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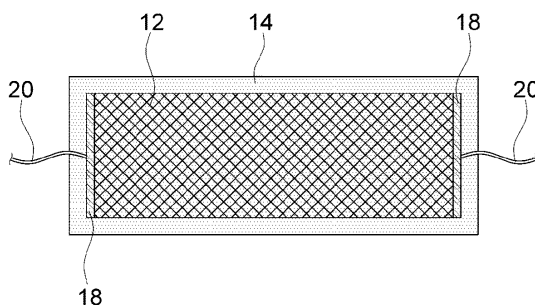
(54) **PLANAR HEATING SHEET ASSEMBLY**

(57) Disclosed is a surface heating sheet assembly including a surface heating sheet of a woven type, which has flexibility and electric conductivity and generates heat by applied electricity. A surface heating sheet assembly including a metallic woven fabric according to an embodiment includes: a heating sheet formed by weaving a metallic heating fiber to have predetermined area, thickness, and size; a resin layer entirely covering a middle portion of the heating sheet other than predetermined edge portions on both sides of the heating sheet; an elec-

trode portion having a front-end portion corresponding to and adjacent to an end portion of the heating sheet exposed by the resin layer; and a connector portion including an upper connector portion and a lower connector portion covering a portion of the heating sheet exposed by the resin layer and the electrode portion at an upper side and a lower side, respectively, to be electrically connected and fixed thereto by a compression bonding at a high temperature and a high pressure.

FIG. 2

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Description

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims the priority benefit of Korean Patent Application No. 10-2018-0127048 filed on Oct 23, 2018, the disclosure of which is incorporated herein by reference.

BACKGROUND OF THE INVENTION

Field of the Invention

[0002] Embodiments of the invention relate to a surface heating sheet assembly including a surface heating sheet of a woven type, which has flexibility and electric conductivity and generates heat by applied electricity.

Description of the Related Art

[0003] Generally, heating elements are classified into a linear heating element made of a metal wire or a ceramic wire, a bulk heating element such as graphite, and a surface heating element (a sheet-typed heating element) having a heating element of a film shape coated on a flat electrode. In the surface heating element among them, a metallic, ceramic-based, or carbon-based heating layer is coated on a flat metal electrode, and upper and lower portions of the heating layer are sealed with an insulator.

[0004] Recently, there is a need to manufacture a surface heating element having a shape of a curved surface, which is not a flat surface, or a flexible surface heating element being able to be flexibly bent during use. However, since there are limitations of flexibility of a substrate having a surface heating element and flexibility of a heating material coated on the substrate, cracking or performance deterioration occurs in the surface heating element having flexibility. Alternatively, a heating material is brittle and thus a surface heating element having the heating material is easily broken, or a heat generating property or heating efficiency of a surface heating element, which is manufactured by filling a heating material inside a substrate having a network structure, is not superior.

[0005] For example, a carbon-based electrode expected to be a surface heating element is not easily used for a long period of time due to a problem that the carbon-based electrode is oxidized at a high temperature, and is brittle and easily cracked due to an impact. In addition, a surface heating element, which is manufactured by coating a far-infrared ceramic-based heating element on a metal substrate, cannot be used in the state that the surface heating element is largely bent due to a limitation of bend or flexibility of the ceramic-based heating element.

[0006] In order to overcome this problem, a technique of forming a linear heating element using a conductive material and weaving the linear heating element to man-

ufacture a surface heating element is known. As in Korean Patent Laid-Open Publication No. 10-2008-0090068 of "a surface heating element, a structure and a property thereof, and a manufacture method thereof" (hereafter referred to as 'prior art'), for the conventional surface heating element, a method of manufacturing or weaving a surface heating element by using a weaving yarn made through twisting a common fiber and a metal fiber together is known.

[0007] In the conventional technique, since a metal wire cannot be woven itself, a surface heating element is manufactured by using a weaving yarn made through twisting a common fiber and a metal fiber together, or by coating a metal on a surface of a non-conductive polymer yarn and then weaving it. However, when the surface heating element is manufactured or woven by the above method, the surface heating element is not flexible, and a manufacturing process thereof is complicated and a manufacturing cost thereof is increased.

[0008] [Related Patent] Korean Patent Laid-Open Publication No. 10-2008-0090068 (published on October 10, 2008)

SUMMARY OF THE INVENTION

[0009] Therefore, embodiments of the invention have been made in view of the above problems, and embodiments of the invention are to provide a surface heating sheet assembly including a metallic woven fabric that allows surface heating on a limited temperature range and allows partial installation and application corresponding to various clothes.

[0010] In order to achieve the above object, embodiments of the invention provide a surface heating sheet assembly including a metallic woven fabric. The surface heating sheet assembly including the metallic woven fabric according to the embodiment includes: a heating sheet formed by weaving a metallic heating fiber to have predetermined area, thickness, and size; a resin layer entirely covering a middle portion of the heating sheet other than predetermined edge portions on both sides of the heating sheet; an electrode portion having a front-end portion corresponding to and adjacent to an end portion of the heating sheet exposed by the resin layer; and a connector portion including an upper connector portion and a lower connector portion covering a portion of the heating sheet exposed by the resin layer and the electrode portion at an upper side and a lower side, respectively, to be electrically connected and fixed thereto by a compression bonding at a high temperature and a high pressure.

[0011] Also, the connector portion may further include a metal film at a facing surface (an inner surface) of each of the upper connector portion and the lower connector portion to correspond to the heating sheet exposed by the resin layer and the electrode portion. The facing surface may face the heating sheet exposed by the resin layer and the electrode portion. The metal film may be

connected to the heating sheet exposed by the resin layer and the electrode portion by the compression bonding of the upper connector portion and the lower connector portion so that the connector portion is electrically connected to the heating sheet exposed by the resin layer and the electrode portion.

[0012] In addition, a welding member may be further provided on the facing surface of the connector portion. The welding member may be melted by a high temperature and a high pressure to have an area the same as or larger than an area of the metal film to fill a space between the upper connector portion and the lower connector portion.

[0013] Further, a surface of the connector portion or a partial surface of the electrode portion may further include a coupling portion for coupling the connector portion or the electrode portion with other fabric when the connector portion or the electrode portion is positioned close to the other fabric.

[0014] On the other hand, a temperature sensor having a length to have an end portion protruding than an end position of the electrode portion and reaching the heating sheet to measure a temperature at an end position of the heating sheet may be provided.

[0015] According to embodiments of the invention, a surface heating sheet assembly including a metallic woven fabric can be maintained to be attached to clothes in a state that an area of a heating sheet corresponds to a portion of the clothes where a user wants, and an electrode portion is electrically connected to a power supply unit through a predetermined portion of clothes. Thereby, the surface heating sheet assembly including the metallic woven fabric according to embodiments of the invention can flexibly change in accordance with a change of a body or a change of a clothes shape by the change of the body, and can protect a human body by raising and maintaining a temperature at a desired level at a portion where the surface heating sheet assembly including the metallic woven fabric according to embodiments of the invention is attached.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016]

FIG. 1 is a partially exploded perspective view showing an arrangement relationship between a heating sheet and resin layers included in a surface heating sheet assembly including a metallic woven fabric according to an embodiment of the invention.

FIG. 2 is a plan view showing an assembled state of a surface heating sheet assembly including a metallic woven fabric according to an embodiment of the invention.

FIG. 3 is a cross-sectional view schematically showing an arrangement and an assembled relationship of elements included in the surface heating sheet assembly including the metallic woven fabric shown

in FIG. 2.

FIG. 4 is a cross-sectional view showing an assembled state of the elements included in the surface heating sheet assembly including the metallic woven fabric shown in FIG. 3.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0017] Terms and words used in the present description and claims are not limited to an ordinary or dictionary meaning. Thus, the terms and the words used in the present description and claims are to be construed in accordance with a technical spirit of the invention based on the principle of 'the inventor can properly define a concept of a term in order to explain his or her invention in the best way'.

[0018] Also, it should be noted that embodiments described in the present specification and elements shown in the drawings are merely preferred embodiments of the invention and do not represent all the technical ideas of the invention. Accordingly, it should be understood that various equivalents and modifications are possible.

[0019] Hereinafter, embodiments of the invention will be described in detail with reference to the accompanying drawings.

[0020] As shown in FIGS. 1 to 4, a surface heating sheet assembly (a sheet-typed heating sheet assembly) 10 including a metallic woven fabric according to an embodiment of the invention includes a heating sheet 12. The heating sheet 12 may be formed by a weaving method through using a metal fiber or a metallic fiber to have a sheet shape. In this instance, the metal fiber or the metallic fiber may be a fiber type including a metallic heating fiber manufactured to have a high level of tensile strength, an electrical conductivity, and a resistance value, as stated in the prior art.

[0021] The heating sheet 12 has a predetermined area, a predetermined thickness, and a predetermined size.

[0022] In this instance, when the heating sheet 12 is applied to human clothes, a size of the heating sheet 12 may be determined to correspond to a size of each part based on a body size of a person in general.

[0023] In addition, a size, a clothes shape, or the like of the heating sheet 12 may be limited since the heating sheet 12 or the surface heating sheet assembly 10 including the metallic woven fabric is applied to working clothes for a person working in a cold place or is applied to clothes for a cold place such as polar regions.

[0024] On the other hand, each of resin layers 14a and 14b, which prevents the heating sheet 12 from being damaged by an external physical action or an external impact, entirely covers a middle portion of the heating sheet 12 other than predetermined edge portions on both sides of the heating sheet 12.

[0025] The both end portions or the both edge portions of the heating sheet 12 not covered by the resin layers 14a and 14b may be generally positioned on both ends or both sides in a longitudinal direction; however, the both

end portions or the both edge portions of the heating sheet 12 not covered by the resin layers 14a and 14b may be preferably positioned on both sides in a width direction.

[0026] In addition, the both edge portions of the heating sheet 12 exposed by the resin layers 14a and 14b may preferably be positioned to face each other.

[0027] Further, electrode portions 22a and 22b are disposed at both end portions of the heating sheet 12 exposed by the resin layers 14a and 14b. A front-end portion of the electrode portion 22a or 22b may be in contact with or close to an end portion of the heating sheet 12 exposed by the resin layers 14a and 14b in a direction facing each other.

[0028] A connector portion 18 may include an upper connector portion 18 and a lower connector portion 18. More particularly, the upper connector portion 18 includes a pair of upper connector portions 18 covering the both end portions of the heating sheet 12 exposed by the resin layer 14a and the electrode portions 22a and 22b at an upper side. The lower connector portion 18 includes a pair of lower connector portions 18 covering the both end portions of the heating sheet 12 exposed by the resin layer 14b and the electrode portions 22a and 22b at a lower side. The pair of the upper connector portions 18 and the pair of the lower connector portions 18 face each other. The connector portion 18 is electrically connected and fixed by a compression bonding at a high temperature and at a high pressure.

[0029] The connector portion 18 may further include a metal film 16 at a facing surface of each of the upper connector portion 18 and the lower connector portion 18 to correspond to a portion of the heating sheet 12 exposed by the resin layers 14a and 14b and the electrode portion 22a or 22b.

[0030] As stated in the above, the electrical connection by the connector portion 18 may be achieved by the metal film 16 connected or coupled to the heating sheet 12 exposed by the resin layers 14a and 14b and the electrode portion 22a or 22b through the compression bonding of the upper and lower connector portions 18.

[0031] In this instance, the metal film 16 may be formed of a thin film of copper, aluminum, chromium, nickel, or the like, but a material of the metal film 16 is not limited thereto. Thus, as the metal film 16, any of various metal materials having high electrical conductivity and being able to have a good electrical connection with the heating sheet 12 may be used.

[0032] A welding member 20 may be provided on the facing surface of the connector portion 18. The welding member 20 is melted by a high temperature and a high pressure to have an area the same as or larger than an area of the metal film 16 to fill a space between the upper and lower connector portions 18.

[0033] In addition, a surface of the connector portion 18 or a partial surface of the electrode portions 22a and 22b may further include a coupling portion (not shown) for coupling the connector portion 18 or the electrode

portions 22a and 22b with other fabric when the connector portion 18 or the electrode portions 22a and 22b is positioned close to the other fabric.

[0034] A surface of the coupling portion at one of the connector portion 18 or the electrode portions 22a and 22b and the other fabric may be rough and have a hook-shaped portion or the like, and a facing surface at the other of the connector portion 18 or the electrode portions 22a and 22b and the other fabric may be a smooth surface or have an annular portion, as known as Velcro. Then, the surface of the coupling portion and the facing surface can be coupled to each other. Alternatively, the coupling portion may be formed of an adhesive or a double-sided adhesive tape.

[0035] The coupling portion is for attaching the surface heating sheet assembly 10 including the metallic woven fabric according to the embodiment to a surface of a fabric covering a person or a specific facility to maintain or to raise a temperature of a corresponding portion at a desired value.

[0036] Therefore, the electrode portions 22a and 22b are provided with a general connector (not shown) to be connected to another electricity supply member at ends of the electrode portions 22a and 22b.

[0037] Further, as shown in FIG. 3, the electrode portions 22a and 22b may further include a temperature sensor 24. The temperature sensor 24 may preferably have a length to have an end portion protruding than an end position of the electrode portion 22a or 22b and thus reach the heating sheet 12 to be able to measure a temperature at an end position of the heating sheet 12.

[0038] The temperature sensor 24 described above may apply or supply the measured temperature to a controller (not shown) provided in a power supply apparatus (not shown) or the like to allow the controller to control a power supply to the heating sheet 12.

Claims

1. A surface heating sheet assembly comprising a metallic woven fabric, comprising:

a heating sheet formed by weaving a metallic heating fiber to have predetermined area, thickness, and size;

a resin layer entirely covering a middle portion of the heating sheet other than predetermined edge portions on both sides of the heating sheet; an electrode portion having a front-end portion corresponding to and adjacent to an end portion of the heating sheet exposed by the resin layer; and

a connector portion including an upper connector portion and a lower connector portion covering a portion of the heating sheet exposed by the resin layer and the electrode portion at an upper side and a lower side, respectively, to be

electrically connected and fixed thereto by a compression bonding at a high temperature and a high pressure.

2. The surface heating sheet assembly comprising the metallic woven fabric according to claim 1, wherein the connector portion further comprises a metal film at a facing surface of each of the upper connector portion and the lower connector portion to correspond to the heating sheet exposed by the resin layer and the electrode portion, wherein the facing surface facing the heating sheet exposed by the resin layer and the electrode portion, and wherein the metal film is connected to the heating sheet exposed by the resin layer and the electrode portion by the compression bonding of the upper connector portion and the lower connector portion so that the connector portion is electrically connected to the heating sheet exposed by the resin layer and the electrode portion.

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3. The surface heating sheet assembly comprising the metallic woven fabric according to claim 2, further comprising:

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a welding member on the facing surface of the connector portion, wherein the welding member being melted by a high temperature and a high pressure to have an area the same as or larger than an area of the metal film to fills a space between the upper connector portion and the lower connector portion.

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4. The surface heating sheet assembly comprising the metallic woven fabric of claim 1, further comprising:

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a temperature sensor having a length to have an end portion protruding than an end position of the electrode portion and reaching the heating sheet to measure a temperature at an end position of the heating sheet.

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5. The surface heating sheet assembly comprising the metallic woven fabric of claim 1, wherein the heating sheets comprises at least two divided parts, the heating sheet comprises a length adjusting part for adjusting the length of the heating sheet and for connecting electrically the divided parts of the heating sheets.

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6. The surface heating sheet assembly comprising the metallic woven fabric of claim 1, wherein the length adjusting part comprises: a flexible body connecting the divided parts of the heating sheet and having a wave shape with a predetermined length enabling the adjustment of the length of the heating sheet; a wiring having the identical shape as the flexible body and embodied in the flexible body and for con-

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necting the divided parts of the heating sheets; a second connecting part arranged at the ends of the flexible body and the end of the divided parts of the heating sheet and electrically connecting the wiring and the heating sheet.

FIG. 1

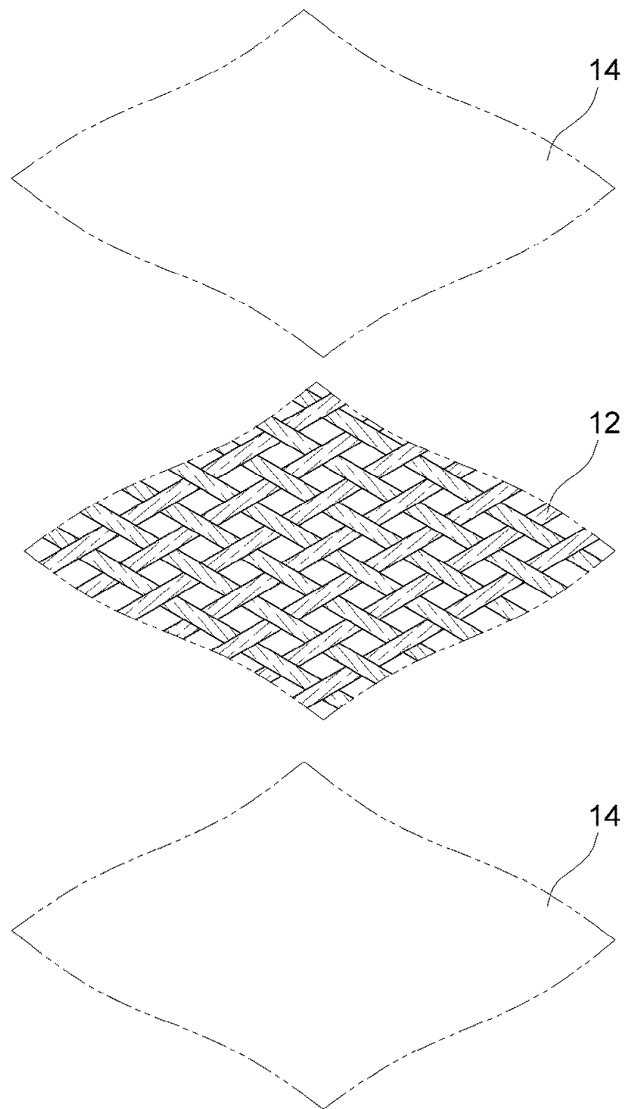


FIG. 2

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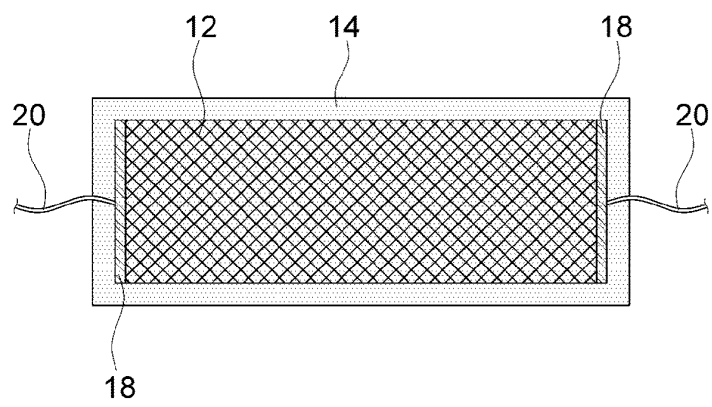


FIG. 3

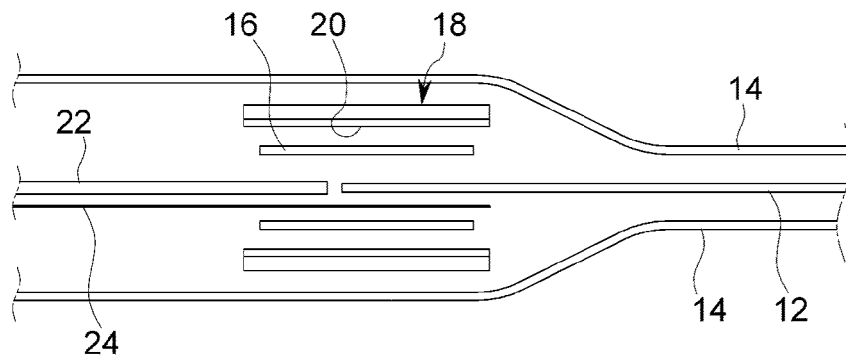


FIG. 4

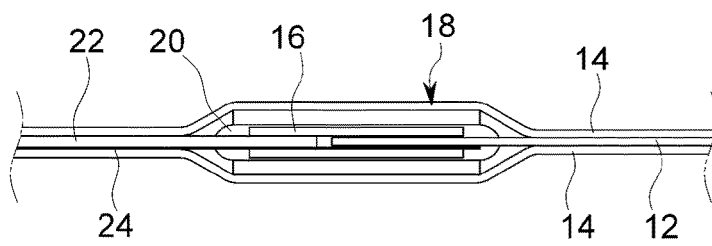


FIG. 5

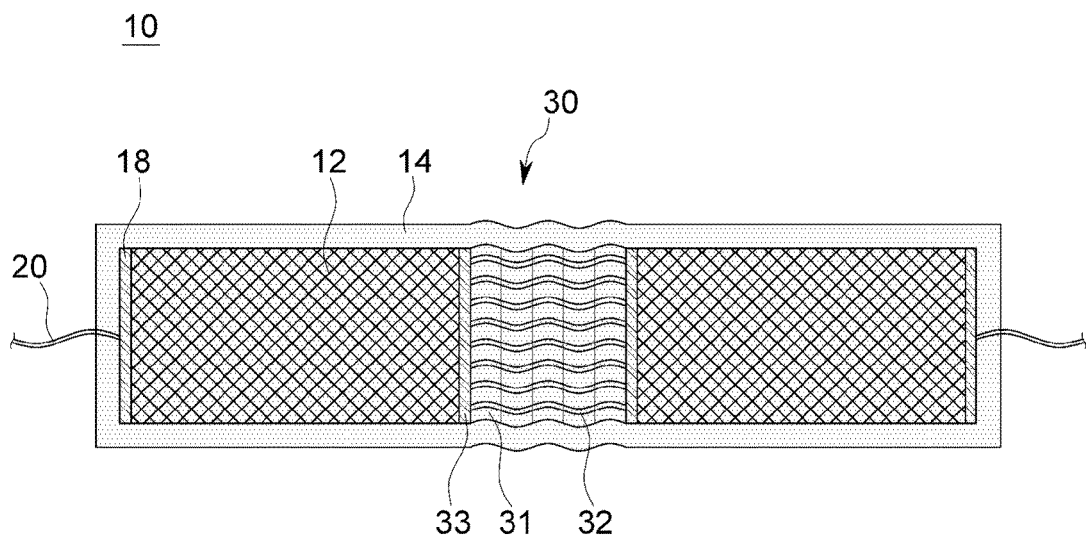


FIG. 6

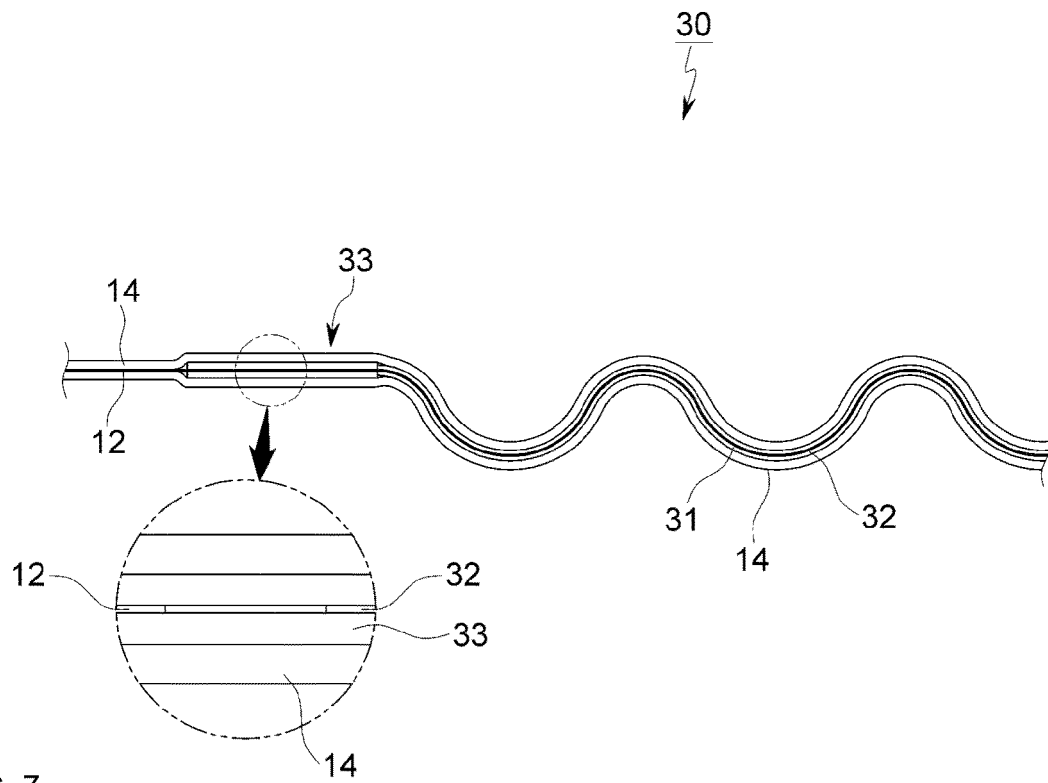
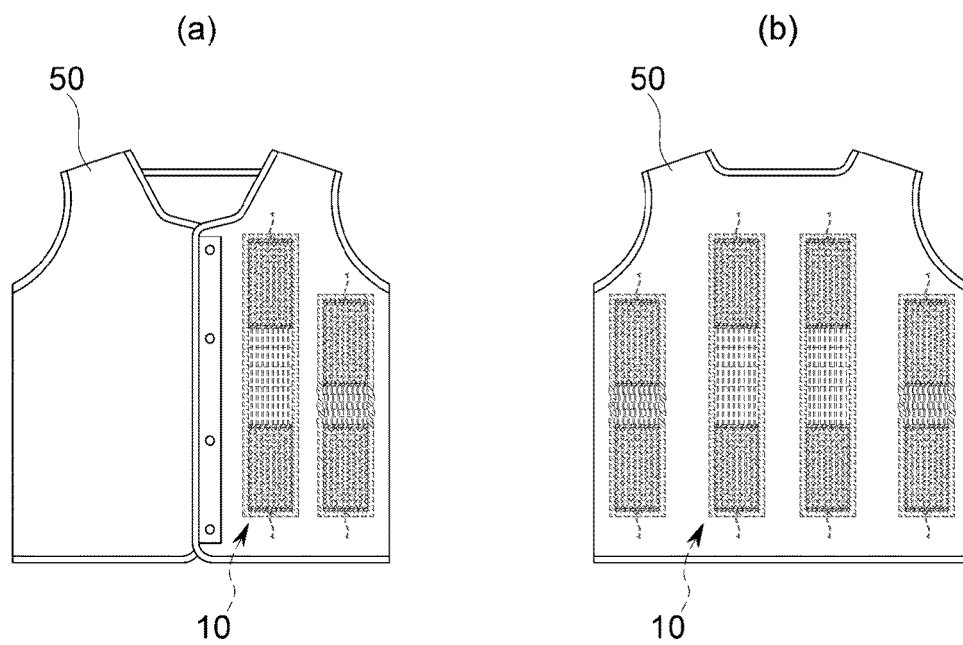


FIG. 7



INTERNATIONAL SEARCH REPORT

International application No.

PCT/KR2018/016456

A. CLASSIFICATION OF SUBJECT MATTER

H05B 3/34(2006.01)i, H05B 3/03(2006.01)i, H05B 3/06(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H05B 3/34; A41D 1/02; A61F 5/03; A61F 7/08; D03D 15/08; D03D 15/12; G01K 1/14; G01K 7/00; H05B 3/14; H05B 3/03; H05B 3/06

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models: IPC as above

Japanese utility models and applications for utility models: IPC as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS (KIPO internal) & Key words: metallic, thermoelectric textile, sheet, connector, electrode, resin layer, elastic

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	KR 10-2011-0053864 A (KIM, Soo Ho et al.) 24 May 2011 See paragraphs [0044]-[0062], [0079]-[0080]; claim 18; and figures 6-15.	1-4
Y		5-6
Y	KR 20-2011-0000674 U (SILVERAY CO., LTD.) 20 January 2011 See paragraphs [0040]-[0046]; and figures 1-2b.	5-6
A	KR 10-2018-0039335 A (KOREA ELECTROTECHNOLOGY RESEARCH INSTITUTE) 18 April 2018 See paragraphs [0009]-[0014], [0020]-[0021]; and figure 1.	1-6
A	KR 10-2013-0083352 A (SILVERAY CO., LTD.) 22 July 2013 See paragraphs [0041]-[0052]; and figure 1.	1-6
A	US 2014-0180624 A1 (NIKONOV, Dmitri E. et al.) 26 June 2014 See paragraphs [0017]-[0019], [0038]-[0042]; and figures 1-6.	1-6

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

* Special categories of cited documents:

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Date of the actual completion of the international search

23 JULY 2019 (23.07.2019)

Date of mailing of the international search report

24 JULY 2019 (24.07.2019)

Name and mailing address of the ISA/KR


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Authorized officer

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/KR2018/016456

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REFERENCES CITED IN THE DESCRIPTION

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- KR 1020180127048 [0001]
- KR 1020080090068 [0006] [0008]