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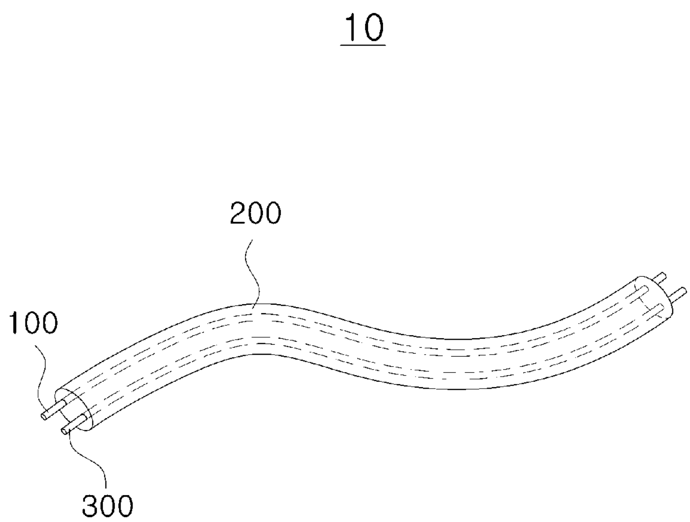
(54) HEATING UNIT AND HEATING MODULE COMPRISING SAME

(57) A heat unit according to an embodiment of the present invention includes a conductor configured to cause electricity to flow therethrough in a lengthwise direction, and a heating element configured to generate heat from the electricity transferred thereto from the conductor. The heating element surrounds the conductor in the lengthwise direction to prevent occurrence of electric shock.

Fig. 1



EP 3 468 300 A1

Description

[Technical Field]

[0001] The present invention relates to a heat unit and a heat module including the same, and more particularly, to a heat unit configured to generate heat when a current is applied thereto and a heat module including the same.

[Background Art]

[0002] Recently, heating yarn which generates heat when a current is applied thereto has been manufactured.

[0003] The heating yarn is a fiber impregnated with carbon (hereinafter referred to as 'carbon-impregnated fiber') and generates heat by generating resistance when electricity is applied thereto.

[0004] Heating fabric woven from the carbon-impregnated fiber serving as heating yarn may be heated to a desired temperature within a short time period due to a high electric resistance property of the heating yarn, does not generate electromagnetic waves unlike existing electric mats, and has a constant temperature characteristic in which a temperature thereof is not increased any more when the heating fabric reaches a certain temperature. Accordingly, power consumption may be minimized, a user may be prevented from being burned, and thus much attention has been paid to the heating fabric as a healthy product.

[0005] However, in the case of the carbon-impregnated fiber, it is very difficult to uniformize a distribution of carbon when fiber is impregnated with carbon, and a deviation in energy efficiency is very high according to carbon mixing and dispersion ratios.

[0006] As the distance between the carbon-impregnated fiber and a current source increases, the amount of generated heat becomes reduced and thus heat is not uniformly generated.

[0007] Furthermore, since carbon is a resistor, a large amount of power is needed to generate heat from the whole carbon-impregnated fiber.

[Disclosure]

[Technical Problem]

[0008] To address the above-described problems, the present invention is directed to uniformizing a distribution of carbon, uniformly generating heat, and generating a large amount of heat from a small amount of power.

[0009] However, the present invention is not limited thereto, and additional aspects will be apparent to those of ordinary skill in the art from the present disclosure and the appended drawings.

[Technical Solution]

[0010] One aspect of the present invention provides a heat unit including a conductor configured to cause electricity to flow therethrough in a lengthwise direction, and a heating element configured to generate heat from the electricity transferred thereto from the conductor. The heating element surrounds the conductor in the lengthwise direction to prevent occurrence of electric shock.

[0011] Another aspect of the present invention provides a heat module including the heat unit, an insulator configured to insulate the heat unit, and a fixing part configured to fix the heat unit at a certain location on the insulator.

[Advantageous Effects]

[0012] According to a heat unit and a heat module including the same according to an embodiment of the present invention, a distribution of carbon can be uniformized, heat can be uniformly generated, and a large amount of heat can be generated from a small amount of power.

[0013] The effects of the present invention are not, however, limited thereto, and additional effects will become apparent and more readily appreciated by those of ordinary skill in the art to which the present invention belongs from the following description and the appended drawings.

[Description of Drawings]

[0014]

FIG. 1 is a schematic perspective view of a heat unit according to an embodiment of the present invention.

FIG. 2 is a schematic cross-sectional view of a heat unit according to an embodiment of the present invention.

FIG. 3 is a schematic cross-sectional view of a heat module according to an embodiment of the present invention.

FIG. 4 is a schematic block diagram of a heat module according to an embodiment of the present invention.

FIG. 5 is a schematic perspective view of a heat unit according to another embodiment of the present invention.

FIG. 6 is a schematic exploded perspective view of a heat unit according to another embodiment of the present invention.

FIGS. 7 and 8 are schematic cross-sectional views of a heat unit according to another embodiment of the present invention.

FIG. 9 is a schematic exploded perspective view of a positive electrode extension part and a negative electrode extension part of a heat unit according to another embodiment of the present invention.

FIG. 10 is a schematic cross-sectional view of a positive electrode extension part and a negative electrode extension part of a heat unit according to another embodiment of the present invention.

[Modes of the Invention]

[0015] Hereinafter, exemplary embodiments of the present invention will be described in detail with reference to the accompanying drawings. However, the scope of the present invention is not limited to the embodiments set forth herein, and those of ordinary skill in the art can easily suggest other retrogressive inventions or other embodiments falling within the scope of the present invention by adding other elements or changing or canceling elements without departing from the scope of the present invention. The retrogressive inventions or the other embodiments should be understood as falling within the scope of the present invention.

[0016] The same elements having the same function falling within the same scope of the invention and illustrated in the drawings of the embodiments set forth herein will be described below by allocating the same reference numerals thereto.

[0017] A heat unit according to an embodiment of the present invention includes a conductor configured to cause electricity to flow therethrough in a lengthwise direction, and a heating element configured to generate heat from the electricity transferred thereto from the conductor. The heating element may surround the conductor in the lengthwise direction to prevent occurrence of electric shock.

[0018] The conductor may include aluminum. The heating element may include a heating agent configured to generate heat from electricity, and a softening agent configured to increase moldability. The conductor and the heating element may be bent by an external force.

[0019] The heating agent may include carbon, and the softening agent may include polyethylene.

[0020] The heat unit may further include a temperature sensor part configured to sense a temperature of generated heat. The heating element may surround the temperature sensor part to protect the temperature sensor part from an external environment.

[0021] The temperature sensor part may be disposed spaced apart from the conductor.

[0022] The temperature sensor part may include a thermocouple, and sense a temperature of heat generated from the heating element in the lengthwise direction.

[0023] A heat module according to another embodiment of the present invention includes the heat unit, an insulator configured to insulate the heat unit, and a fixing part configured to fix the heat unit at a certain location on the insulator.

[0024] The heat unit may be located at one side of the insulator. The insulator may include a through-space configured such that the heat unit is prevented from passing therethrough but the fixing part is allowed to pass therethrough. The fixing part may include a fixing exposure part located at another side of the insulator, a fixing pass part extending from one end of the fixing exposure part to pass through the through-space, and a fixing and surrounding part extending from the fixing pass part to surround the heat unit located at the one side of the insulator.

[0025] The fixing part may further include a fixing extension part extending from another end of the fixing exposure part. The insulator may further include a pass-space configured to allow the fixing extension part to pass therethrough. The fixing extension part may pass through the pass-space to be exposed at the one side of the insulator.

[0026] The conductor may include a positive electrode conductor connected to a positive electrode and extending in the lengthwise direction, and a negative electrode conductor connected to a negative electrode and extending in the lengthwise direction. The heating element may generate heat from a flow of electrons generated by the positive electrode conductor and the negative electrode conductor, and surround the positive electrode conductor and the negative electrode conductor in the lengthwise direction to prevent the occurrence of electric shock. The positive electrode conductor and the negative electrode conductor may not be connected to each other and may be arranged on the heating element to be spaced apart from each other. The electrons flowing through the negative electrode conductor move to the positive electrode conductor from the negative electrode conductor via the heating element, and implement heat generation from the heating element.

[0027] The heat unit may further include a negative electrode guide part connected to the negative electrode conductor and configured to guide a direction of electrons flowing from the negative electrode conductor toward the positive electrode conductor.

[0028] A plurality of negative electrode guide parts may be formed on the negative electrode conductor in the lengthwise direction to be spaced apart from each other.

[0029] The heat unit may further include a positive electrode guide part connected to the positive electrode conductor and configured to guide the direction of electrons flowing from the negative electrode conductor toward the positive electrode conductor.

[0030] The negative electrode guide part and the positive electrode guide part may not overlap each other in a widthwise direction perpendicular to the lengthwise direction.

[0031] A thickness of a portion of the negative electrode conductor which is in contact with the negative electrode guide part may be less than a thickness of the other portions of the negative electrode conductor which are not in contact with the negative electrode guide part.

[0032] The negative electrode guide part may include a negative electrode contact part configured to be in contact with and connected to the negative electrode conductor, and a negative electrode extension part extending from the negative electrode contact part.

[0033] The negative electrode extension part may extend in a direction from the negative electrode contact part toward the positive electrode conductor.

[0034] To clarify the technical idea of the present invention, parts of the invention which are less related to the technical idea of the present or which may be easily derived by those of ordinary skill in the art are briefly illustrated or omitted in the appended drawings.

[0035] FIG. 1 is a schematic perspective view of a heat unit according to an embodiment of the present invention. FIG. 2 is a schematic cross-sectional view of a heat unit according to an embodiment of the present invention.

[0036] FIG. 3 is a schematic cross-sectional view of a heat module according to an embodiment of the present invention. FIG. 4 is a schematic block diagram of a heat module according to another embodiment of the present invention.

[0037] FIG. 5 is a schematic perspective view of a heat unit according to another embodiment of the present invention. FIG. 6 is a schematic exploded perspective view of a heat unit according to another embodiment of the present invention.

[0038] FIGS. 7 and 8 are schematic cross-sectional views of a heat unit according to another embodiment of the present invention. FIG. 9 is a schematic exploded perspective view of a positive electrode extension part and a negative electrode extension part of a heat unit according to another embodiment of the present invention. FIG. 10 is a schematic cross-sectional view of a positive electrode extension part and a negative electrode extension part of a heat unit according to another embodiment of the present invention.

[0039] As illustrated in FIGS. 1 and 2, a heat unit 10 according to an embodiment of the present invention may be configured to generate heat by resistance when electricity is applied thereto.

[0040] That is, the heat unit 10 may be configured to generate heat by converting electric energy into heat energy.

[0041] Here, the heat unit 10 may include a conductor 100 configured such that electricity flows therethrough in a lengthwise direction, and a heating element 200 configured to generate heat from the electricity transferred thereto from the conductor 100.

[0042] For example, the conductor 100 may have a cylindrical shape extending lengthily in the lengthwise direction.

[0043] For example, an electric current may flow through the conductor 100 in the lengthwise direction when a positive (+) electrode and a negative (-) electrode are connected to opposite ends thereof.

[0044] For example, the conductor 100 may be a metal or a composite formed of one or more metals selected from among aluminum, silver, bronze, iron, and copper.

[0045] For example, the heating element 200 may be a resistor having a certain resistance.

[0046] That is, the heating element 200 may be a resistor which resists an electric current transferred from the conductor 100 and may generate heat using electric resistance.

[0047] For example, the heating element 200 may include a heating agent generating heat by electricity, and a softening agent increasing moldability.

[0048] The heating agent may be a resistor which generates heat through electric resistance, and may be, for example, carbon.

[0049] The softening agent is configured to increase moldability, and may be, for example, polyethylene.

[0050] For example, the softening agent may be melted at a certain temperature and fused, mixed, or polymerized with the heating agent. When cooled to normal temperature, the softening agent may have a certain degree of strength and thus may be prevented from being broken even when a certain tensile force is applied thereto and may be bent in various forms by an external force.

[0051] That is, the heating element 200 may generate heat when an electric current is applied thereto due to the heating agent which is a resistor, and may be bent or deformed into various forms without being broken due to the softening agent even when a certain external force is applied thereto.

[0052] Similarly, the conductor 100 may be bent or deformed into various forms when a certain external force is applied thereto.

[0053] Here, as illustrated in FIGS. 1 and 2, the heating element 200 may surround the conductor 100 in the lengthwise direction.

[0054] For example, the heating element 200 may have a long pipe shape having a hollow formed in the lengthwise direction, and the conductor 100 is inserted into the hollow of the heating element 200 to be surrounded by the heating element 200.

[0055] Since an external side of the conductor 100 is surrounded by the heating element 200 in the lengthwise direction, a user may be prevented from being shocked by an electric current flowing through the conductor 100.

[0056] Furthermore, since the heating element 200 is in contact with an external surface of the conductor 100 in the lengthwise direction, the heating element 200 may generate heat uniformly in the lengthwise direction in which the heating element 200 is in contact with the conductor 100.

[0057] That is, heat is not generated from only a portion of the heating element 200 in the lengthwise direction but may be uniformly generated from the heating element 200 in the lengthwise direction.

[0058] Accordingly, an effect of generating a large amount of heat from even a small amount of power may be achieved.

[0059] For example, the heat unit 10 according to an embodiment of the present invention may further include a temperature sensor part 300 configured to sense a temperature of generated heat.

[0060] For example, the temperature sensor part 300 may be configured to sense a temperature change caused by heat generated by the heating element 200.

[0061] For example, the temperature sensor part 300 may have a long pillar shape in the lengthwise direction.

[0062] For example, the temperature sensor part 300 may be a thermocouple.

[0063] However, the temperature sensor part 300 is not limited to the thermocouple, and may be variously changed by those of ordinary skill in the art, provided that a temperature changed by heat generated by the heating element 200 can be sensed.

[0064] For example, the temperature sensor part 300 may be arranged adjacent to the conductor 100 surrounded by the heating element 200.

[0065] In more detail, the heating element 200 may form another hollow in the lengthwise direction, and the temperature sensor part 300 may be inserted into the other hollow of the heating element 200 to be surrounded by the heating element 200.

[0066] That is, the heating element 200 may protect the temperature sensor part 300 from an external environment by surrounding the temperature sensor part 300 in the lengthwise direction.

[0067] The temperature sensor part 300 may be inserted into the heating element 200 in the lengthwise direction to sense a temperature of heat generated by the heating element 200 in the lengthwise direction.

[0068] An outer side surface of the temperature sensor part 300 may be in contact with the heating element 200 and thus may receive heat generated from the heating element 200 and sense the temperature of the heat element 200.

[0069] Thus, the temperature sensor part 300 may not sense a temperature of heat generated from only a portion of the heating element 200 in the lengthwise direction but may sense a temperature of heat generated from the whole heating element 200 in the lengthwise direction.

[0070] For example, the temperature sensor part 300 may be arranged inside the heating element 200 to be spaced apart from the conductor 100.

[0071] The heating element 200 may be formed such that a plurality of hollows are spaced apart from each other, and thus, the conductor 100 and the temperature sensor part 300 inserted into the plurality of hollows may be located spaced apart from each other while being surrounded by the heating element 200.

[0072] As a result, the heating element 200 may prevent an electric current flowing through the conductor 100 from directly flowing to the temperature sensor part 300.

[0073] A heat module 1 according to another embodiment of the present invention will be described in detail below.

[0074] As illustrated in FIG. 3, the heat module 1 may include the heat unit 10, an insulator 20 configured to insulate the heat unit 10, and a fixing part 30 configured to fix the heat unit 10 at a certain location on the insulator 20.

[0075] The insulator 20 may be configured to insulate the heat unit 10.

[0076] For example, when the heating element 200 of the heat unit 10 partially peels off or a thickness thereof decreases, an electric current flowing through the conductor 100 may flow to a user and thus the user may be shocked by the current.

[0077] To prevent this problem, the insulator 20 may cover at least one side of the heat unit 10 to insulate the heat unit 10.

[0078] For example, the insulator 20 may be a nonconductor, e.g., a nonmetal, plastic, fiber, or the like.

[0079] The fixing part 30 may be configured to restrict the heat unit 10 to be fixed at a certain location with respect to the insulator 20.

[0080] The heat unit 10 may be arranged and fixed at a certain location at a side of the insulator 20 by the fixing part 30.

[0081] Here, the insulator 20 may include a through-space S1 configured such that the heat unit 10 is prevented from passing therethrough and the fixing part 30 is allowed to pass therethrough.

[0082] The through-space S1 may have a width less than that of the heat unit 10 so that the heat unit 10 located at one side of the insulator 20 cannot pass through another side of the insulator 20.

[0083] Here, the fixing part 30 may include a fixing exposure part 31 located at the other side of the insulator 20, a fixing pass part 32 extending from one end of the fixing exposure part 31 to pass through the through-space S1, and a fixing and surrounding part 33 extending from the fixing pass part 32 to surround the heat unit 10 located at the one side of the insulator 20.

[0084] The fixing exposure part 31 may be supported on the other side of the insulator 20. The fixing pass part 32 may extend from the fixing exposure part 31 and be located in the through-space S1. The fixing and surrounding part 33 may extend from the fixing pass part 32 to surround the heat unit 10, thereby fixing the heat unit 10 at a certain location.

[0085] In FIG. 3, if an external force which moves the heat unit 10 downward is applied to the heat unit 10, the external force may be transferred to the fixing and surrounding part 33 from the heat unit 10. The external force transferred to the fixing and surrounding part 33 may be transferred to the fixing exposure part 31 via the fixing pass part 32, and the fixing exposure part 31 may transfer the external force to the insulator 20 while being supported at the other side of the insulator 20.

[0086] Accordingly, the heat unit 10 may be fixed at the one side of the insulator 20 by the fixing and surrounding part 33, the fixing pass part 32, and the fixing exposure part 31 even when the external force which moves the heat unit 10 downward is applied to the heat unit 10.

[0087] Here, the fixing part 30 may further include a fixing extension part 34 extending from another end of the fixing exposure part 31.

[0088] The fixing pass part 32 may extend from the one end of the fixing exposure part 31, and the fixing extension part 34 may extend from the other end of the fixing exposure part 31.

[0089] Here, the insulator 20 may further include a pass-space S2 configured to allow the fixing extension part 34 to pass therethrough.

[0090] The pass-space S2 may be formed spaced apart from the through-space S1.

[0091] Here, the fixing extension part 34 may extend from the other end of the fixing exposure part 31, pass through the pass-space S2, and be exposed to the one side of the insulator 20 at which the heat unit 10 is disposed.

[0092] The fixing extension part 34 exposed to the one side of the insulator 20 may be directly or indirectly supported on the one side of the insulator 20.

[0093] In FIG. 3, if the fixing exposure part 31 is pulled upward by an external force, the external force applied to the fixing exposure part 31 is transferred to the fixing and surrounding part 33 via the fixing pass part 32. The external force applied to the fixing and surrounding part 33 may be transferred to the heat unit 10 and thus the heat unit 10 may be pressurized upward by the external force.

[0094] In this case, the heat unit 10 may be pressurized between the fixing and surrounding part 33 and the insulator 20 and be thus broken, or the heating element 200 of the heat unit 10 may peel off.

[0095] To solve this problem, the external force applied to the fixing exposure part 31 in an upward direction may be transferred to the fixing extension part 34 and be then directly or indirectly transferred to the one side of the insulator 20 by the fixing extension part 34, thereby dispersing or decreasing the external force applied to the heat unit 10.

[0096] Accordingly, the heat unit 10 may be stably located and fixed at the one side of the insulator 20 without being broken by the external force applied in the upward direction by the fixing extension part 34.

[0097] For example, the fixing extension part 34 may be directly or indirectly fixed to the insulator 20.

[0098] Thus, the external force applied to the fixing extension part 34 may be directly or indirectly transferred to the insulator 20.

[0099] FIG. 4 is a schematic block diagram of the heat module 1.

[0100] As illustrated in FIG. 4, the heat module 1 may further include a display unit 40 configured to display certain information to a user, an input unit 50 configured to receive input information from the user, and a controller 60 configured to control the display unit 40, the input unit 50, the conductor 100, and the temperature sensor part 300.

[0101] For example, the controller 60 may adjust intensity of an electric current applied to the conductor 100 according to the input information input to the input unit 50.

[0102] Furthermore, the controller 60 may calculate a temperature sensed by the temperature sensor part 300, and adjust the intensity of the electric current applied to the conductor 100 according to the temperature sensed by the temperature sensor part 300.

[0103] For example, when the temperature sensed by the temperature sensor part 300 is higher than a reference temperature, the controller 60 may decrease the intensity of the electric current applied to the conductor 100 or may not supply an electric current to the conductor 100.

[0104] In contrast, when the temperature sensed by the temperature sensor part 300 is lower than the reference temperature, the controller 60 may increase the intensity of the electric current applied to the conductor 100.

[0105] As a result, the controller 60 may prevent the occurrence of fire caused by high-temperature heat generated by the heating element 200, and may maintain an appropriate temperature which a user wants.

[0106] A heat unit 10A according to another embodiment of the present invention will be described in detail with reference to FIGS. 5 to 10 below.

[0107] As illustrated in FIGS. 5 to 8, the heat unit 10A according to another embodiment of the present invention may be configured to generate heat through resistance when electricity is applied thereto.

[0108] That is, the heat unit 10A may be configured to generate heat by converting electric energy into heat energy.

[0109] Here, the heat unit 10A according to another embodiment of the present invention may include a positive electrode conductor 1000 connected to a positive electrode and extending in a lengthwise direction, a negative electrode conductor 2000 connected to a negative electrode and extending in the lengthwise direction, and a heating element 3000 configured to generate heat from a flow of electrons generated by the positive electrode conductor 1000 and the negative electrode conductor 2000.

[0110] For example, the positive electrode conductor 1000 and the negative electrode conductor 2000 may be components of the conductor 100 of the heat unit 10 described above.

[0111] For example, the positive electrode conductor 1000 and the negative electrode conductor 2000 may each have a cylindrical shape extending lengthily in the lengthwise direction.

[0112] For example, one end of the positive electrode conductor 1000 may be connected to a positive electrode of a controller (not shown) generating a flow of electrons, and one end of the negative electrode conductor 2000 may be connected to a negative electrode of the controller.

[0113] For example, each of the positive electrode conductor 1000 and the negative electrode conductor 2000 may be a metal or a composite formed of one or more metals selected from among aluminum, silver, bronze, iron, and copper.

[0114] For example, the heating element 3000 may be a resistor having a certain degree of resistance.

[0115] That is, the heating element 3000 may be a resistor resisting an electric current and may generate heat by resisting a flow of electrons.

[0116] For example, the heating element 3000 may include a heating agent generating heat from electricity, and a softening agent increasing moldability.

[0117] The heating agent may be a resistor configured to generate heat through electric resistance, and may be, for example, carbon.

[0118] The softening agent is configured to increase moldability and may be, for example, polyethylene.

[0119] For example, the softening agent may be melted at a certain temperature and fused, mixed, or polymerized with the heating agent. When cooled to normal temperature, the softening agent may have a certain degree of strength and thus may be prevented from being broken even when a certain tensile force is applied thereto and may be bent in various forms by an external force.

[0120] That is, the heating element 3000 may generate heat when an electric current is applied thereto due to the heating agent which is a resistor, and may be bent or deformed into various forms without being broken due to the softening agent even when a certain external force is applied thereto.

[0121] Similarly, the positive electrode conductor 1000 and the negative electrode conductor 2000 may be bent or deformed into various forms when a certain external force is applied thereto.

[0122] Here, the heating element 3000 may surround the positive electrode conductor 1000 and the negative electrode conductor 2000 in the lengthwise direction to prevent the occurrence of electrical shock.

[0123] For example, the heating element 3000 may have a long pipe shape having a hollow formed in the lengthwise direction. Each of the positive electrode conductor 1000 and the negative electrode conductor 2000 may be inserted into the hollow of the heating element 3000 to be surrounded by the heating element 3000.

[0124] Alternatively, the heating element 3000 may be formed by extrusion molding on outer surfaces of the positive electrode conductor 1000 and the negative electrode conductor 2000.

[0125] The heating element 3000 surrounds outer sides of the positive electrode conductor 1000 and the negative electrode conductor 2000 in the lengthwise direction and may thus prevent a user from getting shocked by an electric current flowing through the positive electrode conductor 1000 and the negative electrode conductor 2000.

[0126] Here, the positive electrode conductor 1000 and the negative electrode conductor 2000 may not be connected to each other but may be arranged inside the heating element 3000 to be spaced apart from each other.

[0127] That is, the positive electrode conductor 1000 may extend from the positive electrode of the controller in the lengthwise direction, and may not be in contact with the negative electrode conductor 2000 inside the heating element 3000.

[0128] Similarly, the negative electrode conductor 2000 may extend from the negative electrode of the controller in the lengthwise direction, and may not be in contact with the positive electrode conductor 1000 inside the heating element 3000.

[0129] Accordingly, electrons flowing through the negative electrode conductor 2000 may move to the positive electrode conductor 1000 from the negative electrode conductor 2000 via the heating element 3000 and thus implement heat generation from the heating element 3000.

[0130] That is, the electrons flowing through the negative electrode conductor 2000 cannot directly move to the positive electrode conductor 1000 but may move to the positive electrode conductor 1000 via the heating element 3000 due to a voltage between the negative electrode conductor 2000 and the positive electrode conductor 1000.

[0131] Accordingly, even if a low voltage is applied between the positive electrode conductor 1000 and the negative electrode conductor 2000, all electrons move from the negative electrode conductor 2000 to the positive electrode conductor 1000 via the heating element 3000 and thus the efficiency of generating heat from the heating element 3000 may be maximized.

[0132] Here, as illustrated in FIGS. 6 and 7, for example, the heat unit 10A according to another embodiment of the present invention may further include a negative electrode guide part 4200 connected to the negative electrode conductor 2000 and configured to guide a direction of electrons flowing from the negative electrode conductor 2000 to the positive electrode conductor 1000.

[0133] For example, a plurality of negative electrode guide parts 4200 may be formed on the negative electrode conductor 2000 in the lengthwise direction to be spaced apart from each other.

[0134] For example, the negative electrode guide parts 4200 may be fixed to the negative electrode conductor 2000 while surrounding the negative electrode conductor 2000.

[0135] Here, the negative electrode guide parts 4200 may be conductors allowing electrons to flow therethrough.

[0136] That is, the negative electrode guide parts 4200 may receive electrons from the negative electrode conductor 2000 and guide the electrons to flow to the positive electrode conductor 1000.

[0137] More specifically, distances between the negative electrode guide parts 4200 and the positive electrode conductor 1000 in regions of the negative electrode conductor 2000 on which the negative electrode guide parts 4200 are disposed may be less than a distance between the negative electrode conductor 2000 and the positive electrode conductor 1000.

[0138] As a result, an amount of electrons flowing toward the positive electrode conductor 1000 via the heating element 3000 in the regions of the negative electrode conductor 2000 on which the negative electrode guide parts 4200 are disposed may be greater than that of electrons flowing toward the positive electrode conductor 1000 via the heating element 3000 in the other regions of the negative electrode conductor 2000 on which the negative electrode guide parts 4200 are not disposed.

[0139] Accordingly, the negative electrode guide parts 4200 may be arranged at predetermined locations on the negative electrode conductor 2000 if necessary to guide electrons to flow from the negative electrode conductor 2000 to the positive electrode conductor 1000 via the heating element 3000.

[0140] Furthermore, for example, the plurality of negative electrode guide parts 4200 are fixed to the negative electrode conductor 2000 in the lengthwise direction to be spaced apart from each other and thus a fixing force between the negative electrode conductor 2000 and the heating element 3000 may be maximized.

[0141] Here, as illustrated in FIGS. 6 and 7, for example, the heat unit 10A according to another embodiment of the present invention may further include a positive electrode guide part 4100 connected to the positive electrode conductor 1000 and configured to guide a direction of electrons flowing from the negative electrode conductor 2000 toward the positive electrode conductor 1000.

[0142] For example, a plurality of positive electrode guide parts 4100 may be formed on the positive electrode conductor 1000 in the lengthwise direction to be spaced apart from each other.

[0143] For example, the positive electrode guide parts 4100 may be fixed to the positive electrode conductor 1000 while surrounding the positive electrode conductor 1000.

[0144] Here, the positive electrode guide parts 4100 may be conductors allowing electrons to flow therethrough.

[0145] That is, the positive electrode guide parts 4100 may receive electrons flowing from the negative electrode conductor 2000 to the heating element 3000 and guide the electrons to flow to the positive electrode conductor 1000.

[0146] More specifically, distances between the positive electrode guide parts 4100 and the negative electrode conductor 2000 in regions of the positive electrode conductor 1000 on which the positive electrode guide parts 4100 are disposed may be less than the distance between the negative electrode conductor 2000 and the positive electrode conductor 1000.

[0147] Thus, an amount of electrons flowing from the regions of the negative electrode conductor 2000 on which the positive electrode guide parts 4100 are located toward the positive electrode conductor 1000 via the heating element 3000 may be greater than that of electrons flowing from the other regions of the negative electrode conductor 2000 on which the positive electrode guide parts 4100 are not located toward the positive electrode conductor 1000 via the heating element 3000.

[0148] Accordingly, the positive electrode guide parts 4100 may be arranged on predetermined locations on the positive electrode conductor 1000 if necessary to guide electrons to flow from the negative electrode conductor 2000 toward the positive electrode conductor 1000 via the heating element 3000.

[0149] Furthermore, for example, the plurality of positive electrode guide parts 4100 may be fixed to the negative electrode conductor 2000 in the lengthwise direction to be spaced apart from each other, thereby maximizing a fixing force between the positive electrode conductor 1000 and the heating element 3000.

[0150] Here, for example, the negative electrode guide parts 4200 and the positive electrode guide parts 4100 may not overlap each other in a widthwise direction perpendicular to the lengthwise direction.

[0151] If the negative electrode guide parts 4200 and the positive electrode guide parts 4100 are arranged at a location at which they overlap each other in the widthwise direction, separation distances between the negative electrode guide parts 4200 and the positive electrode guide parts 4100 are relatively small and thus electrons flowing toward the positive electrode conductor 1000 from the negative electrode conductor 2000 via the heating element 3000 may be concentrated in a region in which the positive electrode guide parts 4100 and the negative electrode guide parts 4200 overlap each other.

[0152] Accordingly, the negative electrode guide parts 4200 and the positive electrode guide parts 4100 may be arranged not to overlap each other in the widthwise direction to uniformly generate heat from the heating element 3000 in the lengthwise direction.

[0153] Here, for example, as illustrated in FIG. 4, the negative electrode guide parts 4200 and the positive electrode guide parts 4100 may be nonconductors which do not allow electrons to flow therethrough.

[0154] When the negative electrode guide parts 4200 are nonconductors, the negative electrode guide parts 4200 may guide electrons flowing through the heating element 3000, which is close to the negative electrode conductor 2000, in the lengthwise direction to flow toward the positive electrode conductor 1000.

[0155] When the positive electrode guide parts 4100 are nonconductors, the positive electrode guide parts 4100 may prevent electrons flowing through the heating element 3000 from being concentrated on a specific region of the positive electrode conductor 1000 and may disperse electrons flowing from the heating element 3000 to the positive electrode conductor 1000.

[0156] Furthermore, fixing forces between the positive electrode conductor 1000 and the heating element 3000 and between the negative electrode conductor 2000 and the heating element 3000 may be increased.

[0157] A through-hole may be formed in the positive electrode guide part 4100 into which the positive electrode conductor 1000 may be inserted to pass therethrough, and a through-hole may be formed in the negative electrode guide part 4200 into which the negative electrode conductor 2000 may be inserted to pass therethrough.

[0158] The positive electrode guide part 4100 and the negative electrode guide part 4200 may each have a plate shape or may be respectively compressed onto the positive electrode conductor 1000 and the negative electrode conductor 2000 to be fixed onto the positive electrode conductor 1000 and the negative electrode conductor 2000.

[0159] Here, for example, as illustrated in FIGS. 7 and 8, a thickness D2 of a portion of the negative electrode conductor 2000 which is in contact with the negative electrode guide part 4200 may be less than a thickness D1 of the other portions of the negative electrode conductor 2000 which are not in contact with the negative electrode guide part 4200.

[0160] That is, an inwardly recessed step D may be formed at the portion of the negative electrode conductor 2000 which is in contact with the negative electrode guide part 4200.

[0161] Thus, an area of the negative electrode guide part 4200 which is in contact with the negative electrode conductor 2000 may be increased to more firmly fix the negative electrode guide part 4200 to the negative electrode conductor 2000.

[0162] Similarly, a thickness of a portion of the positive electrode conductor 1000 which is in contact with the positive electrode guide part 4100 may be less than a thickness of the other portions of the positive electrode conductor 1000 which are not in contact with the positive electrode guide part 4100.

[0163] A negative electrode guide part 4200A and a positive electrode guide part 4100A which are another embodiment of the negative electrode guide part 4200 and the positive electrode guide part 4100 will be described with reference to FIGS. 9 and 10 below.

[0164] Parts of the negative electrode guide part 4200A and the positive electrode guide part 4100A which are the same as those of the negative electrode guide part 4200 and the positive electrode guide part 4100 described above in terms of technical features thereof will not be described again here.

[0165] For example, the negative electrode guide part 4200A may include a negative electrode contact part 4210A which is in contact with and connected to the negative electrode conductor 2000, and a negative electrode extension part 4220A extending from the negative electrode contact part 4210A.

[0166] Here, for example, the negative electrode extension part 4220A may extend from the negative electrode contact part 4210A toward the positive electrode conductor 1000.

[0167] The negative electrode extension part 4220A may be arranged toward the positive electrode conductor 1000 if necessary to reduce a separation distance between negative electrode extension part 4220A and the positive electrode conductor 1000, so that a flow of electrons moving through the heating element 3000 may be more actively guided using the negative electrode guide part 4200A.

[0168] Similarly, for example, the positive electrode guide part 4100A may include a positive electrode contact part 4110A which is in contact with and connected to the positive electrode conductor 1000, and a positive electrode extension part 4120A extending from the positive electrode contact part 4110A.

[0169] Here, for example, the positive electrode extension part 4120A may extend from the positive electrode contact part 4110A toward the negative electrode conductor 2000.

[0170] Thus, the positive electrode extension part 4120A may be arranged toward the negative electrode conductor 2000 to reduce a separation distance between the positive electrode extension part 4120A and the negative electrode conductor 2000.

[0171] Furthermore, the positive electrode extension part 4120A and the negative electrode extension part 4220A may be arranged not to overlap each other in the widthwise direction.

[0172] As described above, the heat unit 10A according to another embodiment of the present invention may generate high-temperature heat even from a relatively low voltage, and may further guide a flow of electrons flowing through the heating element 3000 to uniformly generate heat from the whole heating element 3000.

[0173] The heat units 10 and 10A according to various embodiments described above may be classified and defined in terms of technical features thereof but the present invention is not limited thereto. For example, although not shown in the drawings, it will be apparent that the temperature sensor part 300 which is a component of the heat unit 10 described above is applicable to the heat unit 10A.

[0174] Furthermore, it will be apparent that the heat module 1 may be embodied as including the heat unit 10A.

[0175] That is, for example, it will be apparent that the heat module 1 may be embodied by, for example, coupling the heat unit 10A to the insulator 20 and the fixing part 30.

[0176] While the structure and features of the present invention have been described above with respect to embodiments thereof, the present invention is not limited thereto and it will be apparent to those of ordinary skill in the art that various changes or modifications may be made in the present invention without departing from the idea and scope of the present invention. Accordingly, such changes or modifications should be understood as falling within the scope of the invention defined in the claims appended herein.

Claims

1. A heat unit comprising:

a conductor configured to cause electricity to flow therethrough in a lengthwise direction; and
a heating element configured to generate heat from the electricity transferred thereto from the conductor,
wherein the heating element surrounds the conductor in the lengthwise direction to prevent occurrence of electric shock.

2. The heat unit of claim 1, wherein the conductor comprises aluminum,
the heating element comprises:

a heating agent configured to generate heat from electricity; and
a softening agent configured to increase moldability, and
the conductor and the heating element are bent by an external force.

3. The heat unit of claim 2, wherein the heating agent comprises carbon, and
the softening agent comprises polyethylene.

4. The heat unit of claim 1, further comprising a temperature sensor part configured to sense a temperature changed by heat generated from the heating element,
wherein the heating element surrounds the temperature sensor part to protect the temperature sensor part from an external environment.

5. The heat unit of claim 4, wherein the temperature sensor part is disposed spaced apart from the conductor.

6. The heat unit of claim 5, wherein the temperature sensor part comprises a thermocouple, and senses a temperature of heat generated from the heating element in the lengthwise direction.

7. A heat module comprising:

the heat unit of claim 1;
an insulator configured to insulate the heat unit; and
a fixing part configured to fix the heat unit at a certain location on the insulator.

8. The heat module of claim 7, wherein the heat unit is located at one side of the insulator,
the insulator comprises a through-space configured such that the heat unit is prevented from passing therethrough but the fixing part is allowed to pass therethrough, and
the fixing part comprises:

a fixing exposure part located at another side of the insulator;
a fixing pass part extending from one end of the fixing exposure part to pass through the through-space; and
a fixing and surrounding part extending from the fixing pass part to surround the heat unit located at the one side of the insulator.

9. The heat module of claim 8, wherein the fixing part further comprises a fixing extension part extending from another end of the fixing exposure part,
the insulator further comprises a pass-space configured to allow the fixing extension part to pass therethrough, and
the fixing extension part passes through the pass-space to be exposed at the one side of the insulator.

10. The heat unit of claim 1, wherein the conductor comprises:

a positive electrode conductor connected to a positive electrode and extending in the lengthwise direction; and
a negative electrode conductor connected to a negative electrode and extending in the lengthwise direction,
the heating element generates heat from a flow of electrons generated by the positive electrode conductor and the negative electrode conductor, and surrounds the positive electrode conductor and the negative electrode conductor in the lengthwise direction to prevent the occurrence of electric shock,
the positive electrode conductor and the negative electrode conductor are not connected to each other and are arranged inside the heating element to be spaced apart from each other, and the electrons flowing through the negative electrode conductor move to the positive electrode conductor from the negative electrode conductor via the heating element, and implement heat generation from the heating element.

11. The heat unit of claim 10, further comprising a negative electrode guide part connected to the negative electrode conductor and configured to guide a direction of electrons flowing from the negative electrode conductor toward the positive electrode conductor.

12. The heat unit of claim 11, wherein a plurality of negative electrode guide parts are formed on the negative electrode conductor in the lengthwise direction to be spaced apart from each other.

13. The heat unit of claim 12, further comprising a positive electrode guide part connected to the positive electrode conductor and configured to guide the direction of electrons flowing from the negative electrode conductor toward the positive electrode conductor.

14. The heat unit of claim 14, wherein the negative electrode guide part and the positive electrode guide part do not overlap each other in a widthwise direction perpendicular to the lengthwise direction.

15. The heat unit of claim 11, wherein a thickness of a portion of the negative electrode conductor which is in contact with the negative electrode guide part is less than a thickness of the other portions of the negative electrode conductor which are not in contact with the negative electrode guide part.

16. The heat unit of claim 11, wherein the negative electrode guide part comprises:

a negative electrode contact part configured to be in contact with and connected to the negative electrode conductor; and
a negative electrode extension part extending from the negative electrode contact part.

17. The heat unit of claim 16, wherein the negative electrode extension part extends in a direction from the negative electrode contact part toward the positive electrode conductor.

Fig. 1

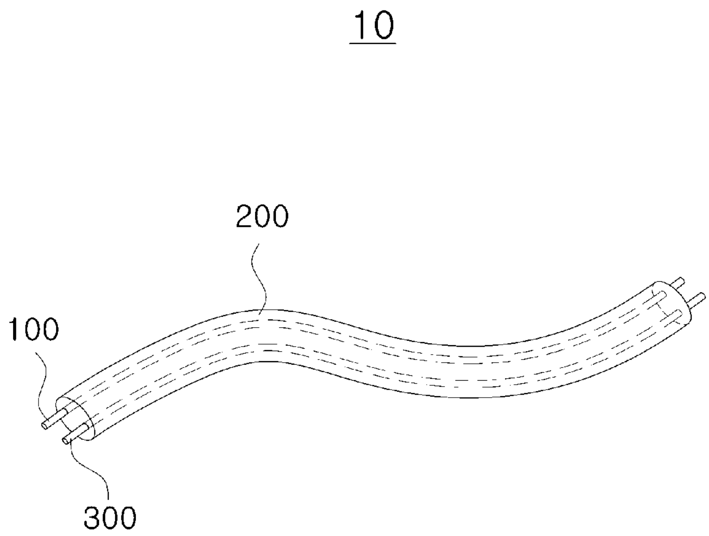


Fig. 2

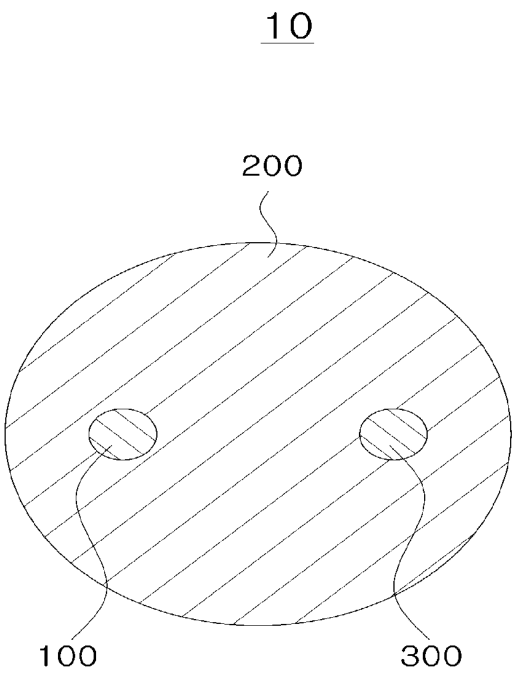
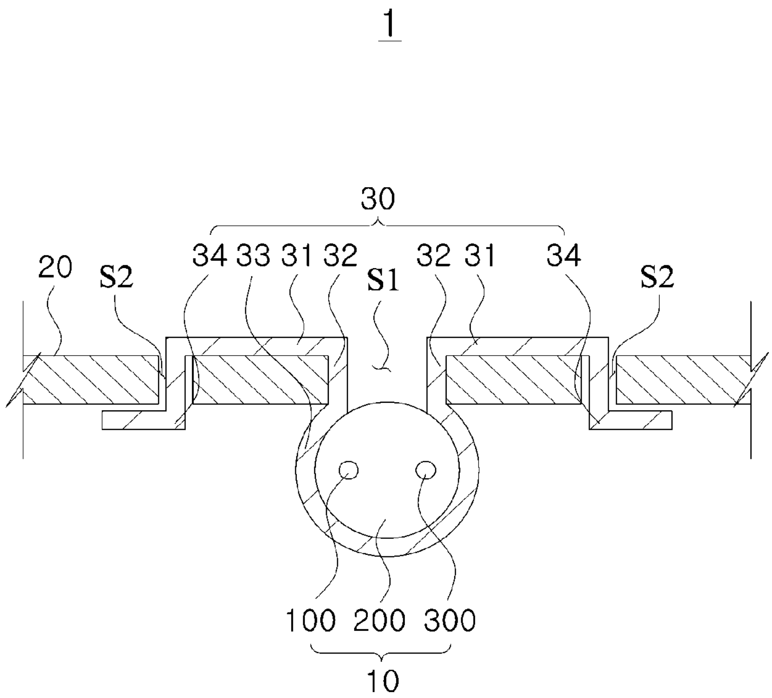


Fig. 3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30
20
S2
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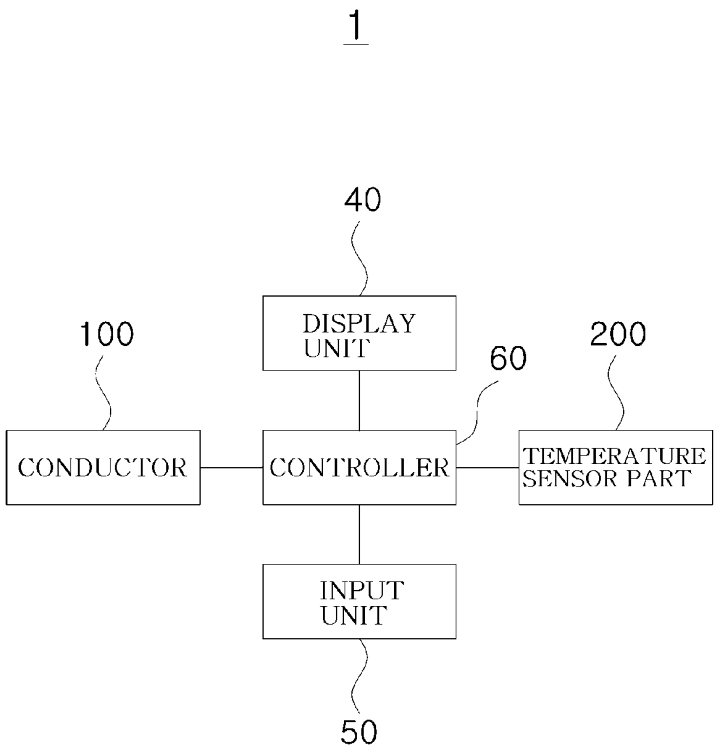
S1
32 31
34
S2
100 200 300
10

Fig. 4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60
200
CONDUCTOR
CONTROLLER
TEMPERATURE SENSOR PART
INPUT UNIT
50

Fig. 5

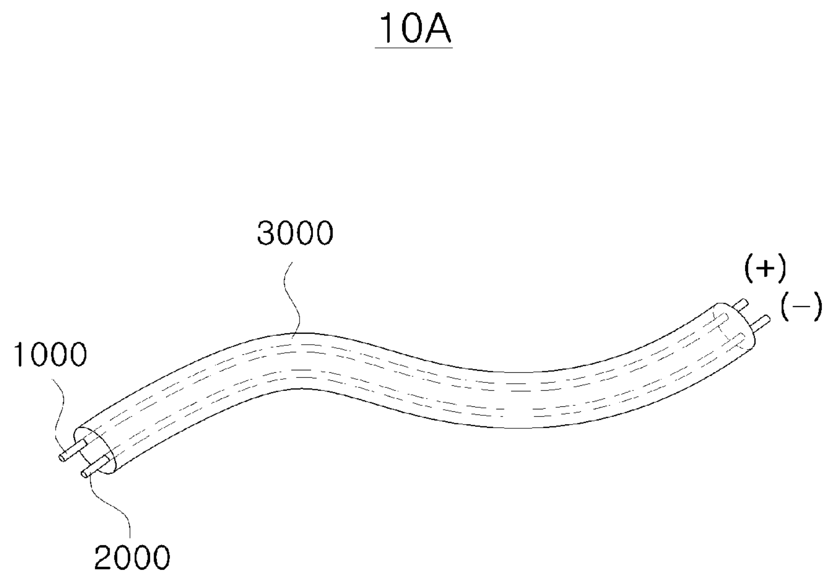


Fig. 6

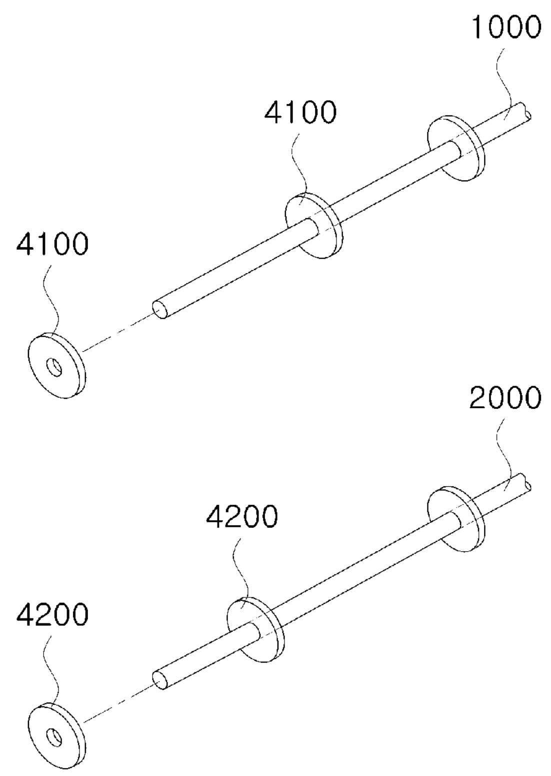
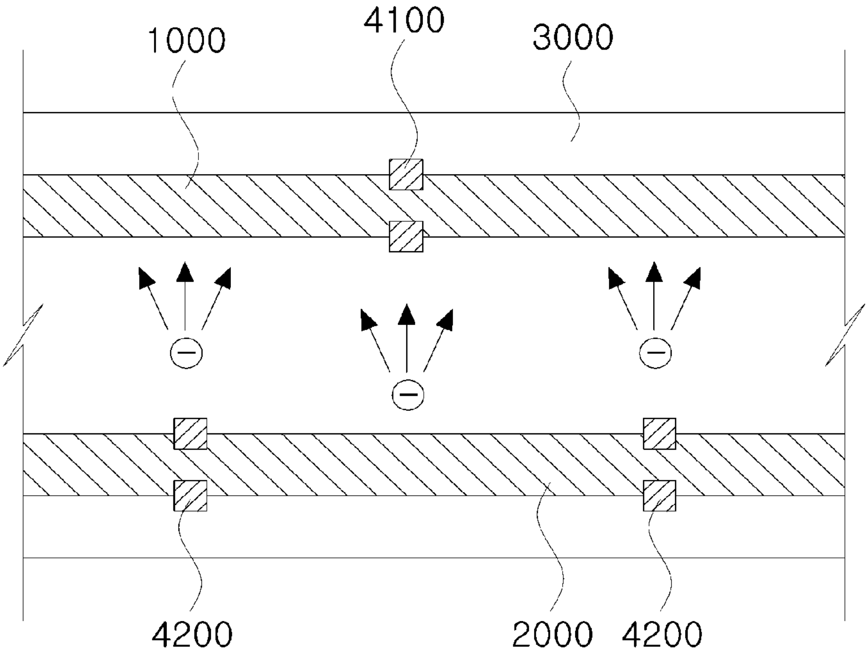


Fig. 7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4200
2000
4200

Fig. 8

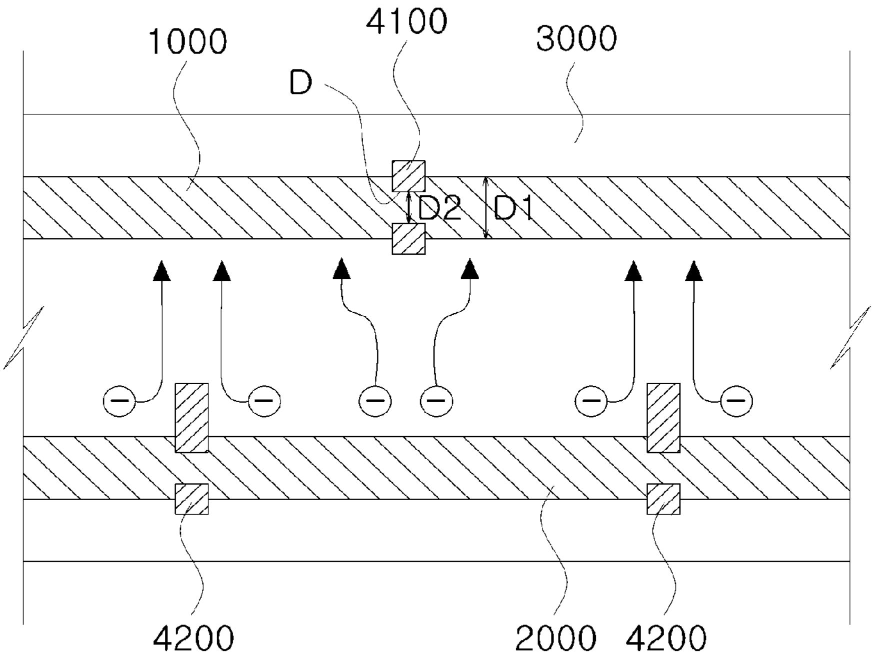
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Fig. 9

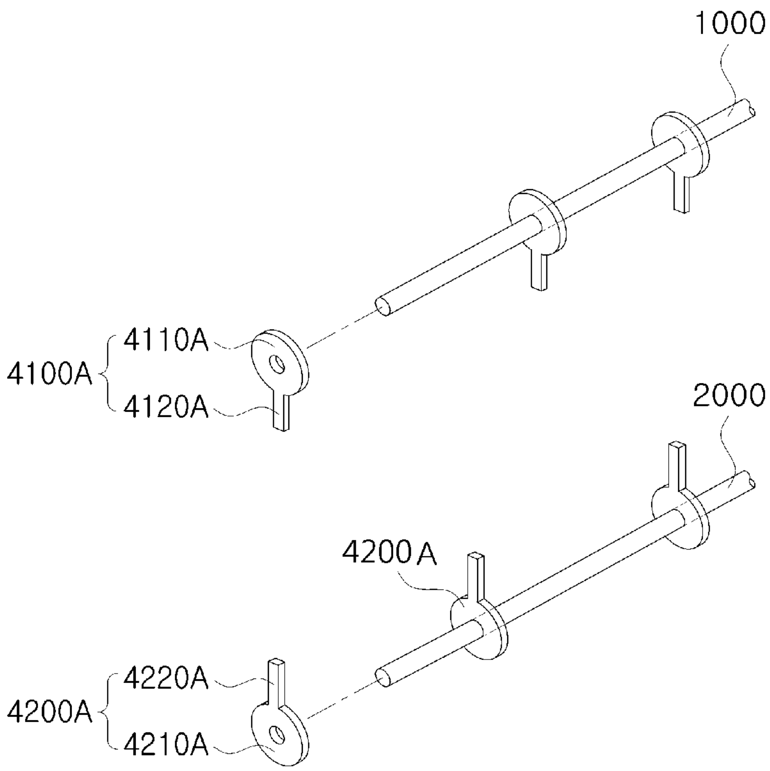
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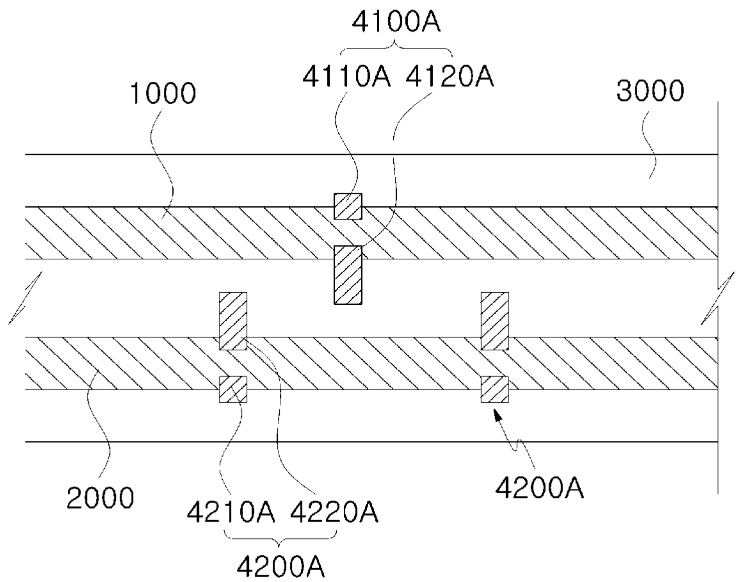
Fig. 10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4200A

INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2018/002895

A. CLASSIFICATION OF SUBJECT MATTER

H05B 3/56(2006.01)i, H05B 3/14(2006.01)i, H05B 1/02(2006.01)i, G05D 23/22(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 3/56; H01C 7/02; F24D 13/02; H05B 3/20; H05B 3/14; G05D 23/19; H05B 1/02; G05D 23/22

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean Utility models and applications for Utility models: IPC as above
Japanese Utility models and applications for Utility models: IPC as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
eKOMPASS (KIPO internal) & Keywords: heating, electrode, electron, wire, carbon

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	KR 10-2013-0000193 A (ONSTONE CO., LTD.) 02 January 2013 See paragraphs [0033]-[0050]; claims 1-6; and figure 3.	1-3,10
Y		4-7
A		8-9,11-17
Y	KR 10-0833722 B1 (KIL, Jong Jin) 29 May 2008 See paragraphs [0034]-[0050]; and figures 1-3.	4-6
Y	JP 2004-185947 A (TOTOKU ELECTRIC CO., LTD. et al.) 02 July 2004 See paragraphs [0004]-[0006]; and figure 7.	7
A	JP 2007-157680 A (FUJIKURA LTD.) 21 June 2007 See paragraphs [0016]-[0020]; and figures 1-3.	1-17
A	JP 06-251863 A (MATSUSHITA ELECTRIC WORKS LTD.) 09 September 1994 See paragraphs [0012]-[0015]; and figure 1.	1-17

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

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
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"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
15 JUNE 2018 (15.06.2018)	**15 JUNE 2018 (15.06.2018)**

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Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/KR2018/002895

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JP 06-251863 A	09/09/1994	NONE	

Form PCT/ISA/210 (patent family annex) (January 2015)