to at least one of a user's coccyx or left and right great trochanter regions.

8. The sitting mat of claim 1, wherein at least one air cell has an internal space partially or entirely filled with a filling material to adjust the amount of change in volume made by air pressure.

9. The sitting mat of claim 8, wherein at least one air cell is plural, and the amounts of the filling material, which fills some of the plurality of air cells, are different from one another.

10. The sitting mat of claim 1, wherein the air mat comprises a plurality of air pockets, and each of the air pockets is connected to at least one air cell to apply air pressure to the air cell.

11. The sitting mat of claim 10, wherein the plurality of air pockets are connected to a single air pump through different nozzles and supplied with air pressure.

12. The sitting mat of claim 11, further comprising: an atmospheric pressure adjustment part configured to adjust the air pressure supplied to the air pocket in conjunction with the air pump.

13. The sitting mat of claim 12, wherein the atmospheric pressure adjustment part comprises:

an input unit having at least one user input device; and
a valve configured to open or close the air pump.

14. The sitting mat of claim 13, wherein the atmospheric pressure adjustment part further comprises:

a power supply unit;
a display unit configured to inform a user of a state of pressure currently applied to the sitting mat; and
a control unit configured to control the display unit and the valve by receiving an input signal from the input unit by receiving electric power from the power supply unit.

15. The sitting mat of claim 14, wherein the atmospheric pressure adjustment part further comprises at least one pressure sensor configured to measure pressure applied to the air pocket.

Figure 1

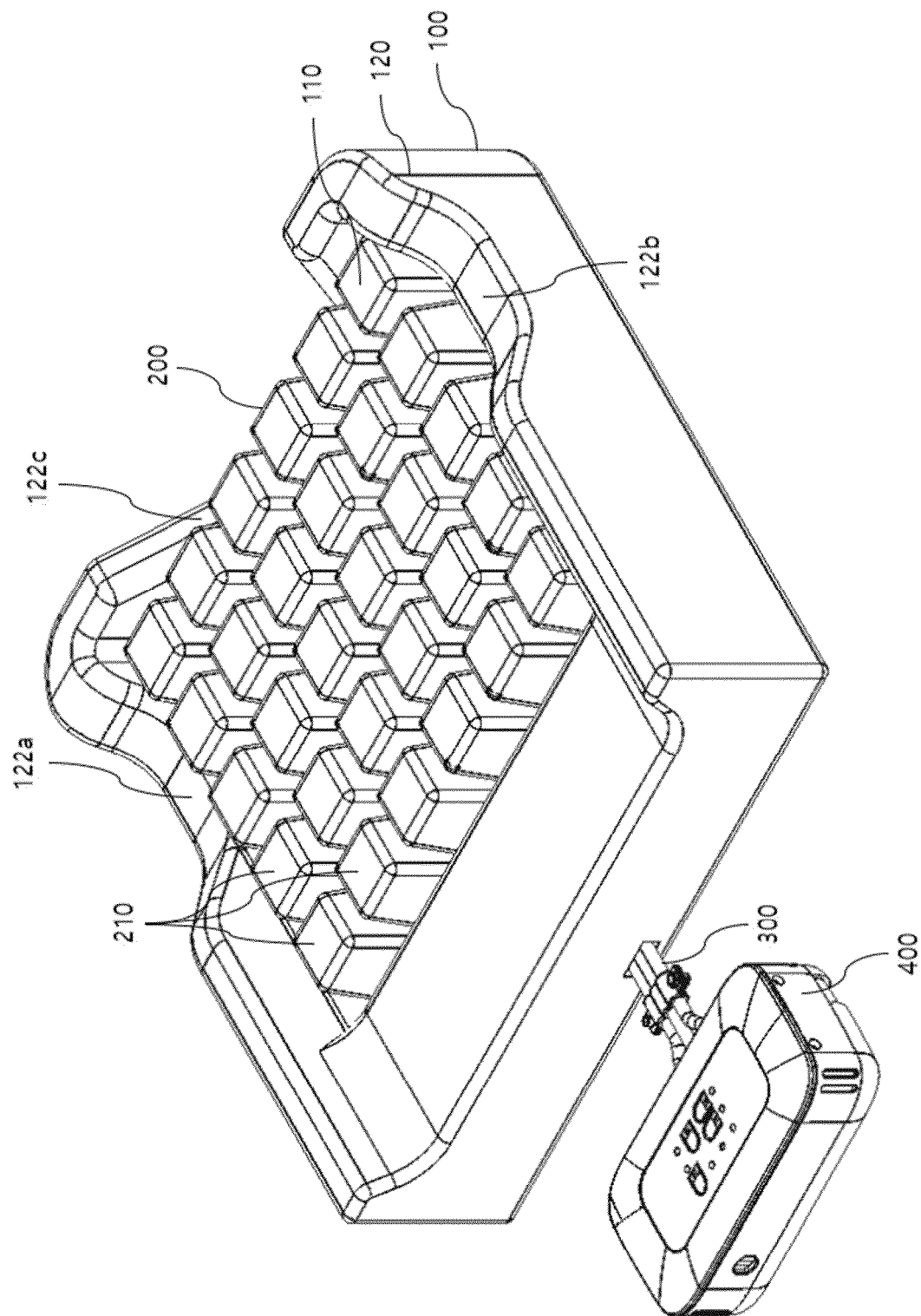


Figure 2

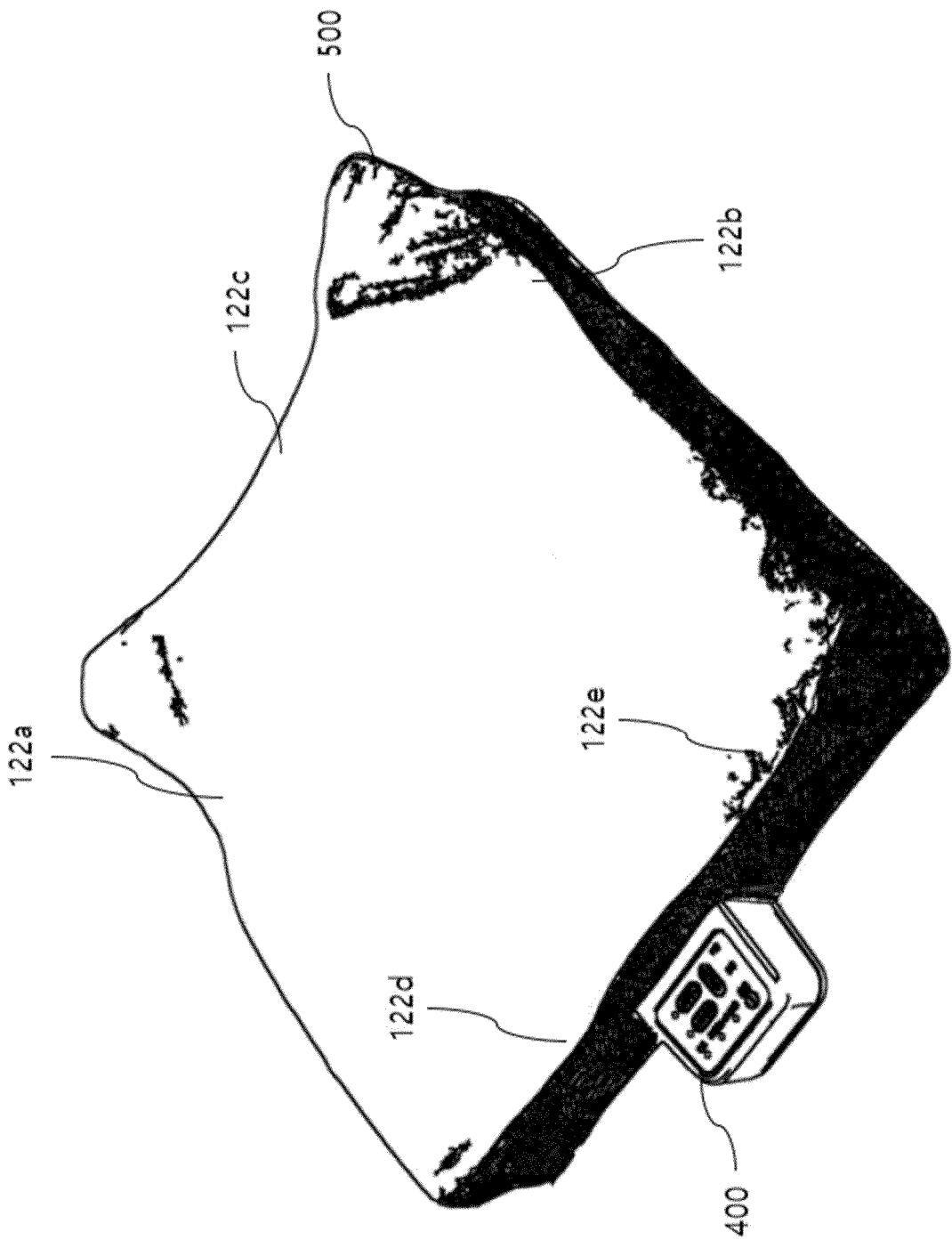


Figure 3

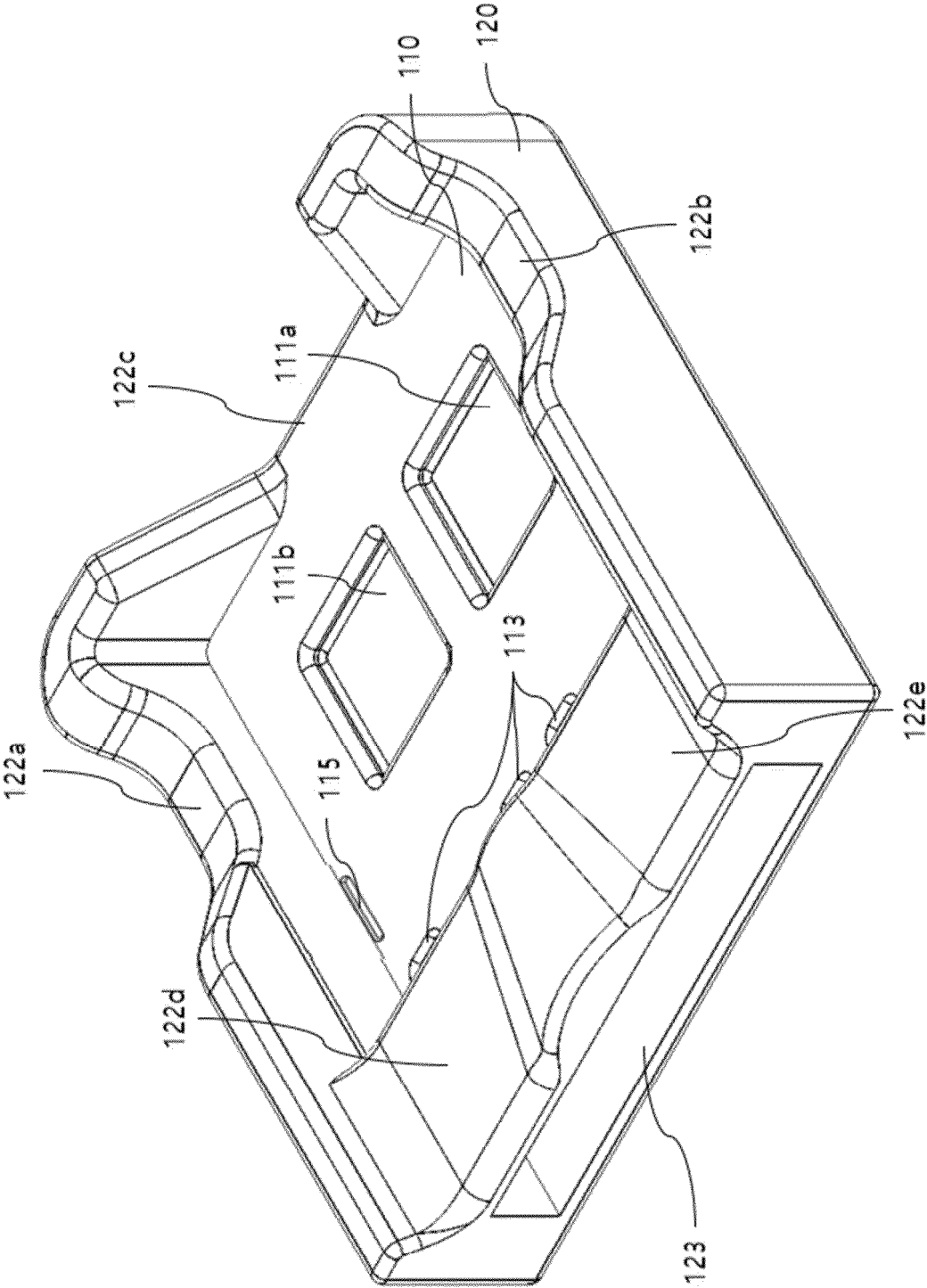


Figure 4

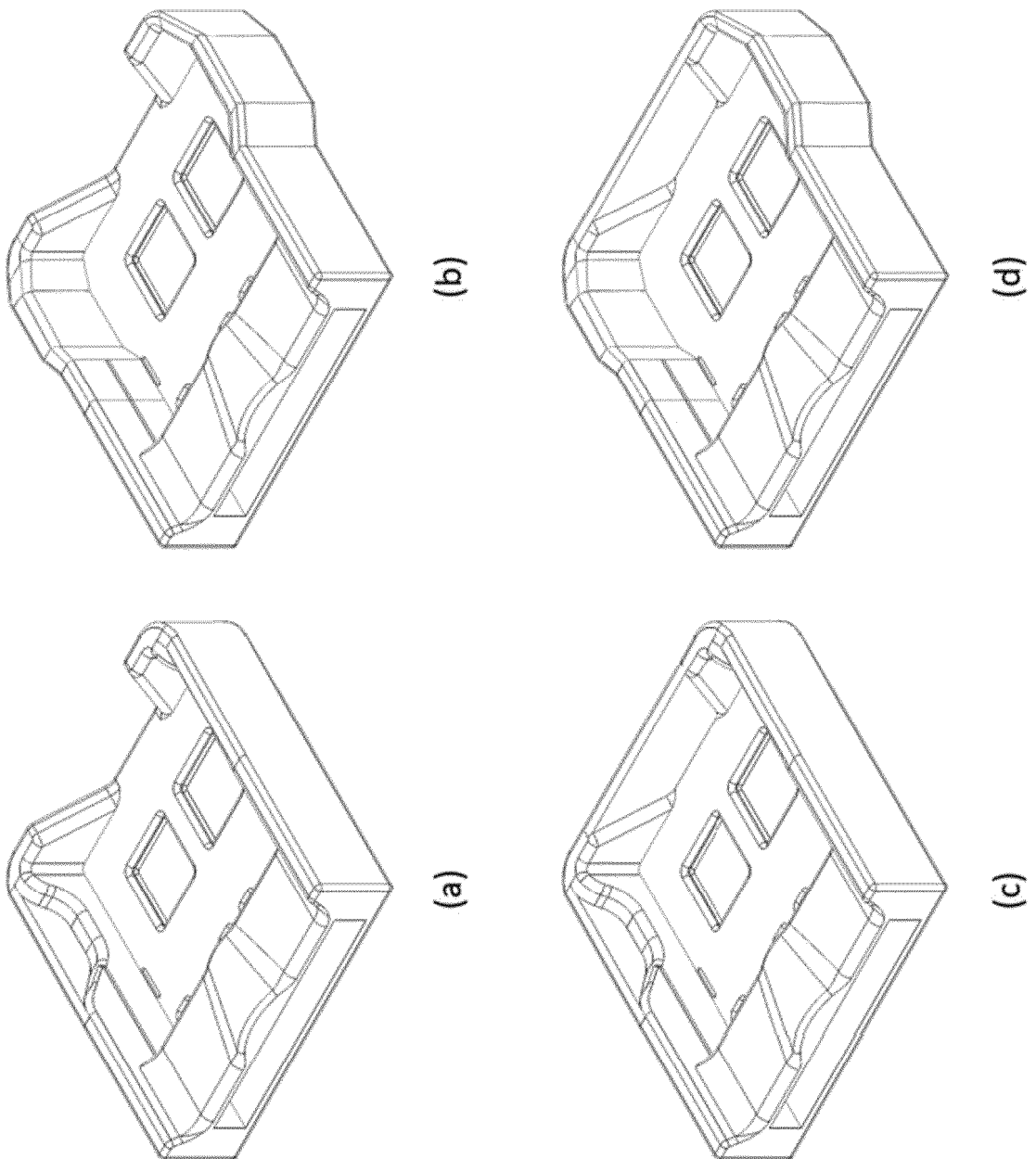


Figure 5

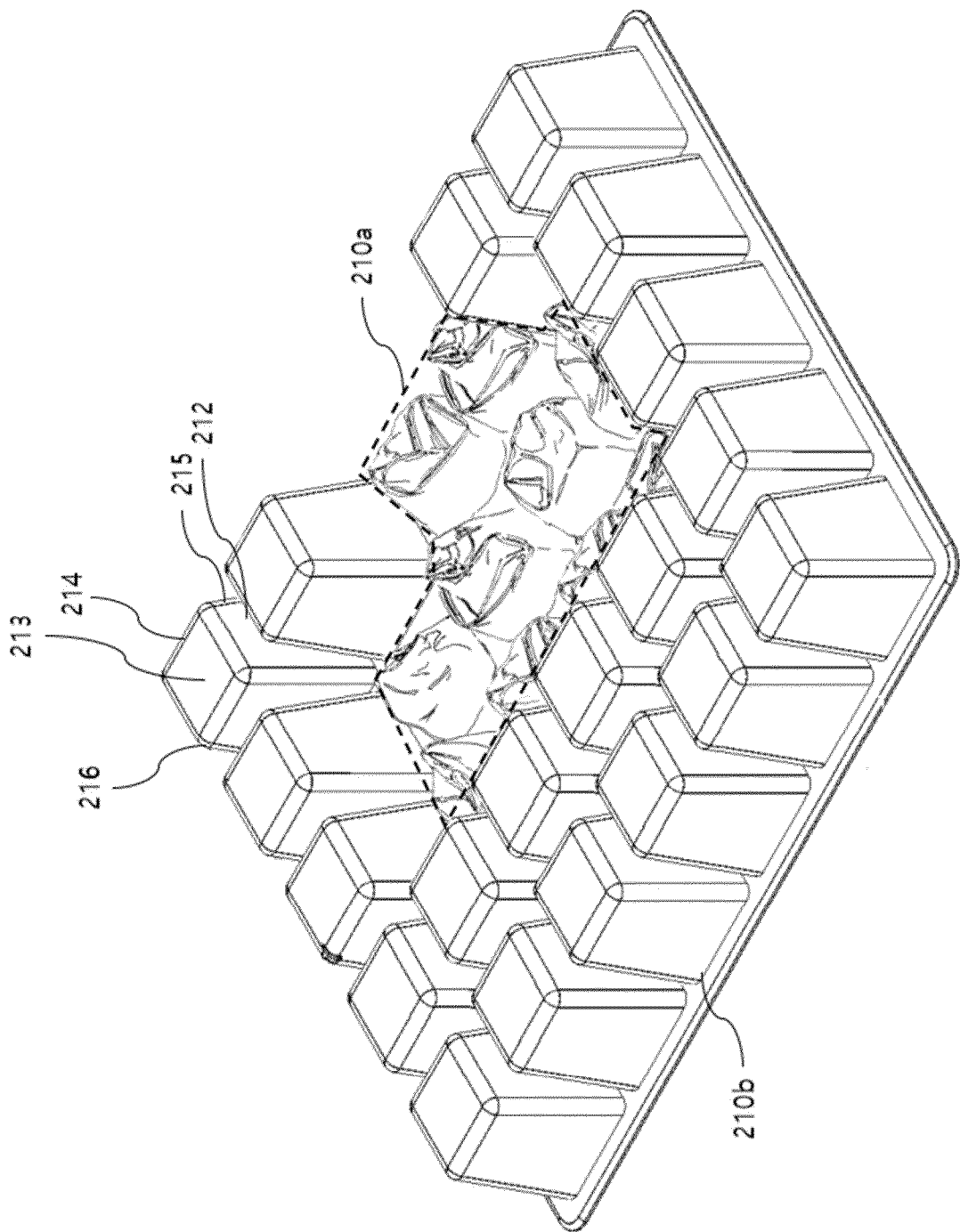


Figure 6

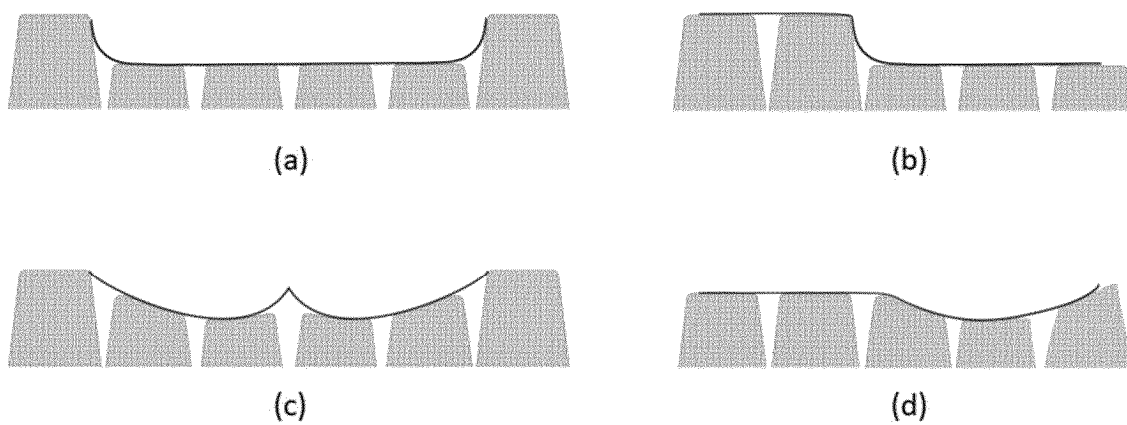


Figure 7

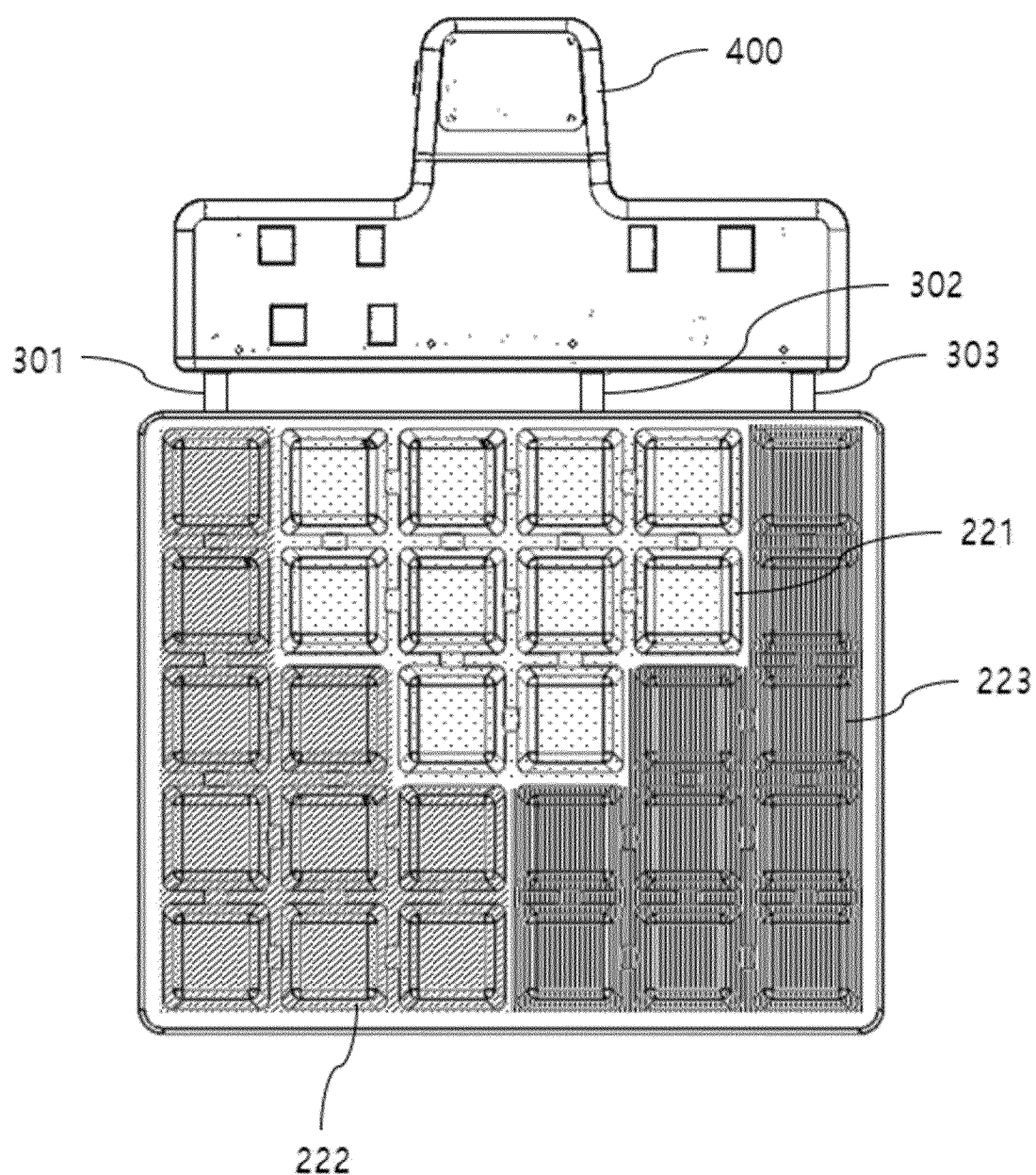


Figure 8

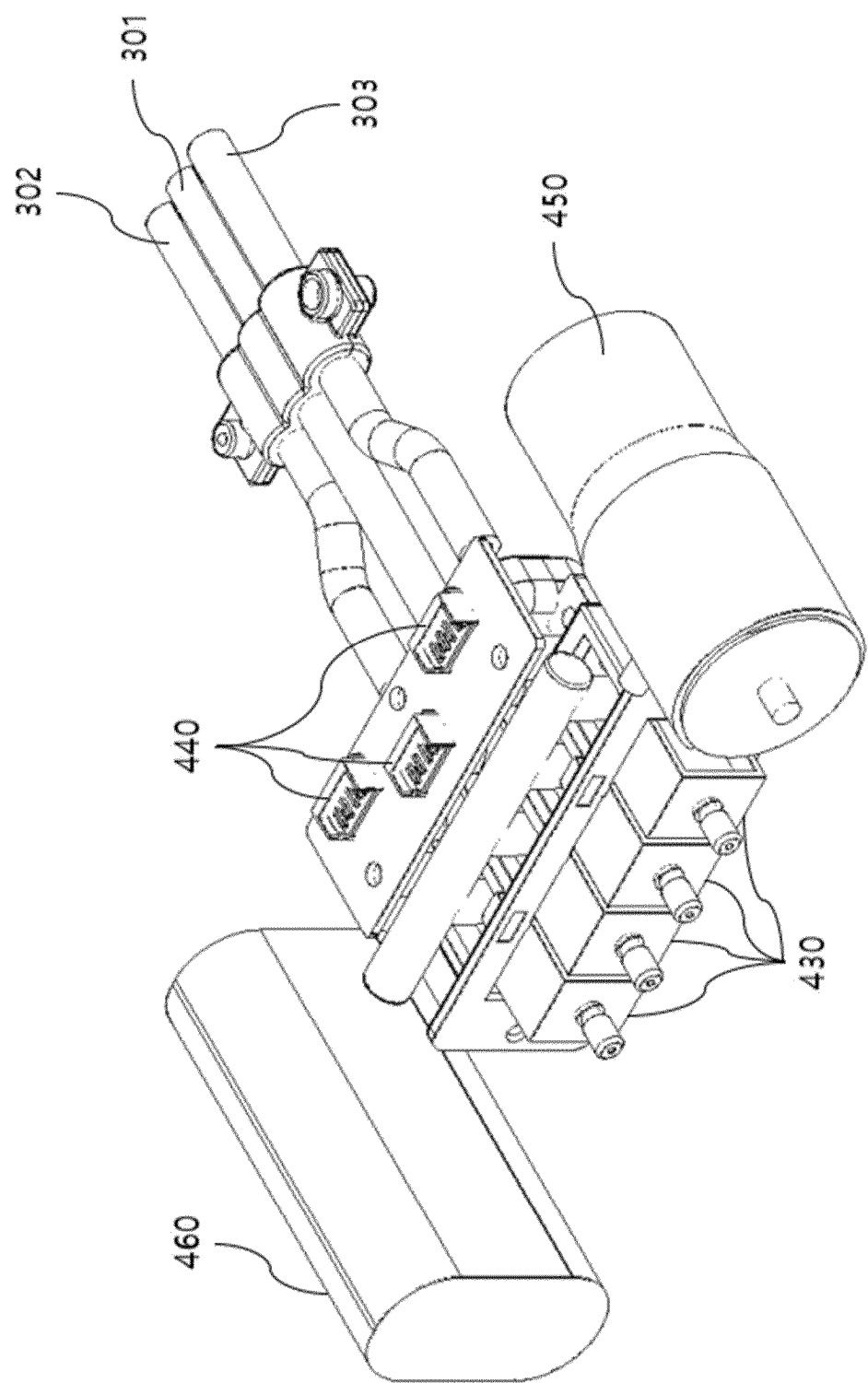


Figure 9

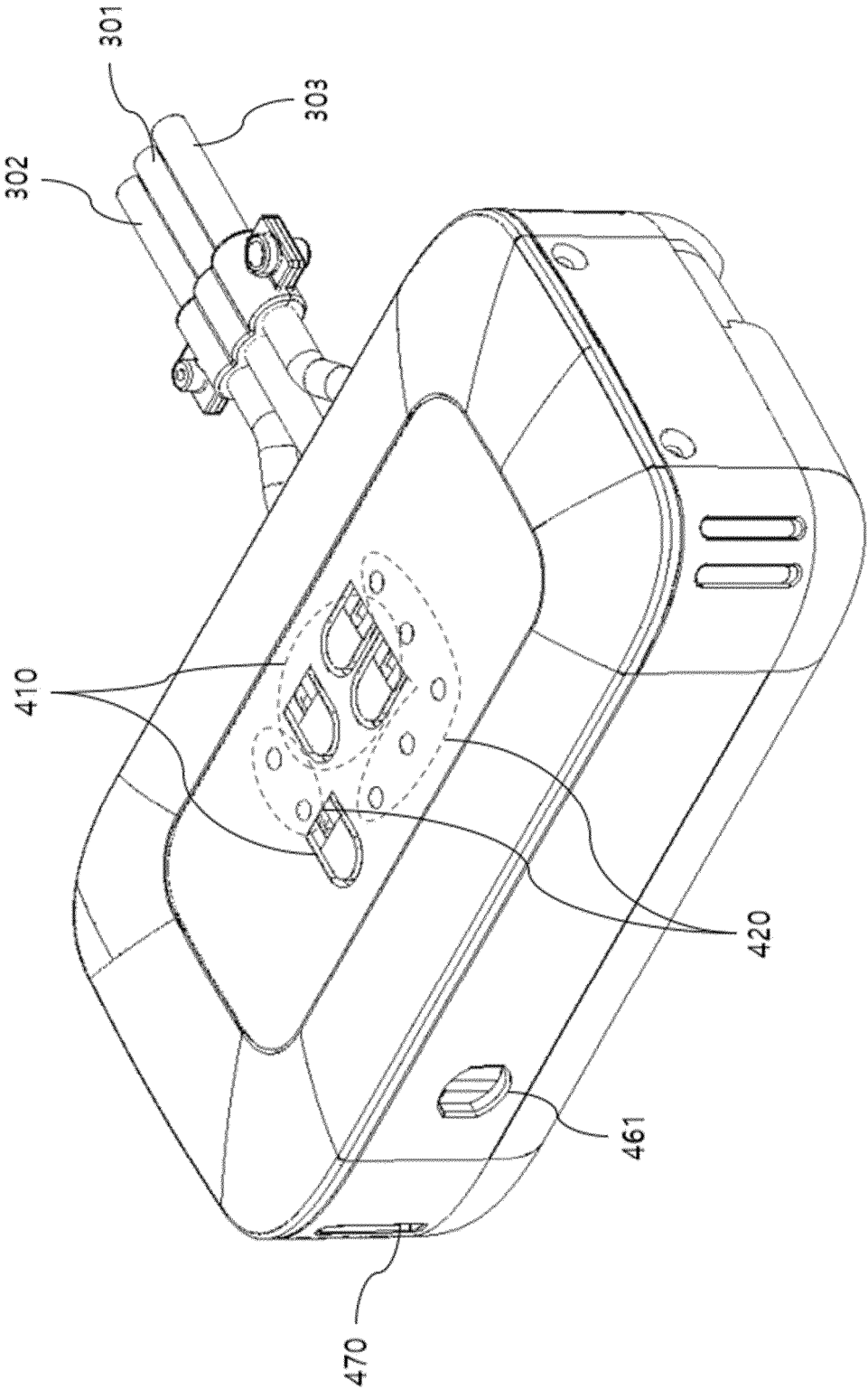


Figure 10

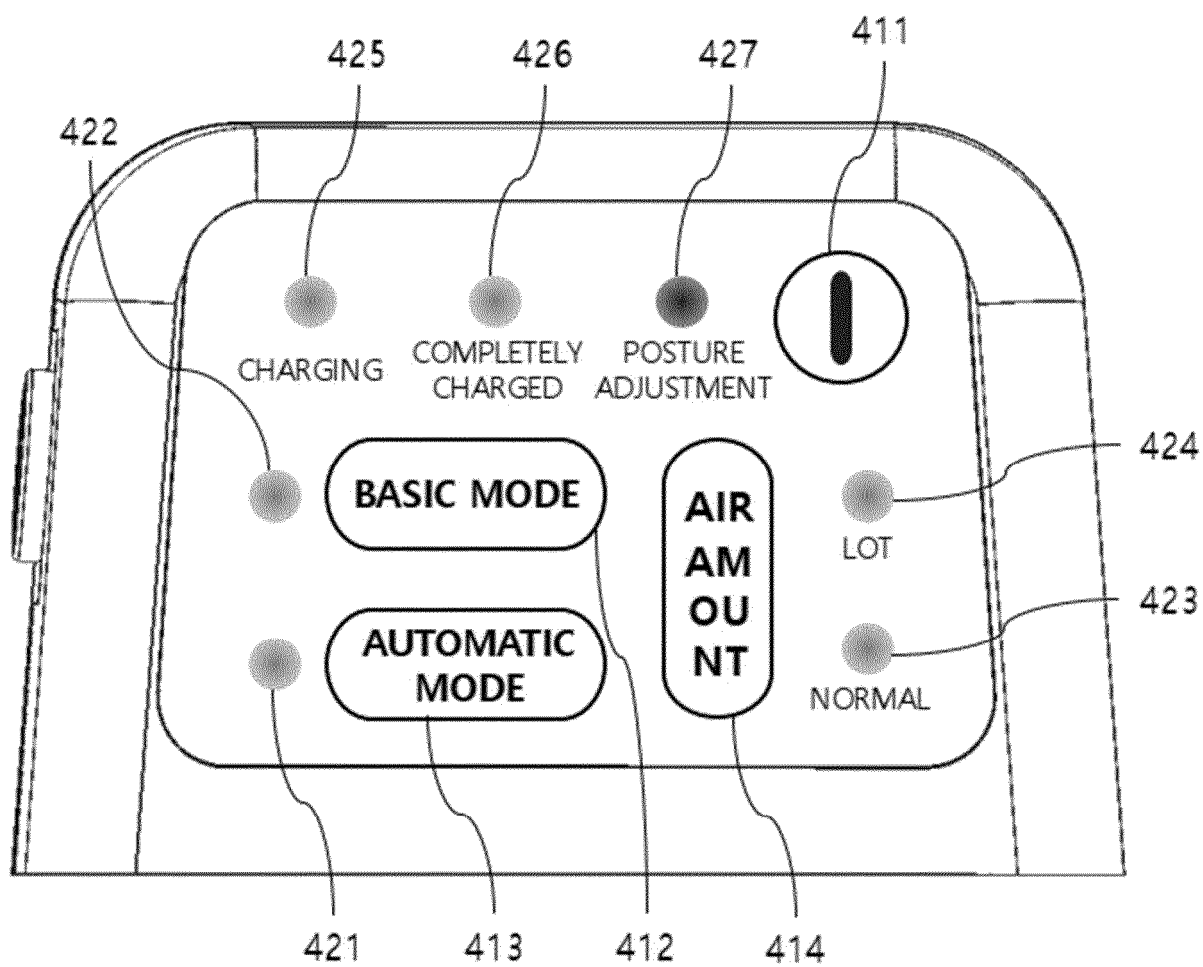
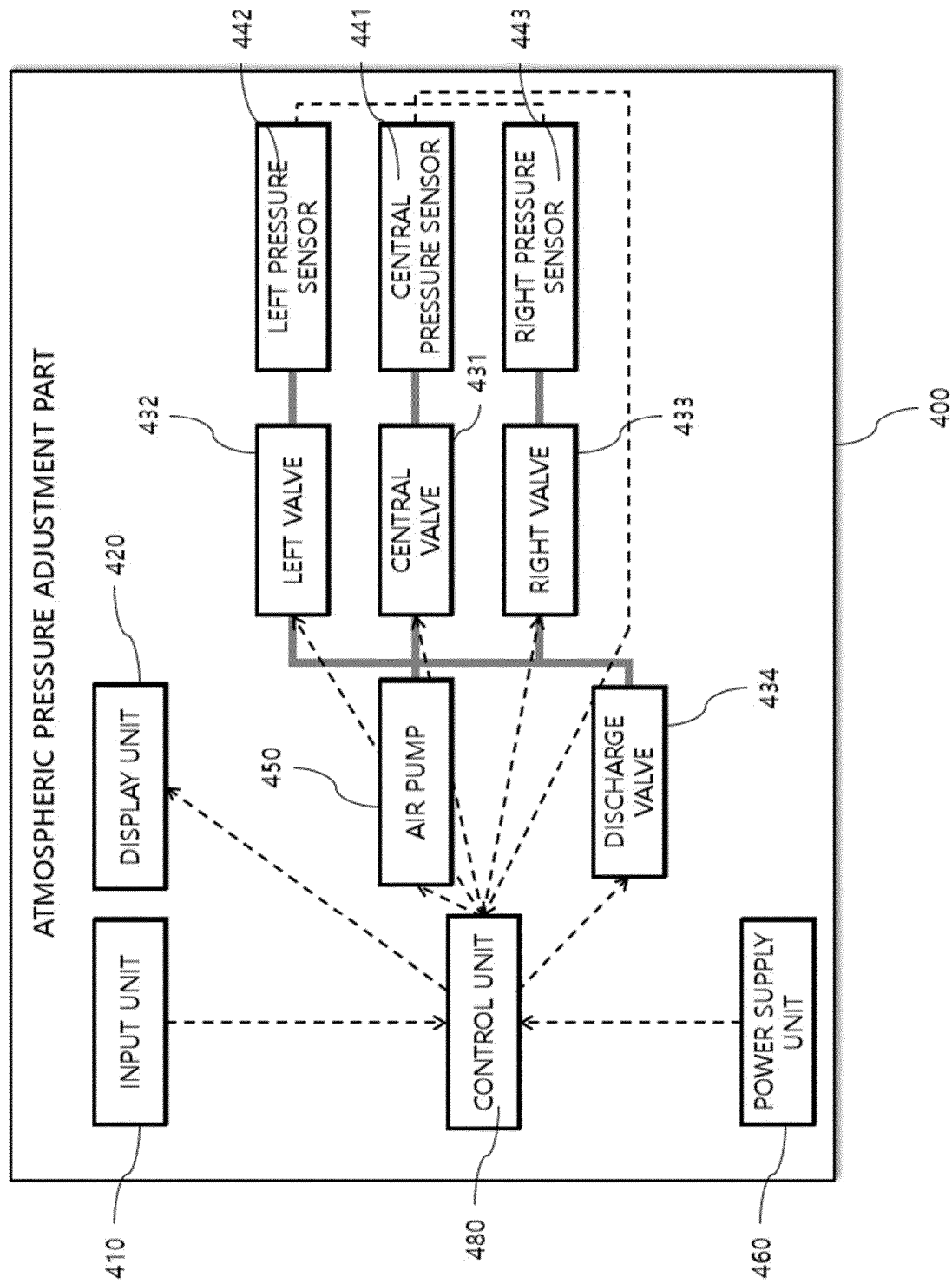


Figure 11



INTERNATIONAL SEARCH REPORT

International application No.

PCT/KR2024/096295

A. CLASSIFICATION OF SUBJECT MATTER

A61G 7/057(2006.01)i; A47C 27/08(2006.01)i; A47C 27/00(2006.01)i; A47C 27/10(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)

A61G 7/057(2006.01); A47C 21/04(2006.01); A47C 27/00(2006.01); A47C 27/08(2006.01); A47C 27/10(2006.01);
A61G 7/05(2006.01); A61G 9/00(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: 방석(cushion), 베이스부(base), 에어 매트(air mattress), 에어 셀(air cell), 공기압
(air pressure)**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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X	see pages 3-4, 6-12.	
X	네오에이블, 닥터실버 욕창 예방 전동 방석 출시. 강남투데이. 17 March 2023, non-official translation (Neoable Launches Dr. Silver Pressure Sore Prevention Electric Cushion. Gangnam Today). [Retrieved on 09 June 2025]. Retrieved from <URL: http://gangnamtoday.com/?p=12916 >.	1-7,10-15
X	see pages 1-2; and the video.	
X	KR 10-2011-0116753 A (CERAGEM AIRTECH) 26 October 2011 (2011-10-26)	1-3,10-12
X	see paragraphs [0046]-[0053]; and figures 5-6.	

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:

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“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

02 July 2025

Date of mailing of the international search report

03 July 2025

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2024/096295

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C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Information on patent family members

International application No.

PCT/KR2024/096295

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