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(54) Heat blanket at high density power

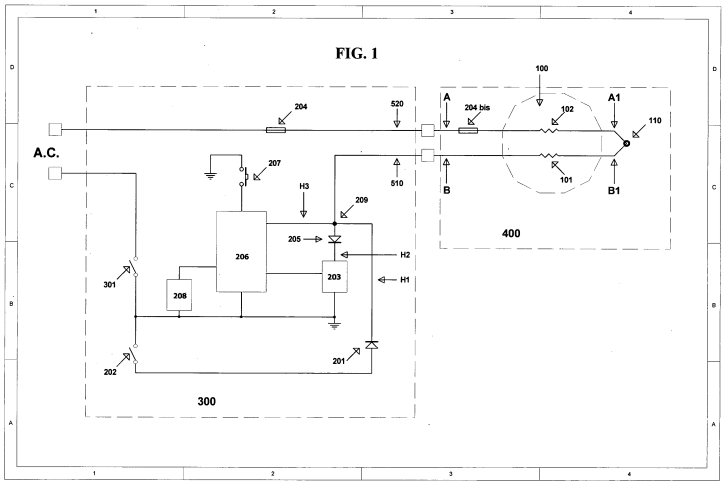
(57) The present invention-relates to a heat blanket that comprises a power supply control unit and an operating unit, wherein said power supply control unit is electrically connectable on one side to an alternating current electric supply and on the other side it is electrically connectable, through an interconnection cable comprising two conductors only, to said operating unit that comprises a foldable sheet and a heating element distributed inside the sheet, the heat blanket being characterized in that said control unit contains means for supplying such heating element with alternating voltage having first and second polarities separately managed, wherein a first polarity is managed by an electro-mechanical switch placed in series with a diode-type semiconductor, while the second polarity is managed by a switching element that is controlled by an electronic circuit.

The heat blanket of the invention also comprises a temperature measuring device to measure the internal temperature of the power supply control unit, whereby a) such an electronic circuit determines if it has to supply or not the switching element for a predetermined time period of rapid heating (TPH time) in order to provide said alternating voltage second polarity to said heating element, and b) the power supply control unit is able to modify the duration of such a predetermined time period of rapid heating TPH time.

The present invention further relates to a method for supplying such a heat blanket.

By this way the heat blanket of the invention is able to rapidly heat a bed, for example by increasing the temperature from 15 °C to 30 °C in only about ten minutes, by using a simple electric circuit.

FIG. 1



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Description

Field of the invention

[0001] The present invention relates to a heat blanket, also known as electric blanket; in particular, the present invention relates to a heat blanket working at high power density.

State of the art.

[0002] The heat blankets have long been known, and generally comprise a power supply control unit and an operating unit electrically connected to it; these two units can be permanently connected one each other or can be separated and electrically connectable. The operating unit generally comprises a foldable sheet and a linear heating element distributed inside the sheet and consists of one or more conductors, mostly having a serpentine-like shape, having such a path to promote the bending of the sheet. The heat is electrically produced by Joule effect inside the conductors, and from here it is distributed all over the sheet.

[0003] Some known in the art heat blankets work with a high power density that can be reduced by the power supply control unit after a predetermined period of time in order not to exceed the desired temperature limits on the heating element. However these types of blankets, in order to fulfill the safety tests established for example by the international safety standard IEC60335-2-17 and to avoid redundant costly electronic circuits, provide a specific electro-mechanical switch within the supply control unit to select the position or positions for a continuous use, that is for use during night time. By this electro-mechanical switch it is allowed to change the connection scheme of the conductors used in the heating element, so as to increase its impedance and thus safely reduce its heating power.

[0004] However, this type of solution with electro- mechanical switch requires the blanket and the power supply control unit to be connected one each other through an interconnecting cable composed of at least three conductors. This results in not irrelevant production costs.

[0005] Patent application EP 0910227-A2, in the name of the same Requester of the present application, discloses a heat blanket comprising a control unit for energy supply. With particular reference to Figure 3, there is described a circuit wherein, when the electro-mechanical switch 24 is closed, the diode 28 is short-circuited by the connection 24-26, and the blanket will always work at its full strength with both the semi-waves. A disadvantage of this solution is that the heating blanket described in EP 0910227-A2 must be designed to be safe to work at a lower maximum power value and then in longer heating times.

[0006] Similarly, patent application EP 1331836- A2 discloses a heat blanket whose power supply is adjusted by the circuit shown in Fig. 1 wherein, when the electro-mechanical switch S10 is closed, the diode S12 is excluded from the electrical connection. Therefore, also the heating blanket therein described will always work with the double semi- wave at its full strength and therefore it must be designed with limited values of said maximum power thereby resulting in longer heating times.

[0007] US Patent application No. 2006/289463-A describes a circuit for adjusting temperature in a heat blanket. As shown in particular in Figures 12, 13, heating elements 85, 98 always work with only one half-wave that passes through the diode 97 and the SCR 94; therefore, a second polarity cannot be supplied, even if it would be by-passed by diodes 101 and 103 in any case. The second polarity passing through the heating element 85 and SCR 94 is only used to detect security signals, and not for heating purposes.

[0008] Patent application GB 2 086 676-A discloses a circuit for adjusting the electric blanket protection, wherein the heating element is made from a textile fiber material. In the circuit described therein, the possibility that a switching element controlled by an electronic circuit can manage a second polarity in order to supply the heat blanket heating element is not taken into account.

[0009] Therefore, the technical problem that the Requester of the present application has faced is to provide a heat blanket able to work at high power density for a pre- determined period of time, by using simple and inexpensive means to achieve the purpose of quickly heating the bed.

Summary of the Invention

[0010] In a first aspect the present invention relates to a heat blanket as the one indicated in claim 1.

[0011] The Requester of the present application has in fact surprisingly found that a heat blanket comprising a power supply control unit and an operating unit, wherein said power supply control unit is electrically connectable on one side to an alternating current electric supply and on the other side it is electrically connectable, through an interconnection cable comprising two conductors only, to said operating unit that includes a foldable sheet and a heating element distributed within the sheet, said heat blanket being **characterized in that:**

- said power supply control unit contains means for supplying said heating element with alternating voltage having first and second polarity managed in a separate way, wherein
- the first polarity is managed by an electro-mechanical switch connected in series to a diode type semiconductor, while the second polarity is managed by a switching element controlled by an electronic circuit,
- is able to rapidly heat a bed, for example by increasing the temperature from 15 °C to 30 °C in only about ten minutes, by using a circuit diagram and an electronic circuit simpler than known hitherto.

[0012] The term "heat blanket" or "thermal blanket" used in the present description and in the accompanying claims means a heating appliance intended mainly, but not exclusively, to heat a bed or a person in bed, having a substantially flat and of any size shape, that is adapted to completely cover a bed or only a portion of it.

[0013] Preferably, said heat blanket is supplied with an alternating voltage having a frequency of for example 50 or 60 Hz; preferably, said alternating electric network is managed by a power switch.

[0014] Preferably, said heating element comprises two conductors with their relative four terminal elements.

[0015] Preferably, a first terminal element of said heating element is electrically connected to one of the supply phases, a second terminal element of said heating element is electrically connected to a connection node to whom are also connected:

a) a first network providing the supply of negative polarity semi-waves and to which said electro-mechanical switch and said diode are connected in series;

b) a second network providing the supply of positive polarity semi-waves through said switching element;

and the remaining two opposed terminal elements of said heating element are connected one each other to a common node.

[0016] Preferably, a third network is also connected to said connecting node providing the ON or OFF position signal of said electro- mechanical switch to said electronic circuit.

[0017] In this way, according to said ON or OFF position signal of said electromechanical switch, provided by said third network, said electronic circuit activates or deactivates said switching element allowing it to supply to said heating element also the positive polarity, depending on the function pre-determined by the electronic circuit.

[0018] If, through said first and second network, a dual polarity, positive and negative, is provided to said heating element, the power supplied to the heating element will double the power supplied in the case of a single polarity, i.e. the one of only one network, thereby reducing the time needed to lead the heat blanket at the desired temperature.

[0019] In a first embodiment, said switching element is preferably of the Triac type or relè type and therefore it may provide a dual polarity; thus, it requires a diode type semiconductor placed in series to it, so that in practice it manages only said second polarity.

[0020] In a second embodiment, said switching element is able to supply a single polarity to said heating element and it is, preferably, of the semiconductor type, such as, for example, a thyristor or SCR. For the purposes of polarity transmission only, in this case it is not necessary that said switching element is connected in series with a diode-type semiconductor. However, preferably, said switching element is connected in series with a diode-type semiconductor suitably polarized to increase the security level. In this way, the advantage of transmitting to the heating element the selected polarity with greater safety in the event of failure of said switching element is thus obtained.

[0021] Preferably, said power supply control unit also comprises a temperature measuring device for measuring the internal temperature T1 of said power supply control unit; more preferably, said temperature measuring device is a temperature sensor; still more preferably is a NTC sensor type.

[0022] In this way, by measuring the temperature within said power supply control unit through said sensor, immediately after said power switch has been switched on, and considering the fact that such an internal temperature rises directly proportional to both the heat blanket operating time and the supplied power amount, it is possible to know if the heat blanket was already in use and therefore likely already hot.

[0023] Preferably, according to a comparison between said measured internal temperature T1 and a predetermined threshold temperature value T2, and according to the signal that said third network provides to said electronic circuit, the latter determines, when said power switch is switched on, but only if also the electro- mechanical switch of said first network is in the ON position, if it has to supply or not said switching element for a predetermined time period of rapid heating TPH (pre- heating time), hereinafter shortly indicated as "TPH time", so as to provide to said heating element said second polarity of the alternating voltage.

[0024] Preferably, said threshold temperature value T2 inside the power supply control unit can be set at a predetermined value, for example 28 °C (T2 is a pre- determined value in said electronic circuit) . If, from the comparison between said measured internal temperature T1 and said so predetermined temperature threshold value T2, it appears that T1 is greater than T2 (T1 > T2), said power supply control unit will not activate said switching element, avoiding in this way to provide the heat blanket of the invention the second positive polarity and thus to increase the heat blanket power to its maximum value.

[0025] In this way, the measurement of the temperature T1 inside the power supply control unit allows to block the maximum power function at the time when the user is requested to switch off and on again in a short time said power switch and/or said electro-mechanical switch connected in series to said first network. In this way it is possible to avoid undesirable overheating in the heat blanket of the invention when the user wrongly tries, for improper but reasonably foreseeable use, to activate the maximum power operation when the heat blanket cover is already hot.

[0026] Conversely, if from the comparison between said measured internal temperature T1 and said pre- determined temperature threshold value T2, it appears that T1 is less than or equal to T2 (T1 $\leq$ T2), said electronic

circuit activates said switching element. In this way, through said second network, also said second polarity of the alternating voltage is supplied to said heating element, so as to obtain up to 100% of the nominal power.

[0027] Preferably, said TPH time can assume a single value, or it can have shorter or longer durations (for example from 0 to 45 minutes) depending on the internal temperature T1 detected by said temperature measuring device at the moment in which said power switch of the power supply control unit is switched on.

[0028] Preferably, according to said measured internal temperature value T1, said electronic circuit is able to change the duration of said TPH time.

[0029] In this way the TPH time is changed for supplying the positive half-wave to the switching element.

[0030] Preferably, said electronic circuit decreases the duration of said TPH time when the measured internal temperature T1 increases.

[0031] When said electro-mechanical switch is turned off, said TPH time is reset automatically and said electronic circuit will start to manage the switching element with the power level being selectable by the user for a heat blanket continuous use or night-time use.

[0032] Preferably, said power supply control unit, through said electronic circuit, is able to turn off said switching element after a predetermined operating time, hereinafter referred to as "TASO" (Auto- Shut Off Timer) time.

[0033] In this way, the safety of the heat blanket of the present invention is increased when it is erroneously left in the switch on position on one of the power levels intended for continuous use or with said electro-mechanical switched to the OFF position (open), while reducing an unnecessary electricity consuming.

[0034] Preferably, other switching element/s controlled by said electronic circuit can be used to switch off the heat blanket regardless of the selected ON or OFF position of said electro- mechanical switch.

[0035] Preferably, said TASO time may be chosen by the user among several possibilities of one each other different values, modifiable by the user through buttons that send appropriate commands to said electronic circuit. For example, this TASO time may be set to a fixed value, for example, 9 hours, or it can be selected to 3 hours, 6 hours or 9 hours leaving the user the possibility to choose the most appropriate TASO time, as well as instead it is possible to set all such TASO time values in said power supply control unit in such a way that appropriate selection means connected to said power supply control unit are able to select the desired TASO time value through said electronic circuit.

[0036] Preferably, whatever is the selection of said TASO time, preferably at least 3 hours, and of said TPH time of rapid heating, preferably less than 60 minutes, the duration of the TASO time is greater than the duration of the TPH time.

[0037] Preferably, said heating element comprises a first conductor and a second conductor whose first and second terminals are electrically connected to said power supply control unit and the two remaining terminals opposite to said first and second terminals are electrically connected one each other at a common node.

[0038] Preferably, said heating element is constituted by a textile fiber on which is spirally wound said first conductor, covered by a first electrically insulating material onto which is spirally wound said second conductor in turn covered by a second electrically insulating material.

[0039] Preferably, said fiber textile is made of polyester.

[0040] Preferably, said first electrically insulating material is made of polyethylene or polyamide. Preferably, said second electrically insulating material is made of PVC (polyvinyl chloride) .

[0041] Preferably, said second electrically insulating material has a melting point or softening point higher than that of said first electrically insulating material.

[0042] In this way, when said first electrically insulating material loses its dielectric characteristics, due to overheating which may occur within said operating unit, and then cause short circuits between said first and second conductor, said second electrically insulating material is still in conditions such as to ensure sufficient insulating or dielectric characteristics of said heating element.

[0043] Preferably, the heat blanket of the present invention further comprises at least one fuse current source connected in series to said heating element to check for possible anomalies related to overloading, due for example by overheating of said first electrically insulating material due to misuse or to due to aging of the sheet that can cause a heating element migration within said sheet, so to exceed its melting or softening point.

[0044] Preferably, the heat blanket of the present invention comprises at least a first fuse current source inserted in said power supply control unit and at least a second fuse current source inserted in said operating unit, wherein said at least one first fuse and said at least one second fuse are electrically connected in series to said heating element.

[0045] In a second aspect the present invention relates to a method for supplying a heat blanket as the one indicated in claim 10.

[0046] The Requester of the present application has in fact surprisingly found that a method for supplying a heat blanket, wherein said heat blanket comprises a power supply control unit and an operating unit, wherein said power supply control unit is electrically connectable, on one side, to an alternating current electric supply and, on the other side, it is electrically connectable, through an interconnection cable comprising two conductors only, to said operating unit which comprises a foldable sheet and a heating element distributed within the sheet, the method being characterized by supplying said heating element with alternating voltage having first and second polarity managed in a separate way, wherein the first polarity is managed by an electro-mechanical switch connected in series to a diode type semiconductor, while the

second polarity is managed by a switching element controlled by an electronic circuit, and which optionally provides a suitably polarized diode type semiconductor connected in series therewith, is able to supply the heat blanket in a short time by using a simple electronic control circuit.

[0047] Further characteristics and advantages of the present invention will become more apparent from an examination of the following detailed description of a preferred embodiment, but not exclusive, illustrated only by way of non-limiting examples, with the support of the attached drawings, in which:

- Figure 1 is a schematic view of a first embodiment of an operating unit and of a power supply control unit of a heat blanket of the present invention and of the electrical circuit which connects the units one each other;

- Figure 2 is a schematic view of a second embodiment in which some variants were inserted to the operating unit of Figure 1;

- Figure 3 is a detailed perspective view of the heating element contained in the operating unit shown in Figure 1 or Figure 2.

Detailed Description.

[0048] The following detailed description refers to a particular embodiment of a heat blanket according to the present invention, without limiting its content.

[0049] Referring to Figure 1, an electrical circuit is therein described wherein a power supply control unit 300 is connected, through an interconnecting cable comprising two conductors 510 and 520 only, to an operating unit 400 of a heat blanket of the present invention intended to be supplied to an AC voltage for example with a frequency of 50 or 60 Hz. The operating unit 400 is formed by a textile sheet at whose inside a heating element 100 constituted in turn by two other conductors 101, 102 with its four related terminal elements A, B, A1, B1 is arranged. As shown in detail in Figure 3, that heating element 100 is made from a textile fiber of polyester 105 on which is wound a first conductor 101, covered by a first electro-thermal insulating element 103 made of polyethylene on which is spirally wound a second conductor 102, and the whole is wound by an electro-thermal insulating element 104 constituted by PVC. The first conductor 101 and the second conductor 102 of the heating element 100 are electrically connected to the power supply control unit 300 via the respective terminal elements A and B and have respective opposite terminal elements A1, B1 electrically connected one each other in correspondence of a common node 110.

[0050] Such a heating element 100 is electrically connected according to the scheme reported in Figure 1 and is powered only by two terminal elements A and B; the first terminal element A of the heating element 100 is electrically connected (through the conductor 520) to one of the power supply phases, while the second terminal element B of the heating element 100 is electrically connected (through the conductor 510) to a node 209 to which are connected three networks H1, H2 and H3 of the circuit of the power supply control unit 300 supplied from the power switch 301 and that have the following features:

a) the first network H1 provides the supply of negative polarity semi-waves and an electro-mechanical switch 202 and a diode 201 are connected in series on it,

b) the second network H2 provides the supply of positive polarity semi-waves through a switching element 203 connected in series with a diode 205,

c) the third network H3 has the feature of transferring the signal of the ON or OFF position of the electromechanical 202 switch to an electronic circuit 206.

[0051] In a first predetermined period of TPH time in which the heat blanket is operating, for example 30 minutes, during which the electro-mechanical switch 202 is in the ON position, the electronic circuit 206 maintains also the switching element 203 in the permanent position ON. In this way, both the half-waves (positive and negative) are supplied to the heating element, thus obtaining its maximum power.

[0052] In this way, having taken a heat blanket of the present invention (having set the predefined temperature threshold value T2 equal to 28 °C) and placed it at rest at about 15 °C and having set the electro-mechanical switch 202 and the switching element 203 in the described above conditions to provide the heating element 100 with the maximum power through the dual polarity, the heat blanket reaches the desired temperature of 30 °C in only 10 minutes.

[0053] Once the TPH time has lapsed and the electromechanical switch 202 being in the ON position, the electronic circuit 206 will turn off the switching element 203, interrupting the dual polarity supply to the heating element 100 and allowing the single polarity supply, causing in this way the halving of the power supplied to the heating element 100. Therefore, until the electro-mechanical switch 202 remains in the ON position, it will not be possible to lower the power supplied to the heating element 100 to below 50% of its nominal value.

[0054] Conversely, if the electro- mechanical switch 202 is in the OFF position, the power supplied to the heating element 100 will be between 5 and 50% and it will be possible, through the button 207, to send signals to the electronic circuit 206 in order to activate the switching element 203 with alternating cycles of ON- OFF. The power percentage variation supplied to the heating element 100 in that range between 5 and 50% depends

about the type and dimension of the heat blanket. This type of use of the heat blanket of the present invention with supplied power percentages below 50% is particularly advantageous when the user intends to position the command onto one of the positions provided for a continuous use, for example for a night- time use.

[0055] In Figure 1 is also shown a temperature sensor 208 of NTC type inserted in the power supply control unit 300 which measures the internal temperature T1 inside the casing of the control unit 300 itself. By pre-setting a threshold temperature value T2 within the power supply control unit 300, for example at 28 °C, measured at the time in which the power switch 301 is selected in the ON position, it is possible to compare the detected temperature value T1 with this threshold temperature value T2. If T1 is greater than T2, that is if such a threshold value is exceeded, and if simultaneously the electro-mechanical switch 202 is in the ON position, the electronic circuit 206 will not activate the switching element 203 avoiding in this way to provide the positive polarity to the heat blanket and thus to increase the heat blanket power up to its maximum value. An advantage surprisingly discovered by the inventor is that the internal temperature inside the casing of the control unit increases up to a certain over-temperature value according to the supplying time of the heat blanket and thus, by measuring the internal temperature inside the casing of the control unit, dangerous overheating situations of the heat blanket surface may be avoided due to improper, but reasonably foreseeable, use of the heat blanket of the present invention by a user who mistakenly shuts down and resets the function of maximum power (i.e. he/she selects the electromechanical switch 202 in the ON position) when the heat blanket is already hot, or in other equivalent situation when, being the electro-mechanical switch 202 already in the ON position, he/she shuts down and resets the power switch 301 in a short time.

[0056] A further feature of the measured temperature value T1, as detected by the sensor 208, is that it allows the TPH time modification for supplying the positive half-wave to the switching element 203.

[0057] For example, if a threshold temperature value T2 is pre-set, for example at 28 °C, and if the internal temperature T1 measured inside the casing, at the moment in which the power switch 301 and the electro-mechanical switch 202 are turned on, will be lower than 15 °C, the polarity supplying of the second network H2 may have a duration of TPH time of 45 minutes; if such a temperature T1 will be comprised between 16 °C and 20 °C such a duration time is allowed to be 30 minutes; if T1 will be comprised between 21 °C and 25 °C such a duration time is allowed to be 20 minutes; if T1 will be comprised between 26 °C and 28 °C such a duration time is allowed to be 10 minutes, and, finally, if T1 will be higher than 28 °C such a duration time is allowed to be zero minutes.

[0058] Obviously both the time scales and the initial values of the reference temperature will be modifiable according to specific requirements related to the type of heat blanket and/or size of its power supply control unit.

[0059] In Figure 1 are also shown a current fuse 204 positioned in the power supply control unit 300 and a current fuse 204bis positioned in the operating unit 400, arranged in series with the supplying of the heating element 100, which control any possible anomalies related to overloading due, for example, by overheating the first electro-thermal insulating 103 due to improper use or due to an aging of the sheet that may cause a migration of the heating element within said sheet, thus arriving to overcome his melting or softening point and thus creating a series of short-circuits between the two conductors 101 and 102.

[0060] In Figure 1, when the user selects the electromechanical switch 202 in the OFF position for continuous/night-time use of the heat blanket of the present invention, the electronic circuit 206 will turn off the switching element 203 after a predetermined TASO time during which the heat blanket is operating, fixed for example at 6 hours. Once the period of TASO time has lapsed, the heat blanket will stop its operating, for safety and power saving reasons. The counting period of the TASO time may be programmed in the electronic circuit 206 by two different solutions: a) the TASO time starts counting when the power supply control unit 300 is turned on through the power switch 301; or b) the TASO time starts counting when the electro-mechanical switch 202 is turned off by the user, and thus the use period for continuous or night-time use starts. With the above described arrangement, the TASO timer thus provides to turn the heat blanket off only if the electromechanical switch 202 is in the OFF position.

[0061] The diagram in Figure 2 is identical to that one of Figure 1 with the exception for the presence of further switching elements 302 and 303, one in alternative to the other one, in order to automatically turn off the heat blanket of the present invention, as an alternative to the above described embodiment with reference to Figure 1. In such a scheme of Figure 2, the TASO time will begin its counting when the control unit 300 is turned on through the power switch 301. The diagram of Figure 2 shows two distinct embodiments of the TASO time management, depending on whether the switching element 302 or the switching element 303 is used in combination with the switching element 203.

[0062] In fact, in a first embodiment, Figure 2 shows a switching element 302 of the bi-polar type, such as a Triac or a relè, controlled by the electronic circuit 206. The TASO time is then managed by the electronic circuit 206 by turning off the switching element 302; the heat blanket turns off completely, regardless of the position ON or OFF on which the electro-mechanical switch 202 is selected.

[0063] In a second embodiment, Figure 2 shows another switching element 303 to which a diode 201 is connected in series. The switching element 303 open the supplying circuit of the network H1 (semi-negative

waves). Once the TASO time period has lapsed, the electronic control circuit 206 turns off simultaneously both the switching element 303 and the switching element 203 and thus the heat blanket is completely shut off, regardless of the ON or OFF position on which the electro-mechanical switch 202 is selected.

[0064] In any embodiment, such TASO time may be one predetermined time period only (for example 6 or 9 hours) or, through other means not shown in the power supply control unit 300, it will be possible to set different TASO times in the control circuit 206 (for example, 3, 6, 9 hours). In any cases the switching off of the heat blanket occurs when the TASO time laps and the switching off of the blanket is guaranteed by the contemporary turning off that the control circuit 206 performs on the switching elements 203 and 303.

[0065] Of course, to those skilled in the art will be apparent many modifications and variations of the preferred embodiments described, still remaining within the scope of the invention.

[0066] Therefore, the present invention is not limited to the preferred embodiments described, illustrated only by way of example and not limitative, but is defined by the claims that follow.

Claims

1. Heat blanket comprising a power supply control unit (300) and an operating unit (400), wherein said power supply control unit (300) is electrically connectable on one side to an alternating current electric supply and on the other side it is electrically connectable, through an interconnection cable comprising two conductors (510, 520) only, to said operating unit (400) that includes a foldable sheet and a heating element (100) distributed within the sheet, said heat blanket being **characterized in that:**

   said power supply control unit (300) contains means for supplying said heating element (100) with alternating voltage having first and second polarity managed in a separate way, wherein the first polarity is managed by an electro-mechanical switch (202) connected in series to a diode type semiconductor (201), while the second polarity is managed by a switching element (203) controlled by an electronic circuit (206).

2. Heat blanket according to claim 1, wherein said heating element (100) is constituted by two conductors with their related four terminal elements (A, B, A1, B1), wherein a first supplying terminal element (A) of said heating element (100) is electrically connected to one of the supply phases, a second terminal element (B) of said heating element (100) is electrically connected to a connection node (209) to whom are also connected:

   a) a first network (H1) providing the supply of negative polarity semi-waves and to which said electro-mechanical switch (202) and said diode (201) are connected in series;
   b) a second network (H2) providing the supply of positive polarity semi-waves through said switching element (203);

   and the two remaining opposed terminal elements (A1, B1) of said heating element (100) are connected one each other to a common node (110).

3. Heat blanket according to claim 1 or 2, wherein a third network (H3) is also connected to said connecting node (209) providing the ON or OFF position signal of said electro-mechanical switch (202) to said electronic circuit (206).

4. Heat blanket according to any one of claims 1-3 wherein, when said switching element (203) is able to provide a double polarity, said switching element (203) is optionally connected in series to an opportunely polarized diode type semiconductor (205), in order to provide a single polarity to said heating element (100).

5. Heat blanket according to any one of claims 1-3 wherein, when said switching element (203) is able to provide a single polarity, said switching element (203) is optionally connected in series to an opportunely polarized diode type semiconductor (205), in order to provide said single polarity to said heating element (100) with greater safety.

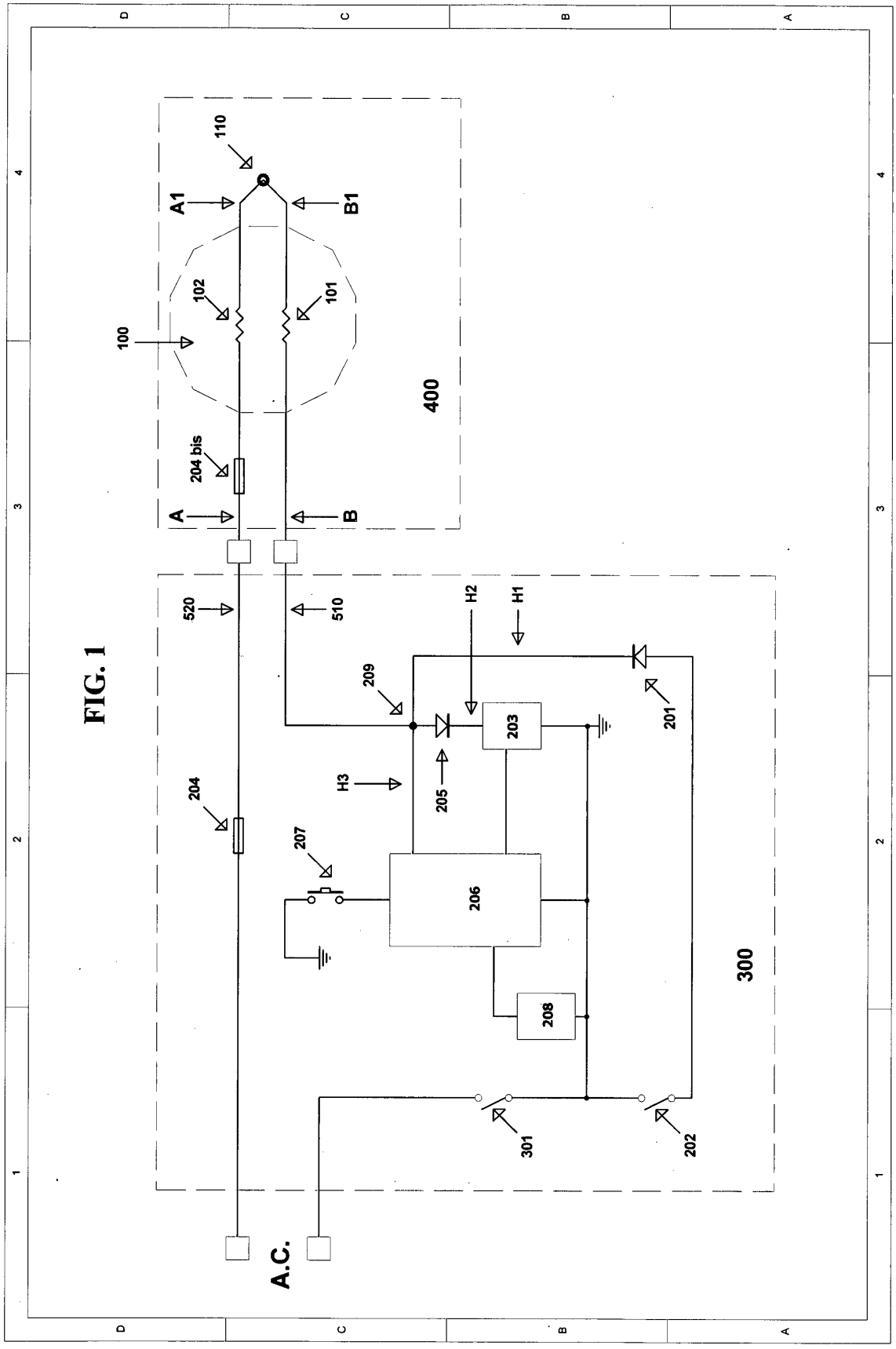
6. Heat blanket according to any one of claims 1-5, wherein said power supply control unit (300) also comprises a temperature measuring device (208) for measuring the internal temperature (T1) of said power supply control unit (300).

7. Heat blanket according to any one of claims 1-6, wherein upon a comparison between said measured internal temperature (T1) and a predetermined threshold temperature value (T2) and according to the signal that the network (H3) provides to said electronic circuit (206), the electronic circuit (206) determines if it has to supply or not said switching element (203) for a predetermined time period of rapid heating (TPH time) in order to provide said alternating voltage second polarity to said heating element (100).

8. Heat blanket according to any one of claims 1-7, wherein said electronic circuit (206) decreases the duration of said predetermined time period of rapid heating (TPH time) as the measured internal temperature (T1) increases.

9. Heat blanket according to any one of claims 1-8, wherein said power supply control unit (300), through said electronic circuit (206), is able to switch off said switching element (203) after a predetermined working period of time (TASO).

10. Method for supplying a heat blanket, wherein said blanket comprises a power supply control unit (300) and an operating unit (400), wherein said power supply control unit (300) is electrically connectable, on one side, to an alternating current electric supply and, on the other side, it is electrically connectable, through an interconnection cable comprising two conductors (510, 520) only, to said operating unit (400) which comprises a foldable sheet and a heating element (100) distributed within the sheet,
the method being **characterized by** supplying said heating element (100) with alternating voltage having first and second polarity managed in a separate way, wherein the first polarity is managed by an electro-mechanical switch (202) connected in series to a diode type semiconductor (201), while the second polarity is managed by a switching element (203) controlled by an electronic circuit (206).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400
204 bis
A
B
520
510
H2
H1
209
203
201
H3
205
204
207
206
208
300
301
202
A.C.

FIG. 1

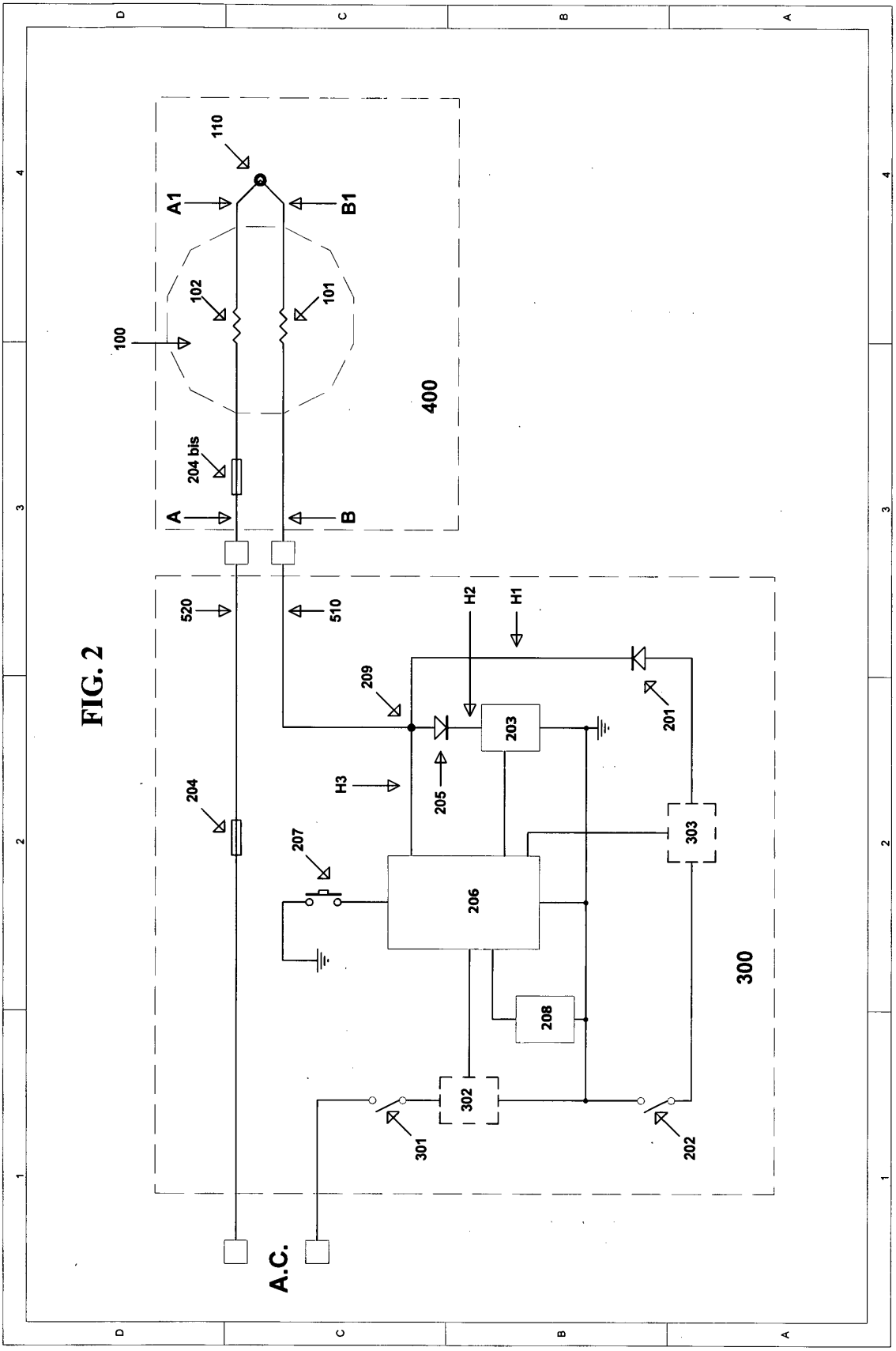
110
A1
B1
102
101
100
400
204 bis
A
B
520
510
H2
H1
209
201
203
H3
205
204
207
303
206
208
300
302
301
202
A.C.

FIG. 2

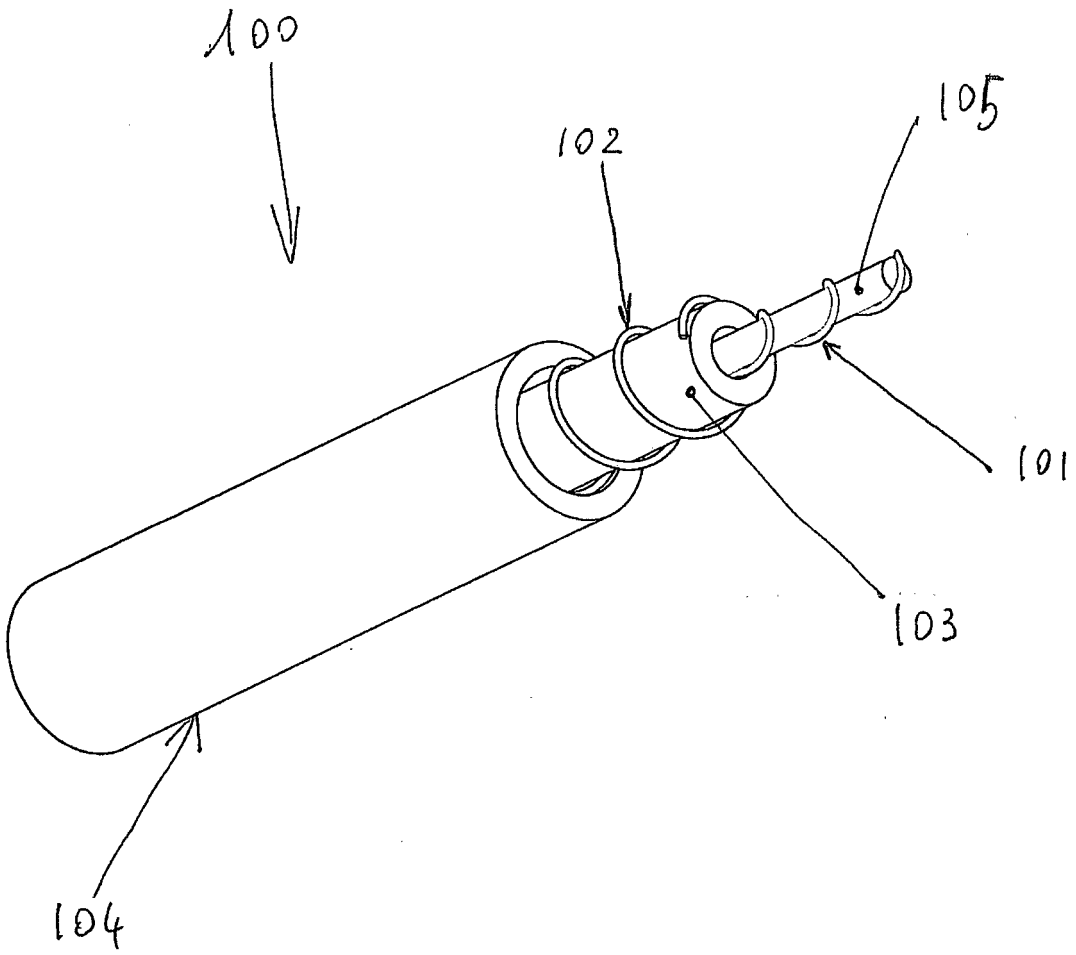

Fig. 3

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EUROPEAN SEARCH REPORT

Application Number
EP 13 00 2328

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H05B
G05D
H02J

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	21 August 2013	Chelbosu, Liviu

CATEGORY OF CITED DOCUMENTS

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