US 20250255363A1

(19) United States

(12) Patent Application Publication (10) Pub. No.: US 2025/0255363 A1

UCHIDA (43) Pub. Date: Aug. 14, 2025

(54) **COOLING GARMENT, COOLING GARMENT SET, AND METHOD FOR WEARING THE COOLING GARMENT SET**

(71) Applicant: **BIGBORN CO., LTD.**, Hiroshima (JP)

(72) Inventor: **Takayuki UCHIDA**, Hiroshima (JP)

(21) Appl. No.: **18/859,482**

(22) PCT Filed: **Dec. 20, 2023**

(86) PCT No.: **PCT/JP2023/045714**

§ 371 (c)(1),
(2) Date: **Oct. 23, 2024**

(30) **Foreign Application Priority Data**

Feb. 24, 2023 (JP) 2023-027109
Aug. 9, 2023 (JP) 2023-129934
Nov. 1, 2023 (JP) 2023-187750

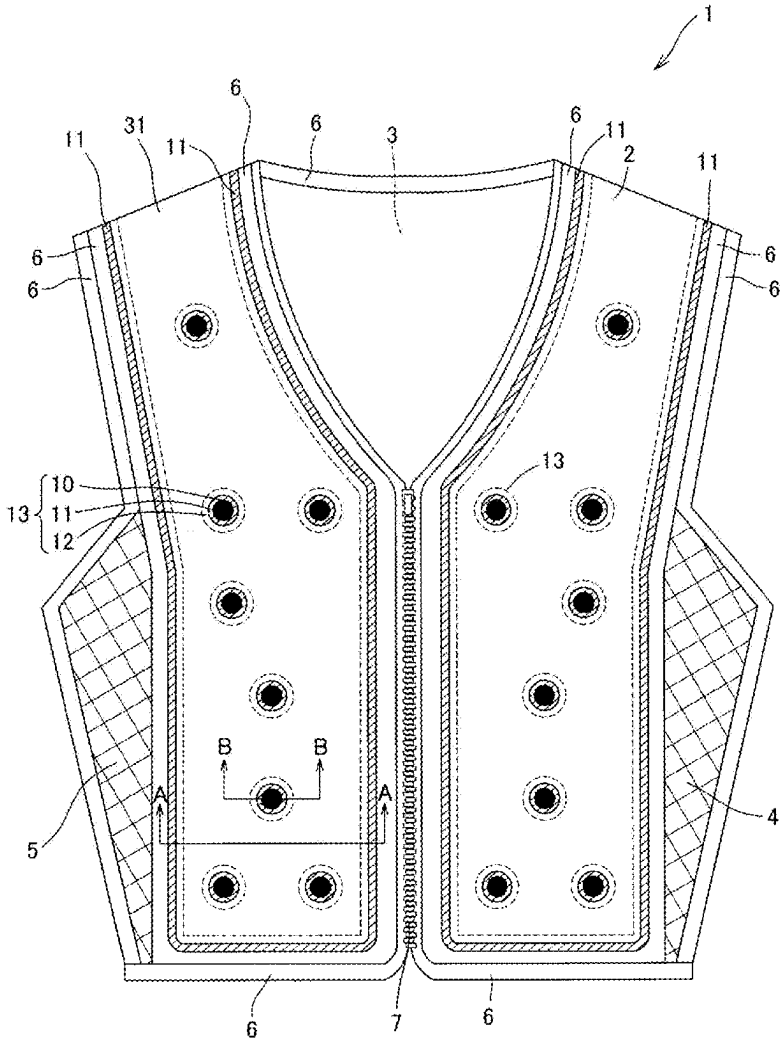
Publication Classification

(51) **Int. Cl.**
A41D 13/005 (2006.01)
A41D 1/04 (2006.01)

(52) **U.S. Cl.**
CPC ***A41D 13/0056*** (2013.01); ***A41D 1/04*** (2013.01)

(57) **ABSTRACT**

A cooling garment includes a front side material and a back side material arranged on a front side or a back side of a body. The front side material or the back side material has an inner layer arranged closest to the body that is waterproof, an outer layer arranged farthest from the body that is moisture permeable and an intermediate layer made of a nonwoven fabric arranged between the inner layer and the outer layer and that absorbs water and stores the absorbed water. A water inlet that supplies the water to the intermediate layer is arranged at an upper part of the front side material or the back side material and a drainage outlet that drains the water is arranged at a lower part of the front side material or the back side material when the cooling garment is attached to the body.



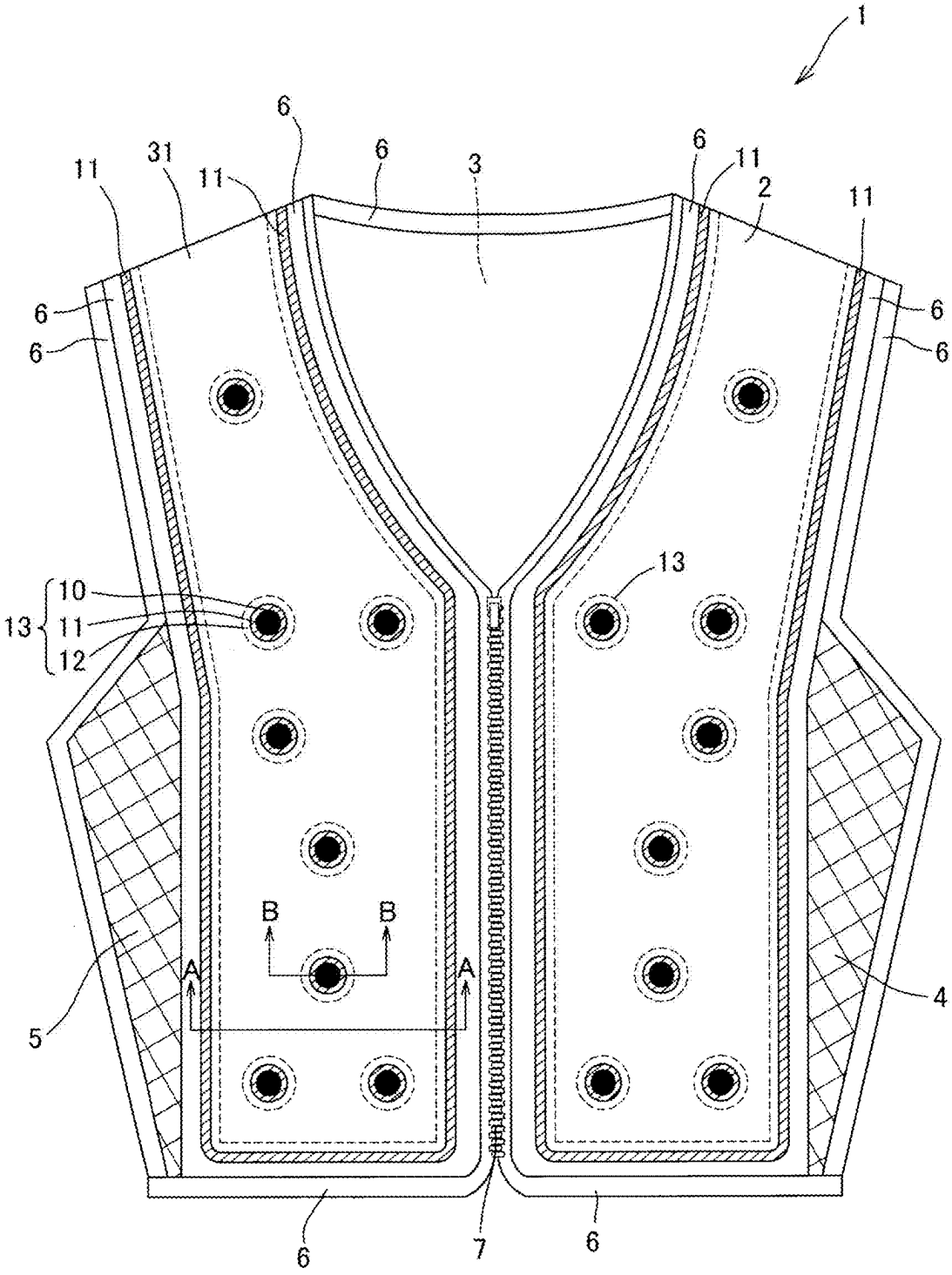


FIG. 1

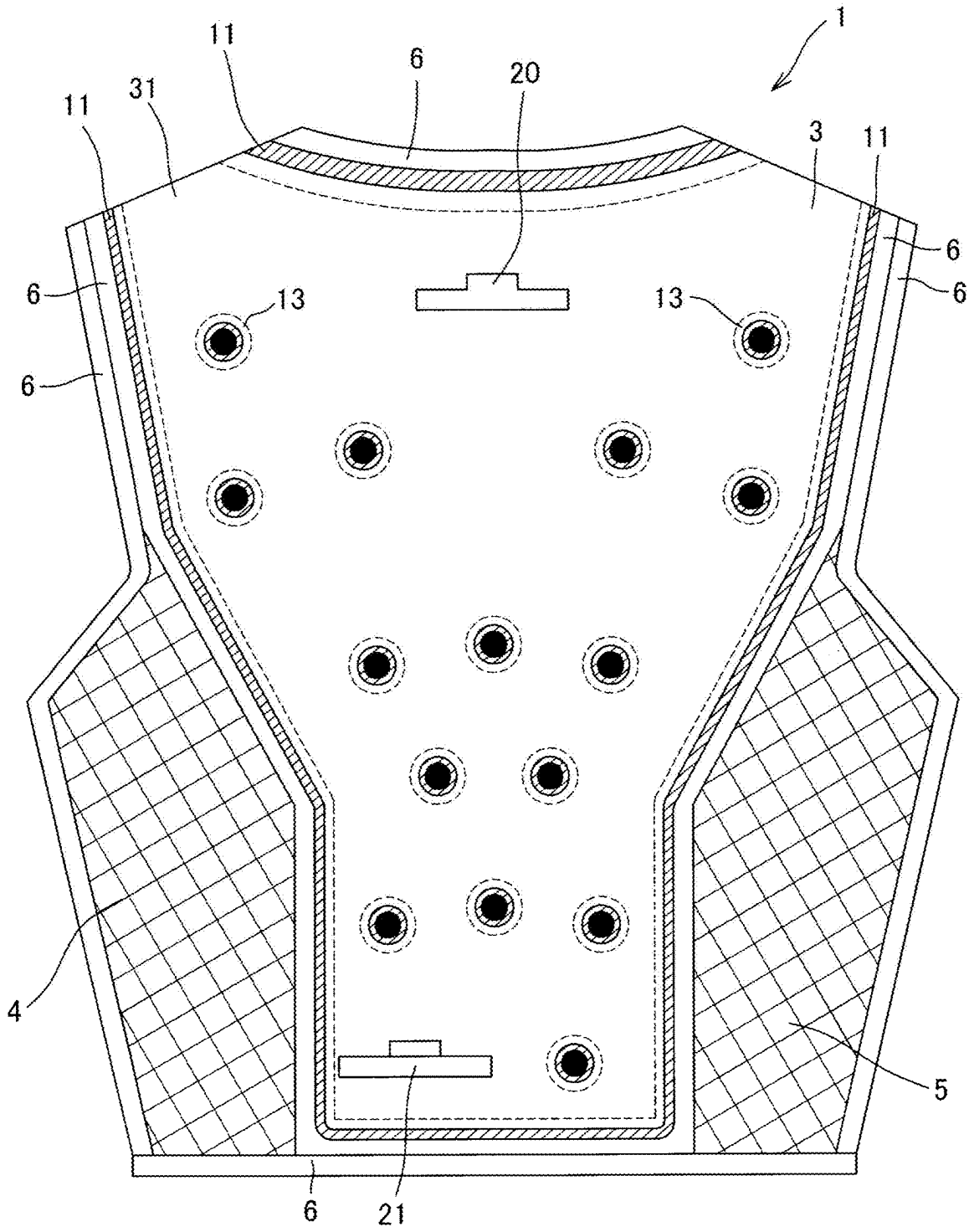


FIG. 2

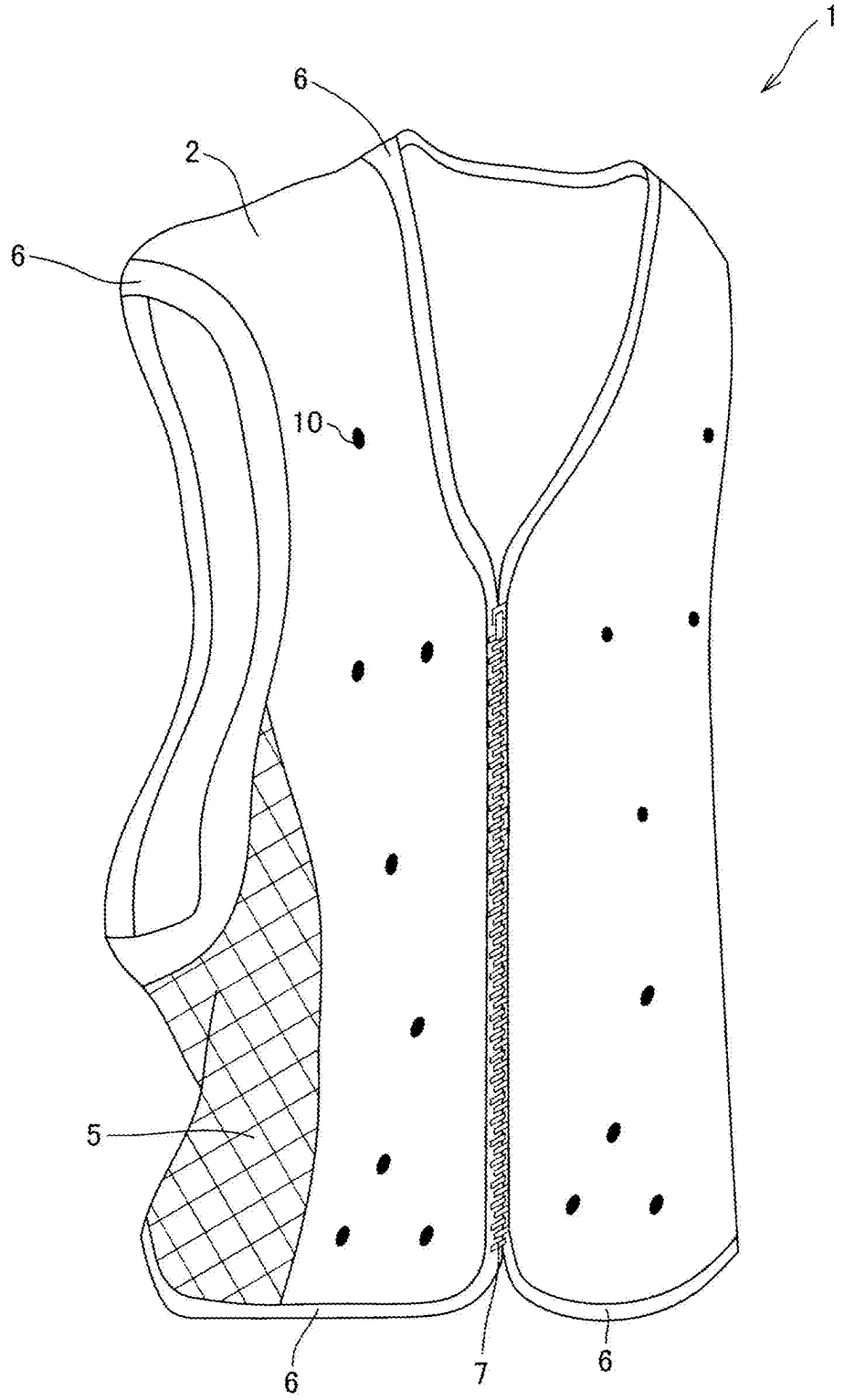


FIG. 3

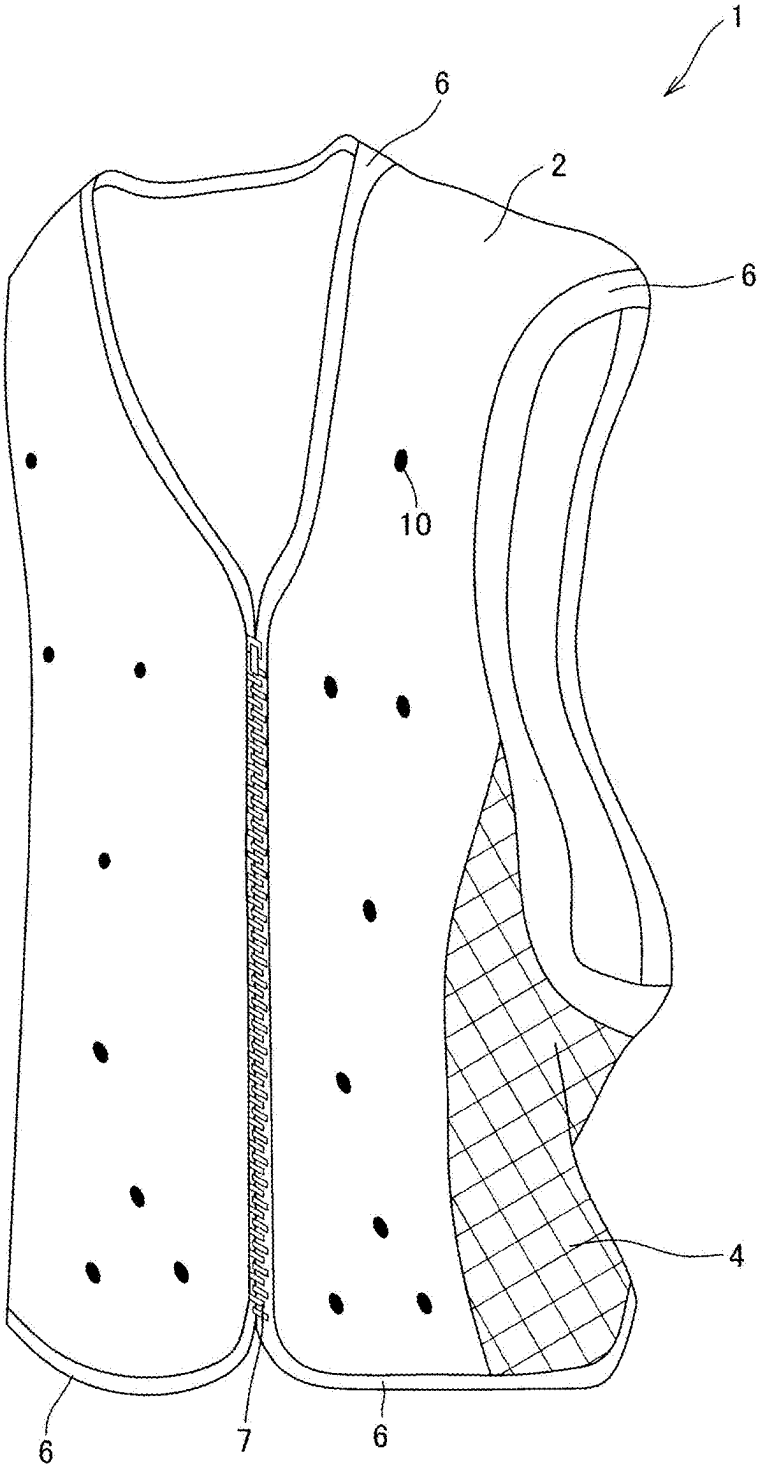


FIG. 4

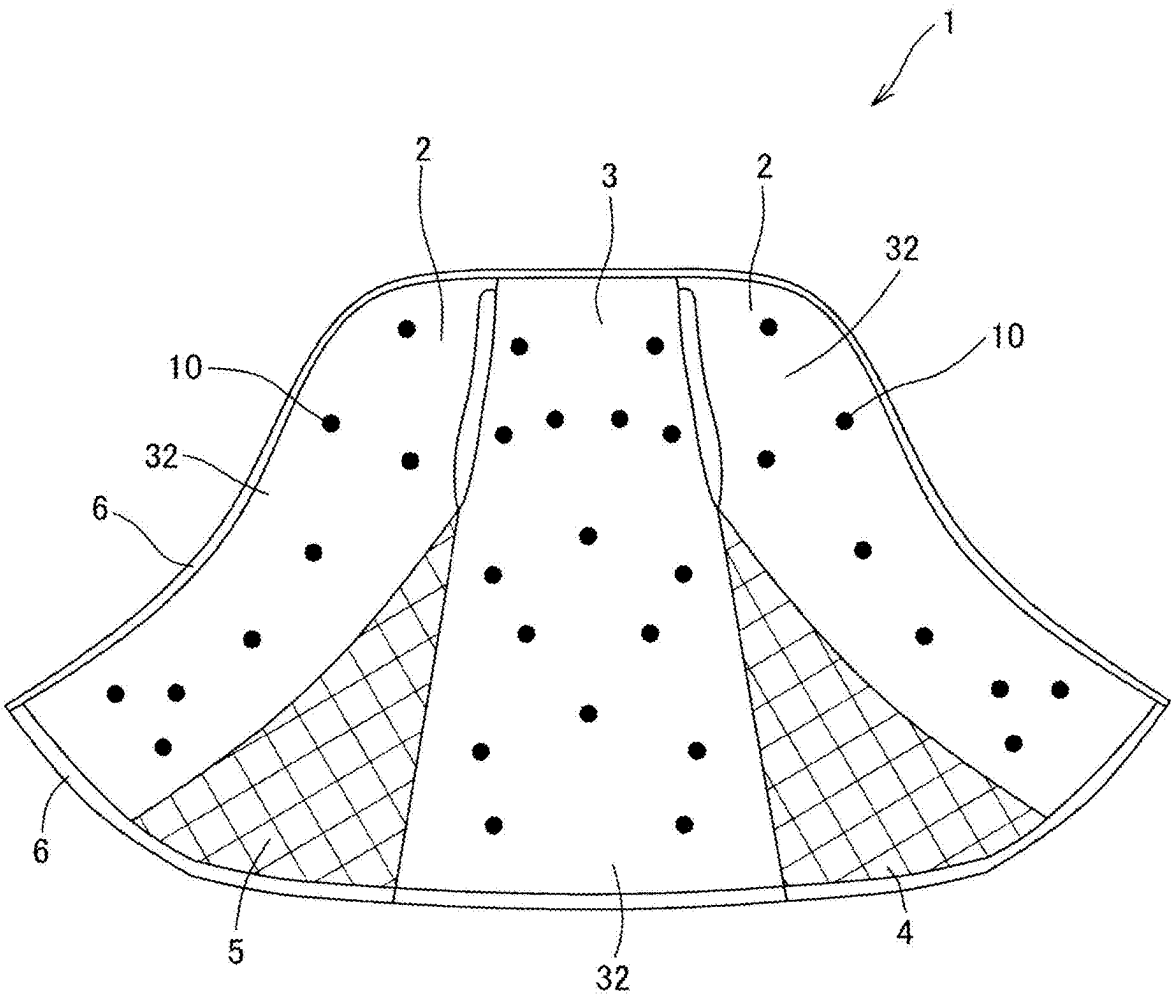


FIG. 5

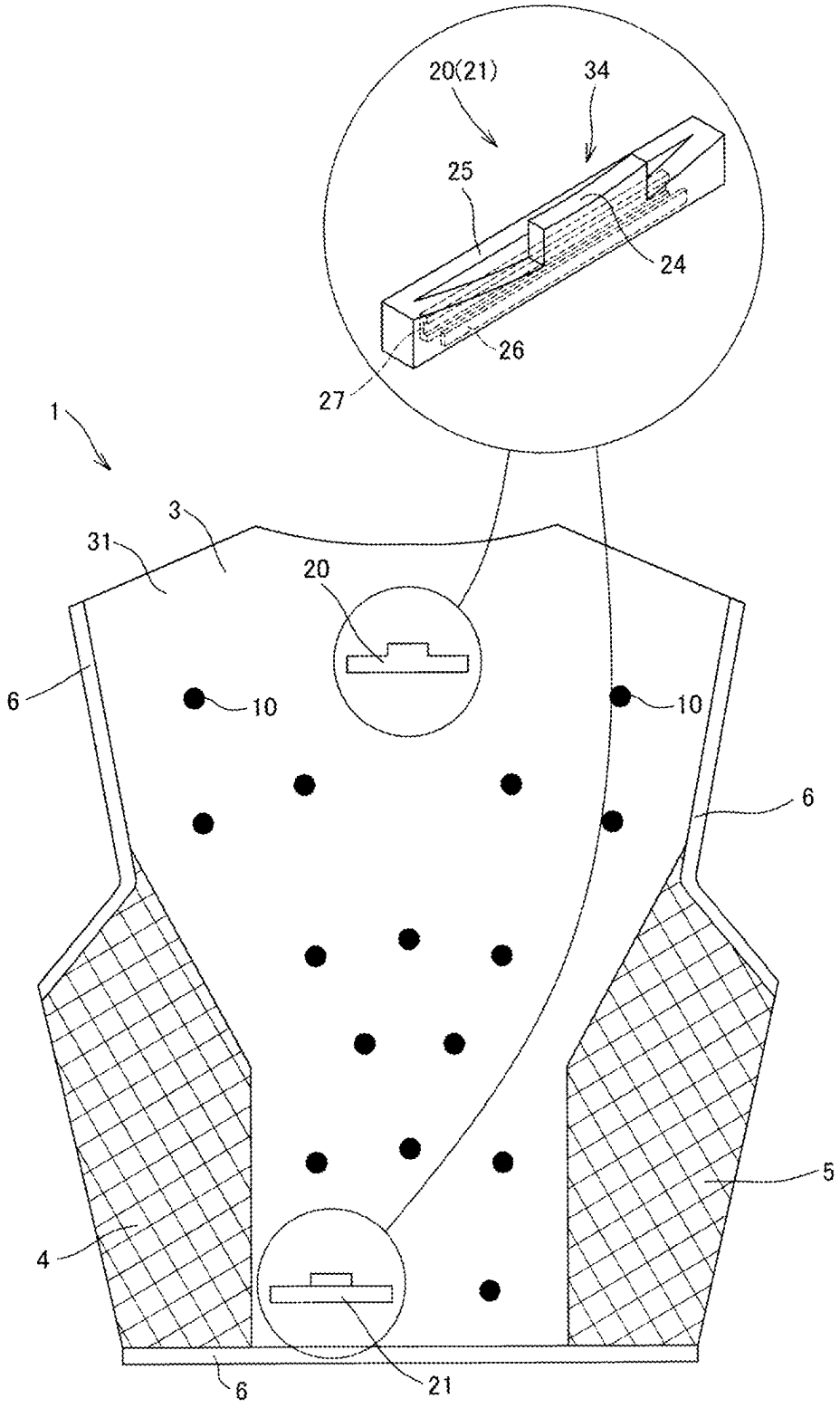


FIG. 6

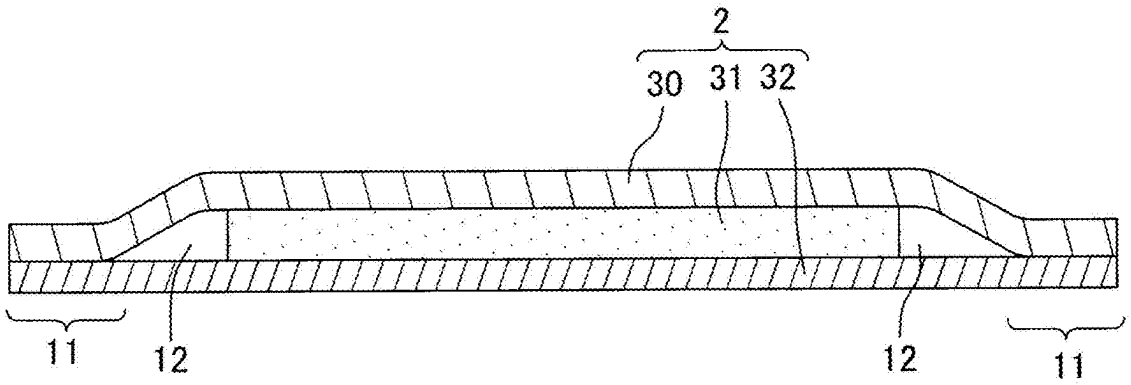


FIG. 7A

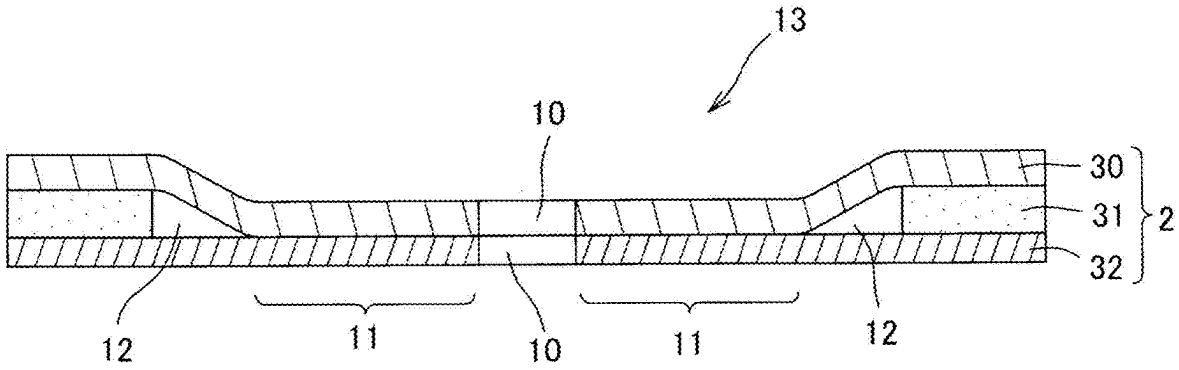


FIG. 7B

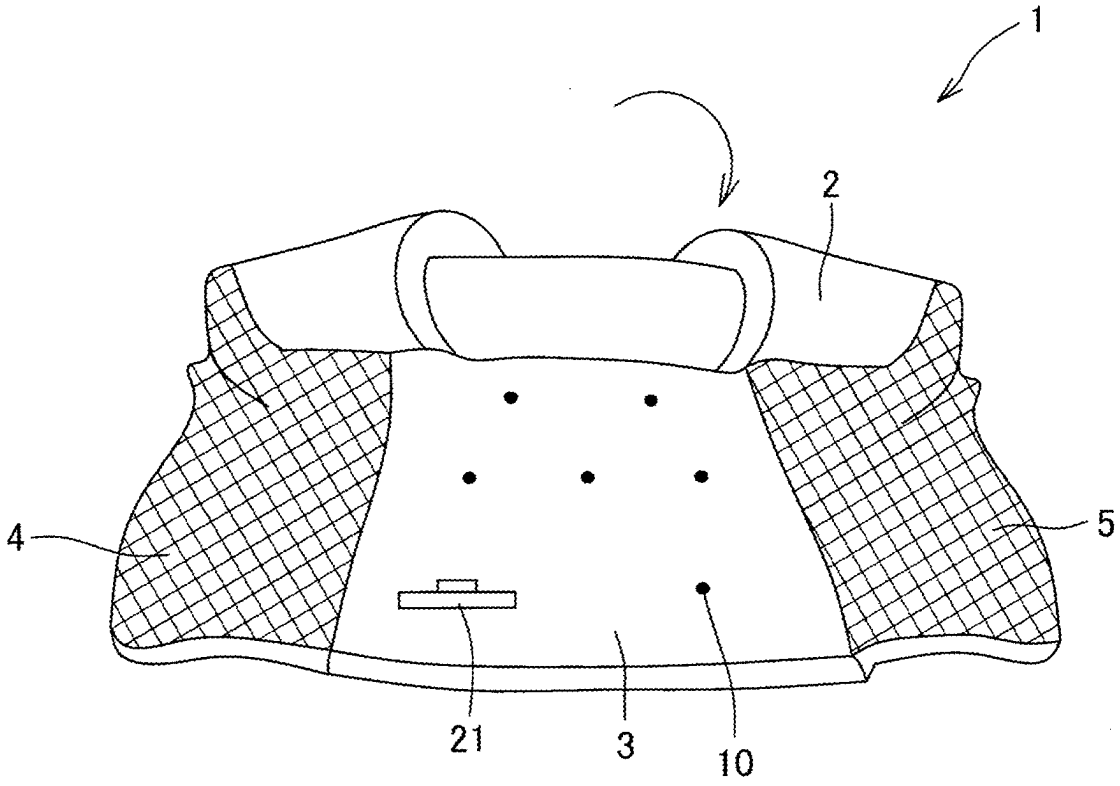


FIG. 8A

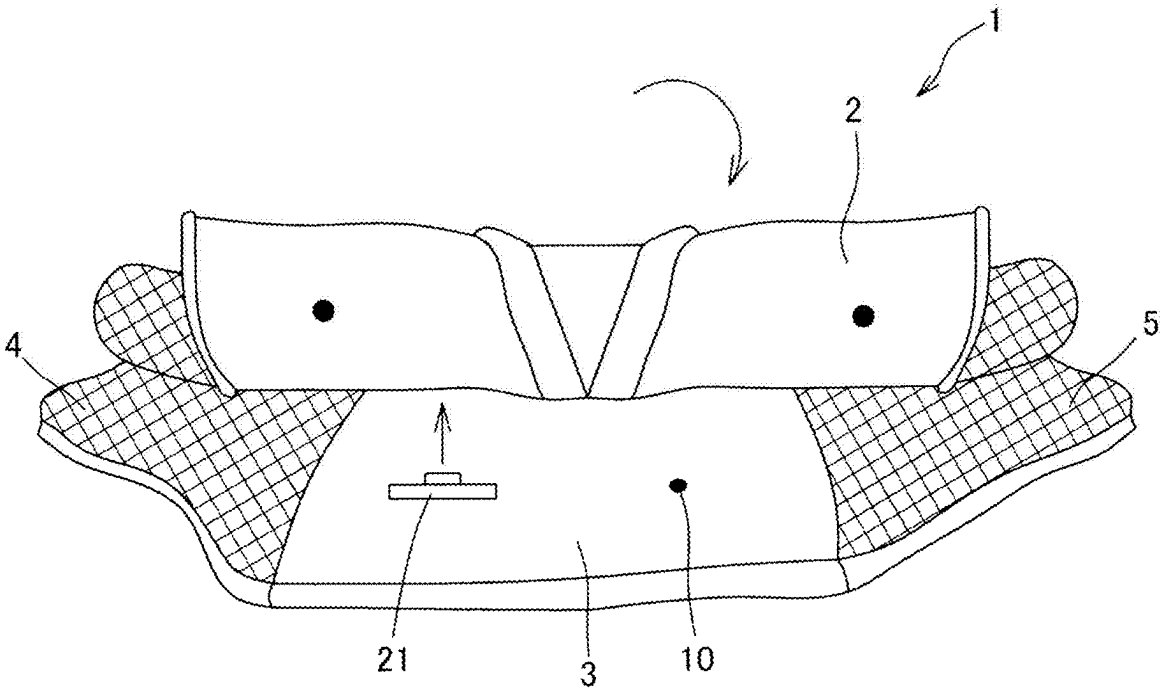


FIG. 8B

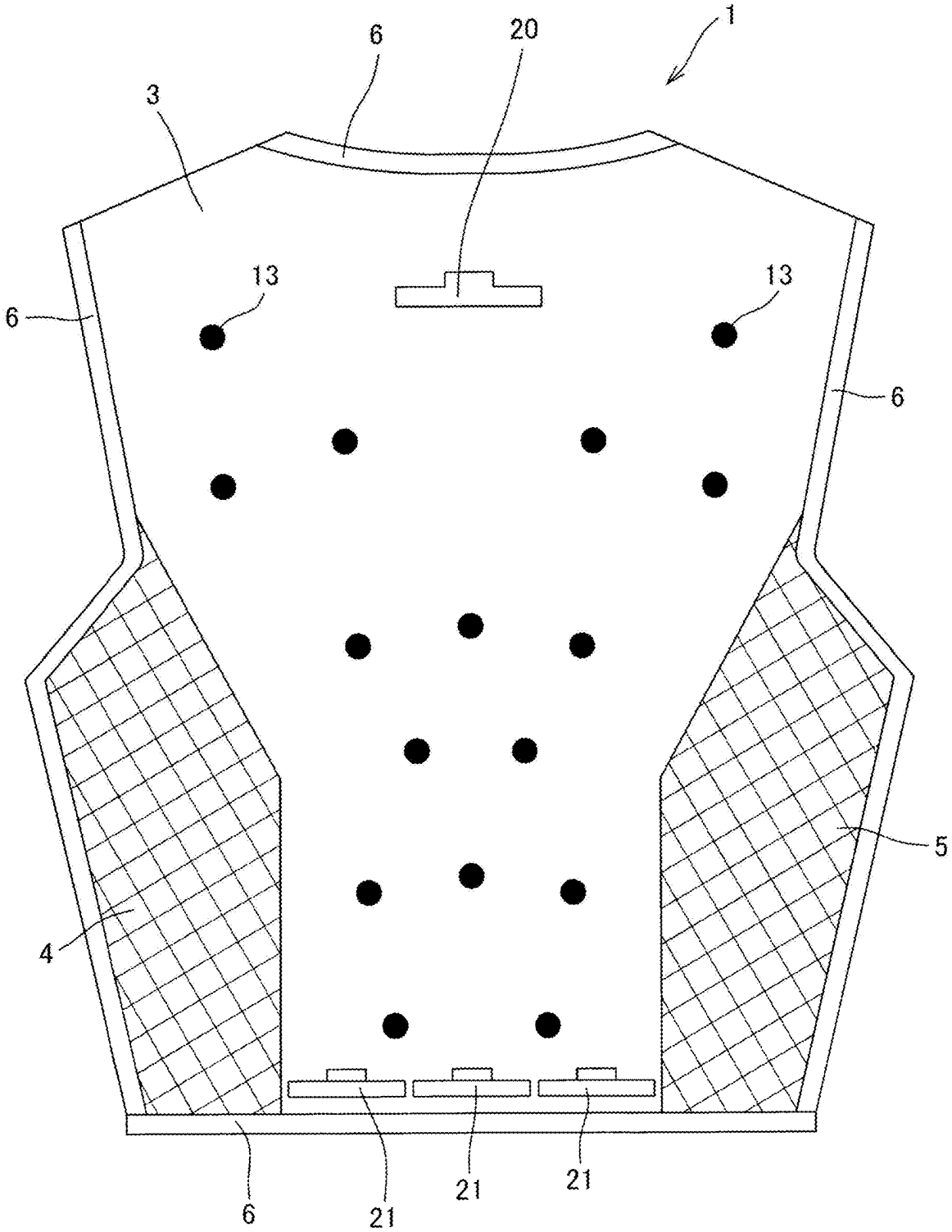


FIG. 9

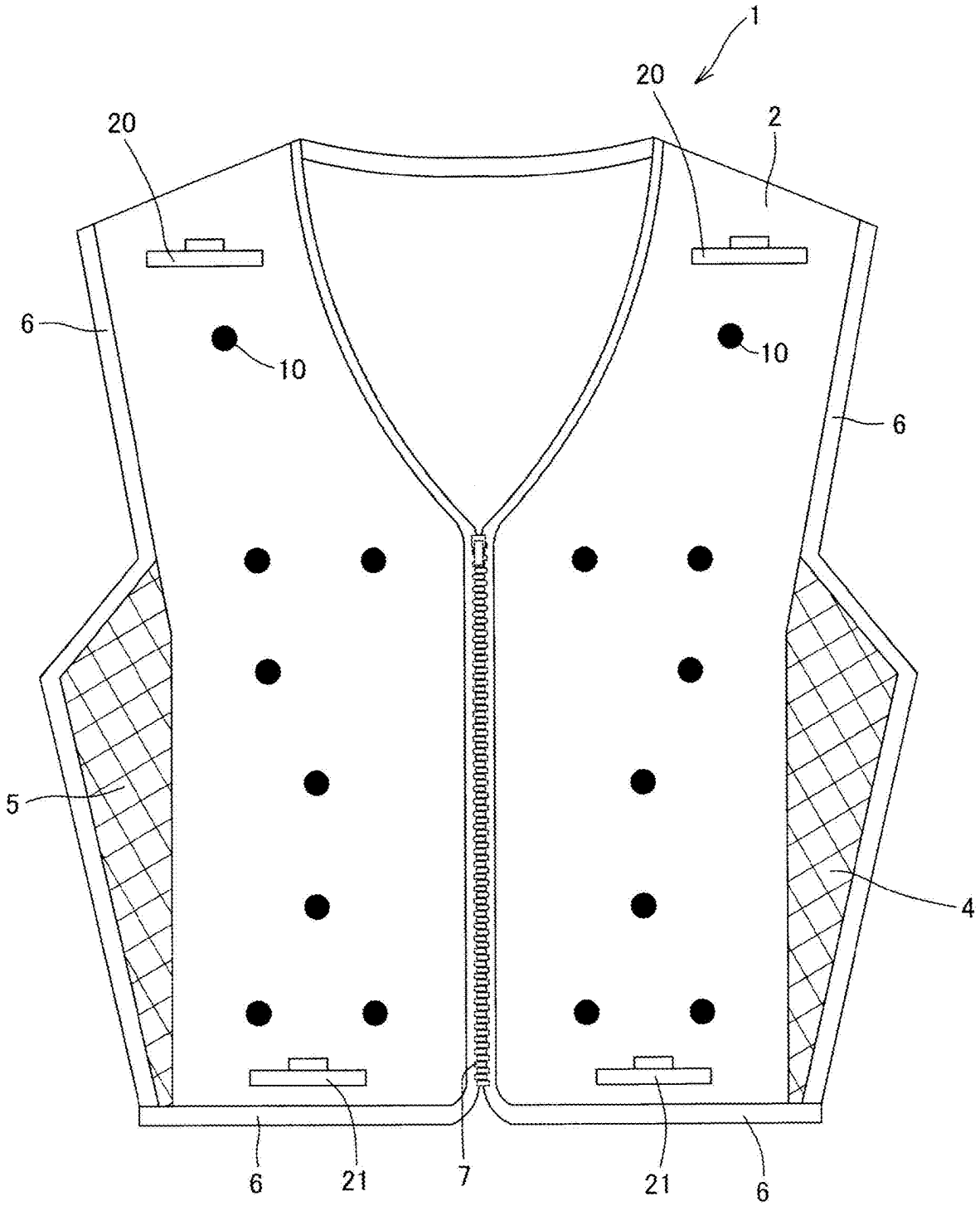


FIG. 10

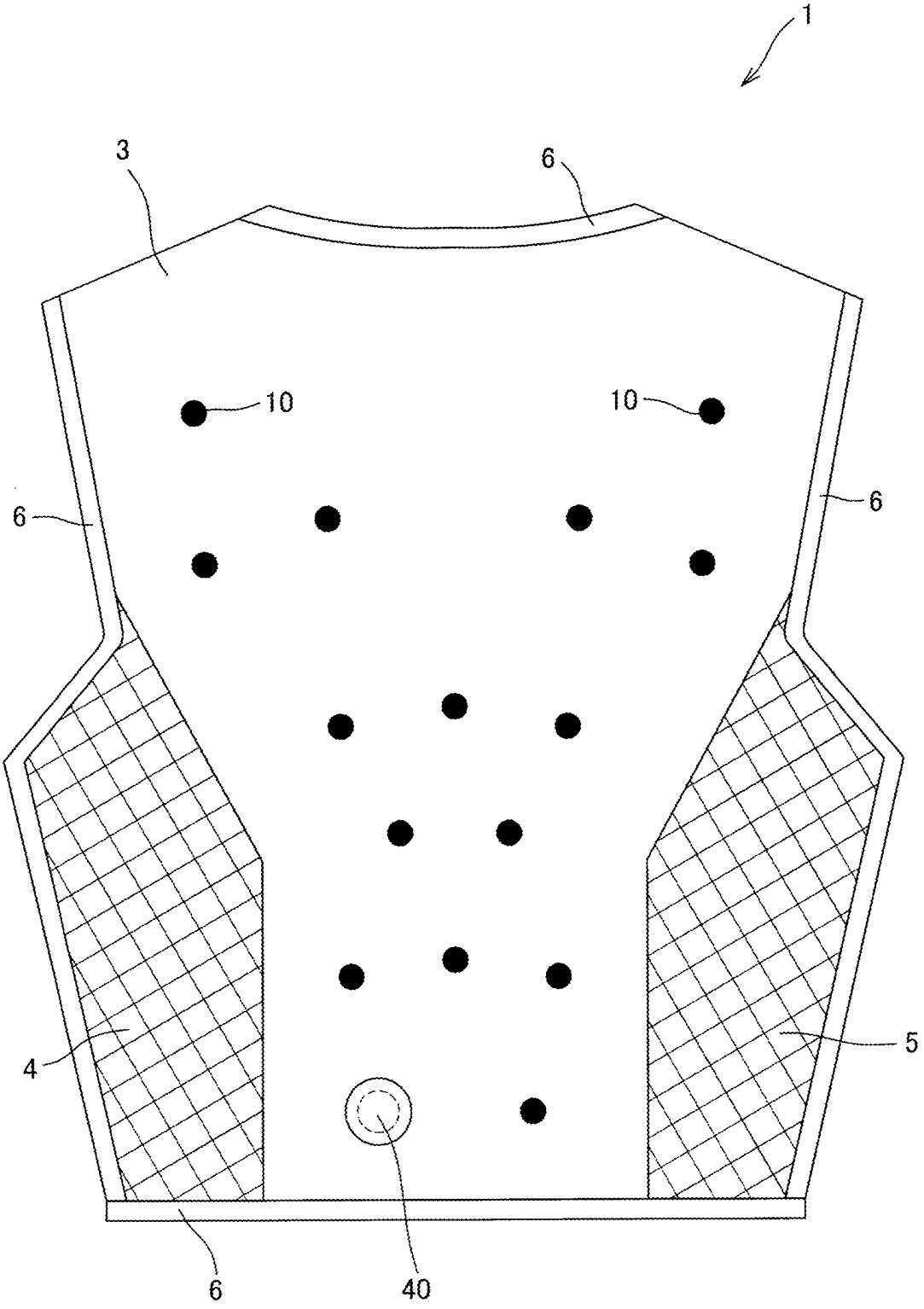


FIG. 11

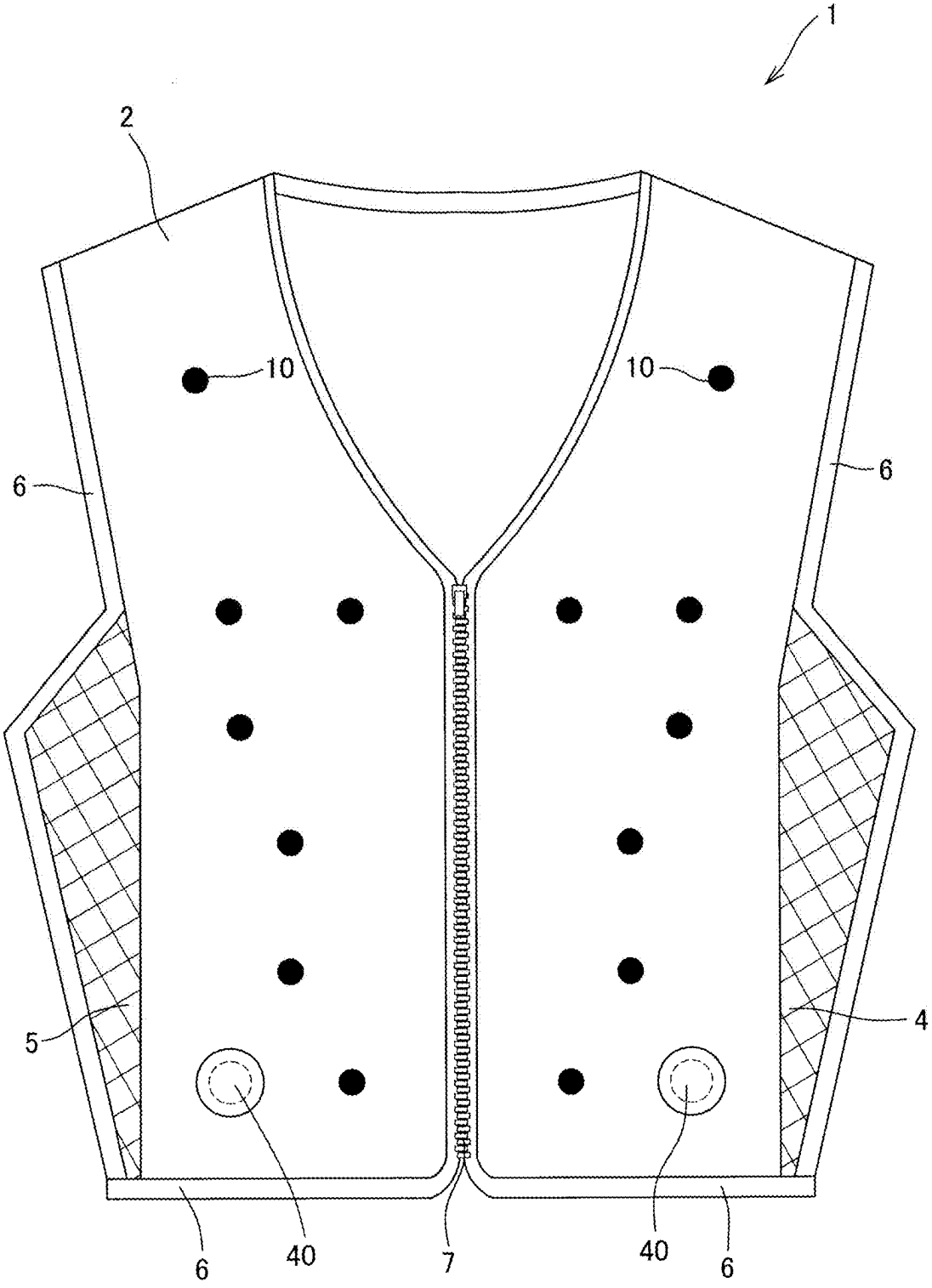


FIG. 12

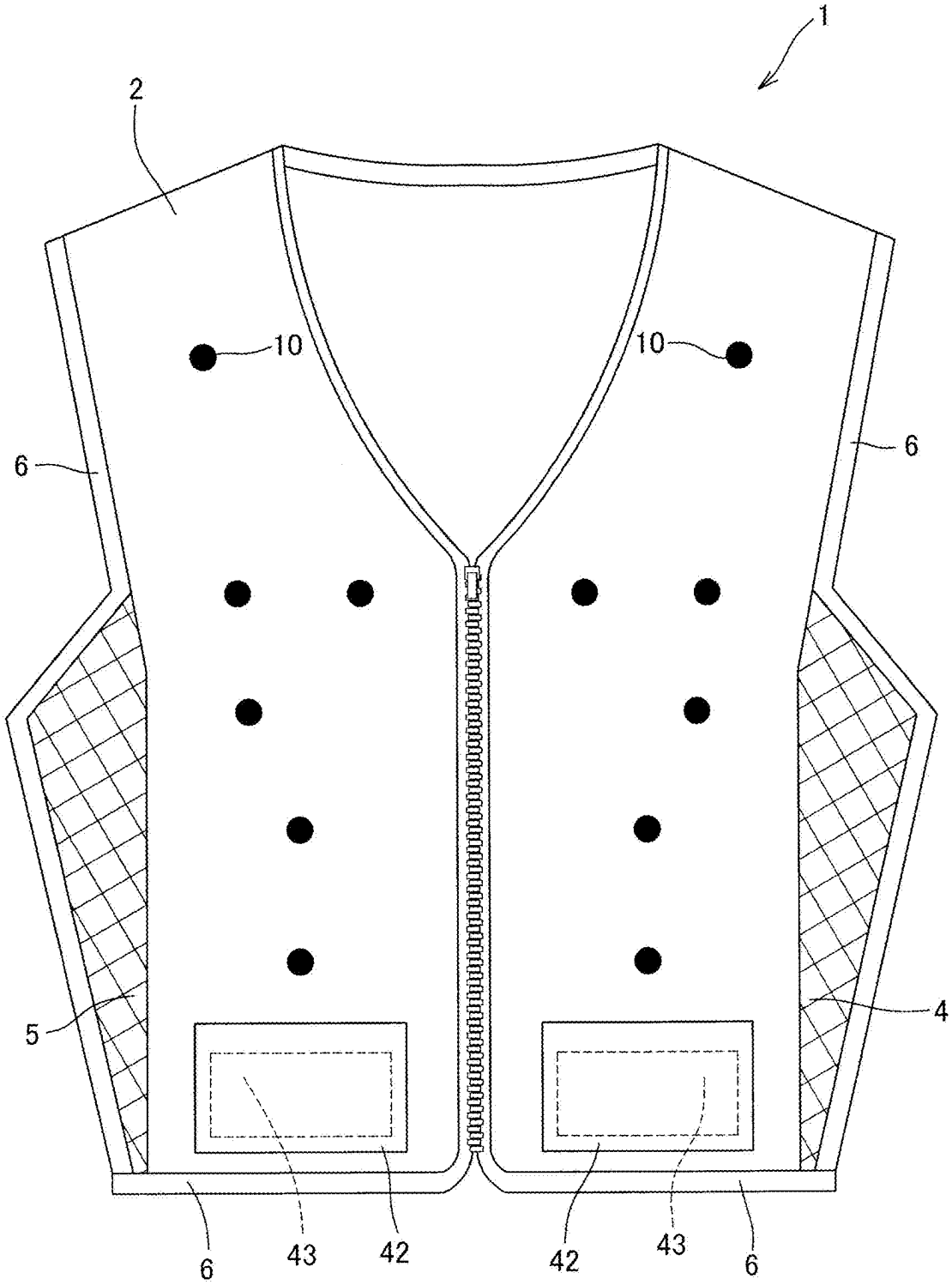


FIG. 13

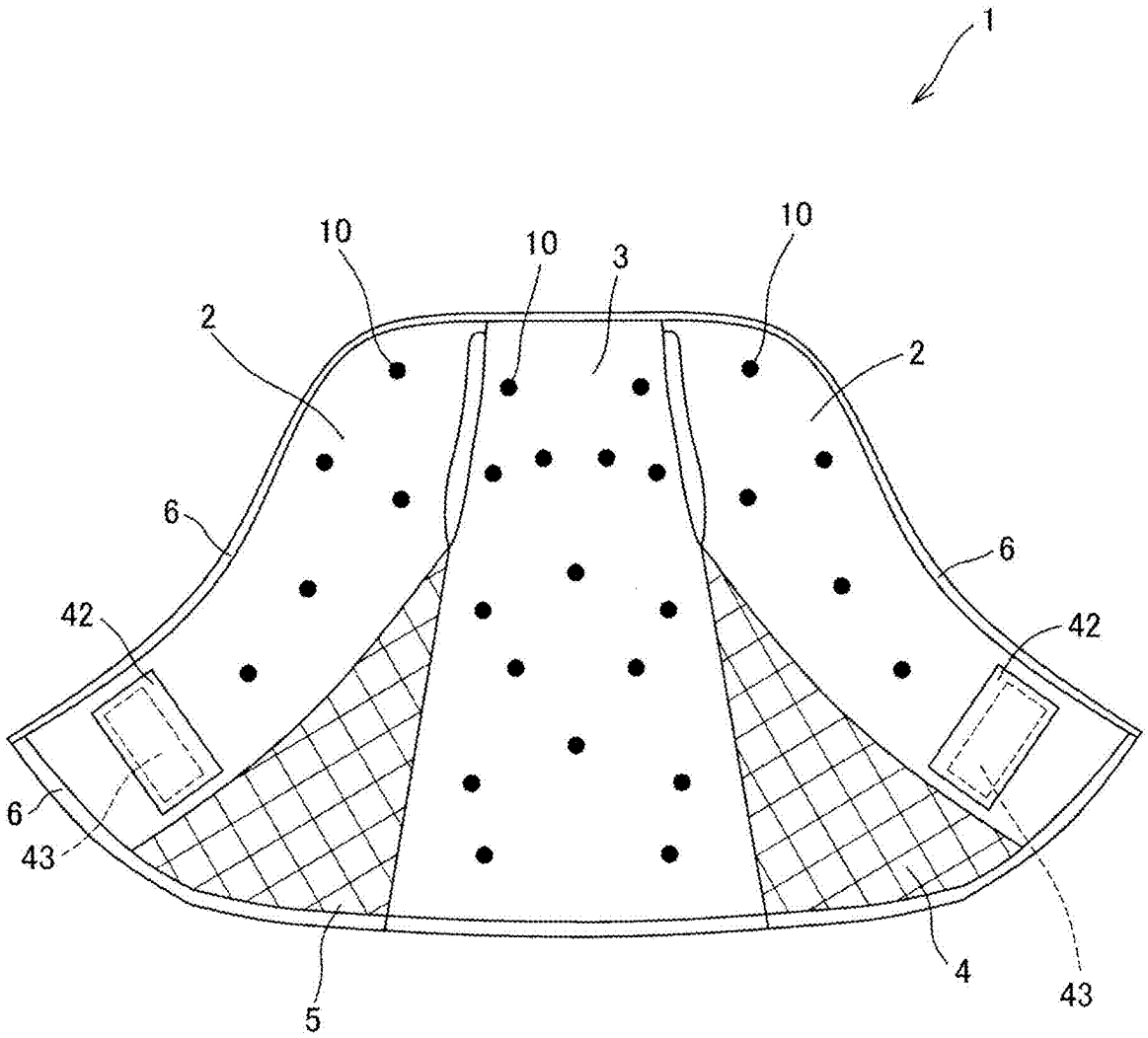


FIG. 14

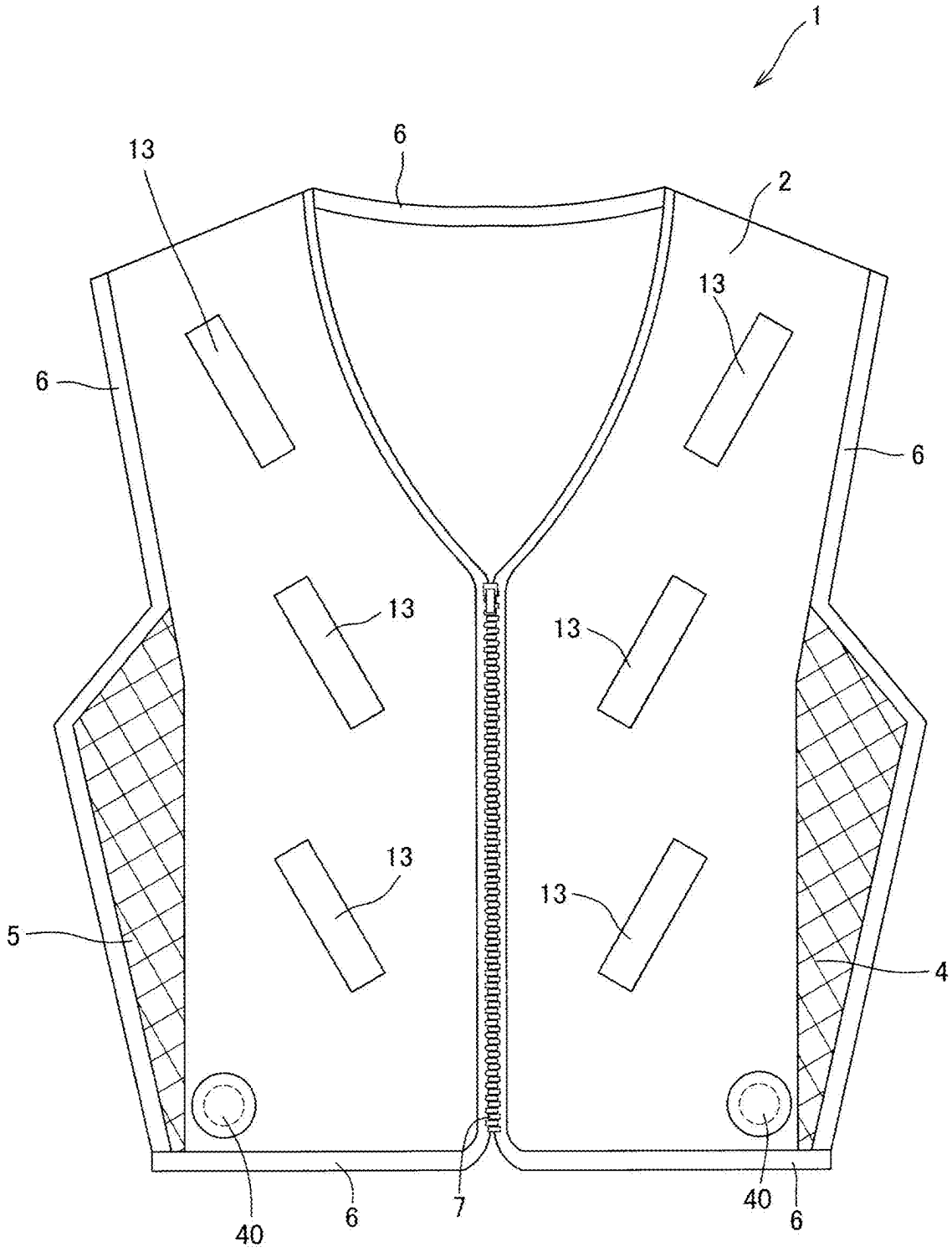


FIG. 15

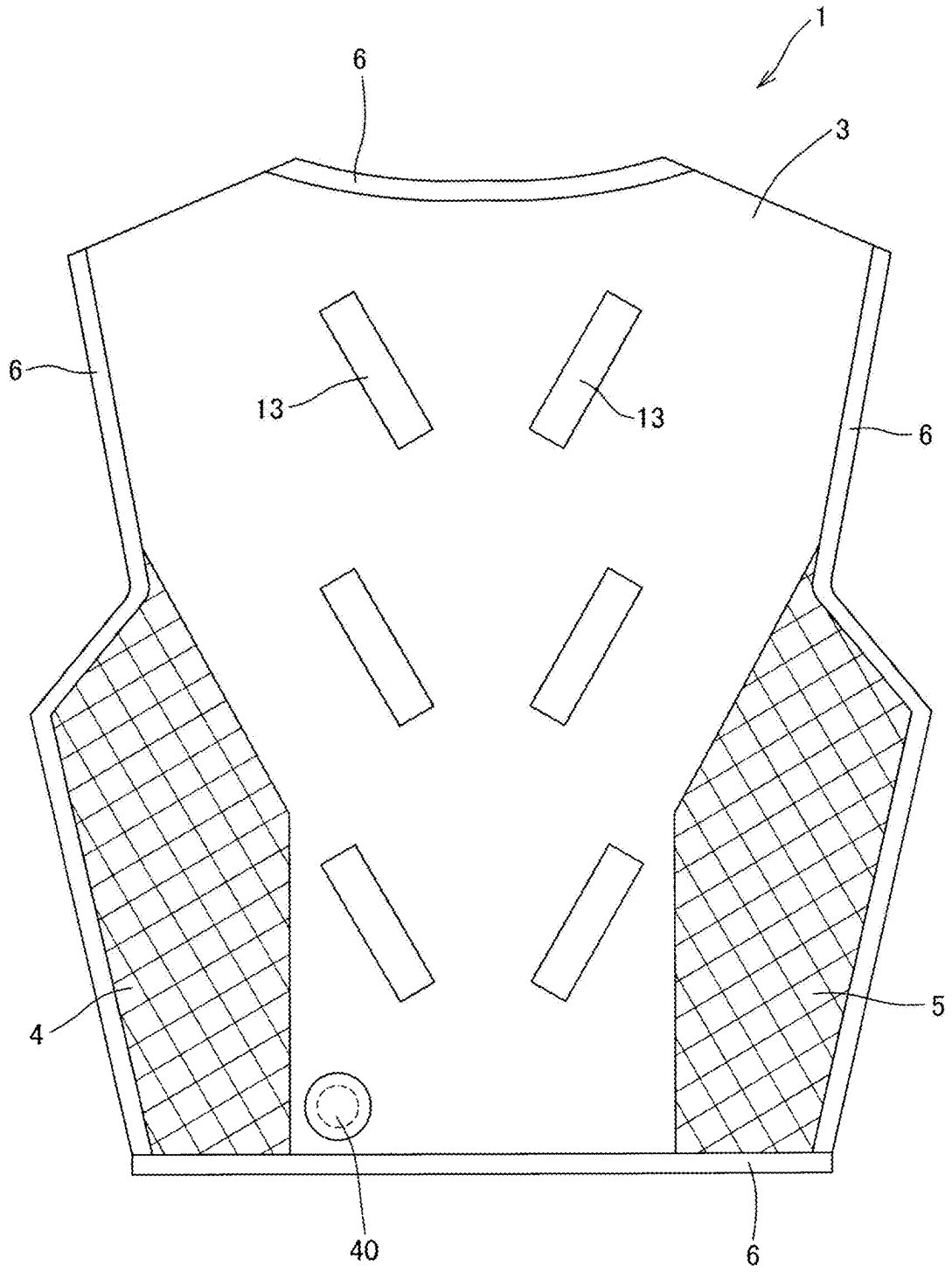


FIG. 16

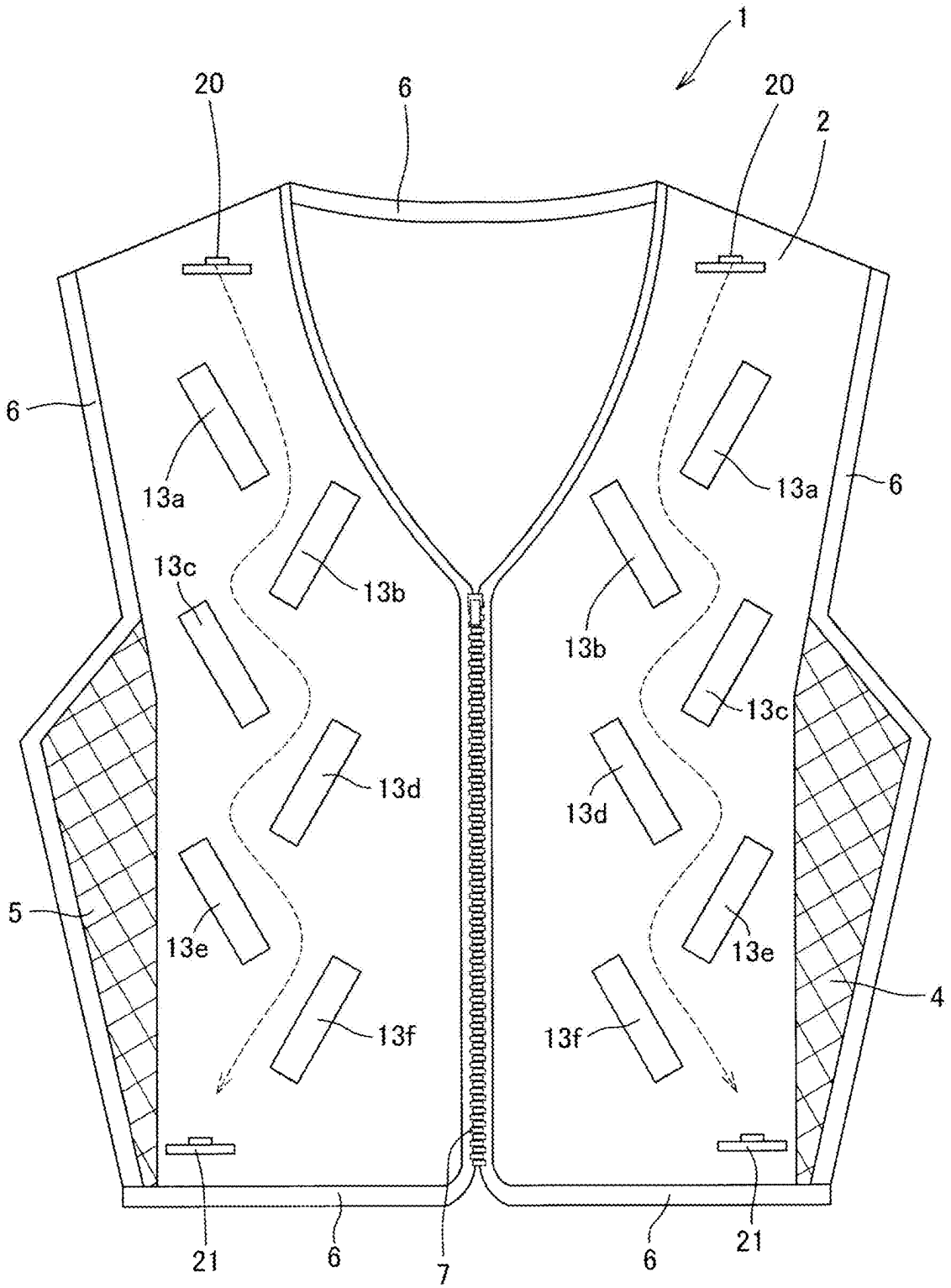

1
20
6
20
2
6
13a
13a
6
13c
13b
13b
13c
13d
13d
5
13e
13e
4
13f
13f
21
6
7
6
21

FIG. 17

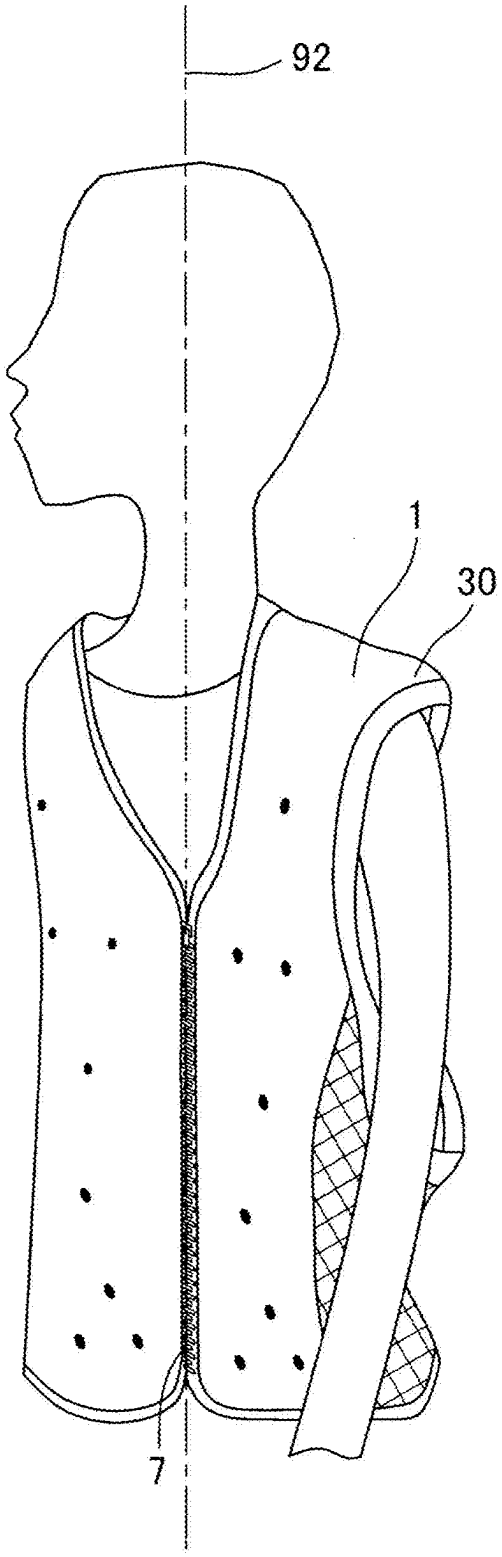


FIG 18A

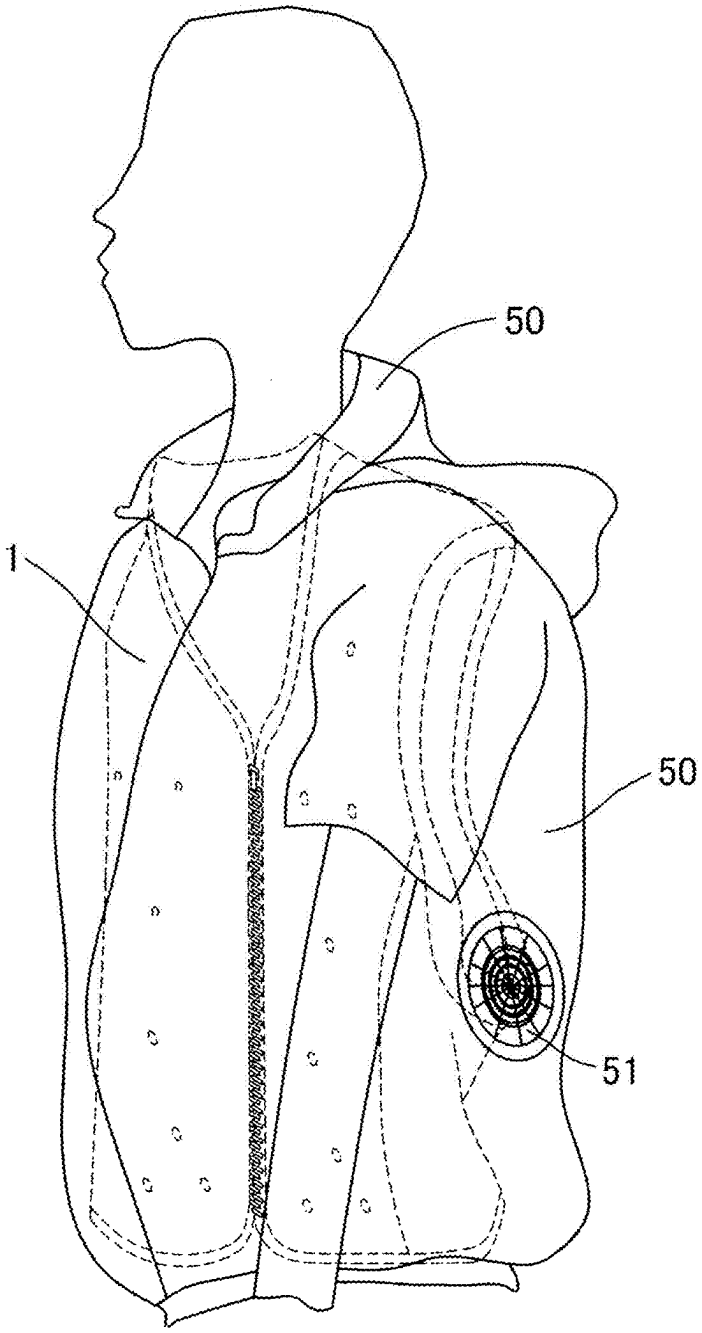


FIG. 18B

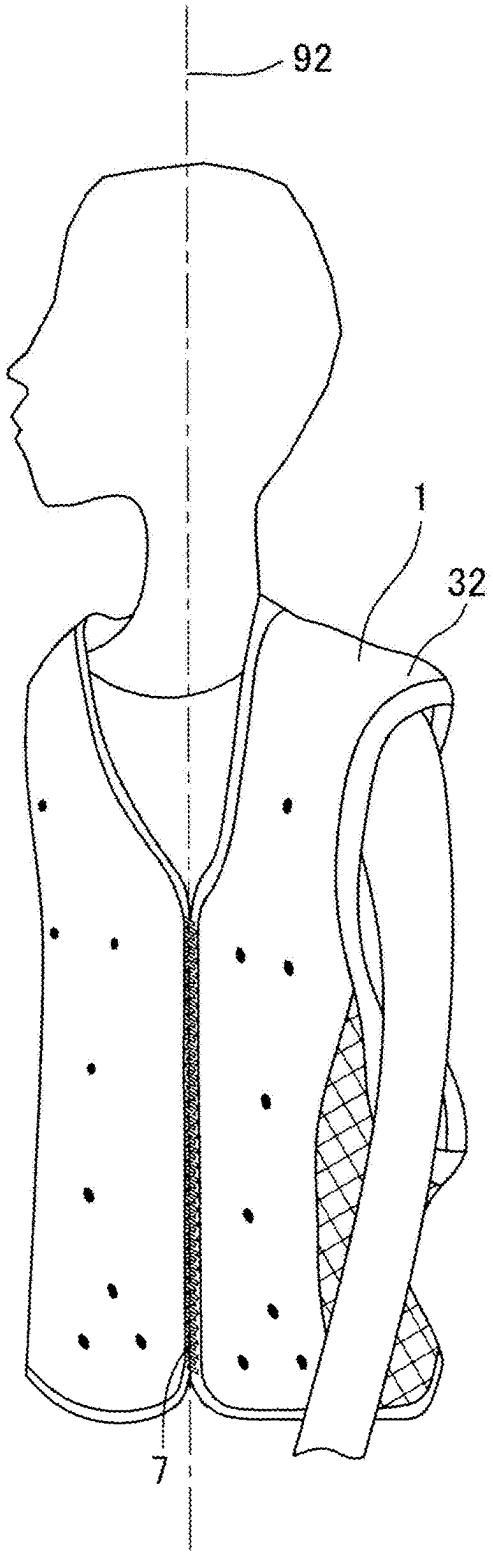


FIG. 19A

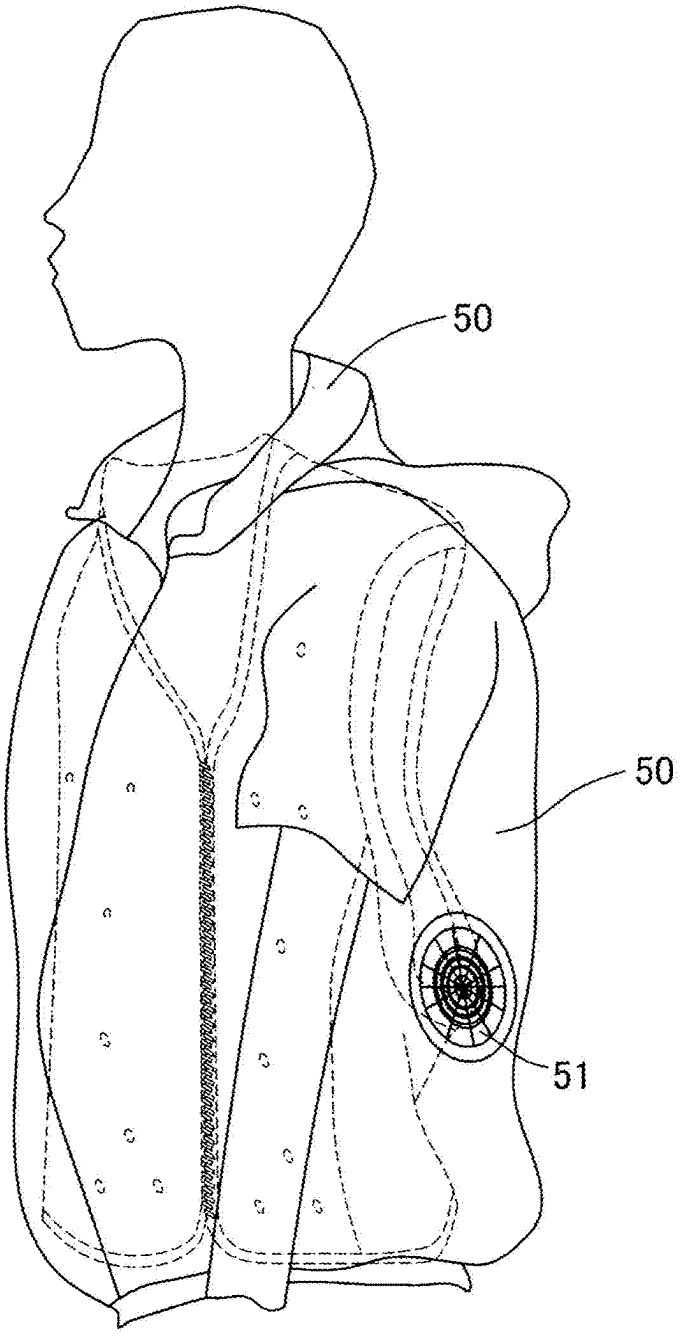


FIG. 19B

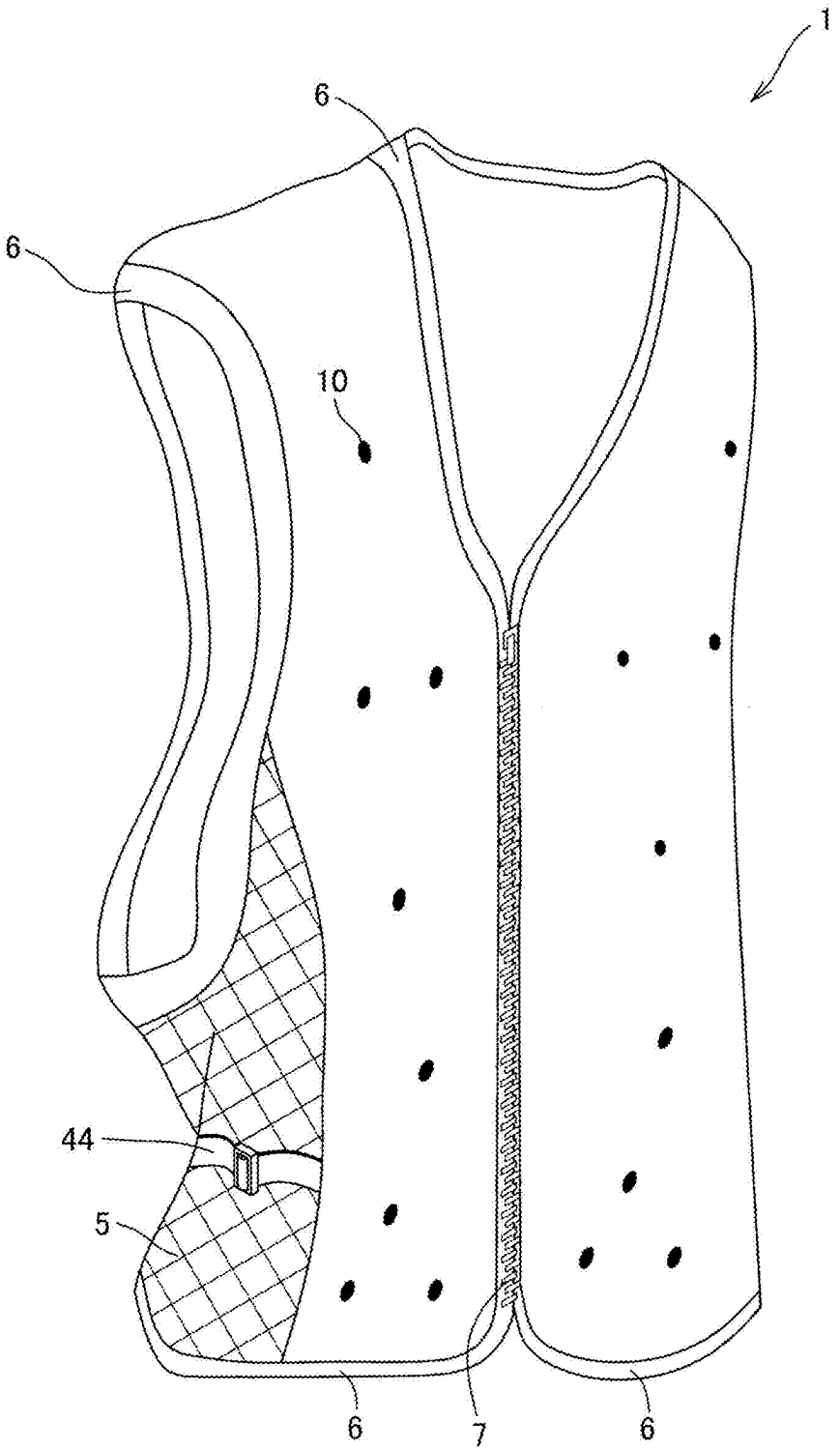


FIG. 20

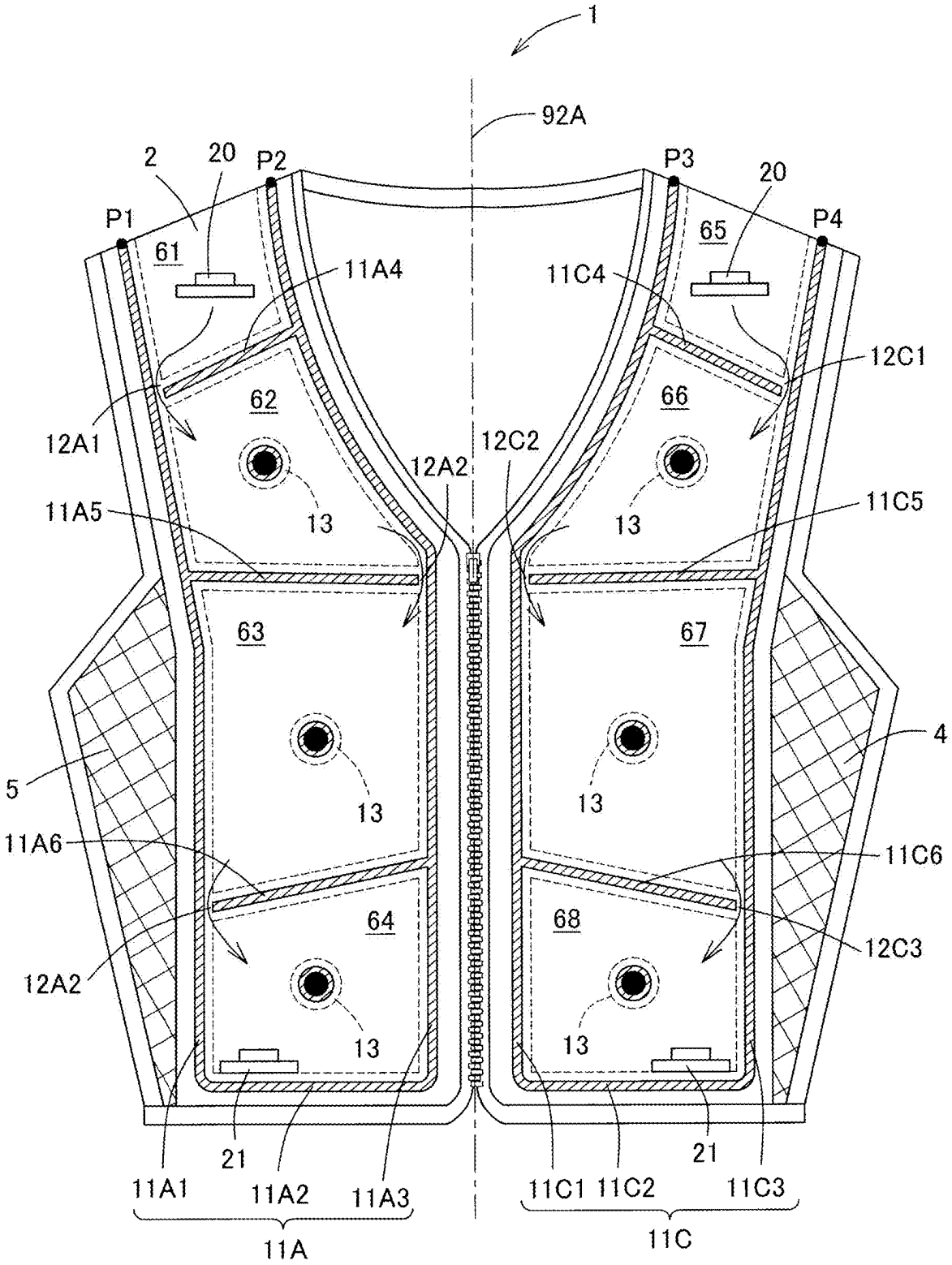

1
92A
2
20
P2
P3
20
P1
P4
61
65
11A4
11C4
12C1
62
66
12A1
12C2
12A2
13
13
11A5
11C5
63
67
13
13
4
5
13
11A6
11C6
64
68
12C3
12A2
13
13
21
21
11A1
11A2
11A3
11C1
11C2
11C3
11A
11C

FIG. 21

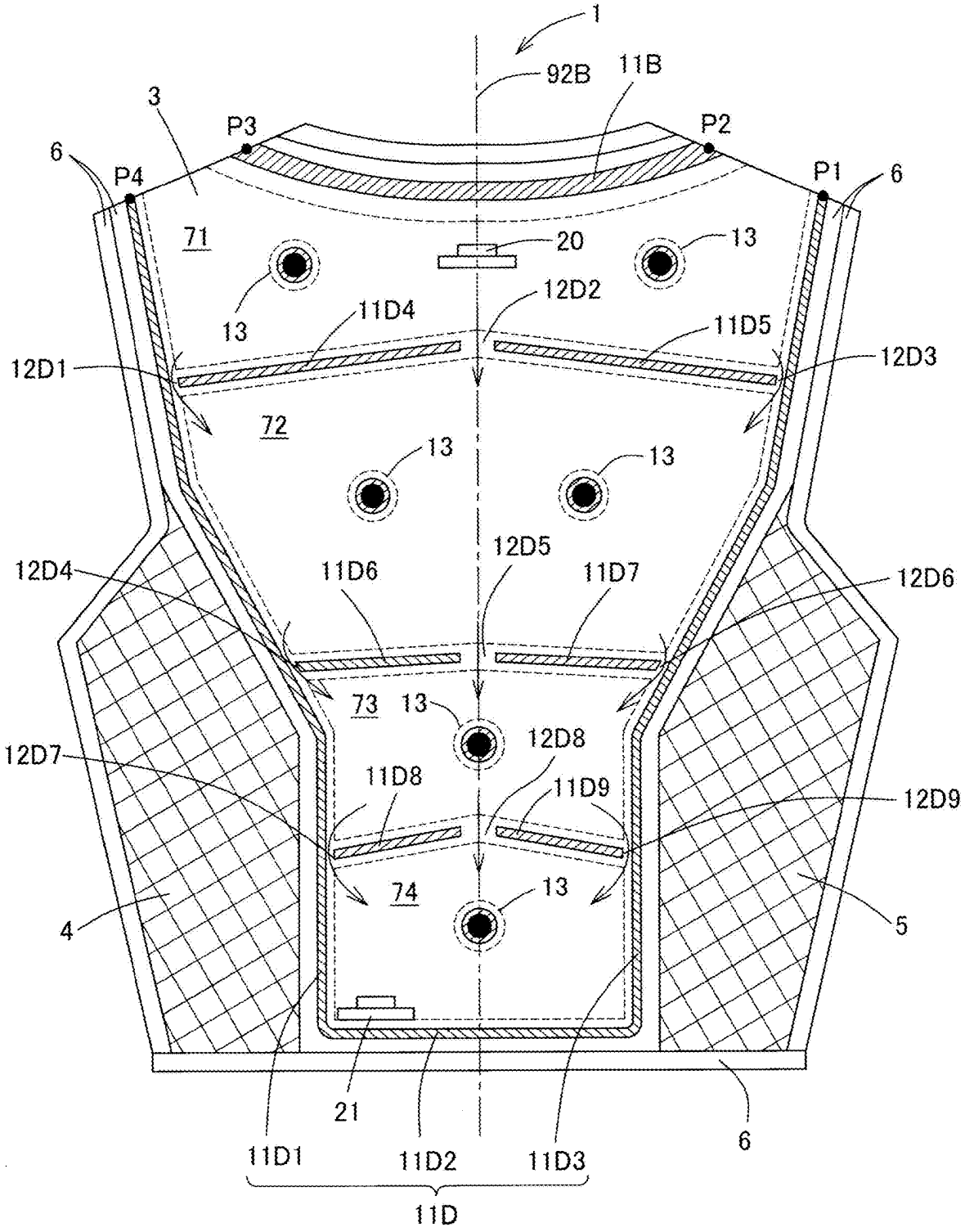

1
92B
11B
3
P3
P2
6
P4
P1
6
71
20
13
13
12D2
11D4
11D5
12D1
12D3
72
13
13
12D5
12D4
11D6
11D7
12D6
73
13
12D8
12D7
11D8
11D9
12D9
74
13
4
5
21
6
11D1
11D2
11D3
11D

FIG. 22

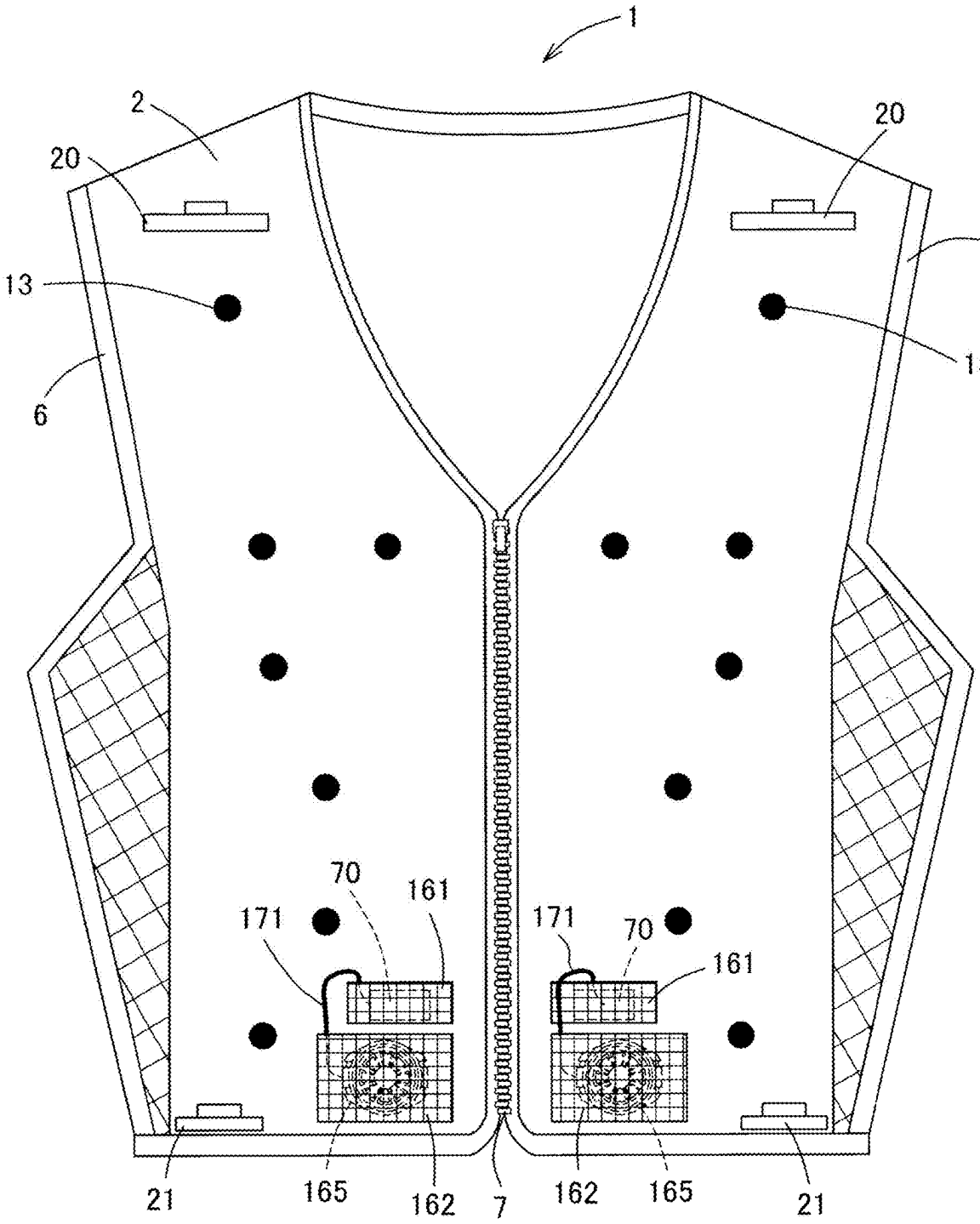


FIG. 23

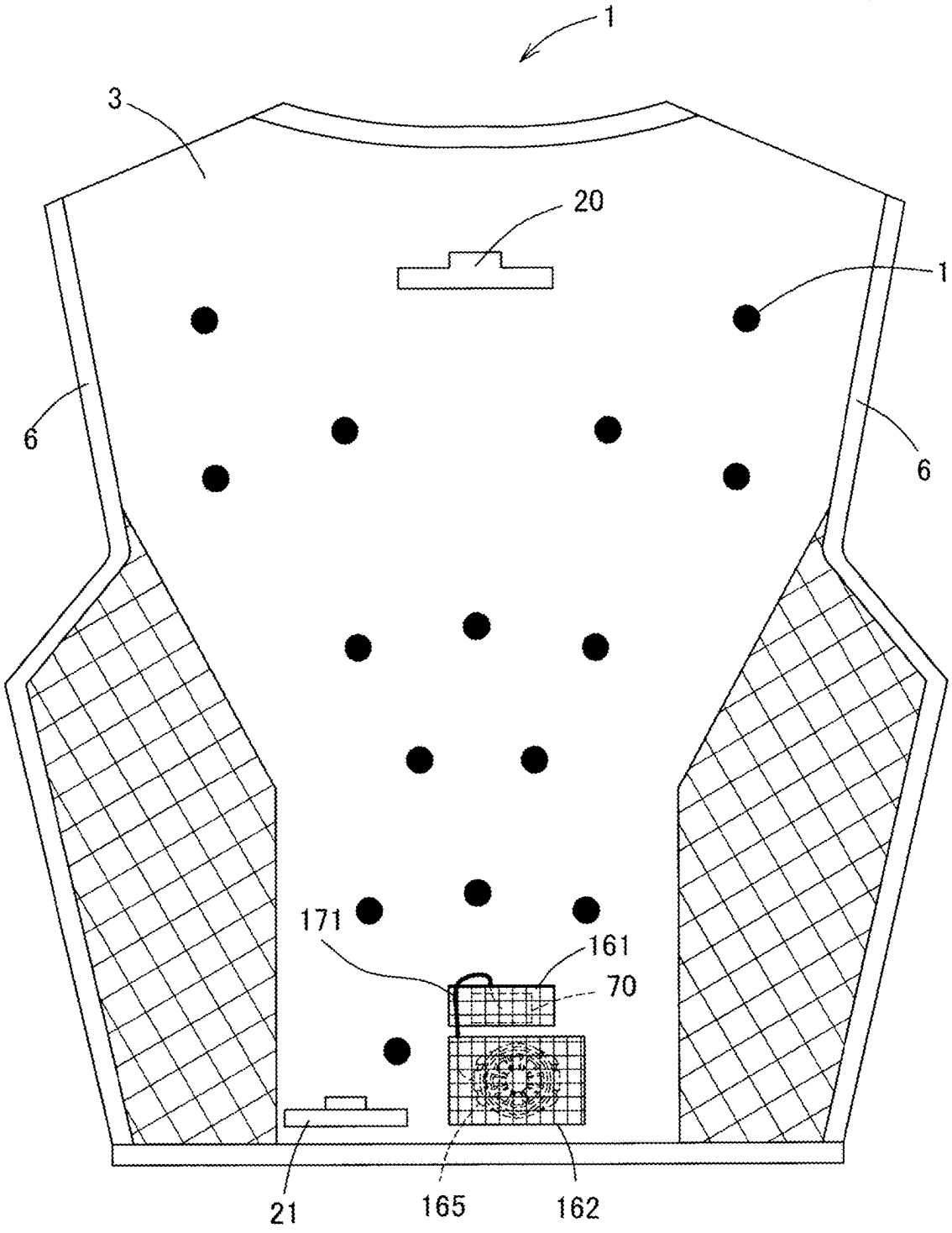


FIG. 24

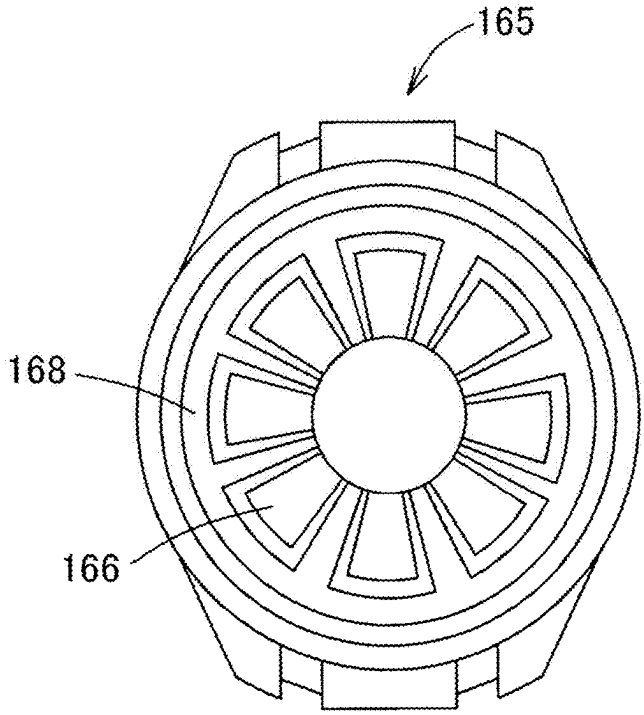


FIG. 25A

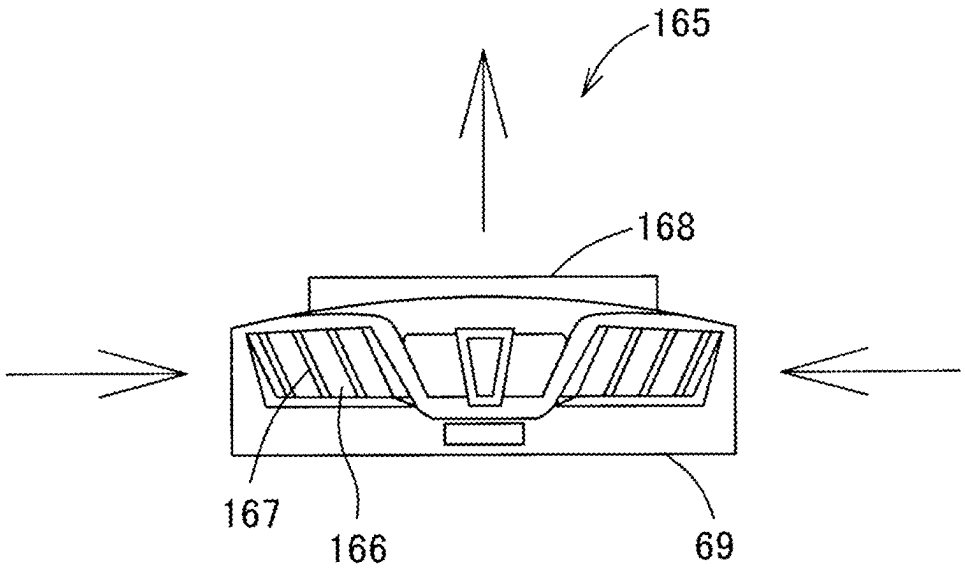


FIG. 25B

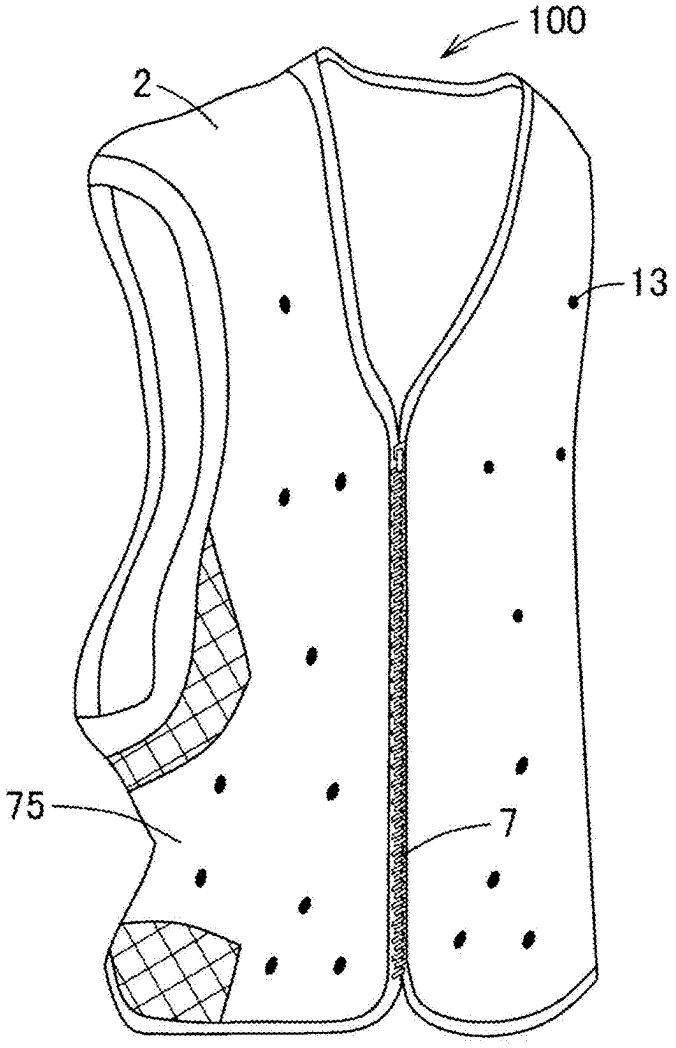


FIG. 26A

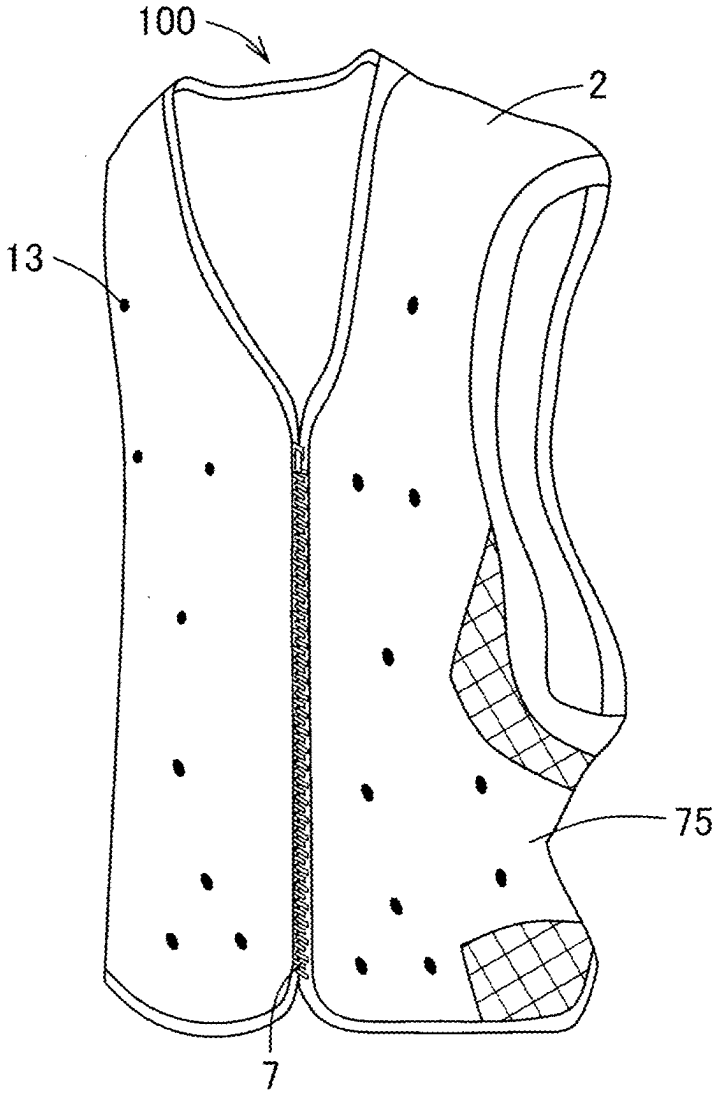


FIG. 26B

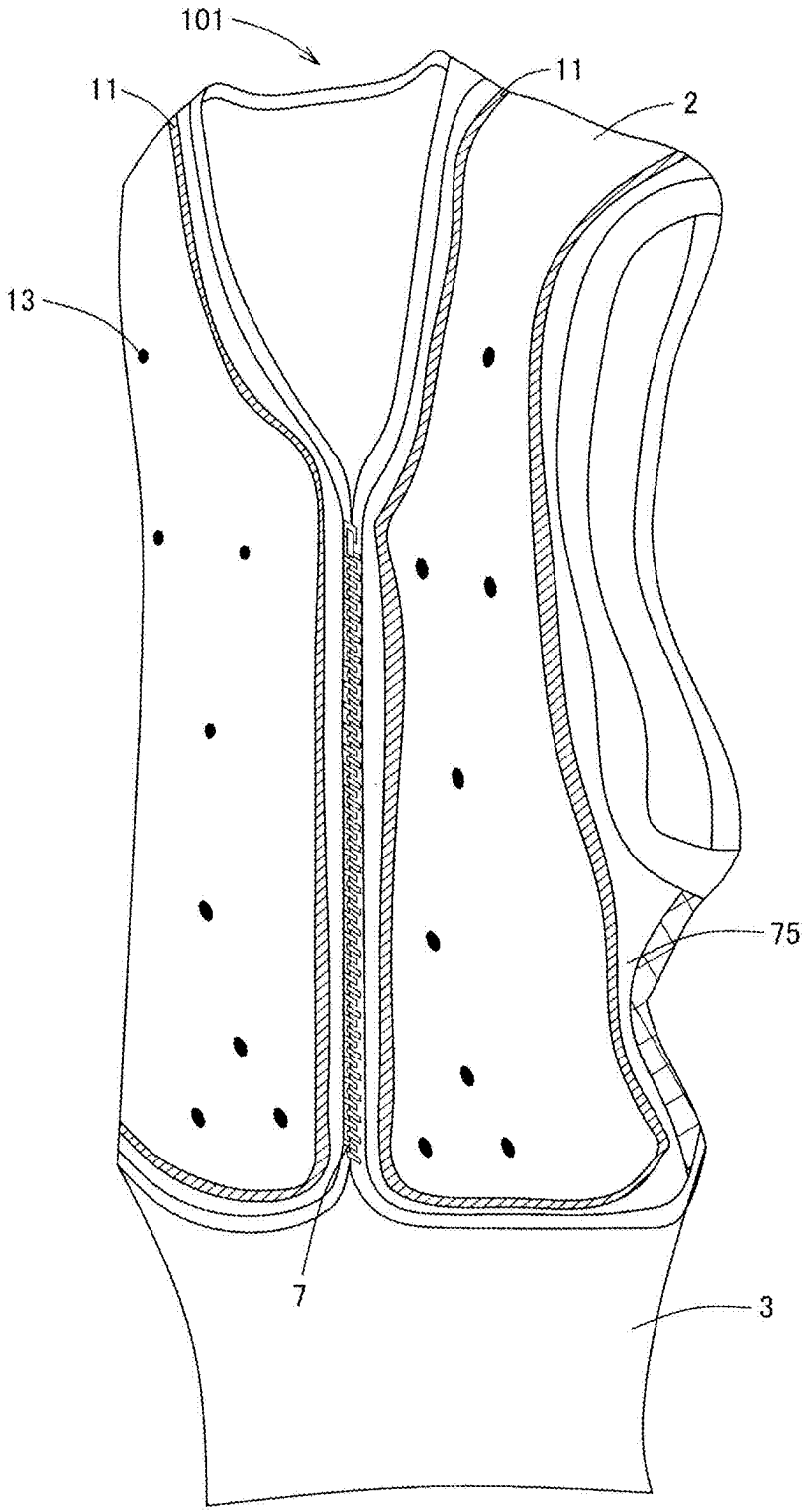


FIG. 27A

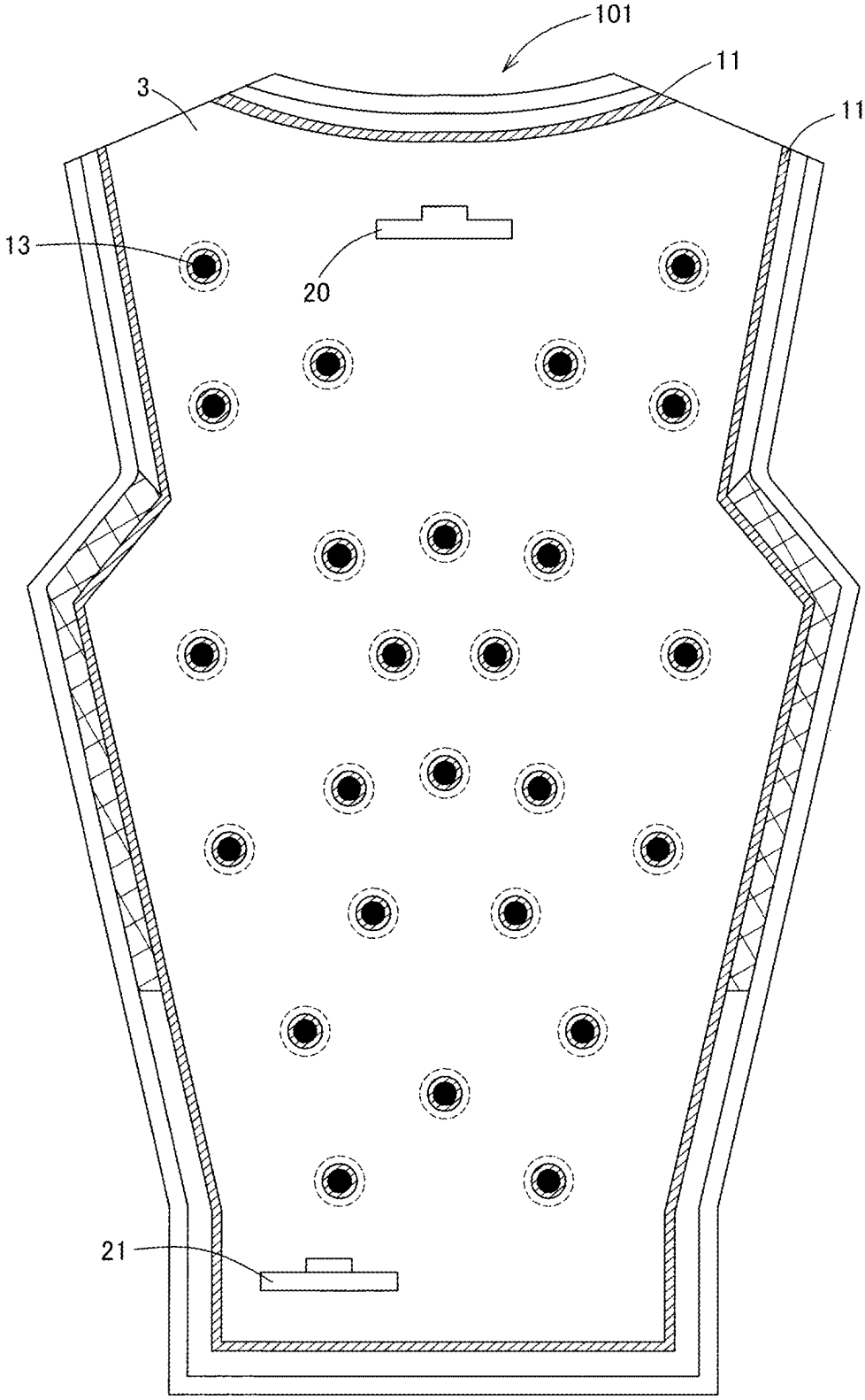


FIG. 27B

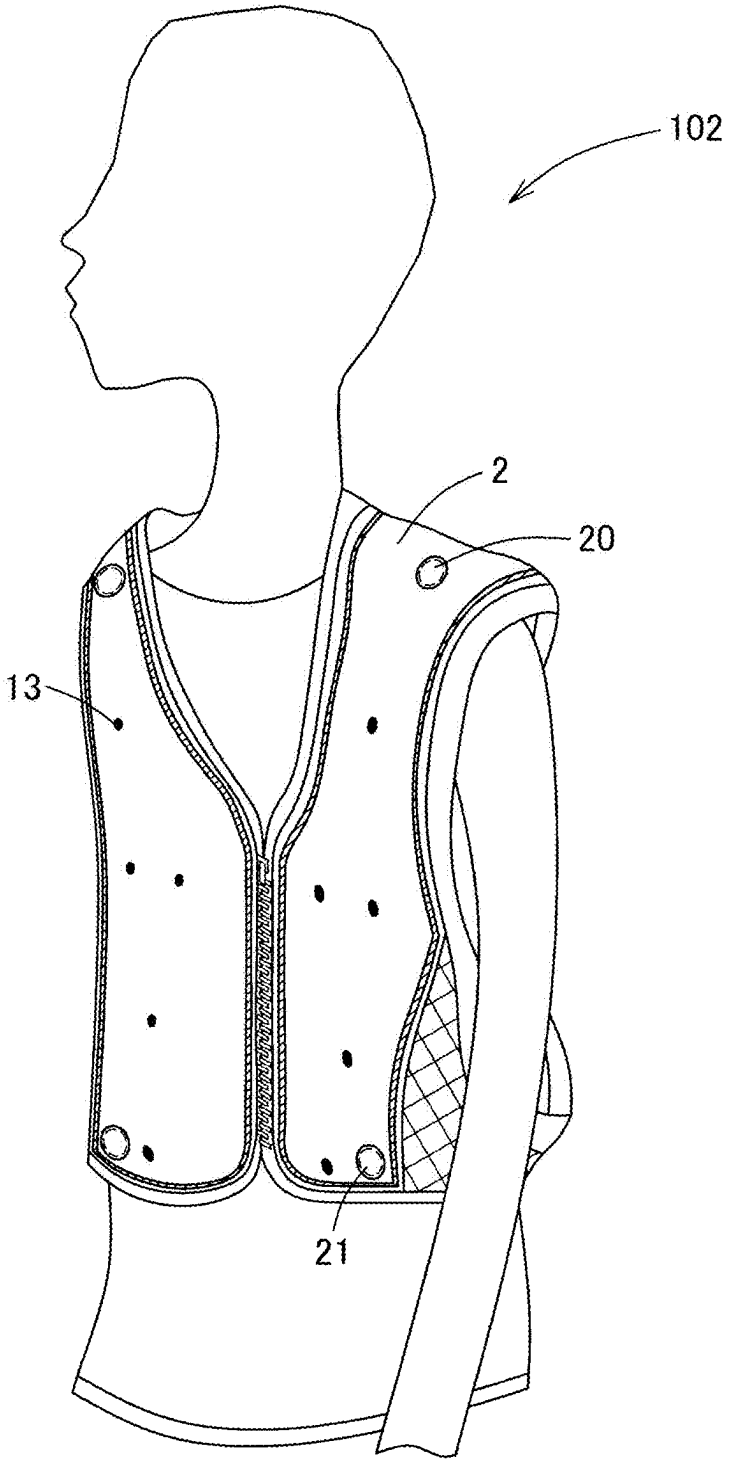


FIG. 28

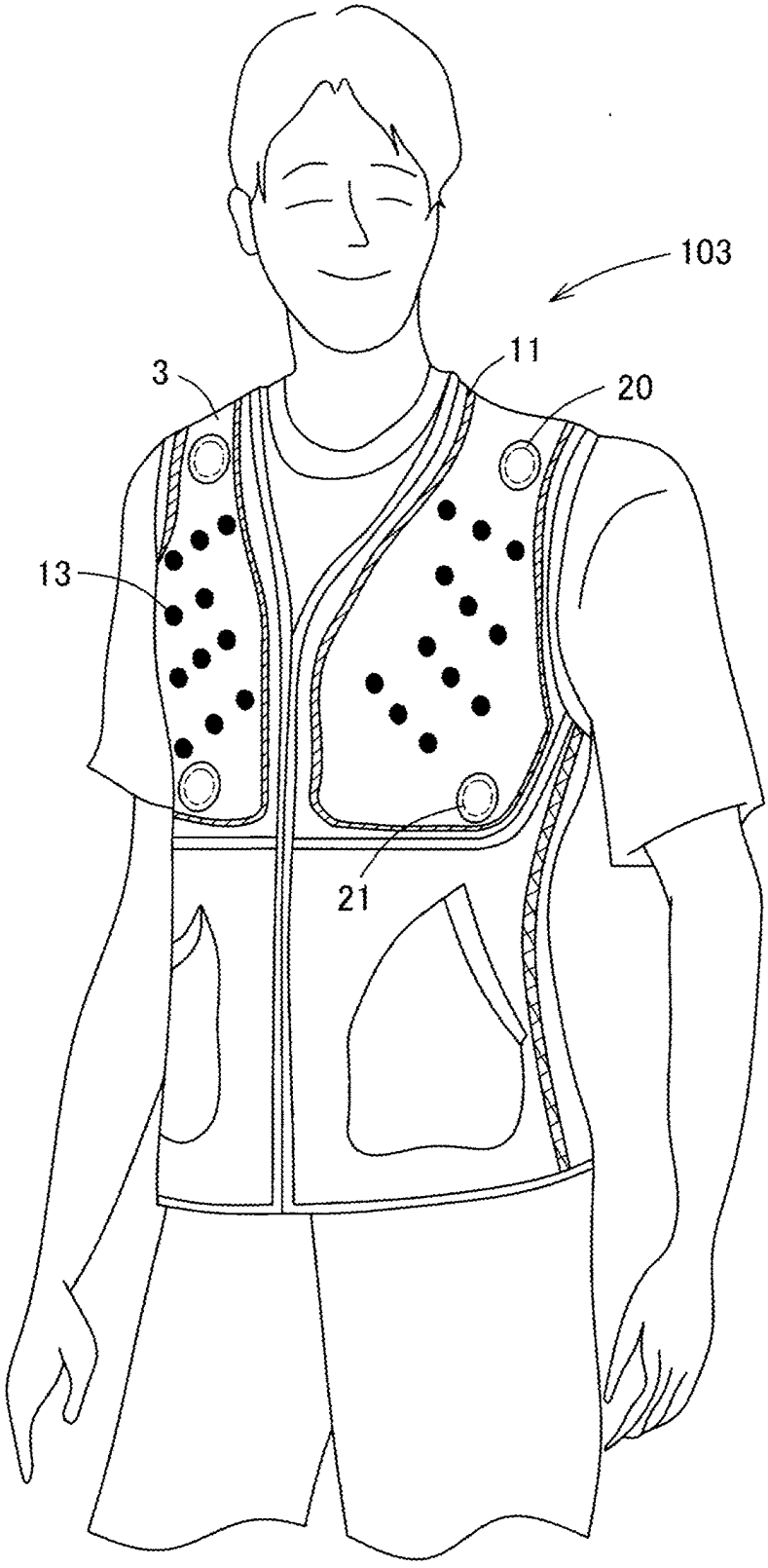


FIG. 29A

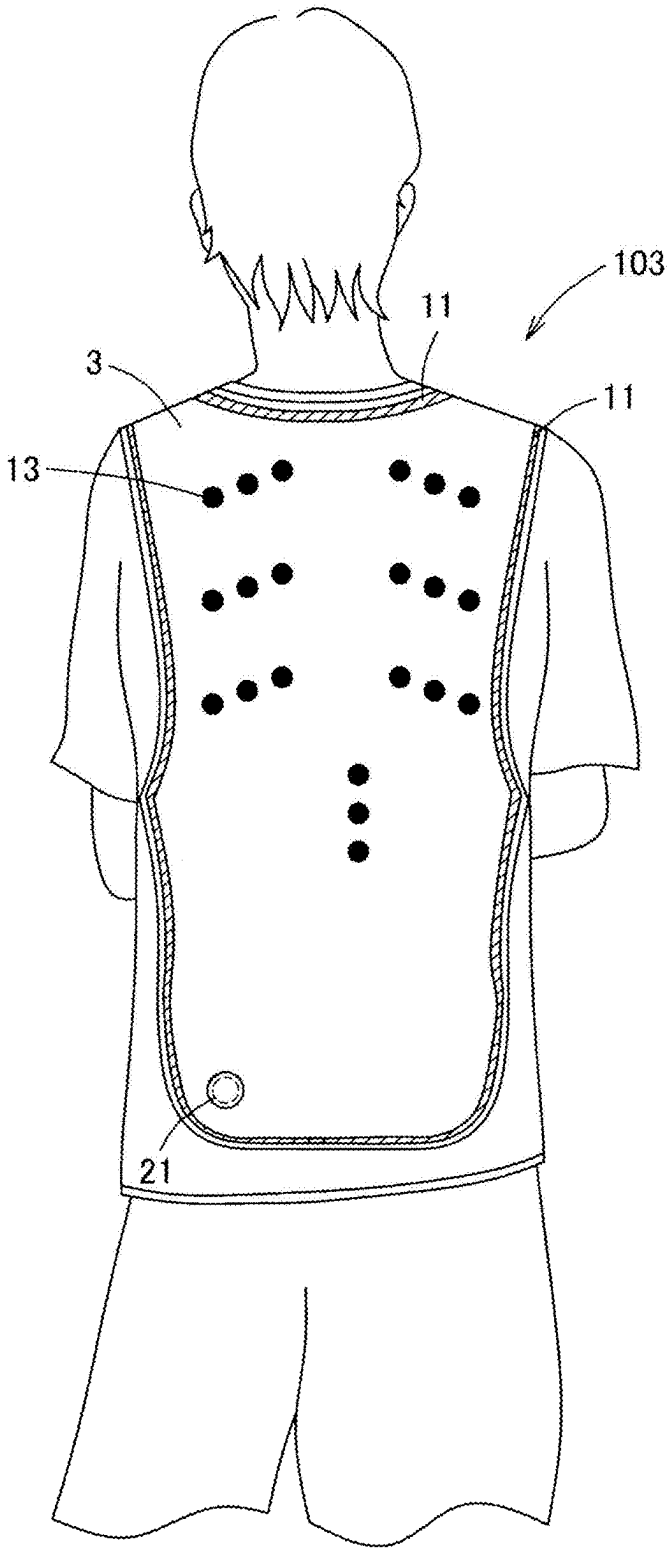


FIG. 29B

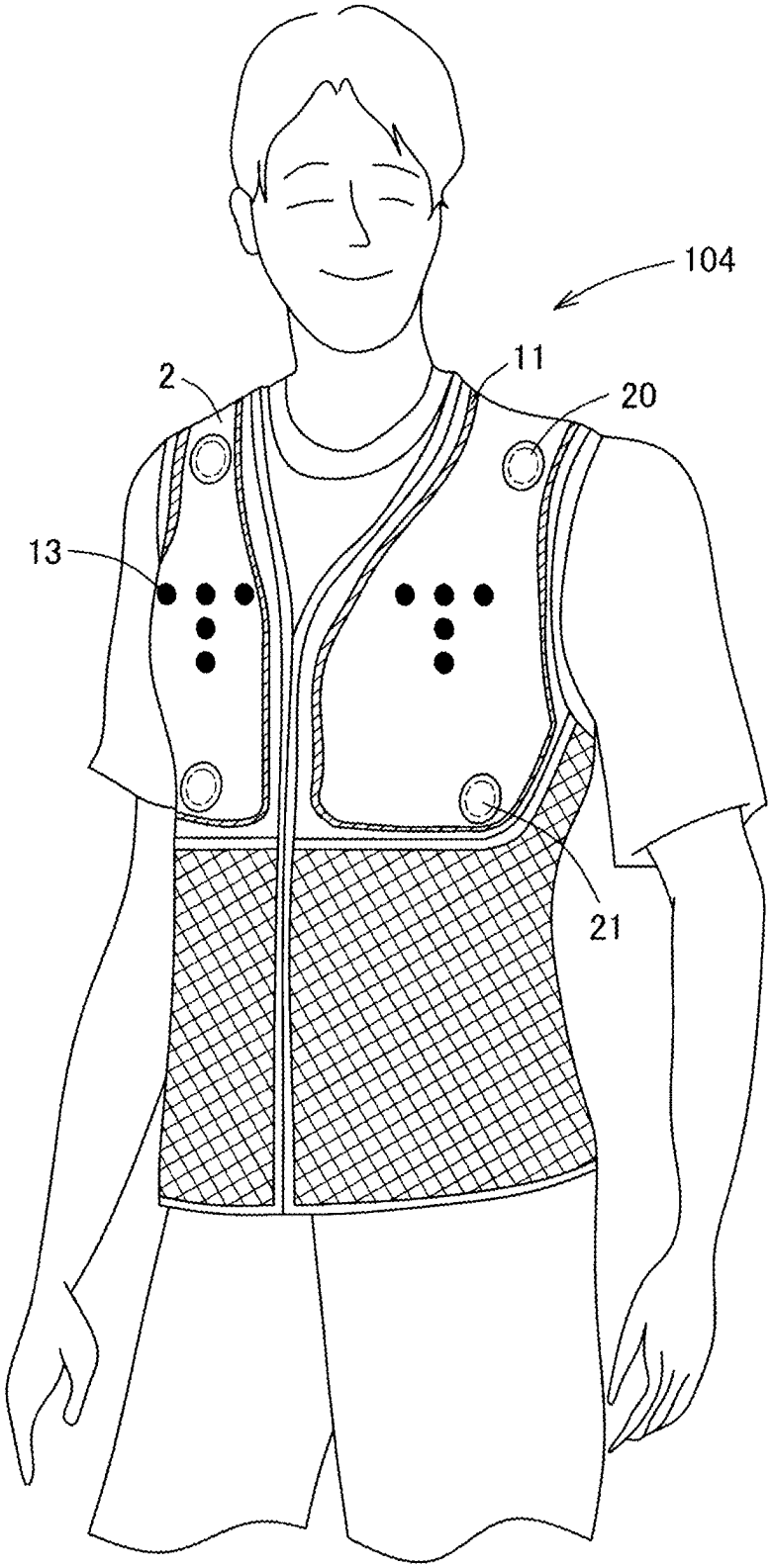


FIG. 30A

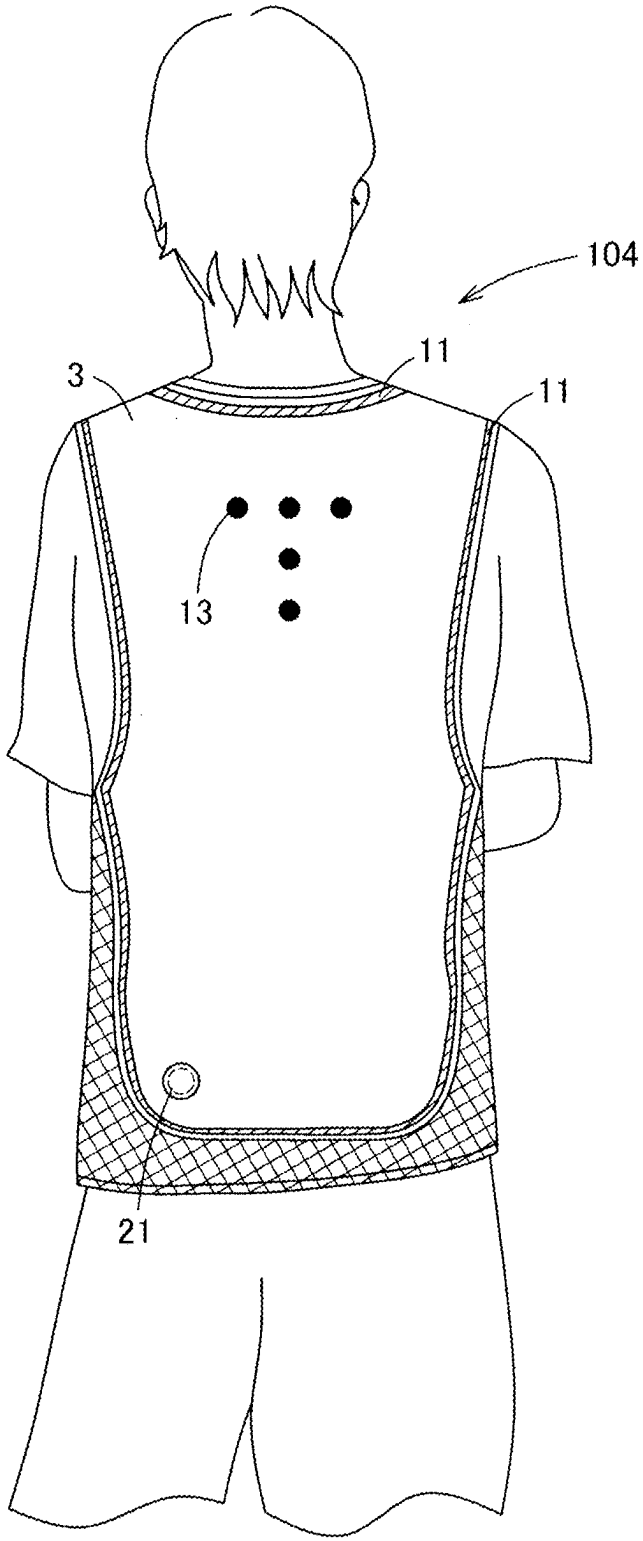


FIG. 30B

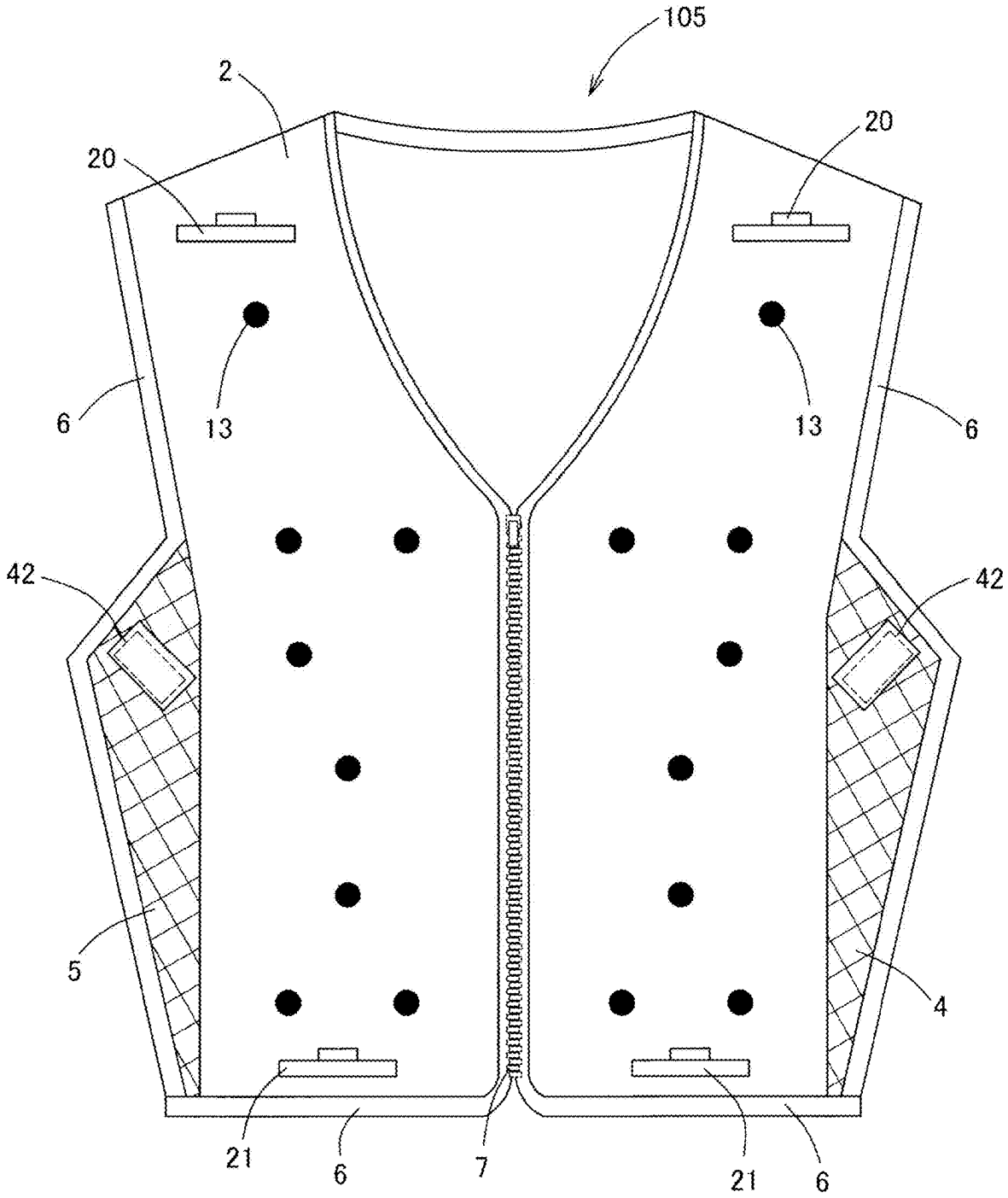


FIG. 31

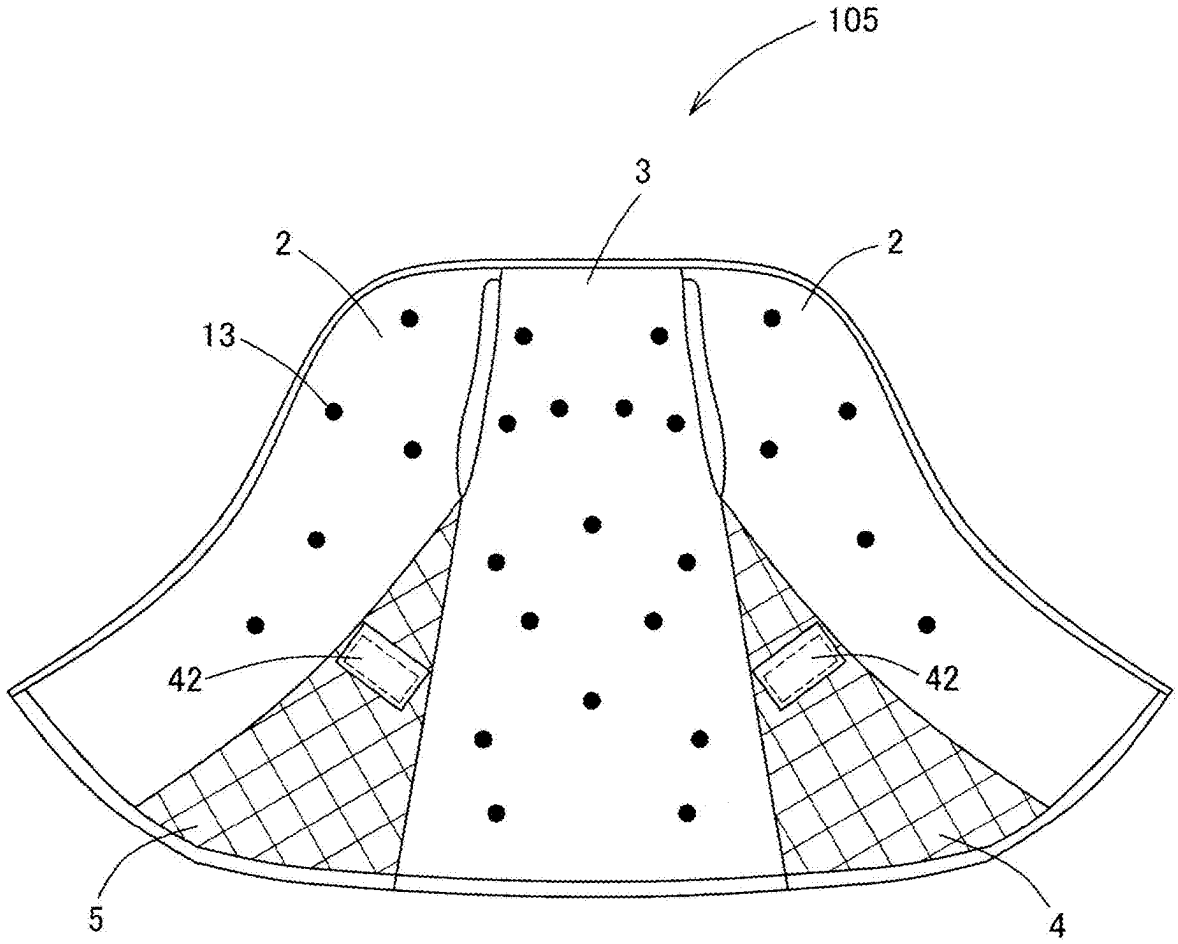


FIG. 32

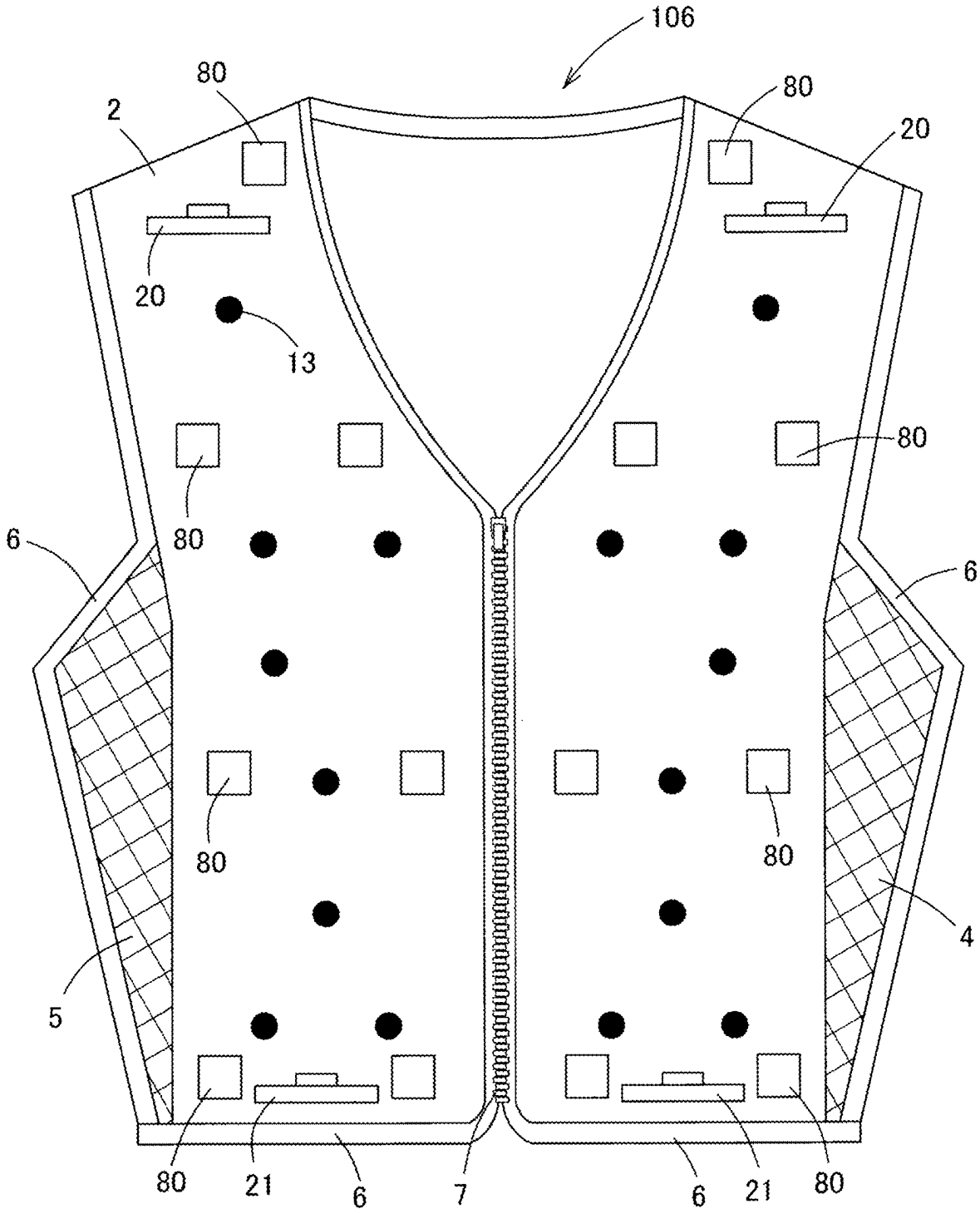


FIG. 33

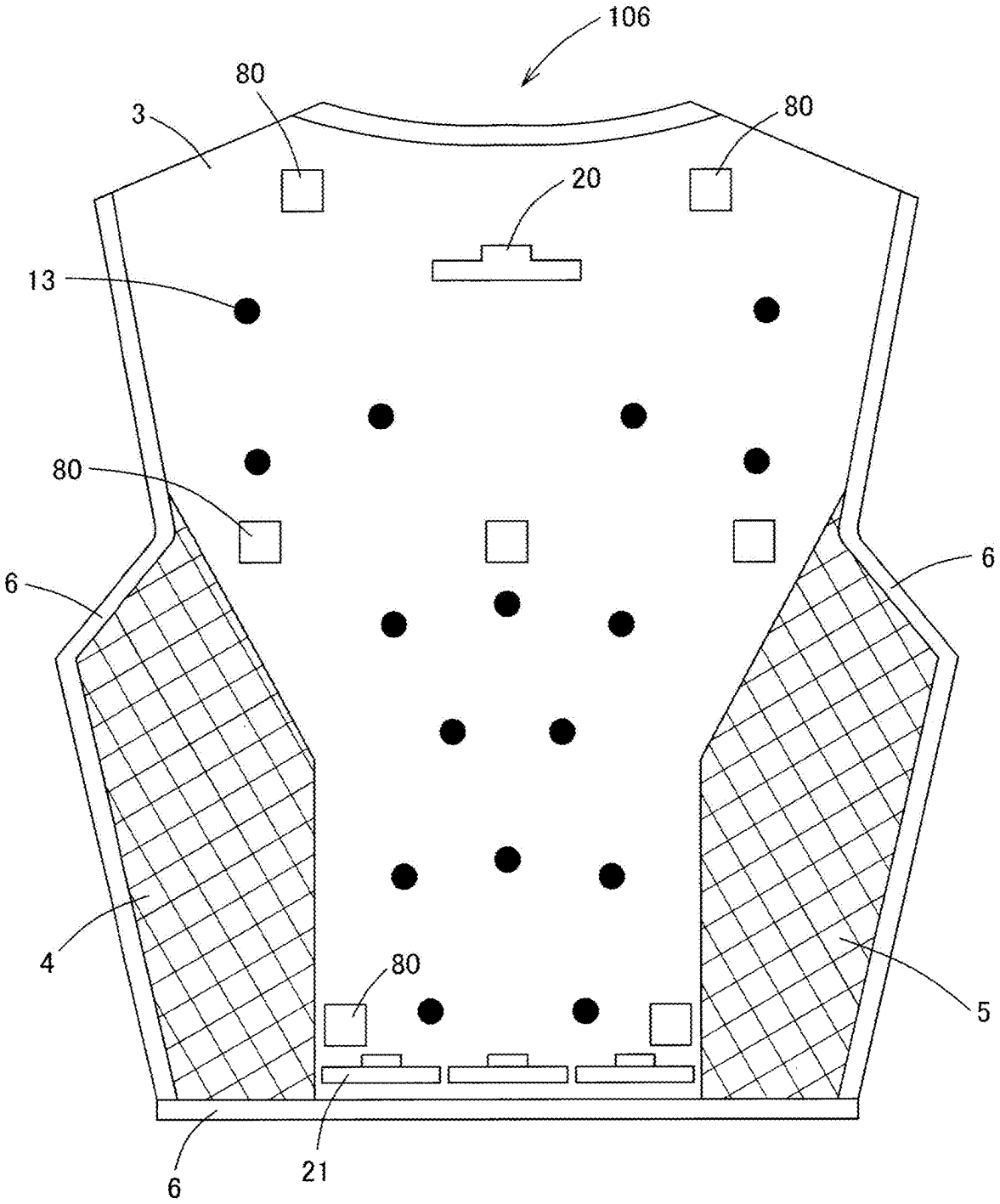


FIG. 34

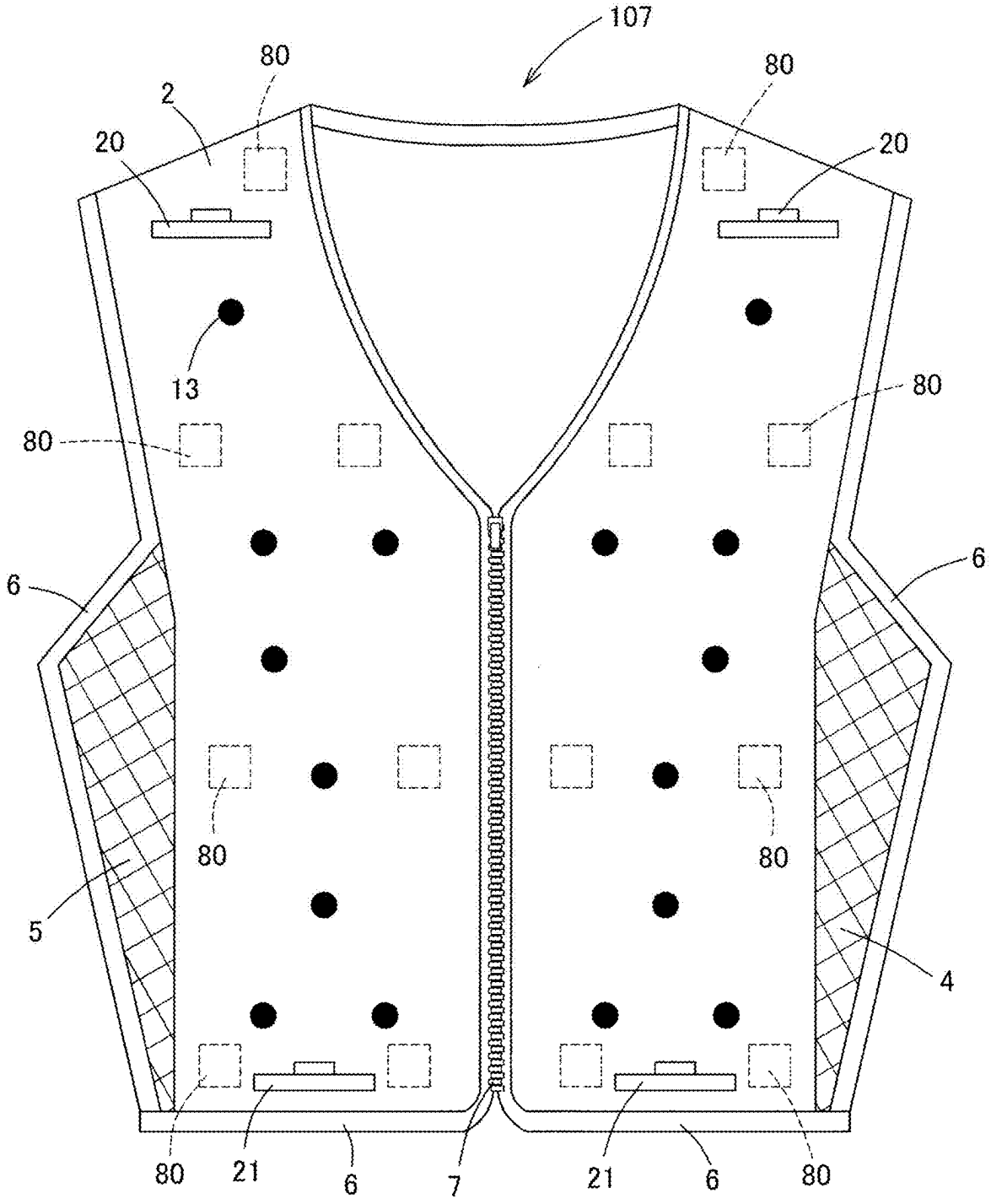


FIG. 35

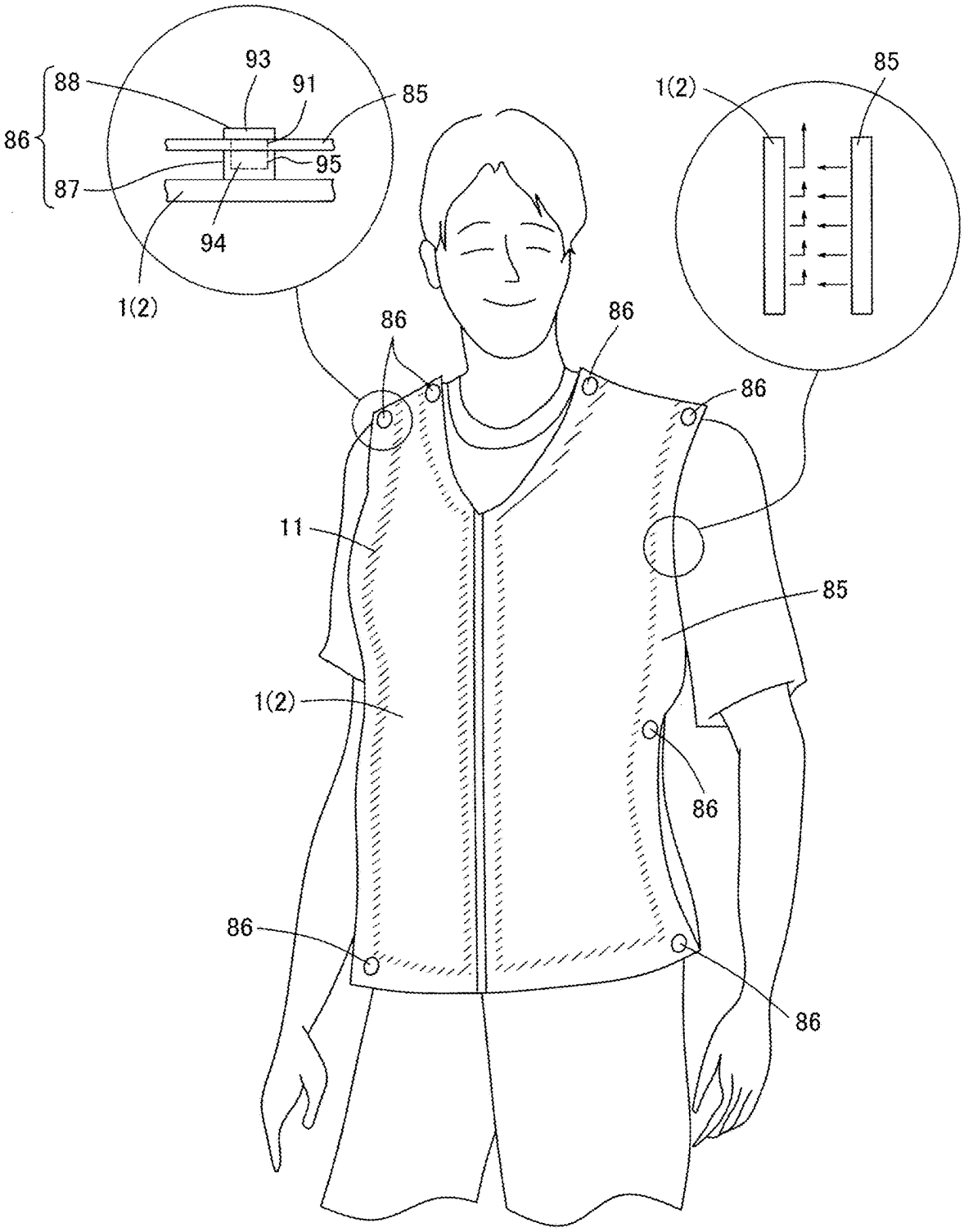


FIG. 36

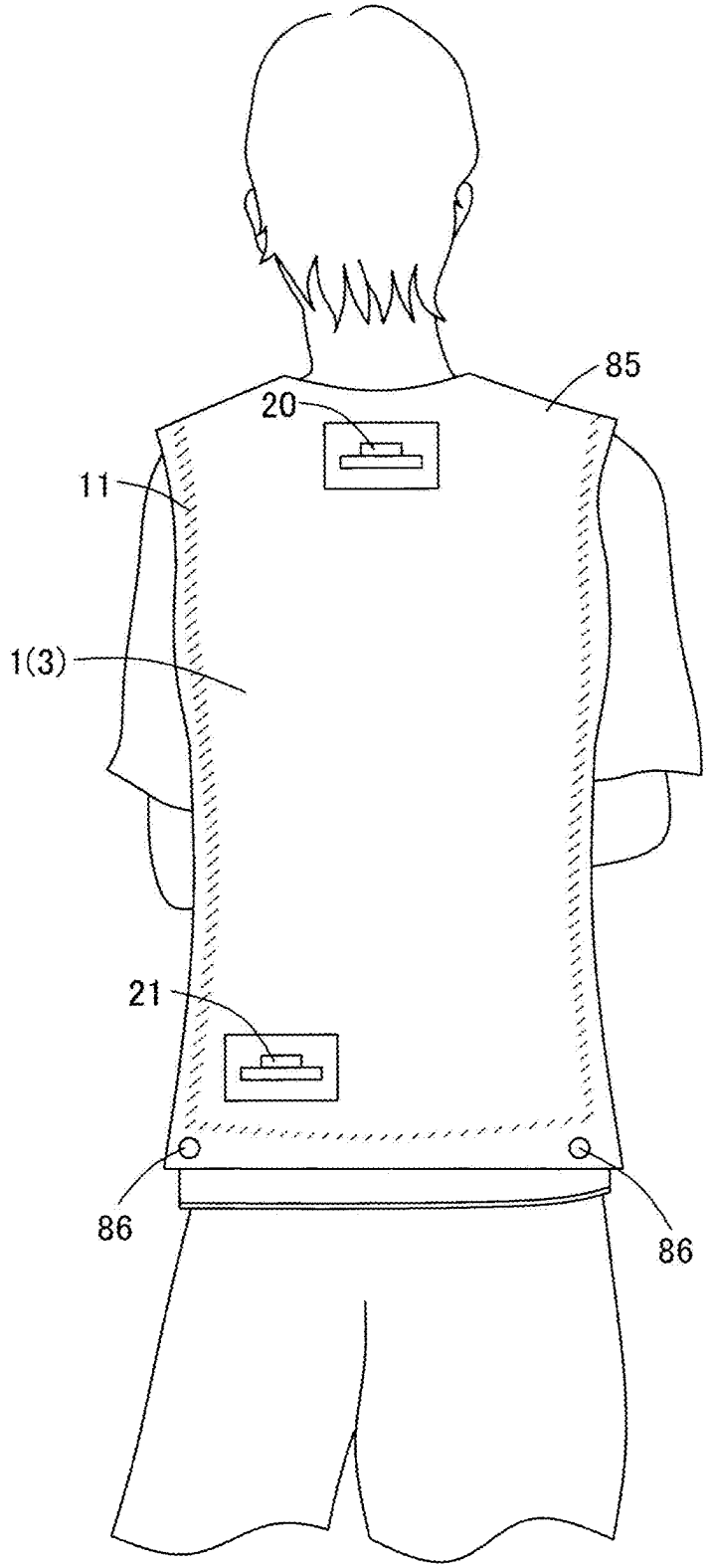


FIG. 37

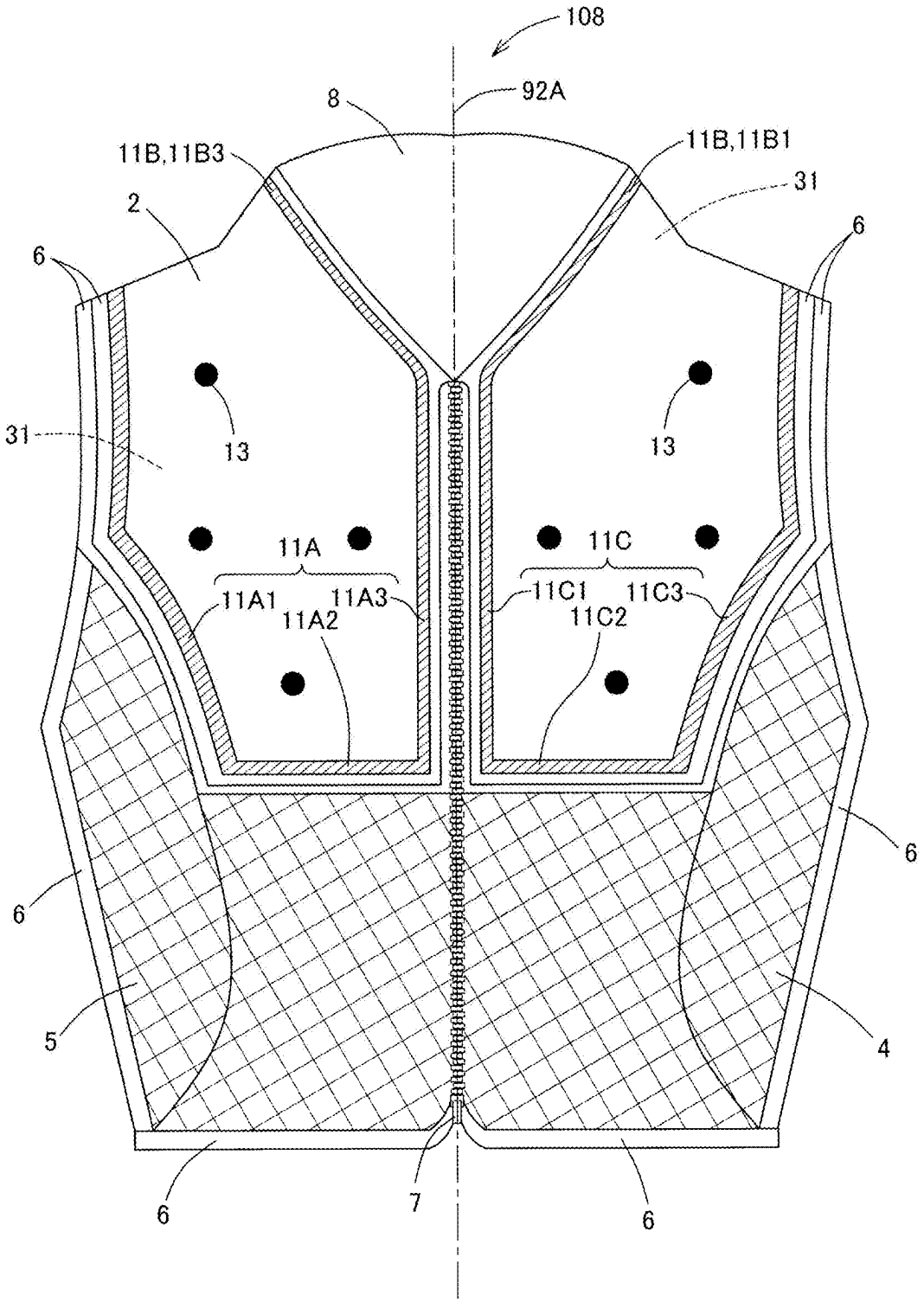

108
92A
8
11B,11B3
11B,11B1
31
2
6
13
13
31
11A
11C
11A1
11A3
11A2
11C1
11C3
11C2
6
6
5
4
6
7
6

FIG. 38A

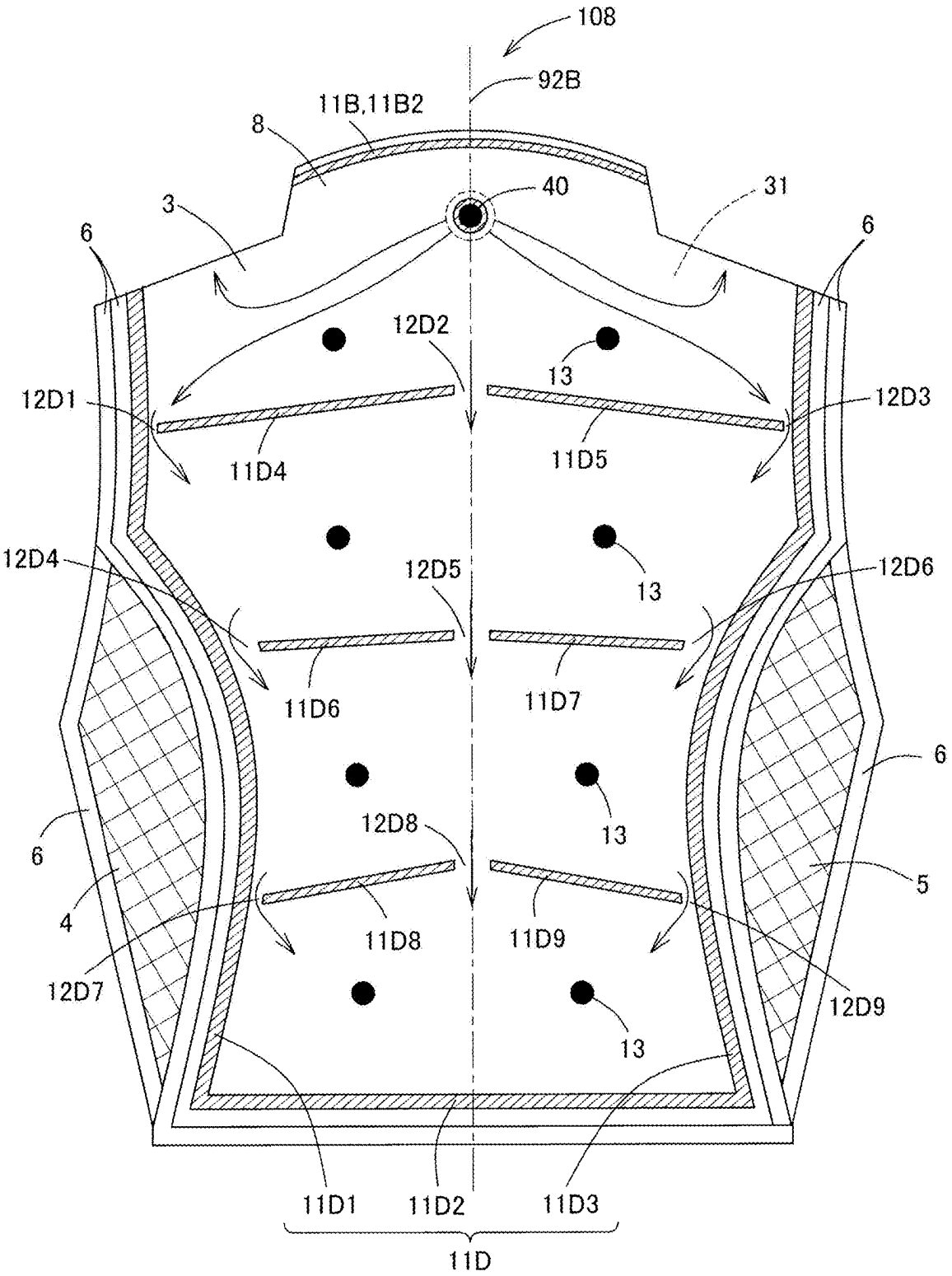

108
92B
11B,11B2
8
40
31
3
6
6
12D2
13
12D1
12D3
11D4
11D5
12D4
12D5
13
12D6
11D6
11D7
6
12D8
13
6
5
4
11D8
11D9
12D7
12D9
13
11D1
11D2
11D3
11D

FIG. 38B

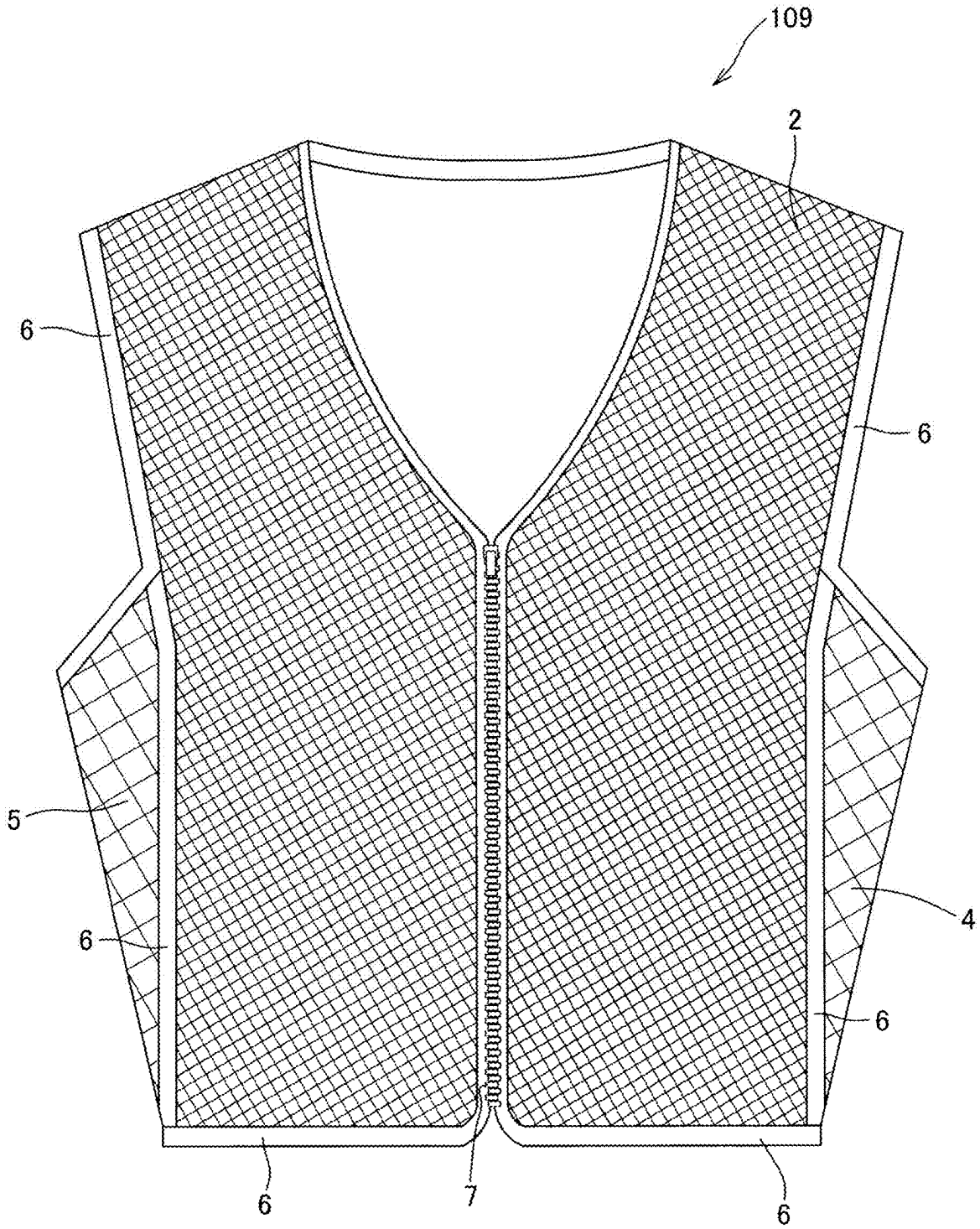


FIG. 39A

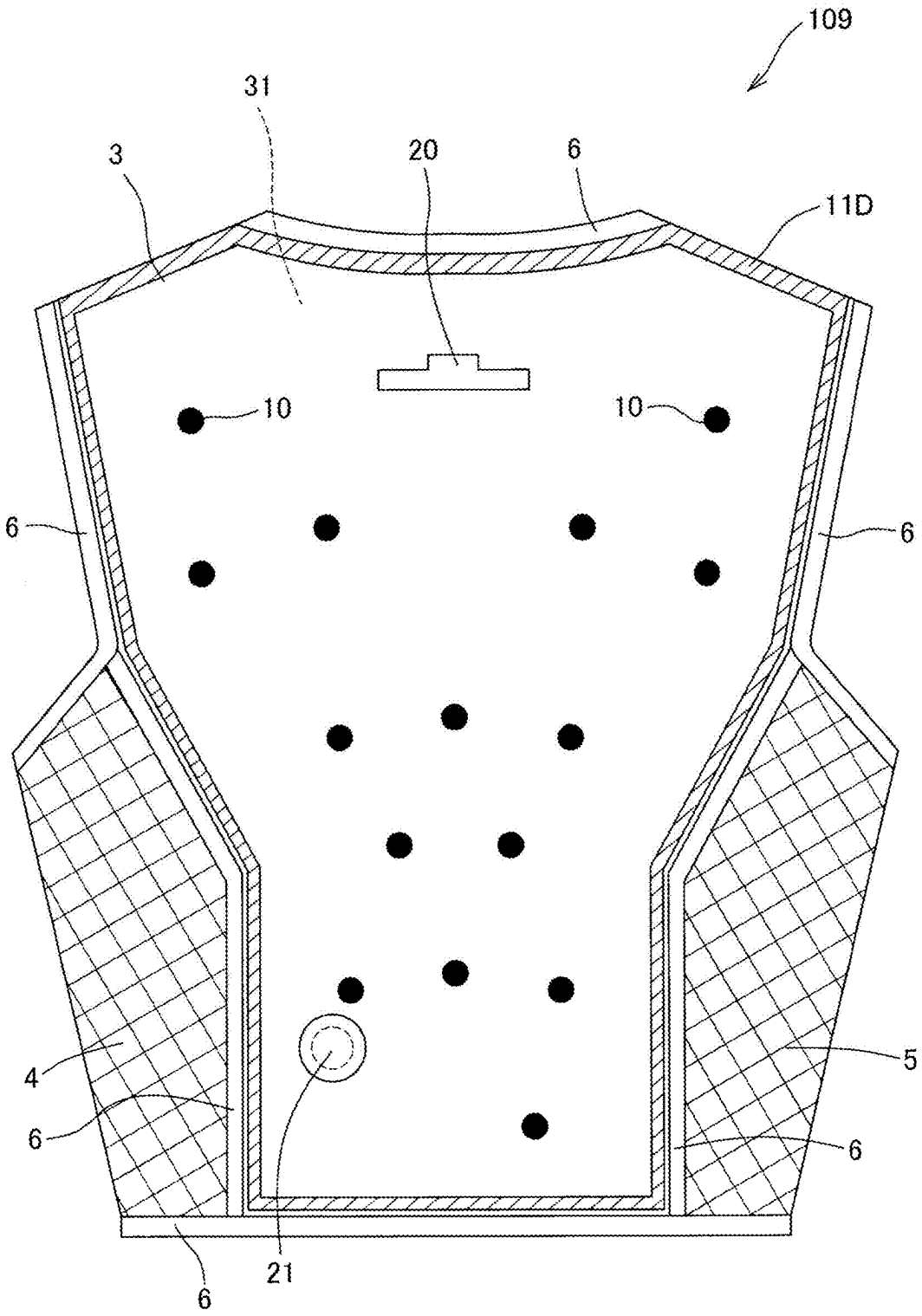


FIG. 39B

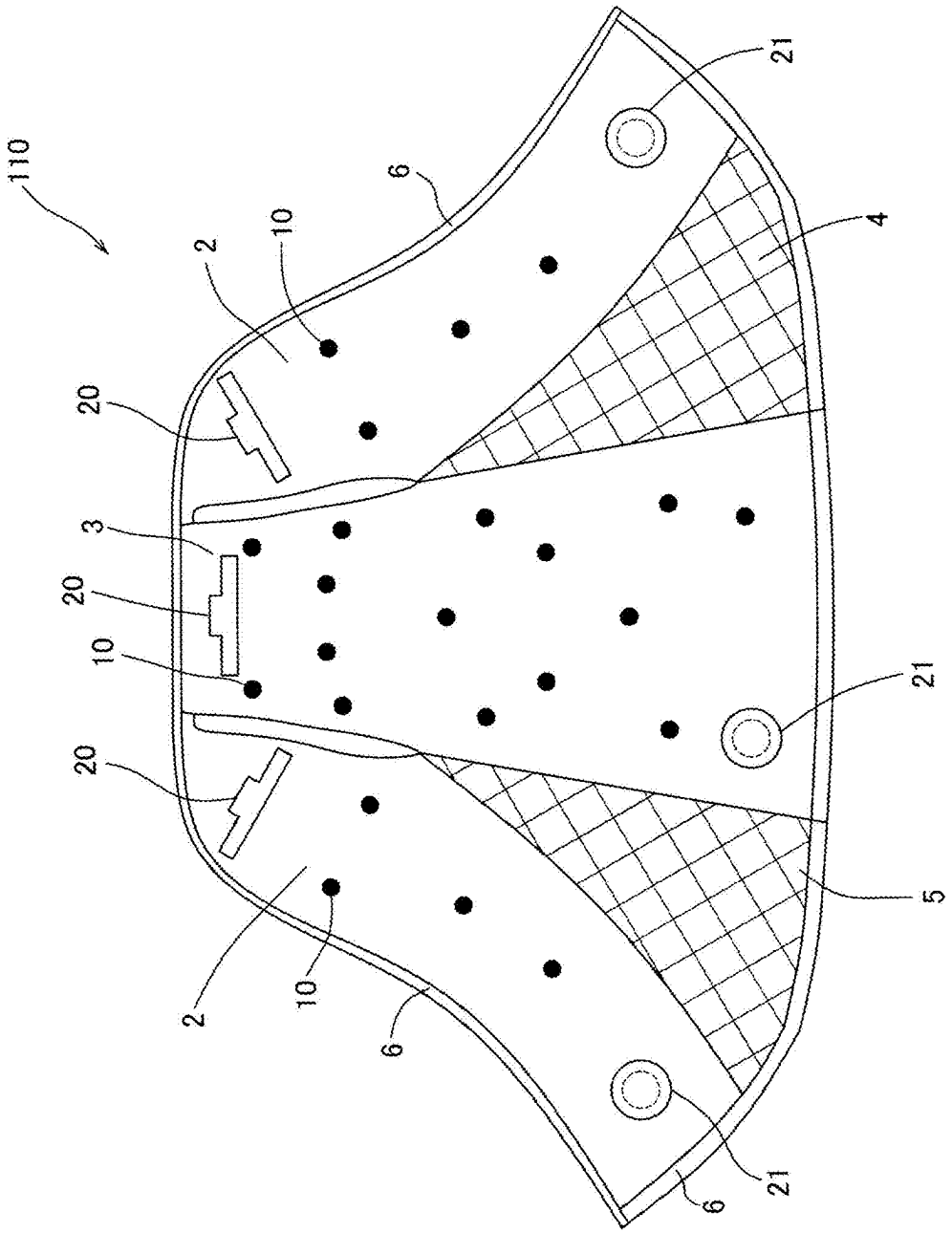


FIG. 40

COOLING GARMENT, COOLING GARMENT SET, AND METHOD FOR WEARING THE COOLING GARMENT SET

TECHNICAL FIELD

[0001] Present disclosure relates to a cooling garment that cools a body by vaporizing water absorbed by a nonwoven fabric, a cooling garment set and a cooling garment set.

BACKGROUND ART

[0002] As a countermeasure against outdoor heat and heat stroke in summer, a cooling garment is known which is a vest or other garment that can be worn by a person or an animal such as a dog, and in which a water absorbent material absorbing the water is provided in a shape of a surface and which can cool the body by absorbing heat of the body due to evaporating the water (see Patent document 1).

[0003] In Patent document 1, a water inlet is arranged at an upper part of the cooling garment, a PET bottle is inserted into the water inlet, and the cold water from the PET bottle is poured from the water inlet to the water absorbent material inside the cooling garment. The heat is absorbed by the vaporization of the cold water poured and the body is cooled. Here, the cold water is water with a temperature lower than an ambient temperature around the body.

PRIOR ART DOCUMENTS

Patent Documents

[0004] Patent Document 1: Japanese Patent No. 6008301

SUMMARY OF INVENTION

Technical Problem

[0005] In the cooling garment of the patent document 1, the cold water absorbed in the absorbent material evaporates, after then temperature of the cold water in the absorbent material reaches room temperature (room temperature is ambient temperature around the body or close to ambient temperature around the body). At that time, not all of the cold water absorbed by the absorbent material evaporates and some water remains in the cooling garment.

[0006] Consequently, when the cold water in the absorbent material reaches room temperature, even if more cold water is added from the water inlet, only a small amount of the cold water is absorbed into the absorbent material, so a cooling effect at the second and subsequent pours of the water almost can be obtained.

[0007] The Patent Document 1 has such a problem.

[0008] The cooling garment, the cooling garment set and the method for wearing the cooling garment set of the present disclosure can solve the above problem.

Solution to Problem

[0009] A cooling garment according to an aspect of the present disclosure includes

[0010] a front side material arranged on a front side of a body; and

[0011] a back side material arranged on a back side of the body,

[0012] wherein the front side material or the back side material has

[0013] an inner layer arranged closest to the body, which is waterproof;

[0014] an outer layer arranged farthest from the body, which is moisture permeable; and

[0015] an intermediate layer made of a nonwoven fabric that is arranged between the inner layer and the outer layer, and that absorbs water and stores the absorbed water,

[0016] wherein a water inlet that supplies the water to the intermediate layer is arranged on an upper part of the front side material or the back side material and a drainage outlet that drains the water absorbed by the intermediate layer is arranged on a lower part of the front side material or the back side material when the cooling garment is attached to the body.

[0017] A cooling garment according to another aspect of the present disclosure includes

[0018] a front side material arranged on a front side of a body; and

[0019] a back side material arranged on a back side of the body,

[0020] wherein the front side material or the back side material has

[0021] an inner layer arranged closest to the body, which is waterproof;

[0022] an outer layer arranged farthest from the body, which is moisture permeable; and an intermediate layer made of a nonwoven fabric that is arranged between the inner layer and the outer layer, and that absorbs water and stores the absorbed water,

[0023] wherein the front side material or the back side material has a slope pressing bonding part that is a part where the outer layer adheres to the inner layer,

[0024] wherein the slope pressing bonding part is inclined with respect to a horizontal line perpendicular to a centerline of a longitudinal direction of the cooling garment so that the water moves from an upper part of the cooling garment toward a lower part of the cooling garment by gravity when the cooling garment is attached to the body.

[0025] A cooling garment including according to yet another aspect of the present disclosure includes

[0026] a front side material arranged on a front side of a body; and

[0027] a back side material arranged on a back side of the body,

[0028] wherein the front side material is constituted of a mesh,

[0029] wherein the back side material has

[0030] an inner layer arranged closest to the body, which is waterproof;

[0031] an outer layer arranged farthest from the body, which is moisture permeable; and

[0032] an intermediate layer made of a nonwoven fabric that is arranged between the inner layer and the outer layer, and that absorbs water and stores the absorbed water,

[0033] wherein the front side material or the back side material includes a pressing bonding part that is a part where the outer layer adheres to the inner layer,

[0034] wherein the intermediate layer is surrounded by the pressing bonding part.

[0035] A cooling garment including according to yet another aspect of the present disclosure includes

[0036] a front side material arranged on a front side of a body; and

[0037] a back side material arranged on a back side of the body,

[0038] wherein the front side material is constituted of a mesh,

[0039] wherein the back side material has

[0040] an inner layer arranged closest to the body, which is waterproof;

[0041] an outer layer arranged farthest from the body, which is moisture permeable; and

[0042] an intermediate layer made of a nonwoven fabric that is arranged between the inner layer and the outer layer, and that absorbs water and stores the absorbed water,

[0043] wherein the front side material or the back side material includes a pressing bonding part that is a part where the outer layer adheres to the inner layer,

[0044] wherein the intermediate layer is surrounded by the pressing bonding part.

[0045] A method according to an aspect of the present disclosure for wearing a cooling garment set includes a cooling garment and an air conditioning function garment, the cooling garment comprising:

[0046] a front side material arranged on a front side of a body; and

[0047] a back side material arranged on a back side of the body,

[0048] wherein the front side material or the back side material has

[0049] an inner layer arranged closest to the body, which is waterproof;

[0050] an outer layer arranged farthest from the body, which is moisture permeable; and

[0051] an intermediate layer made of a nonwoven fabric that is arranged between the inner layer and the outer layer, and that absorbs water and stores the absorbed water,

[0052] wherein a water inlet that supplies the water to the intermediate layer is arranged on an upper part of the front side material or the back side material and a drainage outlet that drains the water absorbed by the intermediate layer is arranged on a lower part of the front side material or the back side material when the cooling garment is attached to the body,

[0053] wherein the method including:

[0054] (i) wearing the air conditioning function garment with a fan stopped over the cooling garment, and then rotating the fan of the air conditioning garment; or

[0055] (ii) wearing the air conditioning function garment with the fan rotating over the cooling garment.

Advantageous Effects of Invention

[0056] A cooling garment of one aspect of the present disclosure can lower the body temperature of

[0057] the body without using electric power.

[0058] In addition, the cooling garment of one aspect of the present disclosure can easily repeat operations of pouring cold water and draining water. As a result, the above operations can be repeated multiple times a day to lower the body temperature throughout the day.

[0059] In addition, wearing an air conditioning function garment over the cooling garment of one aspect of the present disclosure can further lower the body temperature faster with its synergistic effect.

BRIEF DESCRIPTION OF DRAWINGS

[0060] FIG. **1** is a front view of a schematic configuration of a cooling garment in Embodiment 1.

[0061] FIG. **2** is a rear view of a schematic configuration of the cooling garment in Embodiment 1.

[0062] FIG. **3** is a front perspective view of a schematic configuration of the cooling garment which is observed from a left side in Embodiment 1.

[0063] FIG. **4** is a front perspective view of a schematic configuration of the cooling garment which is observed from a right side in Embodiment 1.

[0064] FIG. **5** is an inside view of a schematic configuration of the cooling garment in Embodiment 1.

[0065] FIG. **6** is a rear view of a schematic configuration of the cooling garment in Embodiment 1.

[0066] FIG. **7**A is a schematic sectional view of the cooling garment in Embodiment 1, taken along line A-A of FIG. **1**.

[0067] FIG. **7**B is a schematic sectional view of the cooling garment in Embodiment 1, taken along line B-B of FIG. **1**.

[0068] FIG. **8**A is a schematic operation diagram draining the cold water from the intermediate layer of the cooling garment in Embodiment **1**, illustrating the beginning of rounding an upper part of the cooling garment.

[0069] FIG. **8**B is a schematic operation diagram draining the cold water from the intermediate layer of the cooling garment in Embodiment 1, illustrating the end of rounding the cooling garment.

[0070] FIG. **9** is a rear view of a schematic configuration of a cooling garment in Embodiment 2.

[0071] FIG. **10** is a front view of a schematic configuration of the cooling garment in Embodiment 2.

[0072] FIG. **11** is a rear view of a schematic configuration of a cooling garment in Embodiment 3.

[0073] FIG. **12** is a front view of a schematic configuration of the cooling garment in Embodiment 3.

[0074] FIG. **13** is a front view of a schematic configuration of a cooling garment in Embodiment 4.

[0075] FIG. **14** is an inside view of a schematic configuration of the cooling garment in Embodiment 4.

[0076] FIG. **15** is a front view of a schematic configuration of a cooling garment in Embodiment 5.

[0077] FIG. **16** is a: rear view of a schematic configuration of the cooling garment in Embodiment 5.

[0078] FIG. **17** is a: front view of a schematic configuration of a cooling garment in Embodiment 6.

[0079] FIG. **18**A is a schematic perspective view Illustrating that a person wore the cooling garment, in a case where a person wears an air conditioning function garment over a cooling garment in Embodiment 7.

[0080] FIG. **18**B is a: is a schematic perspective view Illustrating that a person wore the cooling garment and wore the air conditioning function garment over the cooling garment, in a case where a person wears the air conditioning function garment over the cooling garment in Embodiment 7.

[0081] FIG. **19**A is a perspective view Illustrating that a person wore a reversed cooling garment, in a case where a

person wears the reversed cooling garment and wears the air conditioning function garment over the cooling garment in Embodiment 7.

[0082] FIG. **19**B is a perspective view Illustrating that a person wore an air conditioning function garment over a reversed cooling garment, in a case where a person wears the reversed cooling garment and wears the air conditioning function garment over the cooling garment in Embodiment 7.

[0083] FIG. **20** is a perspective view of a cooling garment using adjuster which is observed from a left side.

[0084] FIG. **21** is a front view of a schematic configuration of a cooling garment in Embodiment 8.

[0085] FIG. **22** is a: rear view of a schematic configuration of the cooling garment in Embodiment 8.

[0086] FIG. **23** is a front view of a schematic configuration of a cooling garment in Embodiment 9.

[0087] FIG. **24** is a: rear view of a schematic configuration of the cooling garment in Embodiment 9.

[0088] FIG. **25**A is a plan view of a schematic configuration of a Peltier unit in Embodiment 9.

[0089] FIG. **25**B is a front view of a schematic configuration of the Peltier unit in Embodiment 9.

[0090] FIG. **26**A is a perspective view of a schematic configuration of a cooling garment which is observed from a left side in Embodiment 10.

[0091] FIG. **26**B is a perspective view of a schematic configuration of the cooling garment which is observed from a right side in Embodiment 10.

[0092] FIG. **27**A is a perspective view of a schematic configuration of another cooling garment which is observed from a left side in Embodiment 10.

[0093] FIG. **27**B is a rear view of a schematic of another cooling garment in Embodiment 10.

[0094] FIG. **28** is a front perspective view of a schematic configuration of a cooling garment which is observed from a right side in Embodiment 11.

[0095] FIG. **29**A is a perspective view of a schematic configuration of another cooling garment which is observed from a right side in Embodiment 11.

[0096] FIG. **29**B is a rear view of a schematic of another cooling garment in Embodiment 11.

[0097] FIG. **30**A is a front perspective view of a schematic configuration of another cooling garment which is observed from a right side in Embodiment 11.

[0098] FIG. **30**B is a rear view of a schematic of another cooling garment in Embodiment 11.

[0099] FIG. **31** is a front view of a schematic configuration of a cooling garment in Embodiment 12.

[0100] FIG. **32** is a rear view of a schematic configuration of the cooling garment in Embodiment 12.

[0101] FIG. **33** is a front view of a schematic configuration of a cooling garment in Embodiment 13.

[0102] FIG. **34** is a rear view of a schematic configuration of the cooling garment in Embodiment 13.

[0103] FIG. **35** is a front view of a schematic configuration of another cooling garment in Embodiment 13.

[0104] FIG. **36** is a front view of a schematic configuration of a radiative cooling material in Embodiment 14.

[0105] FIG. **37** is a rear view of a schematic of the radiative cooling material in Embodiment 14.

[0106] FIG. **38**A is a front view of a schematic configuration of a cooling garment in Embodiment 15.

[0107] FIG. **38**B is a rear view of a schematic of the cooling garment in Embodiment 15.

[0108] FIG. **39**A is a front view of a schematic configuration of a cooling garment in Embodiment 16.

[0109] FIG. **39**B is a rear view of a schematic configuration of a cooling garment in Embodiment 16.

[0110] FIG. **40** is an inside view of a schematic configuration of a cooling garment in Embodiment 17.

DESCRIPTION OF EMBODIMENTS

[0111] Hereinafter, more specific embodiments of the present disclosure will be described. However, unnecessarily detailed description may be omitted. For example, a detailed description of a well-known matter and a repeated description of substantially the same configuration may be omitted. This is to avoid unnecessary redundancy of the following description and to facilitate understanding of those skilled in the art. Note that the present inventors provide the accompanying drawings and the following description in order for those skilled in the art to fully understand the present disclosure, and do not intend to limit the subject matter described in the claims by the accompanying drawings and the following description. In the following description, the same or similar components are denoted by the same reference numerals.

[0112] First, an overall outline of a cooling garment **1** (also referred to as a water cooling garment) will be described, next a detailed description of each component will be described.

An Entirety of the Cooling Garment

[0113] The following is a schematic description of the cooling garment **1** that illustrates one aspect of the present disclosure, using the drawings.

[0114] FIG. **1** is a front view of a schematic configuration of the cooling garment in Embodiment 1, FIG. **2** is a rear view of a schematic configuration of the cooling garment in first Embodiment 1, FIG. **3** is a front perspective view of a schematic configuration of the cooling garment which is observed from a left side in Embodiment 1, FIG. **4** is a front perspective view which is observed from a right side and FIG. **5** is an inside view of a schematic configuration of the cooling garment in Embodiment 1.

[0115] The above front perspective view which is observed from a left side means a perspective view of the cooling garment **1** at which an observer looks from the left side.

[0116] The above front perspective view which is observed from a right side means a perspective view of the cooling garment **1** at which an observer looks from the right side.

[0117] These definitions are also adapted in following descriptions.

[0118] As shown in FIGS. **18** and **19**, a central axis of the cooling garment **1** (a person's central axis) when the cooling garment **1** is attached to the human body is defined as a centerline **92**.

[0119] A left side from the centerline **92** is defined as a left side and a right side from the centerline **92** is defined as a right side when the cooling garment **1** is attached to the human body.

[0120] A side closest to the human body is defined as an inner side and a side farthest away from the human body is defined as an outer side when the cooling garment **1** is worn on the human body.

[0121] A head side is defined as an upper side and a leg side as a lower side when the cooling garment **1** is attached to the human body.

[0122] A term "human body" is also used to include both a state of nakedness (a skin itself) and a state in which a person is worn.

[0123] A term "water" is also is also used to include, for example, cold water chilled in a refrigerator as well as water at room temperature (ambient temperature where people are present).

[0124] As shown in FIG. **1**, the cooling garment **1** includes a front side material **2** arranged on the front side of the body, a back side material **3** arranged on the back side of the body, a left side material **4** arranged on the left side of the body, a right side material **5** arranged on the right side of the body, and a fastener **7** arranged in the middle of the front side material **2**.

[0125] The cooling garment **1** also includes a reinforcement line **6** that reinforces edges of the cooling garment **1**.

[0126] An intermediate layer **31** is provided inside the front side material **2** and the back side material **3**, and the intermediate layer **31** is made of non-nonwoven fabric that absorbs water and vaporizes the absorbed water with body heat. Details of the intermediate layer **31** will be described below.

[0127] A pressing bonding part **11** confines the intermediate layer **31** in the front side material **2** and the back side material **3**, and is a line-like area where an outer layer **30**, adheres to an inner layer **32**, and is a continuous line drawn in a single stroke.

[0128] The pressing bonding part **11** is a part where the outer layer **30** and the inner layer **32** are pressed, joined, or bonded so that the outer layer **30** adheres to the inner layer **30**.

[0129] The front side material **2** includes a plurality of water holding parts **13** that hold the water. The details of the water holding part **13** are described below, but the water holding part **13** has a hole **10** (black circle) that penetrates the front side material **2** in a center of it.

[0130] As shown in FIG. **2**, the front side material **2** as well as the back side material **3** include a plurality of the water holding parts **13** that hold the water, the intermediate layer **31**, and the pressing bonding part **11**.

[0131] In an interior of the front side material **2** and the back side material **3**, the intermediate layer **31** is made of one non-woven fabric and is continuous.

[0132] As mentioned above, the intermediate layer **31** is confined inside the front side material **2** and the back side material **3** by the pressing bonding part **11**.

[0133] The back side material **3** includes a water inlet **20** at an upper part to supply the water to the intermediate layer **31** and a drainage outlet **21** at a lower part to drain the water absorbed by the intermediate layer **31**.

[0134] Here, the upper part is higher than half of the cooling garment **1**, and the lower part is lower than half of the cooling garment **1**.

[0135] In FIG. **2**, the drainage outlet **21** is arranged at a left end of the back side material **3** so that when a person sits at a chair or similar, a body of the person is not pushed by the drainage outlet **21**.

[0136] The drainage outlet **21** may be arranged at a right end of it.

[0137] As shown in FIGS. **3** and **4**, the left side material **4** and the right side material **5** are provided at the cooling garment **1** so that the front side material **2** and the back side material **3** fit the body when a person wears the cooling garment **1**.

[0138] The left side material **4** and the right side material **5** connect the front side material **2** and the back side material **3** and are made of elastic material or other stretchable material.

[0139] The left side material **4** and right side fabric **5** may include multiple holes to improve ventilation.

[0140] In addition, in FIGS. **3** and **4**, the hole **10** which is a black circle is depicted in the front side material **2** and which the black circle is representative of the water holding part **13** described below.

[0141] This is also adopted in the following figures.

[0142] FIG. **5** is an inside view of a schematic configuration of the cooling garment **1** in Embodiment 1.

[0143] As shown in FIG. **5**, an inner layer **32** inside of the front side material **2** and the back side material **3** are arranged on the left, center, and right sides.

[0144] A plurality of holes **10** are arranged in the inner layer **32**.

[0145] Next, the details of each component will be explained.

Water Inlet and Drainage Outlet

[0146] FIG. **6** is a rear view of schematic configuration of the cooling garment **1** of Embodiment 1 and FIG. **6** illustrates an enlarged view of the water inlet **20** and drainage outlet **21**.

[0147] With reference to a state in which the cooling garment **1** is worn, the water inlet **20** includes an outer lid **24** arranged far from the body and an inner lid **25** arranged close to the body. from leaking out of the interior.

[0148] The outer lid **24** and the inner lid **25** constitute a closure **34** so that the outer lid **24** and the inner lid **25** contact each other in a front-back direction to prevent the water in the intermediate layer **31**.

[0149] The outer lid **24** has a protrusion so as to be grasped by a hand.

[0150] A convex **26** is arranged inside the outer lid **24** and a concave **27** is arranged outside the inner lid **25**.

[0151] By pressing the outer lid **24** against the inner lid **25**, the convex **26** and concave **27** engage to prevent the water in the intermediate layer **31** from leaking out of the interior of the intermediate layer **31**.

[0152] The water injected through the water inlet **20** is absorbed by the intermediate layer **31** of the back side material **3** and also spreads out the intermediate layer **31** of the front side material **2**, and spreads to an entire surface of the cooling garment **1**.

[0153] In addition, the water inlet **20** may constitute a hook and loop fasteners such as Velcro (registered trademark), a water stopping chuck, or a fastener that prevents the water in the intermediate layer **31** from leaking out of the interior of the cooling garment **1**.

[0154] The drainage outlet **21** has the same structure as the water inlet **20** and may be different from a size of the water inlet **20**.

[0155] FIG. **7**A is a schematic sectional view of the cooling garment **1** in Embodiment 1, taken along line A-A of FIG. **1**.

[0156] As shown in FIG. **7**A, the front side material **2** includes the inner layer **32** that is waterproof and arranged closest to the body, the outer layer **30** that is moisture permeable and arranged farthest from the body, and the intermediate layer **31** that is arranged between the inner layer **32** and the outer layer **30** and that is made of the nonwoven fabric which absorbs the water and vaporizes the absorbed water with body heat.

[0157] A material of the inner layer **32** is preferably a waterproof material such as nylon. The material of the inner layer **32** may also be made antistatic by, for example, antistatic yarns such as hydrophilic polymers.

[0158] A material of the intermediate layer **31** is nonwoven fabric, and other materials such as polyurethane moisture absorption and divergence polyester fleece, technology wicking polyester fleece, or fibers containing polymers based on sodium salt of polyacrylic acid and spun directly from them are preferred. The material of the intermediate layer **31** is not limited to the above materials as long as it absorbs the water and easily vaporizes the absorbed water. A material of the outer layer **30** is preferably a moisture permeable material such as nylon jersey 50% and polyurethane 50%, and may be antistatic with antistatic yarn.

[0159] The material of the outer layer **30** and/or the inner layer **32** may be made of flame-retardant fiber. The material of the outer layer **30** and/or the material of the inner layer **32** may be fire-proofed.

[0160] VINAL (registered trademark), polyetherimide (PEI) fiber, Moeni (registered trademark), CONEX (registered trademark), SUPER EXTAR (registered trademark), UNFLA (registered trademark), HEIM (registered trademark), PROTEXA (registered trademark) FR, HONOGUARD (registered trademark), BREVANO (registered trademark), Nomex (registered trademark), etc. can be used as flame-retardant and fire-retardant fibers.

[0161] As shown in FIG. **7**A, the cooling garment **1** has an air gap **12** between the pressing bonding part **11** and the intermediate layer **31**, the pressing bonding part **11** being a part where the front layer **30** and inner layer **32** are pressed, joined, or bonded to be adhered closely together. In other words, the pressing bonding part **11** of an outer edge of the cooling garment **1** surround the intermediate layer **31** through the air gap **12**.

[0162] The pressing bonding part **11** of the outer edge of the cooling garment **1** does not include the intermediate layer **31**.

[0163] The back side material **3** is the same construction and material as the front side material **2**.

[0164] In FIG. **1**, the water holding part **13** holds the water when the water falls from a shoulder of the cooling garment **1** to the lower part of the cooling garment **1**.

[0165] As shown in FIG. **7**B, the water holding part **13** has the hole **10** through the front side material **2** and the back side material **3**, the pressing bonding part **11** where the outer layer **30** adheres to the inner layer **32** around the hole **10** and the air gap **12** arranged around the pressing bonding part **11** and between the outer layer **30** and the inner layer **32**.

[0166] The water is retained in the water holding parting **13** since the water is stored in the air gap **12**.

[0167] The water holding part **13** will be described in detail.

[0168] The water holding part **13** stores the water temporarily.

[0169] On describing in detail, when the water is supplied to the intermediate layer **31** from the water inlet **20**, the water is temporarily stored in the air gap **12** of the water holding part **13**.

[0170] In this state, as the water held by the intermediate layer **31** adjacent to the air gap **12** evaporates, the water held in the intermediate layer **31** becomes decreased.

[0171] Then, due to a capillary action of the intermediate layer **31**, the water stored in the air gap **12** moves from the air gap **12** to the intermediate layer **31** and is absorbed in the intermediate layer **31**.

[0172] After a further period of time, all of the water stored in air gap **12** moves to the intermediate layer **31** and the water in the air gap **12** does not exist.

Drainage Operation

[0173] FIGS. **8**A and **8**B illustrates a schematic operation to drain the water from the intermediate layer **31** of the cooling garment **1** in Embodiment 1.

[0174] The premise is a state that the intermediate layer **31** of the cooling garment **1** is already absorbed by the water.

[0175] First, a closure **34** of the water inlet **20** is closed and the closure **34** of the drainage outlet **21** is opened, as shown in FIG. **8**A.

[0176] Next, as an upper part of the cooling garment **1** begins to be rounded, the water in the upper part of the intermediate layer **31** in the front side material **2** is squeezed out and the water moves to the lower part of the intermediate layer **31**.

[0177] Finally, as shown in FIG. **8**B, as an end of rounding the cooling garment **1** is nearing and the drainage is nearly complete, the closure **34** of drainage outlet **21** is made closed.

[0178] The above operation can drain the water in the intermediate layer **31** and can allow the water to be poured from the water inlet **20**.

[0179] If the water can be repeatedly poured and drained, the water can be supplied to the cooling garment **1** as many times as needed (e.g., four times a day) to cool the body with the cooling garment **1**.

Embodiment 2

[0180] FIG. **9** is a rear view of a schematic configuration of the cooling garment **1** in Embodiment 2, and FIG. **10** is a front view of a schematic configuration of the cooling garment **1** in Embodiment 2.

[0181] In Embodiment 2, as shown in FIG. **9**, one water inlet **20** is arranged at an upper part of the back side material **3** and a plurality of drainage outlets **21** are arranged at a lower part of the back side material **3**. In FIG. **9**, and three drainage outlets **21** are arranged.

[0182] As shown in FIG. **10**, two water inlets **20** are arranged at the upper part of the front side material **2**, and two drainage outlets **21** are arranged at a right side and a left side of the lower part of the front side material **2**.

[0183] According to the above aspect, since multiple drainage outlets **21** are arranged at the lower part of the back side material **3** or multiple drainage outlets **21** are arranged at the lower part of the front side material **2**, as the cooling garment **1** is rounded, the water can be discharged from the intermediate layer **31** in a short time.

[0184] In addition, as shown in FIG. **10**, since the water inlet **20** is arranged in the front side material **2**, the water can be spread quickly over an entire surface of the intermediate layer **31** in pouring operation.

[0185] When a person wears the cooling garment **1**, the water tends to accumulate in the lower part of the front side material **2** or the back side material **3** due to gravity. The excess water that has accumulated in the lower part of the front side material **2** or the back side material **3** can be drained out through the drainage outlet **21**.

Embodiment 3

[0186] FIG. **11** is a rear view of a schematic configuration of a cooling garment **1** in Embodiment 3 and FIG. **12** is a front view of a schematic configuration of the cooling garment **1** in Embodiment 3.

[0187] In Embodiment 3, a water inlet and drainage outlet **40** that simultaneously pours the water into the cooling garment **1** and drains the water from the cooling garment **1** is provided in the cooling garment **1**. A structure of the water inlet and drainage outlet **40** is a normal cap and as a solid line of the water inlet and drainage outlet **40** in FIG. **11** is picked up and pulled, the cap is opened and a mouth of a dashed line becomes visible.

[0188] As shown in FIG. **11**, the water inlet drainage outlet **40** is arranged at the bottom edge of the back side material **3**.

[0189] As shown in FIG. **12**, the water inlet drainage outlets **40** are arranged at left and right ends of a bottom of the front side material **2**.

[0190] According to the above aspect, as pouring and draining can be performed by a single the water inlet drainage outlet **40**, an area of the intermediate layer **31** can be enlarged and an amount of the water retention can be expanded.

Embodiment 4

[0191] FIG. **13** is a front view of a schematic configuration of a cooling garment **1** in Embodiment 4 and FIG. **14** is an inside view of a schematic configuration of the cooling garment **1** in Embodiment 4.

[0192] As shown in FIGS. **13** and **14**, in Embodiment 4, two pockets **42** holding refrigerants **43** are arranged outside of the front side and inside of the front side material **2** on the lower part of a left side and a right side of the front side material **2**.

[0193] According to the above Embodiment, the water in the intermediate layer **31** is cooled by the refrigerants **43** held in the pockets **42** and a temperature rise of the water can be reduced, thus the body can be cooled for a long time.

[0194] The location of the pocket **42** is not limited on the outside of the front side material **2** and the lower part of the inside of the front side material **2**, and the pocket **42** may be arranged anywhere. The pockets **42** may also be arranged on the back side material **3**. The number of pockets **42** is not limited.

Embodiment 5

[0195] FIG. **15** is a schematic front view of the cooling garment **1** in Embodiment 5, and FIG. **16** is a rear view of the cooling garment **1** in Embodiment 5.

[0196] In Embodiment 5, the water holding part **13** is not circular but rectangular in shape and tilted.

[0197] As shown in FIG. **15**, the two water inlet drainage outlet **40** are provided at two locations on the left and right sides of the front side material **2**, and as shown in FIG. **16**, the water inlet drainage outlet **40** is provided at the bottom edge of the back side material **3**.

[0198] In addition, the water inlet **20** and drainage outlet **21** of Embodiment 1 may be provided instead of the water inlet and drainage outlet **40**.

Embodiment 6

[0199] FIG. **17** is a: front view of a schematic configuration of a cooling garment **1** in Embodiment 6. As shown in FIG. **17**, in Embodiment 6, the rectangular-shaped water holding parts **13** are tilted and alternately staggered.

[0200] The water inlet **20** and the drainage outlet **21** in Embodiment 6 are the same structures as Embodiment 2.

[0201] The flow of the water on the left side of the front side material **2** in FIG. **17** will be described below.

[0202] Six water holding parts **13***a*-**13***f* are arranged on the left side and the right side of the front side material **2**.

[0203] On the left side of the front side material **2**, first, the water falls downward from a shoulder of the front side material **2**, passes through the right side of the first water holding part **13***a* from the top and falls from an upper left part to a lower right part.

[0204] Next, the water passes through the left side of the second water holding part **13***b* from the top and falls from an upper right part to a lower left part. At this time, the water hits the water holding part **13***b* so that the water flowing from the water holding part **13***a* is once caught by the water holding part **13***b*, so the water holding part **13***b* hold the water easily.

[0205] Next, the water holding parts **13***c* and **13***d*, the water holding part **13***e* and the water holding part **13***f* are also the same flows of the water as the water holding part **13***a* and the water holding part **13***b*. Like the water holding part **13***b*, the water holding parts **13***c*-**13***e* also hold the water easily.

[0206] Finally, the water passes through the left side of the water holding part **13***f*, being the sixth from the top, and falls from the upper right part to the lower left part and reaches the drainage outlet **21**. In this way, a direction of the water flowing from the water holding part **13***f* is oriented toward the drainage outlet **21**, the water can be discharged smoothly when the water is discharged.

[0207] The flow of water in the left side of the front side material **2** in FIG. **17** is symmetrical with the flow in the right side of the front side material **2** with respect to the center of the front side material **2**.

[0208] According to the above Embodiment, the water can be held in the water holding parts **13** by arranging the water holding part **13** in a staggered pattern. Consequently, the body can be cooled for a long time.

[0209] In addition, since the direction of the water flowing from the lowest water holding part **13***f* is oriented toward the drainage outlet **21**, so the water can be discharged smoothly when the water is discharged.

[0210] Although the staggered water holding parts **13** are provided on the front side material **2**, like the staggered water holding parts **13** may be also provided on the back side material **3** as on the front side material **2**.

Embodiment 7

[0211] FIGS. **18**A and **18**B illustrate a schematic perspective view in case where the cooling garment **1** of the present disclosure in Embodiment 7 and an air conditioning function garment **50** are worn in layers, the air conditioning function garment **50** also referred to as KUCHOFUUJINFUKU (registered trademark) and KUCHOFUKU (registered trademark). The air conditioning function garment **50** is a clothing that is attached to a fan **51** and is sent an outside air into an inside there in, and sweat from the body is evaporated by the outside air to lower the body temperature, as described in Japanese Examined Utility Model (Registration) Application Publication No. Hei 3-32487 and Japanese Patent No. 6536674.

[0212] The operation of layering the cooling garment **1** and the air conditioning function garment **50** will be described.

[0213] First, as shown in FIG. **18**A, the cooling garment **1**, which has already been poured with the water, is attached to the body and the fastener **7** is fastened.

[0214] Next, as shown in FIG. **18**B, the air conditioning function garment **50** is laid on top of the cooling garment **1**, and the fastener **7** of the air conditioning function garment **50** is fasten.

[0215] Finally, the fan **51** of the air conditioning function garment **50** is rotated and the outside air is sent into the inside of it.

[0216] The combination of the layered the cooling garment **1** and the air conditioning function garment **50** is referred to as a cooling garment set.

[0217] According to the above Embodiment, the air conditioning function garment **50** sends the outside air into a surface of the cooling garment **1** and the vaporization of the water in the cooling garment **1** is promoted. Consequently, the body temperature can be lowered fast. Although the fan **51** is rotated after the air conditioning function garment **50** was put on, the air conditioning function garment **50** of which fan **51** is rotating may be worn over the cooling garment **1**.

[0218] FIGS. **19**A and **19**B are variations of FIGS. **18**A and **18**B, respectively.

[0219] In the variations, the cooling garment **1** is turned inside out (reversed) and attached to the body, as shown in FIG. **19**A.

[0220] After an operation of overlaying the cooling garment **1** and the air conditioning function garment **50** is the same operation as in FIG. **18**B, so the explanation is omitted.

[0221] According to the above Embodiment, since the outer layer **30** of the front side material **2** and the outer layer **30** of the back side material **3** in the cooling garment **1** are arranged closest to the body, so the water in the intermediate layer **31** can be vaporized through the outer layer **30** and consequently, the body temperature can be lowered even if a person does not perspire. In addition, the air conditioning function garment **50** allows the outside air to send into the cooling garment **1**, so the vaporization of the cooling garment **1** can be promoted and consequently, the body temperature can be lowered faster.

Embodiment 8

[0222] Embodiment 8 is an aspect that the cooling garment **1** has an area for storing the water to cool the body for a long time when Embodiment 8 is compared with Embodiment 1.

[0223] FIG. **21** illustrates a front view of a schematic configuration of the cooling garment **1** in Embodiment 8, and FIG. **22** illustrates a rear view of a schematic configuration of the cooling garment **1** in Embodiment 8.

[0224] As shown in FIGS. **21** and **22**, the pressing bonding part **11** has a continuous outer edge pressing bonding part including pressing bonding parts (**11***a*, **11***b*, **11***c*, **11***d*) drawn in a single stroke, as described in Embodiment 1.

[0225] Specifically, the outer edge pressing bonding part **11** includes a right front side pressing bonding part **11**A, a left front side pressing bonding part **11**C, a neck side pressing bonding part **11**B, and a back side pressing bonding part **11**D.

[0226] The right front side pressing bonding part **11**A includes a right front side first pressing bonding part **11A1**, a right front side second pressing bonding part **11A2**, and a right front side third pressing bonding part **11A3**.

[0227] The left front side pressing bonding part **11**C includes a left front side first pressing bonding part **11C1**, a left front side second pressing bonding part **11C2**, and a left front side third pressing bonding part **11C3**.

[0228] The back side pressing bonding part **11**D includes a back side first pressing bonding part **11D1**, a back side second pressing bonding part **11D2**, and a back side third pressing bonding part **11D3**.

[0229] A highest part of the right front side first pressing bonding part **11A1** and a highest part of the back side third pressing bonding part **11D3** are defined as a joint P**1** when a person wears the cooling garment **1**. At the joint P**1**, a highest part of the right front side first pressing bonding part **11A1** and a highest part of the back side third pressing bonding part **11D3** are connected. A joint between a highest part of the right front side third pressing bonding part **11A3** and an end of the neck side pressing bonding part **11**B is defined as a joint P**2**.

[0230] A joint between a highest part of the left front side first pressing bonding part **11C1** and an end of the neck side pressing bonding part **11**B is defined as joint P**3**.

[0231] A highest part of the right front side third pressing bonding part **11A3** and a highest part of the back side first pressing bonding part **11D1** are defined as a joint P**4**.

[0232] At the joint P**4**, a highest part of the left front side third pressing bonding part **11C3** and a highest part of the back side first pressing bonding part **11D1** are connected.

[0233] As shown in FIG. **21**, a right front side fourth pressing bonding part **11A4** (also referred to as a slope pressing bonding part **11A4**) is branched from the right front side third pressing bonding part **11A3** and is connected to the right front side third pressing bonding part **11A3**.

[0234] The right front side fourth pressing bonding part **11A4** slopes from a right highest part to a left bottom of a paper of FIG. **21**.

[0235] In other words, the slope pressing bonding part **11A4** is inclined with respect to a line perpendicular to a centerline **92**A (horizontal line).

[0236] A right front side first air gap **12A1** is provided between the right front side first pressing bonding part **11A1** and the right front side fourth pressing bonding part **11A4**.

[0237] A right front side fifth pressing bonding part **11A5** (also referred to as a slope pressing bonding part **11A5**) is branched from the right front side first pressing bonding part **11A1** and is connected to the right front side first pressing bonding part **11A1**.

[0238] The right front side fifth pressing bonding part **11A5** slopes from a left top to a right bottom of the paper of FIG. **21**.

[0239] A right front side second air gap **12A2** is provided between the right front side third pressing bonding part **11A3** and the right front side fifth pressing bonding part **11A5**.

[0240] A right front side sixth pressing bonding part **11A6** (also referred to as a slope pressing bonding part **11A6**) is branched from the right front side third pressing bonding part **11A3** and is connected to the right front side third pressing bonding part **11A3**.

[0241] The right front side sixth pressing bonding part **11A6** slopes from a right top to a left bottom left of the paper of FIG. **21**.

[0242] The right front side third air gap **12A3** is provided between the right front side first pressing bonding part **11A1** and the right front side sixth pressing bonding part **11A6**.

[0243] The front side material **2** is divided into four areas on the right side and four areas on the left side and the front side material **2** is totally divided into total eight areas.

[0244] The four areas on the right side of the front side material **2** are a right front side first area **61**, a right front side second area **62**, a right front side third area **63** and a right front side fourth area **64**.

[0245] The four areas on the left side of the front side material **2** are a left front side first area **65**, a left front side second area **66**, a left front side area **67** and a left front side area **68**.

[0246] In each of the above areas, the intermediate layer **31** is arranged in a divided state, and each of the above pressing bonding parts surrounds the divided the intermediate layer **31** via the air gap.

[0247] In other words, the air gap is provided between each of the above pressing bonding parts and the divided intermediate layer **31**.

[0248] The right front side first area **61** is the area surrounded by the right front side first pressing bonding part **11A1**, the right front side fourth pressing bonding part **11A4** (slope pressing bonding part **11A4**), the right front side third pressing bonding part **11A3**, and the upper part of the front side material **2** (the line connecting to the joint P**1** and the joint P**2**).

[0249] The water inlet **20** is arranged in the right front side first area **61**.

[0250] As an arrow indicates, the water moves from the right front side first area **61** to the right front side second area **62** through the right front side first air gap **12A1**.

[0251] The above slope pressing bonding part is inclined with respect to the horizontal line perpendicular to the longitudinal centerline of the cooling garment **1** when a person wears the cooling garment **1**.

[0252] As the above slope pressing bonding part is inclined with respect to the horizontal line, and gravity causes the water to move from a top of the cooling garment **1** to a bottom of the cooling garment **1** along the above slope pressing bonding part.

[0253] As the angle of inclination becomes smaller, the amount of the water flowing from the air gap **12A1** becomes smaller, the angle of inclination being an angle between the horizontal line perpendicular to the longitudinal direction (centerline **92**A) of the cooling garment **1** (front side material **2**) and the slope pressing bonding part **11A4**, and thus the water in the right front side first area **61** can be retained longer. As a result, the body can be cooled longer in the right front side first area **61**.

[0254] A movement of the water of the intermediate layer **31** in the right front side first area **61** and the right front side second area **62** including the slope pressing bonding part **11A4**A is analyzed by a general-purpose thermal fluid analysis software using a finite volume method.

[0255] The following procedure is used for the analysis.

[0256] (1) First, the cooling garment **1** is arranged on a horizontal table, the water is poured from the water inlet **20**, and the water is absorbed uniformly into the intermediate layer **31** of the front side material **2**.

[0257] At this time, an amount of the water in the intermediate layer **31** is a maximum amount of the water that the water overflows the intermediate layer **31** if any more water is added to the intermediate layer **31**.

[0258] (2) Next, we analyzed temporal changes in a distribution of the water moving from the right front side first area **61** to the right front side second area **62** when we stood the cooling garment **1** in a vertical direction having the maximum amount of the water in the intermediate layer **31**. At this time, a slope angle between a horizontal line perpendicular to the centerline **92**A and the slope pressing bonding part **11A4** was changed (from 0 to 90 degrees).

[0259] Results of the above simulation will be explained.

[0260] The above simulation illustrates that the amount of the water moving from the right front side first area **61** to the right front side second area **62** (the amount of movement) is almost constant in about 10 seconds, even when a slope angle is changed.

[0261] After about 10 seconds, the amount of movement per unit time was found to be very small.

[0262] If the amount of the water that moves from the right front side first area **61** to the right front side second area **62** after 10 seconds at the slope angle of 90 degrees is a standard (100%) after 10 seconds,

[0263] (a) After 10 seconds, the amount of the water moved at the slope angle of 45 degrees was approximately 91% to 93% of the above standard.

[0264] (b) After 10 seconds, the amount of the water moved at the slope angle of 0 degrees (when horizontal) was approximately 83% to 86% of the above standard.

[0265] In other words, it was found that as the slope angle becomes smaller, the amount of the water that moves from the right front side first area **61** to the right front side second area **62** becomes smaller.

[0266] It was also found that as the slope angle becomes smaller, the water is stored longer at the right front side second area **62** below the slope pressing bonding part **11A4**, (e.g., at a point like the eaves, if the slope pressing bonding part **11A4** is the eaves).

[0267] This is presumably due to the following reasons.

[0268] The water above the slope pressing bonding part **11A4** tries to move downward due to gravity, but is blocked by the slope pressing bonding part **11A4**.

[0269] Consequently, the water below the slope pressing bonding part **11A4** is not subject to the pressure of the water above the slope pressing bonding part **11A4**, so the water stays at a location of the right front side second area **62**

below the slope pressing bonding part **11A4**. Thus, as the slope angle becomes smaller, the water can be stored longer in the intermediate layer **31**.

[0270] On the other hand, when a top of the cooling garment **1** is rounded and the water is drained from the drainage outlet **21**, as the slope angle is larger, an amount of the water flowing from the air gap **12A1** can be larger and consequently, the water can be drained smoothly from the drainage outlet **21**.

[0271] Based on the above simulations, it was found that the slope angle of between 1 degree and 45 degrees is preferable, and the slope angle between 2 degrees and 15 degrees is even more preferable.

[0272] The same can be adapted for each of following slope pressing bonding parts.

[0273] The right front side second area **62** is an area bounded by the right front side first pressing bonding part **11A1**, the right front side fifth pressing bonding part **11A5** (slope pressing bonding part **11A5**), the right front side third pressing bonding part **11A3** and the right front side fourth pressing bonding part **11A4** (slope pressing bonding part **11A4**).

[0274] The water holding part **13** is arranged in the right front side second area **62**.

[0275] As an arrow indicates, the water moves from the right front area **62** to the right front side third area **63** through the right front side second air gap **12A2**.

[0276] The right front side second area **62** includes the right front side fifth pressing bonding part **11A5** (slope pressing bonding part **11A5**) and the right front side fourth pressing bonding part **11A4** (slope pressing bonding part **11A4**).

[0277] The right front side second area **62** has a slope pressing bonding part like the slope pressing bonding part **11A5**, so the water can be held for a longer time in the right front second side area **62** and the water can be move easily downward when the water is drained from the drainage outlet **21** by rounding the top of the cooling garment **1**.

[0278] The right front side third area **63** is an area bounded by the right front side first pressing bonding part **11A1**, the right front side sixth pressing bonding part **11A6** (slope pressing bonding part **11A6**), the right front side third pressing bonding part **11A3** and the right front side fifth pressing bonding part **11A5** (slope pressing bonding part **11A5**).

[0279] The water holding part **13** is arranged in the right front side third area **63**.

[0280] As an arrow indicates, the water moves from the right front side third area **63** to the right front side fourth area **64** through a right front side third air gap **12A3**.

[0281] The right front side third area **63** has the same effect as the right front side second area **62**.

[0282] The right front side fourth area **64** is an area bounded by the right front side first pressing bonding part **11A1**, the right front side second pressing bonding part **11A2**, the right front side third pressing bonding part **11A3**, and the right front side sixth pressing bonding part **11A6** (slope pressing bonding part **11A6**).

[0283] The water holding part **13** and the drainage outlet **21** are arranged in the right front side fourth area **64**.

[0284] The drainage outlet **21** is arranged in a lower right side of the right front side fourth area **64**. When the top of the cooling garment **1** is rounded, the water flows out of the right front side third air gap **12A3** arranged on the right side, so the water can be drained faster from the drainage outlet **21** near the right front side third air gap **12A3**.

[0285] According to the above embodiment, when the water is supplied from the water inlet **20** to the intermediate layer **31** and the front side material **2** on the right side is pushed by a human hand, the water can be supplied to the intermediate layer **31** on the right side of the front side material **2** through the right front side first air gap **12A1**, the right front side second air gap **12A2** and the right front side third air gap **12A3**.

[0286] In addition, the water can be stored in the right front side first area **61**, the right front side second area **62**, the right front side third area **63**, and the right front side forth area **64**.

[0287] As a result, the above embodiment can cool the body for a long time.

[0288] As shown in FIG. **21**, when a person observed from the front, the configuration of the right side of the front side material **2** and the configuration of the left side of the front side material **2** are symmetrical with respect to the centerline **92**A (in this case, the centerline **92**A is a projection of the centerline **92** onto the front side material **2**).

[0289] Therefore, a composition of the left side of the front side material **2** is omitted from the explanation.

[0290] Air gaps are provided at a connection between the right front side third pressing bonding part **11A3** and the right front side fourth pressing bonding part **11A4**, a connection between the right front side first pressing bonding part **11A1** and the right front side fifth pressing bonding part **11A5**, a connection between the right front side third pressing bonding part **11A3** and the right front side sixth pressing bonding part **11A6**, a connection between the left front side first pressing bonding part **11C1** and the left front side fourth pressing bonding part **11C4**, a connection portion between the front side third pressing bonding part **11C3** and the front side left fifth pressing bonding part **11C5**, and at the connection portion between the left front side first pressing bonding part **11C1** and the front side left sixth pressing bonding part **11C6**.

[0291] As shown in FIG. **22**, when a person observes from the back, the back side fourth pressing bonding part **11D4** (also referred to as the first slope pressing bonding part) slopes from the top right to the bottom left of the paper, starting from the centerline **92**B (in this case, the centerline **92**B is the projection of the centerline **92** onto the back side material **3**).

[0292] A back side first air gap **12D1** is provided between the back side first pressing bonding part **11D1** and the side fourth pressing bonding part **11D4**.

[0293] When the centerline **92**B is defined as a starting point, the back side fifth pressing bonding part **11D5** (also referred to as the second slope pressing bonding part) slopes from the upper left to the lower right of the paper.

[0294] A back side third air gap **12D3** is provided between the back side third pressing bonding part **11D3** and the back side fifth pressing bonding part **11D5**.

[0295] The first slope pressing bonding part **11D4** and the second slope pressing bonding part **11D5** are mountainous in shape.

[0296] The apex (virtual vertices) of the mountainous shape described above passes through the centerline **92**B, and the mountainous shape is symmetrical with respect to the centerline **92**B. A back side second air gap **12D2** is provided between one end of the first slope pressing bonding

part **11**D**4** (centerline **92**B side) and one end of the second slope pressing bonding part **11**D**5** (centerline **92**B side) (near the virtual apex).

[0297] One end of the first slope pressing bonding part **11**D**4** (centerline **92**B side) may be connected to one end of the second slope pressing bonding part **11**D**5** (centerline **92**B side) without the back side second air gap **12**D**2**.

[0298] When the centerline **92**B is defined as a starting point, the back side sixth pressing bonding part **11**D**6** (also referred to as the third slope pressing bonding part) slopes from the upper right part to the lower left part of the paper.

[0299] A back side fourth air gap **12**D**4** is provided between the back side first pressing bonding part **11**D**1** and the back side sixth pressing bonding part **11**D**6**.

[0300] When the centerline **92**B is defined as a starting point, the back side seventh pressing bonding part **11**D**7** (also referred to as the fourth slope pressing bonding part) slopes from the upper left to the lower right of the paper.

[0301] A back side sixth air gap **12**D**6** is provided between the back side seventh pressing bonding part **11**D**7** and the back side third pressing bonding part **11**D**3**.

[0302] The third slope pressing bonding part **11**D**6** and the fourth slope pressing bonding part **11**D**7** are mountainous in shape.

[0303] Since the mountain shape is the same as above, the description is omitted.

[0304] When the centerline **92**B is defined as a starting point, the back side eighth pressing bonding part **11**D**8** (also referred to as the fifth slope pressing bonding part) slopes from the upper right part to the lower left part of the paper.

[0305] A back side seventh air gap **12**D**7** is provided between the back side eighth pressing bonding part **11**D**8** and the back side first pressing bonding part **11**D**1**.

[0306] When the centerline **92**B is defined as a starting point, The back side ninth pressing bonding part **11**D**9** (also referred to as the sixth slope pressing bonding part) slopes from the upper left part to the lower right part of the paper.

[0307] A back side ninth air gap **12**D**9** is provided between the back side ninth pressing bonding part **11**D**9** and the back side third pressing bonding part **11**D**3**.

[0308] The back side eighth air gap **12**D**8** is arranged between one end of the eighth slope pressing bonding part **11**D**8** (centerline **92**B side) and one end of the ninth slope pressing bonding part **11**D**9** (centerline **92**B side).

[0309] The eight slope pressing bonding part **11**D**8** and the nineth slope pressing bonding part **11**D**9** have a mountain shape.

[0310] Since the mountain shape is the same as above, the description is omitted.

[0311] The back side material **3** is divided into four areas on the right side.

[0312] The four areas of the back side material **3** are a back side first area **71**, a back side second area **72**, a back side third area **73**, and a back side fourth area **74**.

[0313] The back side first area **71** is the area bounded by the back side first pressing bonding part **11**D**1**, a back side fourth pressing bonding part **11**D**4**, a back side fifth pressing bonding part **11**D**5**, a back side third pressing bonding part **11**D**3**, and the upper part of back side material **3**.

[0314] Since the water inlet **20** is arranged on the centerline **92**B in the back side first area **71**, the water can separate and flow evenly along the first slope pressing bonding part **11**D**4** and the second slope pressing bonding part **11**D**5**.

[0315] When the water is supplied to the intermediate layer **31** from the water inlet **20** and the back side material **3** is pressed by a human hand, the water moves from the back side first air gap **12**D**1**, the back side second air gap **12**D**2** and the back side third air gap **12**D**3** through the back side first area **71** to the back side second area **72** described below, as the arrow indicates.

[0316] Since the water can move from both sides and the center of the back side material **3** from the back side first area **71** to the back side second area **72**, the water can be evenly distributed to the intermediate layer **31** in the back side second area **72**.

[0317] As the slope angle between the horizontal line perpendicular to the longitudinal direction of the cooling garment **1** (back side material **3**) and the slope pressing bonding part **11**D**4** becomes smaller, the amount of water flowing from the back side first air gap **12**D**1** becomes smaller and the water in the back side second area **72** can be retained longer.

[0318] As a result, the body can be cooled longer in the back side second area **72**.

[0319] On the other hand, when the upper part of the cooling garment **1** is rounded and the water is drained from the drainage outlet **21**, as the slope angle is larger, the amount of water that flows from the back side first air gap **12**D**1** becomes larger, so the water can be drained smoothly from the drainage outlet **21**.

[0320] Based on the above simulation, from one degree to 45 degrees or less in the slope angle is preferred, and from 2 degrees to 15 degrees or less is even more preferred.

[0321] The same is true for each of the slope pressing bonding parts (**11**D**5** through **11**D**9**).

[0322] The back side second area **72** is bounded by back side first pressing bonding part **11**D**1**, the back side sixth pressing bonding part **11**D**6**, the back side seventh pressing bonding part **11**D**7**, the back side third pressing bonding part **11**D**3**, the back side fifth pressing bonding part **11**D**5**, and the back side fourth pressing bonding part **11**D**4**.

[0323] Two water holding parts **13** are arranged in the back side second area **72**.

[0324] As the arrows indicate, the water can move from the back side area **72** to the back side third area **73** through the back side forth air gap **12**D**4**, the back side area fifth air gap **12**D**5**, and the back side sixth air gap **12**D**6**.

[0325] Configurations and effect of the back side second area **72** is similar to those of the back side first area **71**.

[0326] The back side third area **73** is bounded by the back side first pressing bonding part **11**D**1**, the back side eighth pressing bonding part **11**D**8**, the back side ninth pressing bonding part **11**D**9**, the back side third pressing bonding part **11**D**3**, the back side seventh pressing bonding part **11**D**7**, and the back side sixth pressing bonding part **11**D**6**.

[0327] One water holding part **13** is arranged in the back side third area **73**.

[0328] As the arrows indicate, the water can move from the back side third area **73** to the back side fourth area **74** through the back side seventh air gap **12**D**7**, the back side eighth air gap **12**D**8**, and the back side ninth air gap **12**D**9**.

[0329] The back side fourth area **74** is surrounded by the back side first pressing bonding part **11**D**1**, the back side second pressing bonding part **11**D**2**, the back side third pressing bonding part **11**D**3**, the back side ninth pressing bonding part **11**D**9**, and the back side eighth pressing bonding part **11**D**8**.

[0330] One water holding parting area **13** and one drainage outlet **21** are arranged in the back side fourth area **74**.

[0331] The drainage outlet **21** is arranged at the lower left side of the back side fourth area **74**.

[0332] When the upper part of the cooling garment **1** is rounded, the water flows out of the back side seventh air gap **12**D**7** arranged on the left side, the water can be drained faster from the drainage outlet **21** near the back side seventh air gap **12**D**7**.

[0333] The drainage outlet **21** may be arranged at the lower part of the right side.

[0334] According to the above arrangement, when the water is supplied to the intermediate layer **31** from the water inlet **20** and the back side material **3** is pressed by a human hand, the water is passed to the back side material **3** through the back side first air gap **12**D**1**, the back side second air gap **12**D**2**, the back side third air gap **12**D**3**, and each of the back side fourth air gap **12**D**4** to the back side ninth air gap **12**D**9**.

[0335] In addition, the water can be stored in the back side first area **71**, the back side second area **72**, the back side third area **73**, and the back side fourth area **74**.

[0336] As a result, the above aspect can cool the body for a long time.

[0337] In addition, since the water can move from the back side first area **71** to the back side second area **72** from air gaps on both sides of the back side material **3** and from an air gap in the center, the water can be evenly distributed to the intermediate layer **31** in the back side second area **72**.

[0338] The back side third area **73** and the back side fourth area **74** are the same as above.

[0339] When the upper part of the cooling garment **1** is rounded, the water can be discharged smoothly through the drainage outlet **21**.

[0340] The front side material **2** may also have a mountain-shaped slope pressing bonding part such that the back side material **3** has the mountain-shaped slope pressing bonding part.

[0341] Although the right front side fourth pressing bonding part **11**A**4** is connected to the right front side third pressing bonding part **11**A**3**, an air gap may be provided between the right front side fourth pressing bonding part **11**A**4** and the right front side third pressing bonding part **11**A**3**. However, in the above case, the air gap meets at least one or more of the following conditions;

[0342] (Condition 1) When the water is supplied from the water inlet **20** of the cooling garment **1** and the cooling garment **1** is worn by a person, the water is stored in the right front side first area **61** and a water level of the stored water is above the air gap in the right front side first area **61**, and the front side material **2** of the right front side first area **61** is not pushed by the hand of the person, then the water does not move from the right front side first area **61** (upper area) to the right front side second area **62** (lower area) through the air gap.

[0343] (Condition 2) When the water is stored in the right front side first area **61** and the right front side first area **61** is pushed by a human hand, the water can move from the right front side first area **61** to the right front side second area **62** through the air gap.

Embodiment 9

[0344] Embodiment 9 is an aspect in which a Peltier element unit **165** is arranged to cool the water in the intermediate layer **31** of the cooling garment **1** and can cool the body for a long time. FIG. **23** is a front view of a schematic configuration of the cooling garment in Embodiment 9. FIG. **24** is a rear view of a schematic configuration of the cooling garment in Embodiment 9. FIG. **25**A is a plan view of a schematic configuration of the Peltier element unit **165** in Embodiment 9, and FIG. **25**B is a front view of a schematic configuration of the Peltier element unit **165** in Embodiment 9.

[0345] As shown in FIG. **23**, pockets **162** for the Peltier element units and pockets **161** for batteries are arranged symmetrically around the central axis of fastener **7** in the lower part of the front side material **2**.

[0346] As shown in FIG. **24**, a pocket **162** for the Peltier element unit and a pocket **161** for the battery are arranged at the lower part of the back side material **3**.

[0347] The pocket **162** for the Peltier element unit and the pocket **161** for the battery are mesh pockets through which air can pass easily.

[0348] The pocket **162** for the Peltier element unit houses the Peltier element unit **165** and the pocket **161** for the battery houses the battery **70**.

[0349] The Peltier element unit **165** is connected to the battery **70** by a connection cord **171**. The connection cord **171** is for example preferably a Type-C capable cord that can be connected to a mobile battery.

[0350] As shown in FIG. **25**A, the Peltier element unit **165** includes a Peltier element, not shown, a heat exhaust fan **166**, an air intake **167**, an exhaust part **168** and a metal plate **69** that is cooled by a cooling part of the Peltier element.

[0351] As shown in FIG. **25**B, the metal plate **69** is cooled by the cooling part of the Peltier element, and when the heat exhaust fan **166** rotates, air around the Peltier element unit **165** is sucked from the air intake **167**. Then, the air heated by a heating part of the Peltier element is discharged from the exhaust part **168** in an upward direction of the Peltier element unit **165**.

[0352] As shown in FIG. **23**, an outer mesh of the pocket **162** for the Peltier element unit is contacted with the heat exhaust fan **166** of the Peltier element unit **165**. A surface material inside the pocket **162** for the Peltier element unit in the front side material **2** is contacted with the metal plate **69** of the Peltier element unit **165**.

[0353] The air heated by the heat exhaust fan **166** is discharged from the mesh. On the other hand, the metal plate **69** cools the water held by the intermediate layer **31** of the front side material **2**.

[0354] According to the above Embodiment, as the Peltier element unit **165** is arranged at a part (for example, at a lower part of the cooling garment **1**) in the cooling garment **1** where the water tends to store and cools the water, the Peltier element unit **165** can cool the body for a long time.

[0355] In addition, three batteries **70** are accommodated in three battery pockets **161** in FIGS. **23** and **24**. However, since the cooling garment **1** becomes heavier by the three batteries **70**, a person can wrap a waist pouch around a waist, the three pockets **161** for batteries in the cooling garment **1** are eliminated, and a configure that the three batteries **70** are arranged in the waist pouch is possible.

[0356] In other words, the three batteries **70** and the three Peltier element units **165**, which are arranged in the waist pouch, are electrically connected to the connection cords **171**.

[0357] Instead of three batteries **70**, one battery **70** arranged in the waist pouch may be electrically connected to

each of the three Peltier element units **165** with the connection cords **171**. According to the above embodiment, the weight of the cooling garment **1** can be lightened.

Embodiment 10

[0358] Embodiment 10 is an aspect that a person's side of the body is cooled by a cooling garment **100**, and can cool the body even more than Embodiment 1.

[0359] FIG. **26**A is a front perspective view of a schematic configuration of the cooling garment **100** in Embodiment 10 when a person observes from a left side of it and FIG. **26**B is a front perspective view of a schematic configuration of the cooling garment **100** in Embodiment 10 when a person observes from a right side of it.

[0360] As shown in FIGS. **26**A and **26**B, a side material **75** is connected to the front side material **2** with the back side material **3** at a left person's side and a right person's side.

[0361] The side material **75** includes the outer layer **30**, the intermediate layer **31**, and the inner layer **32**, similar to the front side material **2** and the back side material **3**. The intermediate layer **31** is continuously connected in the front side material **2**, back side material **3**, and the side material **75**.

[0362] FIG. **27**A is a front perspective view of a schematic configuration of another cooling garment **101** in Embodiment 10 when a person observes from a left side of it and FIG. **27**B is a rear perspective view of a schematic configuration of another cooling garment **101** in Embodiment 10.

[0363] As shown in FIGS. **27**A and **27**B, the side material **75** employs a stretchable elastic mesh for a size adjustment. In this case, the intermediate layer **31** of the front side material **2** is not connected to the intermediate layer **31** of the back side material **3**.

[0364] According to the above Embodiment, the cooling garments **100** and **101** can cool the person's sides and cool the entire body.

[0365] An adjuster **44** may be provided on the stretchable elastic mesh for a size adjustment in FIGS. **27**A and **27**B as shown in FIG. **20**.

[0366] Instead of the stretchable elastic mesh for a size adjustment, only mesh and the adjuster **44** may be provided.

Embodiment 11

[0367] Embodiment 11 is an aspect that mainly a thorax and a back (back part) which are upper parts of person's body is cooled in the cooling garments **102**, **103**, and **104** for users who do not want to cool an abdomen.

[0368] FIG. **28** is a front perspective view of a schematic configuration of the cooling garment **102** in Embodiment 11 when a person observes from a right side of it.

[0369] As shown in FIG. **28**, the front side material **2** of the cooling garment **102** is shortened to cool the thorax so that it does not cover the abdomen.

[0370] The front side material **2** of the cooling garment **102** may cover a part of the abdomen according to a user.

[0371] The back side material **3** of the cooling garment **102** is shortened to cool the back so that it does not cover a waist.

[0372] The back side material **3** of the cooling garment **102** may cover a part of the waist according to a user.

[0373] The water inlet **20** and the drainage outlet **21** are provided in the front side material **2** of the cooling garment **102** and two drainage outlets **21** are provided in the front side material **2** of the cooling garment **102**.

[0374] FIG. **29**A is a front perspective view the of a schematic configuration of another cooling garment **103** in Embodiment 11 when a person observes from a right side of it and FIG. **29**B is a rear view of a schematic configuration of another cooling garment **103** in Embodiment 11. As shown in FIG. **29**A, like FIG. **28**, the front side material **2** of the cooling garment **103** is shortened to cool the thorax so that it does not cover the abdomen. A material of the abdomen is a common material (e.g., polyester) that does not include the intermediate layer **31**.

[0375] Each of the sides has the mesh similar to FIGS. **27**A and **27**B.

[0376] The water inlet **20** and the drainage outlet **21** are provided in the front side material **2** of the cooling garment **103** and one drainage outlet **21** is provided in the back side material **3** of the cooling garment **103**.

[0377] FIG. **30**A is a front perspective view of a schematic configuration of yet another cooling garment **104** in Embodiment 11 when a person observes from a right side of it and FIG. **30**B is a rear view of a schematic configuration of yet another cooling garment **104** in Embodiment 11.

[0378] As shown in FIGS. **30**A and **30**B, the front side material **2** and back side material **3** of the cooling garment **104** differs from a point that the material of the abdomen of the cooling garment **103** in FIGS. **29**A and **29**B constitutes by the stretchable mesh, and the other constitution is the same constitution.

[0379] The constitution shown in FIGS. **30**A and **30**B can accommodate different sizes of users.

[0380] According to the above Embodiment, the cooling garments **102**, **103**, and **104** are configured in a short length to cool mainly the thorax and the back of the body, thus a correspondence to users who do not want to cool their abdomen becomes capable.

Embodiment 12

[0381] Embodiment 12 is an aspect that the person side in which a person feels cool is cooled for long time by the cooling garment **105**.

[0382] FIG. **31** is a schematic front view of the cooling garment **105** in Embodiment 12 and FIG. **32** is a schematic view of the inside of the front side material **2** of the cooling garment **105** in Embodiment 12.

[0383] As shown in FIGS. **31** and **32**, in Embodiment 12, two pockets **42** for holding the refrigerant **43** are arranged at a left person side and a right person side on a surface of the front side material **2** and an inside of the front side material **2**.

[0384] According to the above Embodiment, the person side in which a person feels cool can be cooled for long time.

Embodiment 13

[0385] Embodiment 13 is an aspect in which temperature indicator material **80** is arranged on the cooling garments **106** and **107** to visually capture whether the water is supplied into the cooling garments **106** and **107** has been evenly distributed.

[0386] FIG. **33** is a front view of a schematic configuration of the cooling garment **106** in Embodiment 13, FIG. **34** is a rear view of a schematic configuration of the cooling gar-

ment in Embodiment 13 and FIG. **35** is a front view of a schematic configuration of another cooling garment **107** in Embodiment 13.

[0387] As shown in FIGS. **33** and **34**, the temperature indicator materials **80** are arranged from upper parts to lower parts of the front side material **2** and the back side material **3** in the cooling garment **106**.

[0388] The temperature indicator material **80** is a temperature sensing material using a special material that changes color when a specific temperature is reached and the temperature sensing material such as DIGITALTHERMOTAPE (registered trademark) of Nichiyu Giken Kogyo Co., Ltd. can be used.

[0389] The water (e.g., the water with a temperature between 2 and 10 degrees Celsius) is poured from the water inlet **20** and the cold water is pushed and stroke the cooling garment **106** downward from near the water inlet **20** of the cooling garment **106** with a human hand, and the cold water is pushed into the lower part of the cooling garment **106**.

[0390] At that time, a color of the temperature indicator material **80** arranged at the upper part of the cooling garment **106** changes, then a color of the temperature indicator material **80** arranged downward changes in sequence, and finally a color of the temperature indicator material **80** arranged at the lower part of the cooling garment **106** changes.

[0391] FIG. **35** is a front view of a schematic configuration of another cooling garment **107** in Embodiment 13.

[0392] The temperature indicator material **80** is arranged inside of the cooling garment **107** and a color change of the temperature indicator material **80** becomes invisible from the outside and the cooling garment **107** retains an outside design of the cooling garment **107**.

[0393] According to the above Embodiment, it can be seen that the water is evenly spread over the entire cooling garment **106** by the temperature indicator material **80**.

[0394] And a user does not need to supply more the water than necessary.

Embodiment 14

[0395] Embodiment 14 is an aspect that a radiative cooling material **85** is covered over the cooling garment **1**.

[0396] FIG. **36** is a front view of a schematic configuration of the radiative cooling material **85** in Embodiment 14 and FIG. **37** is a back view of a schematic configuration of the radiative cooling material **85** in Embodiment 14.

[0397] As shown in FIGS. **36** and **37**, the radiative cooling material **85** is covered over the cooling garment **1**.

[0398] The cooling garment **1** adopts the cooling garment **1** in Embodiment 1 and schematically describes the cooling garment **1** in Embodiment 1.

[0399] In FIGS. **36** and **37**, an outer edge pressing bonding part **11** is schematically described with a dashed line.

[0400] The radiative cooling material **85** is a material that uses a principle of "radiative cooling" to lower a temperature of the radiative cooling material **85** and an environmental temperature of a shadow opposite to a direct sunlight (hereinafter referred to as a shadow temperature) without using energy by releasing heat to space, even under direct sunlight. The radiative cooling material **85** can be used, for example, Radi-Cool material of Radi-Cool Japan Co., Ltd. Depending on sunlight conditions, the shadow temperature of the Radi-Cool material can be 10 to 20 degrees Celsius lower than the shadow temperature of typical fabrics.

[0401] In addition, as the radiative cooling material **85**, for example, the radiative cooling material "SPACECOOL (registered trademark)" of SPACECOOL Co., Ltd. can be used.

[0402] The radiative cooling material **85** has a space on the cooling garment **1** and is secured with a fixing member **86**.

[0403] An upper left-hand view in FIG. **36** is an enlarged view of an area around the fixing member **86**.

[0404] The fixing member **86** includes a spacer **87** and a pin **88**.

[0405] The spacer **87** is provided on a surface of the cooling garment **1** and has a spacer hole **95**. A pin **88** is made of rubber and has a head part **93** and a convex part **94**.

[0406] The radiative cooling material **85** has a radiative cooling material hole **91**.

[0407] The convex part **94** of the pin **88** penetrates the radiative cooling material hole **91** and the convex part **94** is fitted into the spacer hole **95**, thus the radiative cooling material **85** is fixed on the cooling garment **1** so as to have space between the radiative cooling material **85** and the cooling garment.

[0408] On the other hand, as the pin **88** can be removed from the spacer hole **95**, the pin **88** can be removed from spacer hole **95** and the radiative cooling material **85** can be removed from the cooling garment **1**.

[0409] Water vapor that vaporizes from the intermediate layer **31** of the cooling garment **1** and generates is released to an outside through the space formed by the spacer **87**.

[0410] The cooling garment **1** and the radiative cooling material **85** may be in partial contact with each other if the water vapor generated by vaporizing from the intermediate layer **31** is released from the outside of the radiative cooling material **85**.

[0411] An upper right-hand view in FIG. **36** is an enlarged view of a left person side.

[0412] A space is provided between the front side material **2** of the cooling garment **1** and the radiative cooling material **85**. If the direct sunlight hits the radiative cooling material **85**, the shadow temperature becomes lower by the radiative cooling material **85**, thus a rise of the temperature of the water which occurred by the direct sunlight can be suppressed, the water being held in the intermediate layer **31** of the cooling garment **1**.

[0413] Thus, an amount of the water vapor released from the intermediate layer **31** into the space becomes reduced, the body can be cooled for a long time.

[0414] A structure of the back side material **3** in FIG. **37** is similar to that of the front side material **2** in FIG. **36**.

[0415] According to the above Embodiment, as the space is provided between the radiative cooling material **85** and the cooling garment **1**, the radiative cooling material **85** lowers the shadow temperature, and the amount of the water vapor released from the intermediate layer **31** into the space becomes reduced, the body can be cooled for a longer time.

Embodiment 15

[0416] Embodiment 15 is an aspect of the cooling garment **108** that is adopted to, for example, elementary school and kindergarten children.

[0417] FIG. **38**A is a front view of a schematic configuration of a cooling garment **108** in Embodiment 15 and FIG. **38**B is a rear view of a schematic configuration of the cooling garment **108** in Embodiment 15.

[0418] As shown in FIG. **38**A, the outer edge pressing bonding parts **11** (**11**A**1**, **11**A**2**, **11**A**3**, **11**C**1**, **11**C**2**, **11**C**3**) are short constitutions not so as to cool the thorax and the abdomen of the front side material **2**.

[0419] The abdomen consists of the mesh to improve a ventilation. The left side material **4** and the right side material **5** consist of rubber meshes and can stretch and shrink to accommodate changes in body size.

[0420] As shown in FIGS. **38**A and **38**B, the cooling garment **108** includes a collar **8** like a school uniform for junior high school boys.

[0421] The outer edge pressing bonding part **11**B and the intermediate layer **31** is provided in the collar **8** and the collar **8** is also configured to cool the neck.

[0422] A neck side pressing bonding part **11**B arranged around the neck connects with the outer edge pressing bonding part **11**A and **11**C, and constitutes the outer edge pressing bonding part **11**.

[0423] The neck side pressing bonding part **11**B has a neck side first pressing bonding part **11**B**1**, a neck side second pressing bonding part **11**B**2** and a neck side third pressing bonding part **11**B**3**, each of them is connected to the other so that a single line can be drawn.

[0424] The left front side first pressing bonding part **11**C**1** is connected to the neck side first pressing bonding part **11**B**1** and the right front side third pressing bonding part **11**A**3** is connected to the neck side third pressing bonding part **11**B**3**.

[0425] As shown in FIG. **38**B, the back side material **3** of Embodiment 15 is basically the same constitution as that of FIG. **22**. A difference between FIG. **38**B and FIG. **22** is that the collar **8** including the intermediate layer **31** and the water inlet drainage outlet **40** are provided in FIG. **38**B.

[0426] The water inlet drainage outlet **40** is arranged in the collar **8**. A center of the water inlet drainage outlet **40** passes through the centerline **92**B.

[0427] As arrows indicate, the water supplied from the water inlet drainage outlet **40** moves in three main directions as follows.

[0428] (1) The water moves from the water inlet drainage outlet **40** to both shoulders and then moves from the both shoulders to the front side material **2**.

[0429] (2) The water moves from the water inlet drainage outlet **40** toward the back side first air gap **12**D**1** and the back side third air gap **12**D**3** arranged on both sides of the back side material **3**.

[0430] (3) The water moves from the water inlet drainage outlet **40** toward the back side second air gap **12**D**2** arranged in a center of the back side material **3**.

[0431] As described above, the water can spread evenly over the front side material **2** and the back side material **3**.

[0432] Since FIG. **38**B has almost the same constitution as FIG. **22**, the duplicated parts are omitted.

Embodiment 16

[0433] The cooling garment **109** of Embodiment 16 is an aspect that almost all of the front side material **2** is constituted of the mesh and the outer edge pressing bonding part portion (back side pressing bonding part portion) **11**D surrounds the intermediate layer **31** of the back side material **3**.

[0434] FIG. **39**A is a front view of a schematic configuration of the cooling garment **109** in Embodiment 16 and FIG. **39**B is a rear view of a schematic configuration of the cooling garment **109** in Embodiment 16.

[0435] As shown in FIG. **39**A, almost all of the front side material **2** of the cooling garment **109** is constituted of the mesh and the front side material **2** of the cooling garment **109** does not include the outer layer **30**, the intermediate layer **31**, and the inner layer **32**.

[0436] A coarseness of the mesh of the front side material **2** is equivalent to a coarseness of the mesh of the left side material **4** or the right side material **5**.

[0437] The coarseness of the mesh of the front side material **2** may be coarser or finer than the coarseness of the mesh of the left side material **4** or the right side material **5**.

[0438] As shown in FIG. **39**B, the back side material **3** of the cooling garment **109** includes the outer layer **30**, the intermediate layer **31** and the inner layer **32**.

[0439] The back side material **3** of the cooling garment **109** is a modification of the back side material **3** of FIG. **2** in Embodiment 1

[0440] The water inlet **20** is provided on the upper part and a cap-type drainage outlet **21** is provided on the lower part in the back side material **3** of the cooling garment. The drainage outlet **21** can be a lid type like the water inlet **20**.

[0441] The intermediate layer **31** is surrounded by the pressing bonding part **11**D (back side pressing bonding part **11**D) where the outer layer **30** and the inner layer **32** are pressed or bonded around the outer edge of the back side material **3** of the cooling garment **109**.

[0442] According to the above Embodiment, since the front side material **2** constitutes the mesh, sweat that evaporates from the body can be discharged through the mesh, thus an amount of a stuffiness can become reduced.

[0443] In addition, since sweat does not remain in the front side material **2**, it is difficult for sweat odor to adhere to the front side material **2**.

[0444] In addition, the water is supplied to only the intermediate layer **31** of the back side material **3** in the cooling garment **109**.

[0445] Thus, an amount of the water poured can be reduced and a weight of the cooling garment **109** can be reduced.

[0446] The above effects are especially effective during hot weather, such as summer.

Embodiment 17

[0447] The cooling garment **110** in Embodiment 17 is an aspect that a design of the outside of the cooling garment **110** is considered, and the water inlet **20** and the drainage outlet **21** are arranged on the inside of the cooling garment **110**.

[0448] FIG. **40** is a schematic view of a schematic configuration illustrating the inside of the cooling garment **109** in Embodiment 17.

[0449] As shown in FIG. **40**, the water inlets **20** are provided on the right and left sides of the upper inside of the front side material **2** and the water inlets **20** are provided on the upper inside of the back side material **3**.

[0450] In addition, the drainage outlets **21** are provided on the right and left sides of the lower inside of the front side material **2** and the drainage outlets **21** are provided on the lower inside of the back side material **3**.

[0451] At least one the water inlet **20** and at least one the drainage outlet **21** may be provided on any one of the insides of the right side of the front side material **2**, the inside of the left of the front side material **2** or the inside of the back side material **3**.

[0452] For example, the one water inlet **20** may be provided on the upper inside of the back side material **3** and the one drainage outlet **21** may be provided on the lower inside of the right side of the front side material **2** in the cooling garment **110**.

[0453] According to the above Embodiment, since the cooling garment **110** has the same water pouring and draining functions as the cooling garment **1** of Embodiment 1 and the water inlet **20** and the drainage outlet **21** are arranged inside the cooling garment **110**, so damaging a design of the outside of the cooling garment **110** is prevented.

[0454] Since the water inlet **20** and the drainage outlet **21** are provided inside the cooling garment **110**, opening the lid of the water inlet **20** or the drainage outlet **21** can be prevented in a case where the lid of the water inlet **20** or the drainage outlet **21** is snagged on an object.

[0455] In Embodiment 1, the left side material **4** and the right side material **5** are made of the stretchable material, but as shown in FIG. **20**, the adjuster **44** that can adjust a length may be provided. The left side material **4** may also be made of a non-stretchable material and the adjuster **44** may be provided.

[0456] In addition, the water inlet **20** or the drainage outlet **21** in Embodiment 1 may be constituted of the cap of Embodiment 3.

[0457] In FIG. **9**, the drainage outlets **21** are provided at the three lower part of the back side material **3**, but one drainage outlet **21** may be provided only at the center, only at the right end, or they may be provided both at the center and the right end.

[0458] In FIG. **10**, the water inlet **20** and the drainage outlet **21** are provided at two locations on the left and right sides of the front side material **2**, but either one on the left or right side can be used.

[0459] In FIGS. **21**, **22**, and **38**B, four areas are provided in the front side material **2** and the back side material **3**, but providing at least two or more areas is sufficient.

[0460] In Embodiment 1, the aspect that the material of the inner layer **32** and/or the material of the outer layer **30** is treated with the antistatic treatment using antistatic yarn and other materials is described.

[0461] However, the present disclosure may include following aspects without using antistatic yarn and other materials as the material of the inner layer **32** and/or the material of the outer layer **30**.

[0462] The aspect is an aspect using a spin tape having antistatic (preventing static electricity) properties.

[0463] The spin tape is made from a material kneaded a conductive material inside fibers of conductive yarn.

[0464] The spin tape is sewn onto a front surface and/or a back surface of the garment.

[0465] The spin tape may be adhered to the front surface and/or back surface of the garment by bonding, joining, or welding.

[0466] For the spin tape, for example, "STA-GUARD SPIN TAPE" of Tokai Thermo Co., Ltd. can be used.

[0467] For the spin tape, for example, "STC60" of SHINDO Co., Ltd. can be used.

[0468] The spin tape is arranged at an arbitrary position on the cooling garment, such as at the shoulders, the person sides, and the sides of the cooling garment.

[0469] In addition, the above present inventions may be substituted or combined as long as there is no contradiction.

[0470] As described above, the present disclosure includes a cooling garment, a cooling garment set and a method of wearing the cooling garment set as described in the following items.

[0471] Item 1

[0472] A cooling garment including:

- **[0473]** a front side material arranged on a front side of a body; and
- **[0474]** a back side material arranged on a back side of the body,
- **[0475]** wherein the front side material or the back side material has
- **[0476]** an inner layer arranged closest to the body, which is waterproof;
- **[0477]** an outer layer arranged farthest from the body, which is moisture permeable; and
- **[0478]** an intermediate layer made of a nonwoven fabric that is arranged between the inner layer and the outer layer, and that absorbs water and stores the absorbed water,
- **[0479]** wherein a water inlet that supplies the water to the intermediate layer is arranged on an upper part of the front side material or the back side material and a drainage outlet that drains the water absorbed by the intermediate layer is arranged on a lower part of the front side material or the back side material when the cooling garment is attached to the body.

[0480] According to the above aspect, the body temperature can be lowered without using electric power. In addition, since the cooling garment can easily repeat operations of pouring the water and draining the water, the body temperature can be lowered throughout the day by repeating the above operation multiple times a day.

[0481] Item 2

[0482] The cooling garment according to item 1,

- **[0483]** wherein the front side material or the back side material has a hole through the front side material or the back side material,
- **[0484]** a pressing bonding part that is a part where the outer layer and the inner layer are adhered to each other around the hole,
- **[0485]** a water holding part that has an air gap arranged around the pressing bonding part and between the outer layer and the inner layer, the air gap temporarily holding the water.

[0486] According to the above aspect, since the water can be held in the water holding part, thus the temperature of the body can be lowered for long time.

[0487] Item 3

[0488] The cooling garment according to item 2,

- **[0489]** wherein the water holding parts are plural,
- **[0490]** wherein the plurality of water holding parts are arranged in a staggered pattern.

[0491] According to the above aspect, since the water holding parts are arranged in a staggered manner and the water can be held in the water holding parts, so the body can be cooled for long time. In addition, since the direction of the water flowing from the water holding part arranged at the bottom faces the drainage outlet, the water can be discharged smoothly when the water is discharged.

[0492] Item 4

[0493] The cooling garment according to item 1,

- **[0494]** wherein the water inlet is arranged on an inner upper part of the front side material or the back side

material and the drainage outlet is arranged on an inner lower part of the front side material or the back side material.

[0495] According to the above aspect, since the cooling garment has the same water pouring and water draining functions as the cooling garment of Embodiment 1 and the water inlet and the drainage outlet are provided inside of the cooling garment, the aspect can prevent the design of the outside of the cooling garment from being spoiled.

[0496] In addition, since the water inlet and the drainage outlet are provided inside the cooling garment, the aspect can prevent the lids of the water inlet or the drainage outlet from opening when they catch on an object.

[0497] Item 5

[0498] A cooling garment including:

[0499] a front side material arranged on a front side of a body; and

[0500] a back side material arranged on a back side of the body,

[0501] wherein the front side material or the back side material has

[0502] an inner layer arranged closest to the body, which is waterproof;

[0503] an outer layer arranged farthest from the body, which is moisture permeable; and

[0504] an intermediate layer made of a nonwoven fabric that is arranged between the inner layer and the outer layer, and that absorbs water and stores the absorbed water,

[0505] wherein the front side material or the back side material has a slope pressing bonding part that is a part where the outer layer and the inner layer are adhered to each other,

[0506] wherein the slope pressing bonding part is inclined with respect to a horizontal line perpendicular to a centerline of a longitudinal direction of the cooling garment so that the water moves from an upper part of the cooling garment toward a lower part of the cooling garment by gravity when the cooling garment is attached to the body.

[0507] According to the above aspect, the slope pressing bonding part can slow the speed of the water falling to the lower part and the body can be cooled for long time.

[0508] Item 6

[0509] The cooling garment according to item 4,

[0510] wherein the slope pressing bonding part includes a first slope pressing bonding part and a second slope pressing bonding part,

[0511] one end of the first slope pressing bonding part and one end of the second slope pressing bonding part are connected at a connection point,

[0512] wherein the first slope pressing bonding part and the second slope pressing bonding part are mountainous shape of which an apex is the connection point when the cooling garment is attached to the body.

[0513] According to the above aspect, the first slope pressing bonding part and the second slope pressing bonding part, with their mountainous shape, can slow the speed of the water falling to the lower side and spread the water to both sides of the cooling garment.

[0514] Item 7

[0515] The cooling garment according to items 5 or 6,

[0516] wherein the slope pressing bonding part includes a first slope pressing bonding part and a second slope pressing bonding part,

[0517] one end of the first slope pressing bonding part and one end of the second slope pressing bonding part are arranged with a gap,

[0518] wherein the first slope pressing bonding part and the second slope pressing bonding part are mountainous shape of which an apex is the gap when the cooling garment is attached to the body.

[0519] According to the above aspect, since the air gap is provided near the apex of the first slope pressing bonding part and the second slope pressing bonding part with the mountain shape, the water can be dropped from the center of the cooling garment to the lower side of it and the water can be spread over the cooling garment.

[0520] Item 8

[0521] The cooling garment according to items 6 or 7,

[0522] wherein the front side material or the back side material includes an outer edge pressing bonding part along the outer edge of the front side material or the back side material,

[0523] wherein air gaps are arranged between the outer edge pressing bonding part and the other end of the first slope pressing bonding part and between the outer edge pressing bonding part and the other end of the second slope pressing bonding part.

[0524] According to the above aspect, since the water can be dropped from the center and both sides of the cooling garment to the lower side, the water can be spread evenly in the cooling garment.

[0525] Item 9

[0526] A cooling garment including:

[0527] a front side material arranged on a front side of a body; and

[0528] a back side material arranged on a back side of the body,

[0529] wherein the front side material is constituted of a mesh,

[0530] wherein the back side material has

[0531] an inner layer arranged closest to the body, which is waterproof;

[0532] an outer layer arranged farthest from the body, which is moisture permeable; and

[0533] an intermediate layer made of a nonwoven fabric that is arranged between the inner layer and the outer layer, and that absorbs water and stores the absorbed water,

[0534] wherein the front side material or the back side material includes a pressing bonding part that is a part where the outer layer and the inner layer are adhered to each other,

[0535] wherein the intermediate layer is divided into several parts,

[0536] wherein the pressing bonding part of the front side material or the back side material surrounds around the intermediate layers divided through an air gap when the cooling garment is attached to the body.

[0537] According to the above aspect, since the cooling garment is divided into several pieces and the speed of the water falling to the lower side can be slowed and the body can be cooled for long time.

[0538] Item 10

[0539] A cooling garment including:

[0540] a front side material arranged on a front side of a body; and

[0541] a back side material arranged on a back side of the body,

[0542] wherein the front side material or the back side material has

[0543] an inner layer arranged closest to the body, which is waterproof;

[0544] an outer layer arranged farthest from the body, which is moisture permeable; and

[0545] an intermediate layer made of a nonwoven fabric that is arranged between the inner layer and the outer layer, and that absorbs water and stores the absorbed water,

[0546] wherein the front side material or the back side material includes a pressing bonding part that is a part where the outer layer and the inner layer are adhered to each other,

[0547] wherein the intermediate layer is surrounded by the pressing bonding part.

[0548] According to the above aspect, since the front side material is constituted of mesh, sweat released from the body can be discharged through the mesh, sweaty steam ca be reduced. In addition, sweat does not remain in the front side material, so the front side material is less prone to attach sweat odor.

[0549] In addition, the water is supplied to the intermediate layer only in the back side material. Thus, the amount of the water to be poured can be reduced, and the weight of the cooling garment can be reduced.

[0550] Item 11

[0551] A cooling garment set including:

[0552] the cooling garment according to any one of items 1 to 10 that is arranged close to the body; and

[0553] air conditioning function garment that lowers the body temperature with an airflow fan and is arranged outside the cooling garment.

[0554] According to the above aspect, the air conditioning function garment allows outside air to be supplied into the surface of the cooling garment, the vaporization of the water in the cooling garment can promote and the temperature of the body can be lowered fast.

[0555] Item 12

[0556] A method for wearing a cooling garment set includes a cooling garment and an air conditioning function garment including:

[0557] (i) wearing the air conditioning function garment with a fan stopped over the cooling garment, and then rotating the fan of the air conditioning function garment; or

[0558] (ii) wearing the air conditioning function garment with the fan rotating over the cooling garment;

[0559] wherein the cooling garment includes a front side material arranged on a front side of a body and a back side material arranged on a back side of the body

[0560] wherein the front side material or the back side material has

[0561] an inner layer arranged closest to the body, which is waterproof;

[0562] an outer layer arranged farthest from the body, which is moisture permeable; and

[0563] an intermediate layer made of a nonwoven fabric that is arranged between the inner layer and the outer layer, and that absorbs water and stores the absorbed water,

[0564] wherein a water inlet that supplies the water to the intermediate layer is arranged on an upper part of the front side material or the back side material and a drainage outlet that drains the water absorbed by the intermediate layer is arranged on a lower part of the front side material or the back side material when the cooling garment is attached to the body.

[0565] According to the above aspect, since the air conditioning function garment allows outside air to be supplied into the surface of the cooling garment, the vaporization of the water in the cooling garment can promote and the temperature of the body can be lowered fast.

INDUSTRIAL APPLICABILITY

[0566] This disclosure is a cooling garment and could achieve the third goal of the Sustainable Development Goals (SDGs), which is to "ensure the healthy lives and promote the well-being of all people of all ages.

[0567] The cooling garment of the present disclosure is power-saving because it does not use electricity and can cool the bodies of children and the elderly evenly and gently, thereby preventing heat stroke, the cooling garment can contribute to an achievement of the third goal of the Sustainable Development Goals (SDGs), the third goal being that "healthy lives are ensured and well-being of all people of all ages is promoted".

REFERENCE SIGNS LIST

[0568] **1**: **100-110** cooling garment

[0569] **2**: front side material

[0570] **3**: back side material

[0571] **13**: water holding part

[0572] **20**: water inlet

[0573] **21**: drainage outlet

[0574] **30**: outer layer

[0575] **31**: intermediate layer

[0576] **32**: inner layer

[0577] **40**: water inlet drainage outlet

[0578] **42**: pockets

[0579] **43**: refrigerant

[0580] **50**: air conditioning function garment

[0581] **51**: fan

[0582] **61**: right side front first area

[0583] **62**: right side front second area

[0584] **63**: right side front third area

[0585] **64**: right side front forth area

[0586] **65**: left side front first area

[0587] **66**: left side front second area

[0588] **67**: left side front third area

[0589] **68**: left side front forth area

[0590] **71**: back side first area

[0591] **72**: back side second area

[0592] **73**: back side third area

[0593] **74**: back side forth area

[0594] **81**: collar

[0595] **11**A, **11**B, **11**C, **11**D: outer edge pressing bonding part

[0596] **11**A**4**-A**6**: slope pressing bonding part

[0597] **11**C**4**-C**6**: slope pressing bonding part

[0598] **11**D**4**: first slope pressing bonding part
[0599] **11**D**5**: second slope pressing bonding part
[0600] **11**D**6**: third slope pressing bonding part
[0601] **11**D**7**: fourth slope pressing bonding part
[0602] **11**D**8**: fifth slope pressing bonding part
[0603] **11**D**9**: sixth slope pressing bonding part
[0604] **12**A**1**-A**3**: right side front first-third air gap
[0605] **12**C**1**-C**3**: left side front first-third air gap
[0606] **12**D**1**-D**9**: back side first-nineth air gap

1. A cooling garment comprising:
a front side material arranged on a front side of a body; and
a back side material arranged on a back side of the body,
wherein the front side material or the back side material has
an inner layer arranged closest to the body, which is waterproof;
an outer layer arranged farthest from the body, which is moisture permeable; and
an intermediate layer made of a nonwoven fabric that is arranged between the inner layer and the outer layer, and that absorbs water and stores the absorbed water,
wherein a water inlet that supplies the water to the intermediate layer is arranged on an upper part of the front side material or the back side material and a drainage outlet that drains the water absorbed by the intermediate layer is arranged on a lower part of the front side material or the back side material when the cooling garment is attached to the body.

2. The cooling garment according to claim **1**,
wherein the front side material or the back side material has
a hole penetrates the front side material or the back side material;
a pressing bonding part that is a part where the outer layer and the inner layer are adhered to each other around the hole; and
a water holding part that has an air gap arranged around the pressing bonding part and between the outer layer and the inner layer, the air gap holding the water temporarily.

3. The cooling garment according to claim **2**,
wherein the water holding parts are plural,
wherein the plurality of water holding parts are arranged in a staggered pattern.

4. The cooling garment according to claim **1**,
wherein the water inlet is arranged on an inner upper part of the front side material or the back side material and the drainage outlet is arranged on an inner lower part of the front side material or the back side material.

5-12. (canceled)

13. A method for wearing a cooling garment set includes a cooling garment and an air conditioning function garment, the cooling garment comprising:
a front side material arranged on a front side of a body; and
a back side material arranged on a back side of the body,
wherein the front side material or the back side material has
an inner layer arranged closest to the body, which is waterproof;
an outer layer arranged farthest from the body, which is moisture permeable; and
an intermediate layer made of a nonwoven fabric that is arranged between the inner layer and the outer layer, and that absorbs water and stores the absorbed water,
wherein a water inlet that supplies the water to the intermediate layer is arranged on an upper part of the front side material or the back side material and a drainage outlet that drains the water absorbed by the intermediate layer is arranged on a lower part of the front side material or the back side material when the cooling garment is attached to the body,
wherein the method including:
(i) wearing the air conditioning function garment with a fan stopped over the cooling garment, and then rotating the fan of the air conditioning garment; or
(ii) wearing the air conditioning function garment with the fan rotating over the cooling garment.

* * * * *