

(19)



(11)

EP 3 100 647 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
07.12.2016 Bulletin 2016/49

(51) Int Cl.:
A47C 21/04 (2006.01)

(21) Application number: **16001214.2**

(22) Date of filing: **30.05.2016**

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

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(30) Priority: **05.06.2015 IT UB20151207**

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(54) **BED WARMER CONTAINING FABRIC WHICH HELPS IN REMOVING THE MOISTURE AND INCREASING THE TRANSPIRATION**

(57) The present invention relates to a bed warmer that includes an operating unit that includes a housing (or blanket) and a heating element distributed inside the casing, characterized in that said bed warmer also comprises a layer that covers at least a side of such operating unit, said layer containing at least one textile fibre having a transpiration value, according to the evaporative resistance tests disclosed in EN 31092 standard, which rep-

resents an improvement of at least 30% with respect to the transpiration value of cotton.

The bed warmer of the present invention is able to reduce sweating emitted by the user while sleeping, and to increase the transpiration especially during the warmer months or in conditions wherein the bed warmer is set at a high temperature.

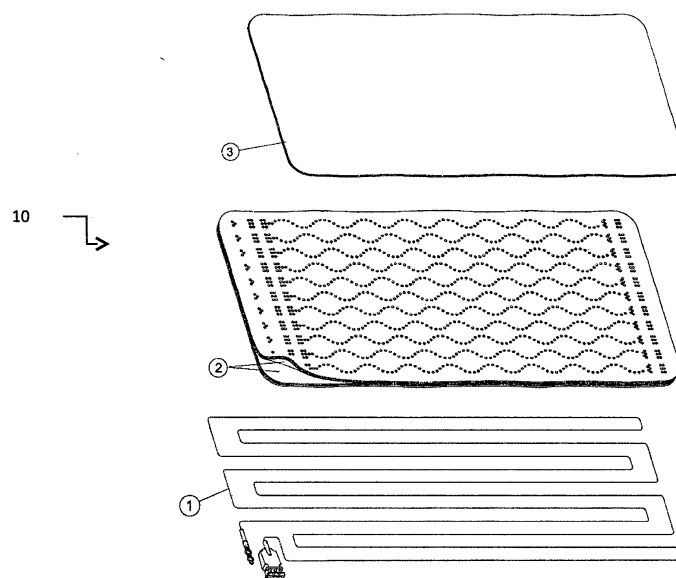


Fig. 1

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DescriptionField of the invention

5 **[0001]** The present invention relates to a bed warmer. In particular, the present invention relates to a bed warmer with a tissue that helps in removing the moisture and increasing transpiration.

Background of the invention

10 **[0002]** The bed warmers, heating pads, heating mats and similar products generally referred to herein with the term "bed warmer" are known since long time ago. Typically, they comprise a power control unit and an operating unit electrically connected one each other; these two units can be connected one each other in a permanent way or they can be separate and electrically connectable. The operating unit generally comprises a folding sheet and a linear heating element distributed inside the sheet and consisting of one or more conductors, mostly with a serpentine-like shape,
15 having a path such as to promote the sheet folding. The heat is electrically produced by a Joule effect in the conductors, and from here the heat is distributed in the sheet.

[0003] In this way, by activating the heating elements of such bed warmers, the user can lie down in bed and can appreciate the heat emitted from it, particularly appreciated in the cold winter time.

20 **[0004]** There are, inter alia, devices that allow a better efficiency and safety of such bed warmers, that allow the user to adjust the desired temperature and to automatically lower the temperature until the switch-off of the bed warmers in the case the temperature reaches too high levels or in case of excessive use over time.

[0005] The Applicant has observed that these bed warmers, while being typically supplied with an electrical power or temperature regulation, designed for a continuous use at night, may generate an unpleasant situation when the user erroneously chooses a too high temperature or when uses heavy blankets also when the bed warmer is off, because
25 sweating is created while sleeping and thus it generates a not comfortable feeling.

[0006] Moreover, such bed warmers are single-season type devices, since their use is limited to winter time, while during summer times they are not used because they do not have a useful function to the user. In this case, the bed warmer should be kept in a safe place until its new use in the next cold season.

30 **[0007]** It is known that the wool has a high moisture absorbing power, but it is expensive and produces a heating effect to the body that is troublesome during summer time.

[0008] On the other hand, it is also known that the silk is particularly useful for its softness, as well as flax is useful for its freshness and polyester for its durability. However all of these materials, as well as cotton, have a relatively low moisture absorption.

35 **[0009]** Therefore, the Applicant of the present invention has noticed the need to achieve a bed warmer which is simple and cheap to be manufactured, convenient to use, and which solves the above described technical problem related to the excessive sweating while sleeping.

40 **[0010]** To overcome these problems, the Applicant has surprisingly found that by providing such bed warmers with at least one side coated with an outer layer formed by a particular fibre, they are able to create a natural ventilation on the part of the body that is in direct contact or indirectly through a sheet with said outer layer, keeping drier the skin and thus giving the user a pleasant freshness feeling.

Summary of the Invention

45 **[0011]** The present invention relates to a bed warmer as that one indicated in claim 1.

[0012] The Applicant of the present application has in fact surprisingly found that a bed warmer that includes an operating unit that includes a casing (or blanket) and a heating element distributed inside the casing, characterized in that said bed warmer also comprises a layer covering at least one side of said operating units, said layer containing at least one textile fibre having a transpiration value, according to the evaporative resistance tests disclosed in EN 31092 standard, which represents an improvement of at least 30% with respect to the transpiration value of cotton,
50 is able to allow to reduce the sweating emitted by the user while sleeping, especially during the warmer months or in conditions wherein the bed warmer is set at a high temperature.

[0013] In fact, thanks to the natural ventilation generated by such textile fibres, such fibres are able to absorb a lot of moisture and to let it evaporate in a natural way, providing a moisture exchange capacity that is much higher when compared to other natural fibres, such as, cotton and wool. Thus, an enjoyable situation of pleasant freshness is created
55 by keeping drier the user's skin.

[0014] In this way, the advantage of being able to use a single device consisting of the bed warmer of the present invention provided with a means for reducing the moisture emitted from the wearer's body due to his sweating while sleeping is also obtained. In fact, such a single device can be used throughout the year, both as a bed warmer to heat

the bed during the cold months, and as an element to cool the body during the warmer months, wherein a greater user sweating occurs.

[0015] In the present invention, when reference is made to cotton and/or polyester, it is meant, respectively, a reference to that kind of cotton and/or polyester typically used in the bedding field, having the structure, texture, workmanship, fabric, wire strands and other features adapted to obtain the typical cotton and/or polyester bed sheets and similar accessories.

[0016] Preferably, said textile fibre has a transpiration value that is at least 150% the one of cotton, according to the evaporative resistance tests disclosed in EN 31092 standard.

[0017] In this way, the moisture due to the user sweating, whose body produces about 0,4 litres of moisture, is greatly absorbed.

[0018] In a first embodiment, said textile fibre is a viscose fibre extracted from wood pulp cellulose, especially from eucalyptus wood.

[0019] In this way, such a fibre results to be naturally hygienic and 100% biodegradable, providing a particularly soft, direct contact with the skin, without irritating the skin itself.

[0020] Preferably, said textile fibre extracted from the cellulose is provided with nano-fibrils.

[0021] In this way, being the nano-fibrils hydrophilic and highly flexible, they allow an optimum moisture absorption with the best thermal properties.

[0022] Preferably, said nano-fibrils are homogeneously distributed within said textile fibre.

[0023] In this way a uniform moisture absorption distribution throughout the entire bed warmer is obtained.

[0024] Preferably, said textile fibre is of the lyocel type (also called Tencel), which is a fibre made from crushed cellulose dissolved in NMMO-mono-hydrate (N-methylmorpholine-N-oxide-mono-hydrate). Such a type of fibre is commercially available under the registered trademark Tencel^R by Lenzing Ag, Austria.

[0025] The structure of such fibres ensures that any moisture released while sleeping is immediately transported to the outer surface of the fabric, letting it immediately evaporate. The fibre transpiration thus keeps the body always pleasantly cool and dry.

[0026] In a second embodiment, said textile fibre is a yarn specially molded; more preferably, the structure of said textile fibre comprises a plurality of microchannels in its interior, for example 4 or 6 microchannels, which extend for the whole length of the fibre.

[0027] In this way, through said micro-channels present in the fibre, the moisture released during user sleeping is more rapidly transported towards the outer surface of the layer to obtain a more rapid evaporation.

[0028] Preferably, said textile fibre of this second embodiment is provided with the Coolmax^R trademark by InvistaTM, USA.

[0029] In any of these first and second embodiment of the textile fibre, preferably, said outer layer containing the textile fibre is fixed to said operating unit comprising said casing enclosing therein said heating element by means of sewing or quilting.

[0030] Preferably, said bed warmer is coated on both the upper side and the lower side by said outer layer formed by said textile fibre.

[0031] Preferably, said bed warmer further comprises a power control electrically connectable at one end to an electrical supply network and at the other side to said operating unit.

[0032] Further characteristics and advantages of the present invention will become more apparent from an examination of the following detailed description of the preferred embodiments, but not exclusive, illustrated only by way of non-limiting example, with the support of the accompanying drawings. In particular, in the drawings:

- Figure 1 is a schematic view of a bed warmer of the present invention, wherein the heating element, the casing and the outer casing, separated one each other, are visible;
- Figure 2 shows a perspective view of a portion of the bed warmer of Figure 1, wherein the heating element is placed inside the casing.

Detailed description

[0033] The following detailed description refers to particular embodiments of the bed warmer of the present invention, without limiting the content.

[0034] Referring to Figures 1-2 an embodiment of the bed warmer 10 of the present invention is described, intended to be supplied at an AC voltage, for example with a frequency of 50 or 60 Hz.

[0035] The main elements that constitute the bed warmer 10 of the present invention are shown in Figure 1, separated one each other, before being assembled together. In fact the heating element 1, consisting of an electric wire coil, a blanket 2 that serves as a casing for the insertion therein of the heating element 1, and the outer layer 3 that includes the textile fibre for the absorption moisture, to be applied to the casing 2, are visible.

[0036] On the contrary, the housing 2 wherein the heating element 1 is inserted is shown in Figure 2, at one end of which is arranged an outlet 4 for the connection to a cable for the electricity network, so that the casing 2 and the heating element 1 constitute all together the operating unit 400 of the bed warmer 10. The bed warmer 10 also comprises a power supply control unit 300 (contained in a plastic housing 209) which is electrically connectable, on one side, to a power supply network and, on the other side, to such an outlet 4 of the operating unit 400 by means of an interconnecting cable 207, in conformity with the international codes H03VV-F 2 X 0.50 mm² of the electrical cables and having for example a length of 60 cm.

[0037] The user, through the power supply control unit 300, can set various parameters related to a better utilization of the bed warmer 10 by the user itself as, for example, the desired temperature, duration of its operation, its turning off after a certain period of time and other parameters related to time, temperature, absorbed and dissipated energy.

Example 1 (first embodiment of the invention).

[0038] The outer layer 3 is substantially constituted by such a textile fibre of the Lyocell type, marketed under the name 700-600 Tencel^R from Lenzing Ag, Austria, which is a modified viscose fibre, naturally hygienic, extracted from the eucalyptus wood pulp cellulose, 100% biodegradable, having a smooth and particularly soft surface. Such a fibre is made by nano fibrils, distributed in a homogeneous and regular way as to allow an optimal moisture absorption and a constant and homogeneous temperature on the whole contact surface of the user and, consequently, a considerable reduction of the bacteria proliferation. In addition, this fibre has neutral electrical properties, thus protecting the user's body from electrostatic charges.

[0039] To complete the construction of the bed warmer 10 of the present invention, the outer layer 3, comprising such a Lyocell type textile fibre, is fixed to the operating unit 400, constituted as mentioned above by the casing 2 which contains in its interior the heating element 1 (Figure 2), so that the outer layer 3 completely covers the side of the operating unit 400 facing the user (not shown in the figures). Such an outer layer 3 may be fixed to the operating unit 400 for example by sewing or quilting.

[0040] In this way, once activated the bed warmer 10 through the power supply control unit 300, in case a high partially temperature setting is reached during the night, the sweat emitted from the wearer's body while sleeping is rapidly absorbed from the textile fibre contained in the outer layer 3 which allows to keep more dry the user's skin and then to give the user a comfortable feeling while sleeping. In fact, thanks to the natural ventilation generated by such textile fibres, such fibres are able to absorb a lot of moisture and let it evaporate in a natural way, providing a very high moisture exchange capability.

[0041] In addition, during warmer summer time, when it is not necessary to activate the heating element of the bed warmers of the present invention, it is possible to continue to use such a bed warmer. In fact, thanks to the fact that it is also provided with the outer layer comprising the textile fibre for the sweating evaporation, it can also be used exploiting a feature similar to that one of a mattress cover, so as to supply the user a pleasant freshness feeling. Therefore, the bed warmer of the present invention may be used throughout the year, instead of only in winter time as occurs to known in the art bed warmers.

Example 2 (second embodiment of the invention).

[0042] The Example 2 is substantially equal to Example 1, the only difference being given by the fact that in this case the outer layer 3 is substantially constituted by a textile fibre marketed under the trade name Coolmax^R, available from InvistaTM, USA. Such a fibre is made from a plurality of channels in its interior, about 4-6 channels, which allow a rapid transfer of moisture towards the outside to be evaporated.

Example 3 (comparison).

[0043] Comparison Example 3 is substantially equal to Example 1 of the invention, the only difference being given by the fact that in this case the outer layer 3 consists substantially of a typical cotton used in the bedding field.

Example 4 (comparison).

[0044] Comparison Example 4 is substantially equal to Example 1 of the invention, the only difference being given by the fact that in this case the outer layer 3 consists substantially of a typical polyester used in the bedding field.

Valuation of evaporating resistance of moisture vapour.

[0045] The various types of textile material used in Examples 1-4 were tested to assess whether they were more or

less breathable fabrics, measuring their evaporative resistance of the moisture vapour (R_{et}) based on the test described in EN 31092 standard, which prescribes methods for the determination of the thermal resistance and of the moisture vapour resistance, in a steady state, of products such as textile materials, including multilayer assemblies used for clothing, quilts, sleeping bags, seat and similar products. The use of this measuring technique is limited to the maximum values of thermal resistance and moisture vapour resistance which depend on the size and construction of the device (for example, respectively $2\text{m}^2\cdot\text{K}/\text{W}$ and $700\text{m}^2\text{Pa}/\text{W}$ for the minimum specifications of the device treated in the present international standard). The lower is the resistance, the more the fabric lets the water vapour generated by the active body to be dispersed, the more it is breathable.

[0046] By setting the temperature of the measuring unit and of the air at 35°C , with a relative humidity R.H. of 40%, as indicated at point 7.4 of the above mentioned standard, after 3 hours from the start of the test, the R_{et} value is obtained for each of the textile fibre used in Examples 1 and 2 of the invention and in the Comparison Examples 3 and 4. The obtained values are reported in the following Table 1.

Tabella 1		
Textile fibre	Example	R_{et} value
Tencel ^R	1 (invention)	85
Coolmax ^R	2 (invention)	90
cotton	3 (comparison)	130
polyester	4 (comparison)	150

[0047] From this table it is clear that the Tencel^R and Coolmax^R textile fibres used, respectively, in bed warmers of the invention shown in Examples 1 and 2, showed an improvement in transpirability of at least 30% with respect to that one of cotton, and even greater (at least 50%) than that one of polyester.

[0048] In fact, considering as indicated above that the lower is the transpiration value, the higher is the humidity absorbed by the tested materials, having measured the transpiration value (R_{et}) of the cotton (Comparison Example 3) as being equal to 130, the theoretical transpiration value $R_{et}(x)$ of a material X (different from cotton) showing an improvement in the transpiration value of 30% with respect to the transpiration value $R_{et}(\text{cotton})$ of the cotton is of about 91, as indicated by the formula:

$$R_{et}(X) = R_{et}(\text{cotton}) - 30/100(R_{et}(\text{cotton})) = 130 - 30/100(130) = 130 - 39 = 91$$

[0049] Thus, having measured the transpiration values for Tencel^R and Coolmax^R, respectively, equal to 85 and 90 (Inventive Examples 1 and 2), both of them being thus lower than 91 (related to an improvement of 30% with respect to cotton), it follows that each of the materials tested in Inventive Examples 1 and 2 showed an improvement in the transpiration value of more than 30% when compared to the transpiration value of the cotton.

[0050] Thus, these textile fibres have a much higher moisture exchange capacity even compared to that one of other natural fibres, such as cotton.

[0051] The bed warmers of the present invention therefore showed an ideal microclimate for a better quality of sleep, also with a reduced bacterial growth due to a reduced amount of residual moisture on the wearer's skin.

[0052] Of course, to those skilled in the art will be evident many modifications and variations of the preferred embodiments described above, still remaining within the scope of the invention.

[0053] For example, in another embodiment, each of both sides of the operating unit 400, therefore, both the one on the side facing the user and the one on the opposite side, may be covered by such an outer layer 3 comprising such textile fibre.

[0054] Accordingly, the present invention is not limited to the described preferred embodiments, illustrated only by way of example and not limitative, but is defined by the following claims.

Claims

1. Bed warmer (10) comprising an operational unit (400) that includes a casing (2) and a heating element (1) contained inside the casing (2), **characterized in that** said bed warmer (10) also comprises a layer (3) covering at least one side of said operating unit (400), said layer (3) containing at least a textile fibre having a transpiration value, according to the evaporative resistance tests disclosed in EN 31092 standard, which represents an improvement of at least 30% with respect to the transpiration value of cotton.

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2. Bed warmer (10) according to claim 1, wherein said textile fibre has a transpiration value, according to the evaporative resistance tests disclosed in EN 31092 standard, which represents an improvement of at least 50% with respect to the transpiration value of cotton.
- 5 3. Bed warmer (10) according to claim 1 or 2, wherein said textile fibre is a viscose fibre extracted from cellulose wood pulp.
- 10 4. Bed warmer (10) according to claim 3, wherein said textile fibre is produced from crushed cellulose dissolved in NMMO-monohydrate (N-methylmorpholine-N-oxide-monohydrate).
- 5 10 5. Bed warmer (10) according to any one of the preceding claims, wherein said textile fibre is provided with nano-fibrils.
6. Bed warmer (10) according to any one of the preceding claims, wherein said textile fibre is of the lyocell type.
- 15 7. Bed warmer (10) according to claims 1 or 2, wherein said textile fibre comprises a plurality of micro-channels in its interior, for example 4 or 6 micro-channels, extending for the whole fibre length.
8. Bed warmer (10) according to claim 7, wherein said textile fibre is available under the trademark Coolmax™.
- 20 9. Bed warmer (10) according to any one of the preceding claims, wherein both the top side and the bottom side of said operating unit (14) of the bed warmer (10) are coated by said layer (3) containing said textile fibre.
- 25 10. Bed warmer (10) according to any one of the preceding claims, wherein said bed warmer (10) further comprises a power supply control unit (300) electrically connectable on one side to an electrical supply network and on the other side to said operating unit (400).

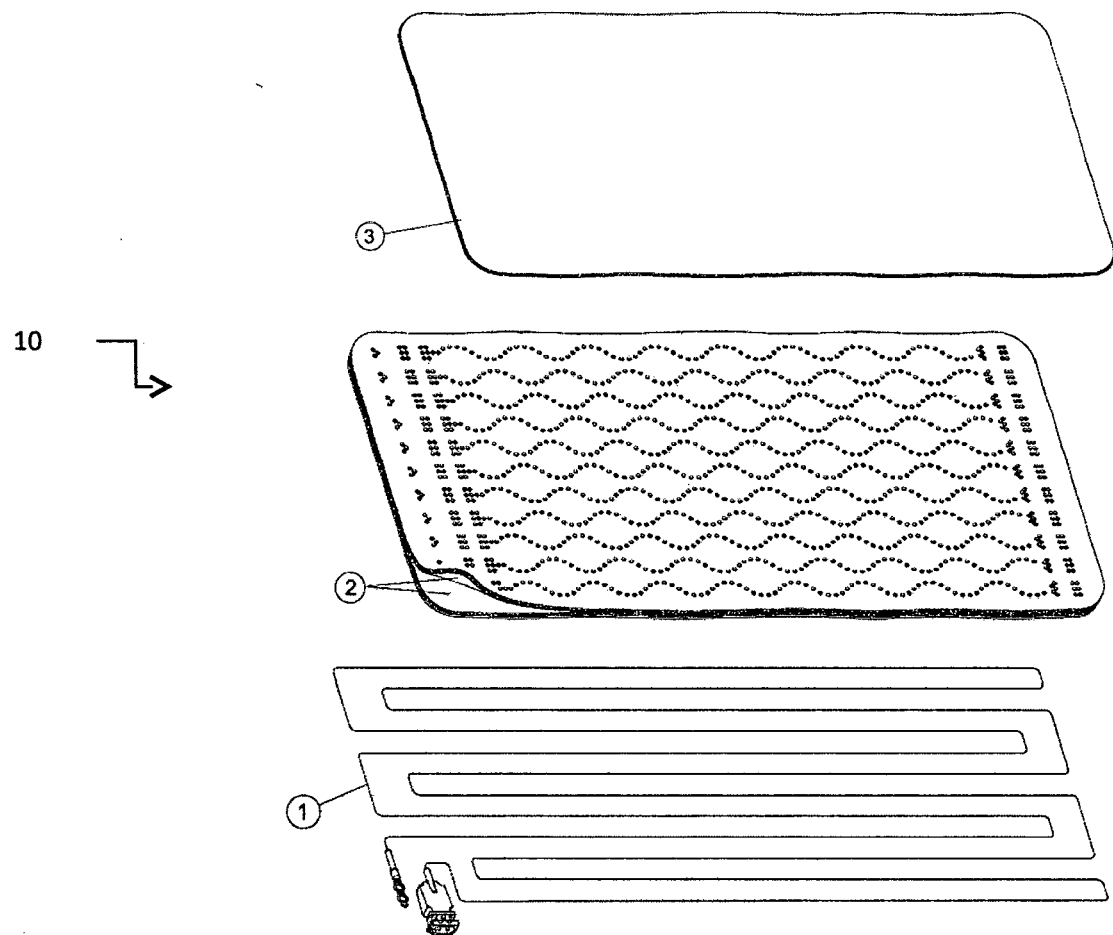


Fig. 1

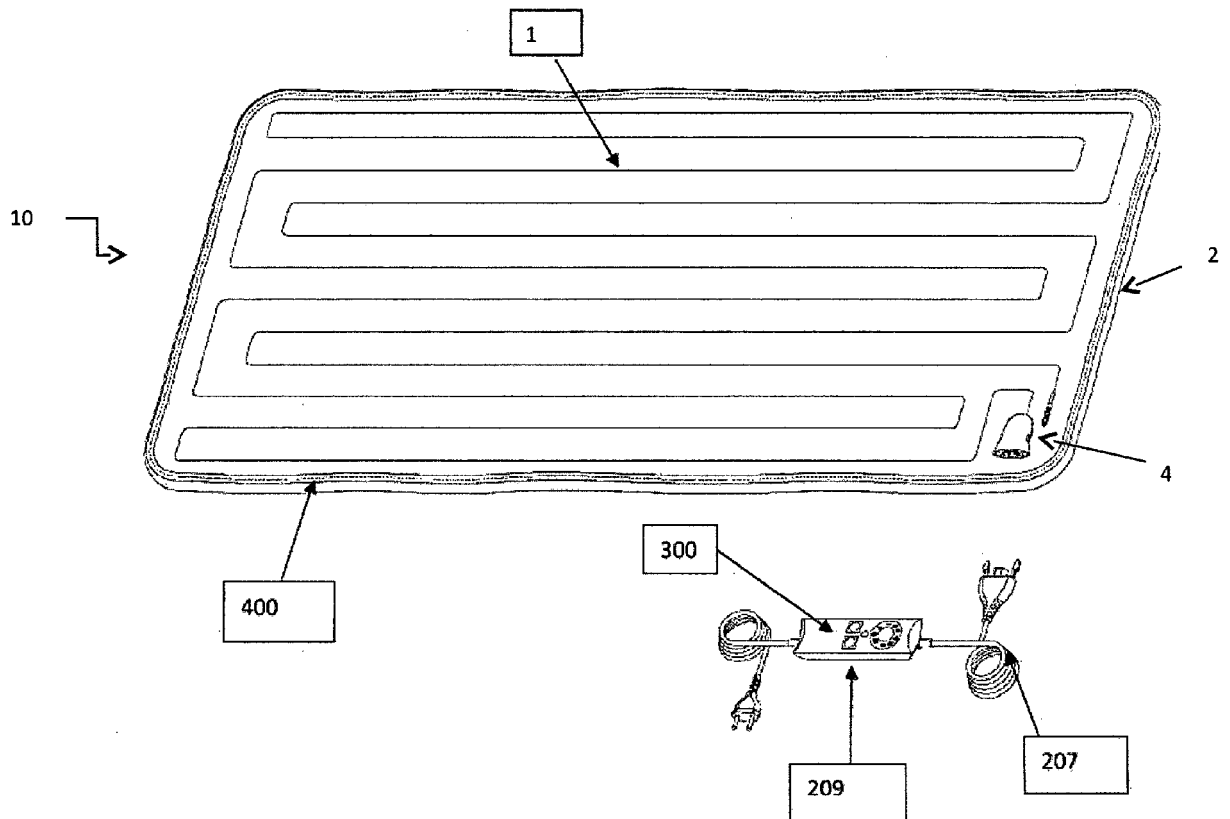


Fig. 2



EUROPEAN SEARCH REPORT

Application Number
EP 16 00 1214

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EPO FORM 1503 03.82 (P04C01)

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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 7 October 2016	Examiner Tempels, Marco
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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