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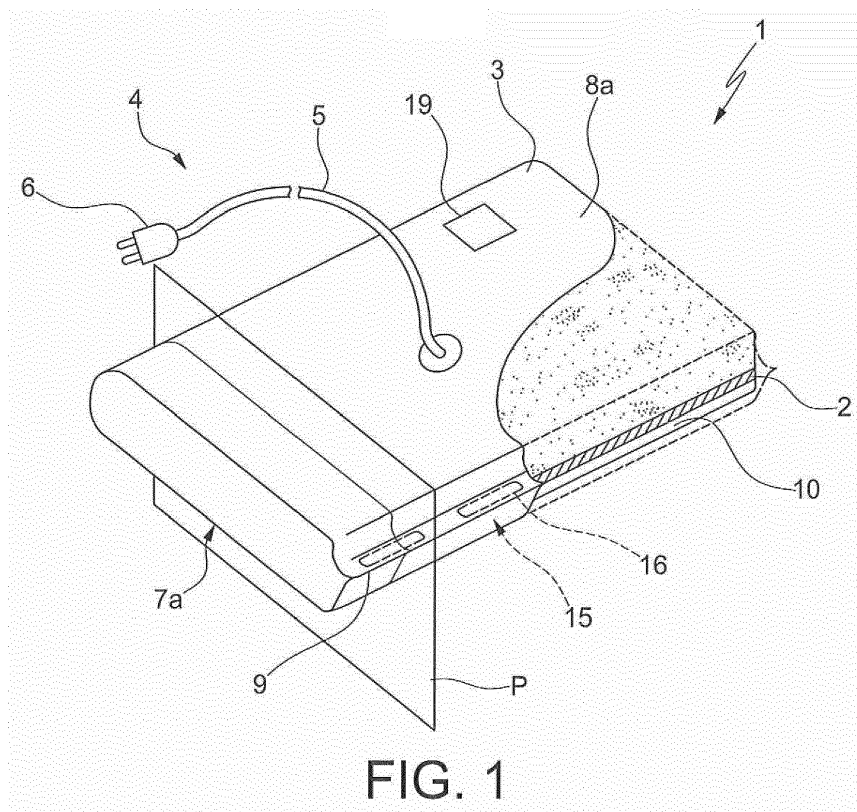
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(54) **ELECTRICALLY POWERED HEATING DEVICE**

(57) A heating device comprises at least one heating resistor (2), of flexible type, adapted to be heated when a current flows through it, a flexible cover (3), made of electrically insulating material, adapted to delimit a sealed seat for containing the heating resistor (2) and electrical connection members (4) for the connection of

the at least one heating resistor (2) to an electrical power grid or the like, wherein the heating resistor (2) comprises connection members (15) associated with the flexible cover (3) in order to allow the mutual connection of multiple heating devices with each other or of the heating device to a support structure.



Description**TECHNICAL FIELD OF THE INVENTION**

[0001] The object of the present invention is a heating device, with electrical power supply.

[0002] More particularly, the present invention regards a heating device of flexible type, configured as a mattress or a blanket or a curtain or a similar element.

STATE OF THE ART

[0003] Today, if it is necessary to execute the insect or parasite disinfestation of a mattress, a chair or the like, it is known to execute a chemical treatment adapted to wipe out the infestation underway. Such chemical treatment provides for the use of at least one chemical substance that is harmful for parasites or insects, to be distributed on the article to be treated. A disinfestation treatment as indicated above has several realization limits due to the fact that the environment where the article is situated might not be fit for habitation during the treatment. In addition, the use of chemical products could be limited or prevented, since the same could ruin the article to be treated or be incompatible therewith.

[0004] In order to overcome the aforesaid limitation, it is known to use heat radiation for executing the insect or parasite disinfestation. For example, one such disinfestation method can provide for the use of hot air or of heating means adapted to heat a confined environment, within which the article to be disinfested is positioned. Indeed, the death of parasites takes place above a certain temperature value.

[0005] Possibly, together with or as an alternative to the heating means, means can be used that are adapted to generate and dispense vapor against the surface of the article to be treated, for the purpose of wiping out the parasites and the insects infesting such article.

[0006] The difficulty of arranging a confined environment inside which the article to be treated can be positioned, or of moving the article itself, represents a limitation of the execution of the aforesaid disinfestation methods, alternatives to the use of chemical substances.

[0007] In addition, the energy consumption necessary for power supplying the heating means and/or adapted to generate and dispense vapor during the execution of the entire disinfestation treatment can be excessive and thus limit the realization of such type of disinfestation method.

[0008] There is therefore the present need to be able to perform the disinfestation of mattresses or chairs or similar articles, in the scope of a solution that is easy to use and that does not damage the article or articles to be treated.

[0009] There is also the need to provide a device that allows the disinfestation substantially of any article, independent of the size or shape thereof, in the scope of a solution with limited operating costs - hence which is

reasonably priced.

OBJECTS OF THE INVENTION

[0010] The technical task of the present invention is to improve the state of the art.

[0011] In the scope of such technical task, one object of the present invention is to make a heating device that allows obtaining a uniform heat diffusion.

10 **[0012]** Still another object of the present invention is to make a heating device of flexible type which is easy and safe to use.

[0013] A further object of the present invention is to make a heating device of flexible type which has a high versatility of application.

15 **[0014]** Another object of the present invention is to make a flexible heating device that is easily handleable by a user, according to a solution that is easily to be transported and positioned in the place of use.

20 **[0015]** A further object of the present invention is to make a heating device that allows executing a treatment of parasite or insect disinfestation according a solution with limited operating costs.

25 **[0016]** This task and these objects are all attained by the heating device according to the enclosed claim 1.

[0017] The dependent claims refer to preferred and advantageous embodiments of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

30 **[0018]** Further characteristics and advantages of the present invention will be more evident from the detailed description of a preferred but not exclusive embodiment of a heating device, illustrated by way of a non-limiting example in the enclosed drawings, in which:

figure 1 is a schematic perspective view of a heating device according to the invention, with some parts removed for better clarity;

40 figure 2 is a schematic view of the heating device according to the invention, sectioned along the plane P illustrated in figure 1;

figure 3 is a schematic plan view of an internal component of the heating device according to the invention;

45 figure 4 is a schematic view along the section plane IV-IV of a detail of the internal component of the heating device pursuant to figure 3;

figure 5 is a schematic perspective view of a heating device according to the invention;

50 figure 6 is a front schematic view of a possible use of a heating device according to the invention.

EMBODIMENTS OF THE INVENTION

55 **[0019]** With reference to the enclosed figures, a heating device according to the present invention is generally indicated with the reference number 1.

[0020] The heating device 1 is of flexible type and is shaped substantially as a blank or small mattress or the like.

[0021] Nevertheless, it is observed that the heating device 1 can be made with any shape/size in relation to the specific application requirements, without limitations.

[0022] The heating device 1 can thus be deformed, e.g. in order to be bent on itself or rolled, facilitating the transport or storage thereof.

[0023] The heating device 1 comprises at least one heating resistor 2, of the type adapted to be heated when a current flows through it, a flexible cover 3 for containing the at least one heating resistor 2 and electrical connection means, indicated overall with 4, for connecting the at least one heating resistor 2 to electrical power means, such as an electrical power grid or the like.

[0024] More in detail, it is observed that the flexible cover 3 is adapted to completely surround the heating resistor 2, insulating it from the outside environment.

[0025] By way of a non-limiting example, the electrical connection means 4 can comprise an electrical conductor cable 5 connected or connectable at a first end thereof to the at least one heating resistor 2, while the opposite end can have at least electrical connector 6 or have connection ends free for the connection to electrical power means, for the purpose of allowing the power supply of the at least one resistor 2.

[0026] The conductor cable 5 departs from the heating device 1, outside the flexible cover 3.

[0027] As an example, the conductor cable 5 can be connected at one end thereof directly to the at least one heating resistor 2.

[0028] According to another version, not illustrated in the enclosed figures, the electrical connection means 4 can be configured removably connectable to the at least one heating resistor 2 and for such purpose comprise a further electrical connector associated with the end of the cable 5 opposite that where the electrical connector 6 or the free electrical connection ends are present. Therefore, the electrical connection means 4 allow placing the at least one electrical resistor 2 in electrical connection with a power source outside the flexible cover 3.

[0029] In the enclosed figures, a heating device 1 is illustrated comprising a single heating resistor 2, even if it is intended that further embodiments are possible comprising a greater number of heating resistors 2 within the flexible cover 3. The at least one heating resistor 2 is flexible. In addition, the at least one heating resistor 2 has a structure that is substantially reticular, in which interstices are present, according to the objectives that will be indicated in the following description.

[0030] The at least one heating resistor 2 has a first surface 7 and a second surface 8 that are mutually opposite, through which during use the heat generated by the heating resistor 2 itself (see figure 2) can be diffused.

[0031] The first surface 7 and the second surface 8 face respective portions of the external cover 3, identifying respective external portions of the heating device 1.

[0032] In particular, the first surface 7 and the second surface 8 respectively identify a first external portion 7a and a second external portion 8a along the flexible cover 3 of the heating device 1, for the objectives that will be indicated hereinbelow.

[0033] The flexible cover 3 is made of electrically insulating material, and at its interior defines a seat with hermetic seal for the housing of the at least one heating resistor 2.

[0034] For such purpose, the flexible cover 3 is delimited by a perimeter edge 9.

[0035] The perimeter edge 9 in fact delimits the external perimeter edge of the heating device 1.

[0036] By way of a non-limiting example, the flexible cover 3 can be made starting from a foil or sheet of at least one impermeable material, which can be bent on itself, until the respective perimeter edges 9 are brought into mutual superimposition. The edges thus superimposed are glued or welded so as to obtain a sealed mutual connection. The flexible cover 3 thus obtained forms a kind of bag for containing the at least one heating resistor 2.

[0037] The perimeter edge 9 is sealed for preventing humidity, liquids or dirt from penetrating inside the flexible cover 3.

[0038] The heating device 1 comprises at least one coupling layer 10 for constraining the at least one heating resistor 2 to an internal portion of the flexible cover 3. A diagram of a possible internal configuration of the heating device 1 is indicated in the enclosed figure 2, which corresponds with a section view of the heating device 1 itself.

[0039] More in detail, the at least one coupling layer 10 is adapted to at least partially incorporate the flexible heating resistor 2. In such a manner, the at least one coupling layer 10 constrains the first surface 7 of the at least one heating resistor 2 to the flexible cover 3.

[0040] Therefore, the at least one coupling layer 10 is provided in a position interposed between the first surface 7 of the at least one heating resistor 2 and the flexible cover 3 (see figure 2).

[0041] In the following description, reference will be made to a heating resistor 2 configured as a heating fabric, though it is intended that further similar or technically equivalent embodiments are still to be considered as falling within the protective scope of the present invention.

[0042] According to one version of the present invention, illustrated as an example in figure 3, the at least one heating resistor 2 is configured as a fabric which has at least one weft 11, comprising at least one continuous wire 12 made of electrically conductive material, and one warp 13 made of non-electrically conductive material.

[0043] The conductive wire 12 has ends provided with contacts 14 in order to allow the electrical connection of the conductive wire 12 itself, for example, to the electrical power means, such as an electrical power grid or power means adapted for such purpose (see figure 3) through the electrical connection means 4. As an example, the conductive wire 12 can be made of copper or of another

electrically conductive material. According to a preferred version, the conductive wire 12 can be coated with electrically insulating paint, so as to prevent undesired short-circuiting phenomena from occurring - which thus benefits the safety of use and operation of the heating device 1.

[0044] The warp 13 can be made, by way of a non-limiting example, by using strips or bands of thin fiber-glass wires, or of another material of electrically insulating type.

[0045] As schematically illustrated in the enclosed figure 3, the conductive wire 12 follows a portion of the at least one heating resistor 2 in one direction and then in the other, after a bend of 180°: due to the side-by-side placement of the sections of the conductive wire 12 - through which electric current flows in opposite directions - the electromagnetic fields generated by the conductive wire 12 itself are canceled. Such aspect can be of particular importance with reference to the applications where it is necessary to limit the magnetic pollution phenomena.

[0046] It is in any case specified that the weft 11 illustrated in the enclosed figure 3 is provided for non-limiting and simplifying purposes for one of the possible fabrics that can be used for making the heating resistor 2.

[0047] With regard to the connection between the at least one heating resistor 2 and at least one portion of the internal surface of the flexible cover 3, it is observed that the coupling layer 10 uniformly adheres to the internal portion of the flexible cover 3, in order to ensure, as better clarified hereinbelow, a uniform connection between the at least one heating resistor 2 and the flexible cover 3. According to a preferred embodiment, the coupling layer 10 can be made of electrically insulating polymer material.

[0048] According to one version of the invention, the polymer material with which the coupling layer 10 is made comprises silicone and/or the like.

[0049] According to a further version of the invention, the material with which the coupling layer 10 is made is entirely constituted by silicone.

[0050] As stated, the at least one heating resistor 2 is at least partially embedded within such coupling layer 10, such that the polymer material of the coupling layer 10 penetrates between the interstices provided between the weft 11 and the warp 13 of the at least one heating resistor 2. In such a manner, it is possible to attain a double result: the achievement of a firm and secure coupling between at least one internal portion of the flexible cover 3 and the at least one heating resistor 2, and a particularly uniform transmission of the heat between the at least one heating resistor 2 and the flexible cover 3.

[0051] More in detail, the coupling between the at least one heating resistor 2 and the flexible cover 3 is made uniform and thus lacks discontinuities.

[0052] Preferably, in some embodiments of the invention, the coupling layer 10 can have a surface extension at least greater than that of the at least one heating resistor 2, such that the latter is completely embedded in

the coupling layer 10. In accordance with such version, the coupling layer 10 comprises, in more detail, a lower layer 10a interposed between the flexible cover 3 and the at least one heating resistor 2, and an upper layer 10b that completely covers the at least one heating resistor 2 (see figure 4).

[0053] With reference to such embodiment of the invention, in addition to obtaining the abovementioned results of optimal mechanical connection and of uniform distribution of the heat generated by the at least one heating resistor 2, and consequently by the heating device 1, it is also possible to make an electrical insulation of the at least one heating resistor 2 itself due to the properties of the coupling layer 10.

[0054] With reference to the version illustrated in the detail view of figure 4, the at least one heating resistor 2 can be completely embedded, or incorporated, in the coupling layer 10, so as to obtain optimal electrical insulation and simultaneously the best conditions for obtaining a transmission and diffusion of the heat that is as uniform as possible.

[0055] According to one aspect of the invention, the heating device 1 can be used for performing a treatment of disinfestation of mattresses, blankets, chairs or generally if it is necessary to execute the insect or parasite disinfestation of an article.

[0056] The heating device 1 can also be used in the treatment of wood furniture or wood beams or generally of wood elements, in order to wipe out insect pests such as woodworms or the like present therein.

[0057] The heating device 1 is configured for irradiating heat to the outside thereof, in a controlled manner, with a temperature such to determine the death of the parasites or insects that infest the object to be treated but such to avoid damaging the object itself (burning, softening, etcetera).

[0058] According to one aspect of the present invention, the heating device 1 comprises connection means, indicated overall with 15, in order to allow the connection of the heating device 1 to a further heating device 1.

[0059] According to one version of the present invention, the connection means 15 allow the connection of the heating device 1 to a structure for supporting the heating device 1 itself, wherein such structure can be provided in proximity to the article to be treated.

[0060] According to a further version of the present invention, the heating device 1 comprises connection means, indicated overall with 15, to allow the connection of the heating device 1 to a further heating device 1 and/or to a structure for supporting the heating device 1.

[0061] If the object to be disinfested has greater dimensions than those of the heating device 1, it is possible to use multiple heating devices 1 according to the invention, mutually connecting them, through the aforesaid connection means 15, in a manner such to obtain a wide surface adapted to irradiate heat.

[0062] The connection means 15 are positioned at the perimeter portion of the heating device 1.

[0063] According to one version of the invention, the connection means 15 are provided along at least one section of the perimeter edge 9 of the flexible cover 3.

[0064] It is observed that the perimeter edge of the flexible cover 3 corresponds to the perimeter edge of the heating device 1.

[0065] According to a preferred version of the present invention, the connection means 15 comprise at least one magnet 16 or a magnetic strip or the like constrained to the flexible cover 3.

[0066] The at least one magnet 16 can be provided within the heating device 1. In particular, the at least one magnet 16 can be constrained inside the flexible cover 3 (see figures 2 and 6).

[0067] In such a manner, the at least one magnet 16 is protected from the outside environment.

[0068] According to a further version of the invention, the flexible cover 3 can comprise at least one internal seat 17 for housing the at least one magnet 16 (see figure 2).

[0069] The at least one internal seat 17 can be configured for separating the at least one magnet 16, housed at its interior, from the at least one heating resistor 2, thus preventing a direct contact between the same.

[0070] According to a further version of the invention, not illustrated in the enclosed figures, the at least one magnet 16 can be provided outside the heating device 1, allowing the attainment of the same above-described objectives.

[0071] According to such version, the heating device 1 could comprise at least one housing seat for the at least one magnet 16, provided outside the flexible cover 3.

[0072] According to a further version of the invention, not illustrated in the enclosed figures, the connection means 15 can be configured for allowing a mechanical connection, of removable type, such as a shape or snap connection.

[0073] More in detail, the connection means 15 according to such version can be provided outside the flexible cover 3, in proximity to at least one section of the perimeter edge 9, and comprise at least one male element engageable in a corresponding at least one female element, through a shape connection. In practice, the connection means 15 thus configured allow connecting the at least one male element of a first heating device 1 to a respective at least one female element of a second heating device 1, actually mutually constraining the first and the second heating device 1.

[0074] As an example, the above-described connection means 15 could comprise or be configured as automatic buttons or the like.

[0075] The heating device 1 is configured for allowing the emission of a heat radiation in a controlled manner through at least one external portion thereof.

[0076] More precisely, the heating device 1 is configured for emitting a heat radiation through only the first external portion 7a.

[0077] On such matter, it is observed that the heating

device 1 comprises at least one layer of thermally insulating material 18 arranged within the flexible cover 3, in order to prevent a heat radiation through the second external portion 8b of the flexible cover 3 of the heating device 1.

[0078] More in detail, the at least one layer of thermally insulating material 18 is arranged in a position interposed between the at least one heating resistor 2 and the flexible cover 3, on the opposite side with respect to the at least one coupling layer 10.

[0079] The layer of thermally insulating material 18 is then provided, interposed between the second surface 8 of the at least one heating resistor 2 and the flexible cover 3.

[0080] The at least one thermally insulating layer 18 can be constrained to at least one between the at least one heating resistor 2 or an internal portion of the flexible cover 3 or to both.

[0081] The layer of thermally insulating material 18 is as flexible as the at least one heating resistor 2, the flexible cover 3 and the at least one coupling layer 10, so as to avoid compromising the flexibility of the heating device 1 itself and the operation thereof.

[0082] In such a manner, it is possible to convey the heat generated by the heating device 1 along a predefined direction, i.e. through the first external portion 7a of the heating device 1 itself.

[0083] According to one version of the invention, to facilitate the correct orientation of the heating device 1, during its use, reference means 19 can be provided, such as a reference element, a graphic symbol or the like.

[0084] According to a further version of the present invention, the reference means 19 can be obtained by means of a suitable positioning of the electrical connection means 4 with respect to the flexible cover 3.

[0085] With reference to the version illustrated in the enclosed figure 1, as an example, the electrical connection means 4 can be positioned along the flexible cover 3 so as to act as reference means 19.

[0086] As an example, the electrical connection means 4 can depart from a portion of the flexible cover 3 comprised along the second external portion 8a, i.e. along the portion of the heating device 1 through which heat is not irradiated during use.

[0087] As stated, the flexible cover 3 is operatively associated or associable with the at least one layer of thermally insulating material 18. The heating device 1, in fact, is configured for not emitting heat through the surface of the flexible cover 3 that faces the layer of thermally insulating material 18 (i.e. the second portion 8a of the flexible cover 3).

[0088] The electrical connection means 4 thus positioned along the flexible cover 3 allow a user to identify, with certainty and in an easy manner, the correct orientation of the heating device 1 during use. In other words, the electrical connection means 4 can be positioned in a manner such to allow the recognition of the surface of the heating device 1 adapted to irradiate heat.

[0089] A possible use of the heating device 1 provides for positioning the heating device 1 itself in proximity to the product to be treated so as to cover it. For example, the heating device 1 can be abutted against the surface of the product to be treated, covering it or covering a predefined portion thereof. If the dimensions of the product to be treated are greater than those of the heating device 1, it is possible to use multiple heating devices 1, mutually connecting them by means of the connection means 15.

[0090] Also forming the object of the present invention is a heating system comprising at least one heating device 1, indicated overall with the reference number 20 and schematically illustrated in the enclosed figure 5.

[0091] One such heating system 20 comprises at least one control unit 21, and a heating device 1 that are operatively connected to each other.

[0092] The control unit 21 is provided for controlling the operation of the at least one heating device 1 connectable thereto. In particular, the control unit 21 is adapted to control the value of the operating temperature of the at least one heating device 1, which can be pre-established as a function of specific use requirements.

[0093] More precisely, the control unit 21 is configured for managing the electrical power supply of the at least one heating device 1 connectable thereto.

[0094] The control unit 21 comprises conductor means 21 a, configured for being connectable to an electrical power source, such as an electrical power grid.

[0095] The control unit 21 comprises electrical connection means 22 in order to allow the electrical connection between the at least one heating device 1 and the control unit 21 itself. The electrical connection means 22 can comprise a connection interface, configured for example as a current outlet, or a terminal board etcetera, without any limitation.

[0096] The control unit 21 comprises at least one temperature sensor 23, operatively connected to the control unit 21 (see figure 5).

[0097] In particular, the at least one temperature sensor 23 can be substantially arranged in any position with respect to the control unit 21; preferably, the at least one temperature sensor 23 can be positioned in proximity to the heating device 1 or to the article to be treated for the purpose of measuring the temperature at the heating device 1 or at the article itself.

[0098] As a function of the data received from the at least one temperature sensor 23, the control unit 21 selectively controls the electrical power supply of the at least one heating device 1.

[0099] If desired, it is possible to simultaneously connect multiple temperature sensors 23 to the control unit 21 in a manner such to be able to carry out a differential control of the temperature in pre-established points in proximity to the at least one heating device 1 itself and/or to the article to be treated.

[0100] As stated, the heating device 1 according to the invention can be used in the disinfestation of mattresses,

chairs, blankets, wood furniture or wood structures infested with insects and/or parasites or, generally, in the treatment of objects infested with insects and/or parasites.

[0101] A possible use of the heating device 1 according to the invention is illustrated, as an example, in the enclosed figure 6, in which multiple heating devices 1 are illustrated for the disinfestation of a mattress 24.

[0102] In figure 6, the control unit 21 has been omitted.

[0103] To be able to proceed with the disinfestation treatment, a user can position one or more heating devices 1 in proximity to or around the mattress 24 so as to cover it or define a casing within which the mattress 24 is enclosed.

[0104] The number of heating devices 1 to be used can vary as a function of the size of the object to be treated.

[0105] In the enclosed figure 6, as an example, three heating devices 1 are illustrated that are mutually connected through the connection means 15, even if it is intended that the use can be provided for a greater or smaller number of heating devices 1.

[0106] The control unit 21 is configured for allowing the selective power supply of each of the heating devices 1 connected thereto.

[0107] If desired, the control unit 21 can be programmed so as to optimize the energy consumption of the heating system 20 as a function of the maximum deliverable electrical power from the electrical power grid used for the power supply of the heating system 20 itself.

[0108] For example, the control unit 21 can selectively activate one or more of the heating devices 1, possibly simultaneously power supplying multiple heating devices 1, in a manner such to prevent the electrical power requested thereby from exceeding the aforesaid maximum available power limit, deliverable by the electrical power grid.

[0109] If the heating system 20 comprises multiple mutually connected heating devices 1, the connection means 15 allow firmly and safely connecting the edge portion 9 of a first heating device with an edge portion 9 of a second heating device 1, adjacent to the first.

[0110] In such a manner, it is possible to easily arrange a single heating surface with the desired dimensions, able to diffuse heat in a substantially uniform manner.

[0111] In particular, the positioning and the movement of the single heating devices 1 is easy to carry out since it is possible to move the single heating devices 1 with respect to the product to be treated, until they are arranged in the desired position, and then mutually connecting the single heating devices 1.

[0112] In addition, the possible presence of the reference means 19 allows a user to easily distinguish the side of each of the heating devices 1 and to correctly orient them with respect to the article to be treated.

[0113] According to one aspect of the present invention, the heating system 20 can comprise at least one support element 25 adapted to define a constraining ref-

erence for the at least one heating device 1.

[0114] According to one version, the support element 25 can be configured as a track or a similar element.

[0115] It is intended that the support element 25 can be configured in a different manner as a function of specific use requirements, without any limitation for the purposes of the invention.

[0116] In particular, with reference to that illustrated in the enclosed figure 6, the support element 25 can be arranged in proximity to the mattress 24 to be treated in order to provide a reference point, to which a first heating device 1 can be connected through the connection means 15.

[0117] If the connection means 15 comprise at least one magnet 16, the support element 25 can be made or can comprise at least one portion made of iron, in order to facilitate the adhesion thereto of the at least one magnet 16. According to a further version of the invention, if the product to be treated has a portion made of iron or the like, the heating system 20 might even lack the aforesaid support element 25, since the at least one magnet 16 present in the connection means 15 could be directly connectable to such iron portion of the product to be treated, thus ensuring the connection of at least one portion of the heating device 1 to the product itself.

[0118] It was thus seen that the heating device 1 according to the invention is able to attain the pre-established objects.

[0119] First of all, the heating device 1 allows obtaining a diffusion of the heat emitted by the at least one heating resistor 2 that is absolutely uniform through a predefined surface of the flexible cover 3.

[0120] In addition, the mechanical connection between the heating resistor 2 and the flexible cover 3 is strong, safe and reliable, ensuring a correct operation of the heating device 1.

[0121] The presence of the connection means 15 allows constraining at least one portion of the heating device 1 to a portion of the product to be treated or to mutually connect multiple heating devices 1, in order to obtain a surface adapted to diffuse heat that has large dimensions, greater than those of the single heat device.

[0122] The heating device 1 according to the invention allows diffusing heat towards an article to be treated in a controlled manner, in the scope of a solution capable of circumscribing the zone to be treated.

[0123] Such characteristic translates into the possibility of executing a disinfection treatment through the heating of an article or of a portion thereof according to a solution that is optimized from an energy standpoint.

[0124] The heating device 1 according to the invention in fact allows executing a disinfection treatment with energy consumptions that are overall reduced with respect to the described conventional methods.

[0125] In addition, a heating system 20 according to the invention is a system of modular type, in the sense that the dimensions of the surface through which heat is irradiated can be easily modified as a function of the di-

mensions of the article to be treated, by simply varying the number of heating devices 1 used. The connection means 15 allow an easy connection of the single heating devices 1, facilitating the modularity and the adaptability of the heating system 20.

[0126] According to a further aspect of the present invention, it is observed that the heating device 1 can be used for further objectives with respect to those set forth above. For example, the heating device 1 could be equally used as a device for defrosting a surface subjected to freezing. As an example, the heating device 1 could be used for unfreezing tarpaulins, for example of a trailer or of a gazebo or the like without any limitation.

[0127] According to such embodiment, the heating device 1 can be configured in a manner so as to reach a maximum operating temperature such to avoid damaging the tarpaulin or the surface against which it is operatively associated. It is in any case intended that the heating device according to the invention can have use for purposes different from those described, without any limitation. The invention thus conceived is susceptible of numerous modifications and variations, all falling within the scope of the inventive concept.

[0128] In addition, all details can be substituted by other technically equivalent elements.

[0129] In practice, the materials used, as well as the contingent shapes and sizes, can be of any type depending on requirements, without departing from the protective scope of the following claims.

Claims

1. Heating device comprising at least one heating resistor (2), of the flexible type, adapted to be heated when a current flows through it, a flexible cover (3) for the containment of said heating resistor (2) and electrical connection means (4) for the connection of said at least one heating resistor (2) to electrical supply means, wherein said flexible cover (3) has a first external portion (7a) for diffusing heat to the outside of said heating device and a second external portion (8a), thermally insulated, opposed to each other, wherein said at least one heating resistor (2) has a fabric structure, said flexible cover (3) being delimited by a perimetric edge (9) and defining to its inside a hermetic sealed housing for holding said at least one heating resistor (2), said heating device comprising at least one coupling layer (10) able to bind said heating resistor (2) to an internal portion of said flexible cover (3), wherein said one coupling layer (10) is suitable for at least partially incorporating said flexible heating resistor (2), and connection means (15) configured to allow the connection of said heating device to a further of said heating device or to a structure to support said heating device, wherein said connection means (15) are associated to said flexible cover (3) in the proximity of at least

one segment of said perimetric edge (9).

2. Heating device according to claim 1, wherein said flexible cover (3) comprises at least a foil or a sheet of at least one impermeable material, of the electrically insulated type. 5
3. Heating device according to claim 1, wherein said connection means (15) comprises at least one magnet (16) or a magnetic tape bound to said flexible cover (3). 10
4. Heating device according to claim 3, wherein said at least one magnet (16) or said magnetic tape is bound to the inside of said flexible cover (3). 15
5. Heating element according to claim 3 or 4, wherein said flexible cover (3) comprises within it at least one seat (17) for housing said at least one magnet (16), wherein said seat (17) is separated from said heating resistor (2). 20
6. Heating device according to claim 1, wherein said connection means (15) are configured to allow a removable type mechanical connection, such as a shape or snap connection or are configured as an opening, said connection means (15) being provided outside from said flexible cover (3) in the proximity of at least one segment of said perimetric edge (9) of said flexible cover (3). 25 30
7. Heating element according to any one of the previous claims, comprising at least one flexible layer of thermally insulating material (18) arranged inside said flexible cover (3), between said at least one heating resistor (2) and said second external portion (8a) of said flexible cover (3), on the opposite side with respect to that of said at least one coupling layer (10), said thermally insulating material layer (18) being suitable for limiting or preventing the heat emission through said second external portion (8a). 35 40
8. Heating device according to claim 1, wherein said electrical connection means (4) run out from said flexible cover (3) through said second external portion (8a). 45
9. Electrically powered heating system, comprising at least one heating device according to any one of the claims from 1 to 8, at least one control unit (21) operatively connected to each of said at least one heating device and suitable for selectively controlling the electrical power supply of said heating device, said at least one control unit (21) being connectable to an electric power source to selectively feed said at least one heating device, at least one temperature sensor (23) operatively connected to said control unit (21) and suitable for con-

trolling the selective electric power supply of said heating device according to the measured temperature.

10. Electrically powered heating system according to claim 9, comprising at least one support element (25), that can be positioned at an article to be treated, said at least one support element (25) being associable with said at least one heating device by said connection means (15). 5
11. Electrically powered heating system according to claim 9 or 10, comprising at least a first of said heating device and at least a second of said heating device, both connected to said control unit (21), wherein said connection means (15) of said first heating device are connected to said connection means (15) of said second heating device. 10 15 20 25 30 35 40 45 50 55

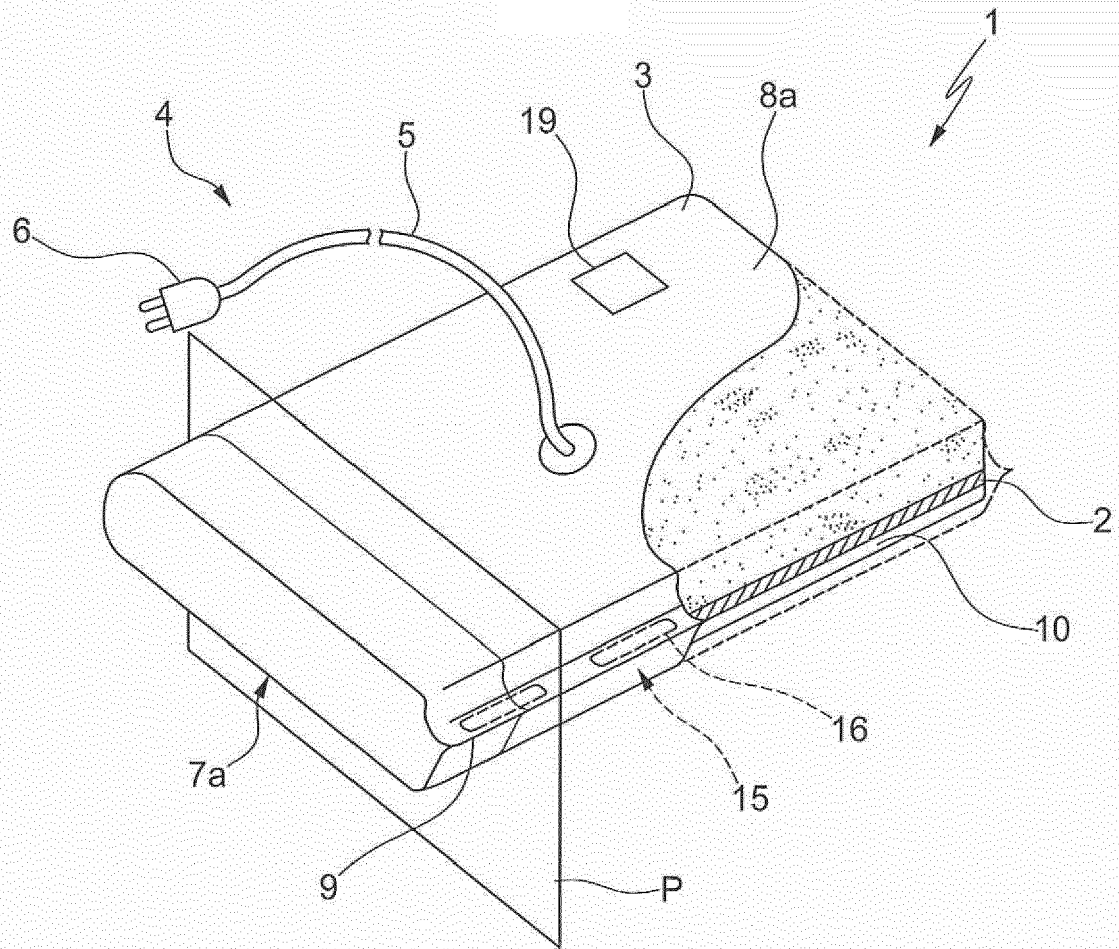


FIG. 1

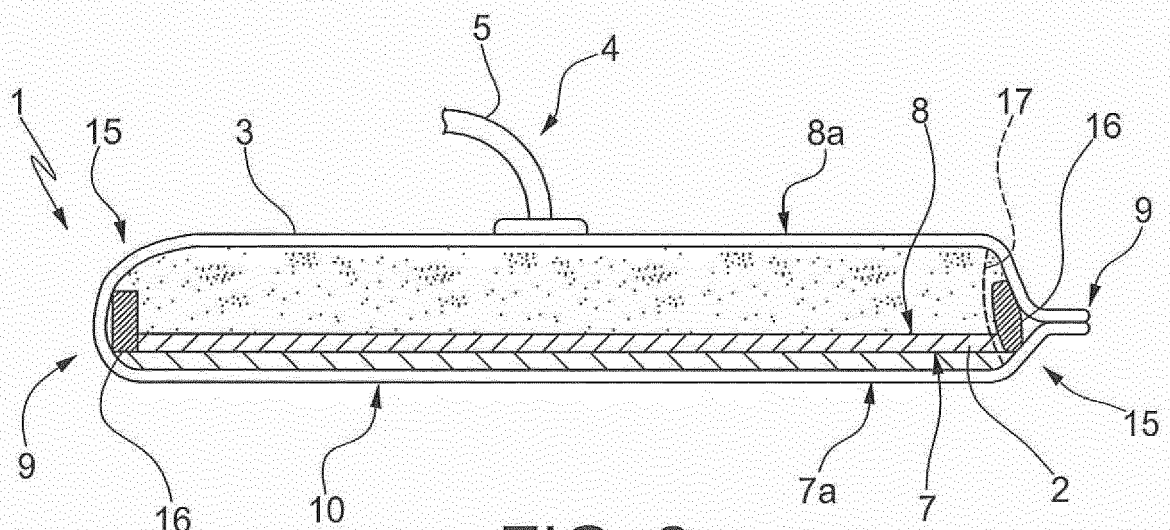


FIG. 2

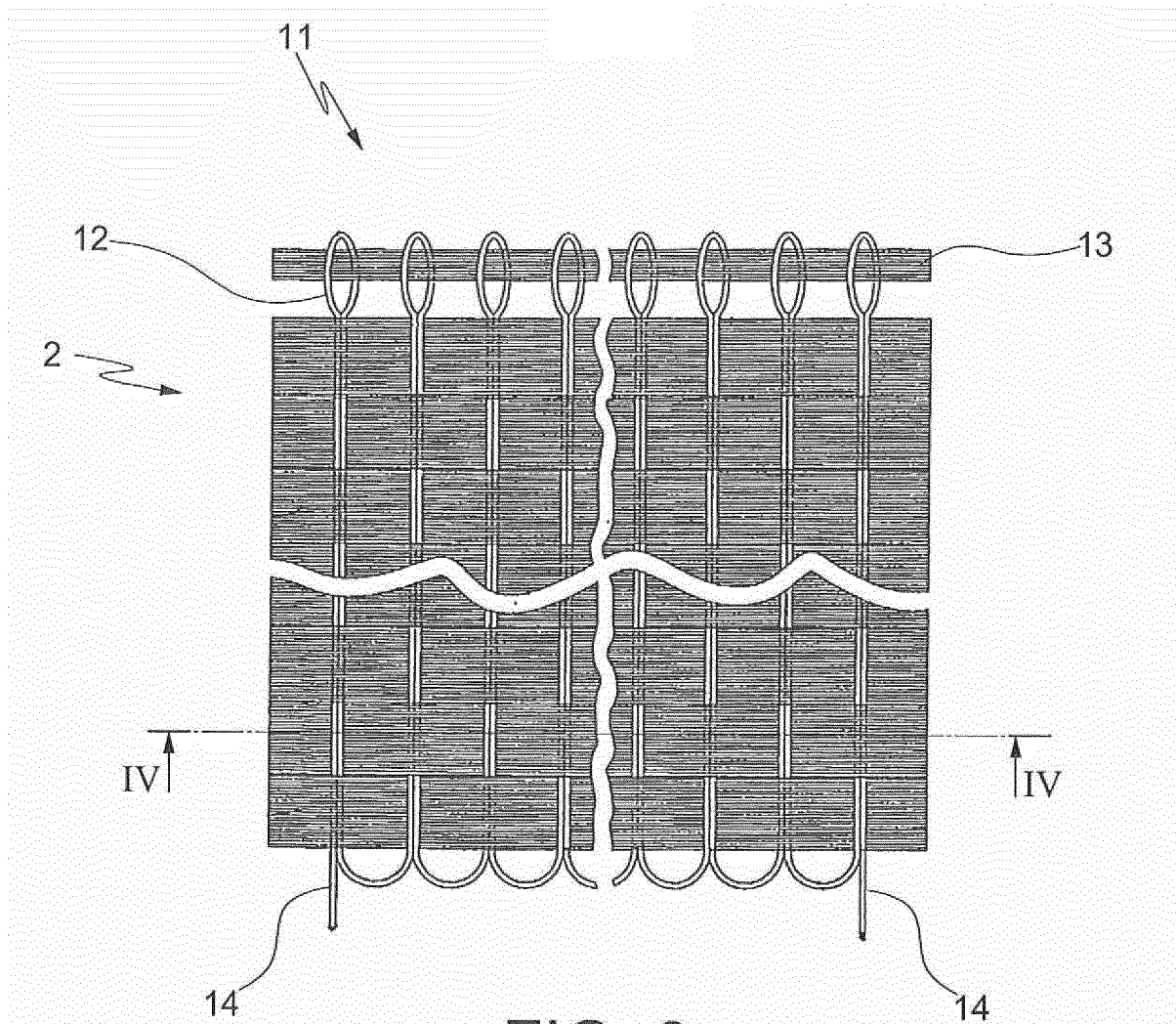


FIG. 3

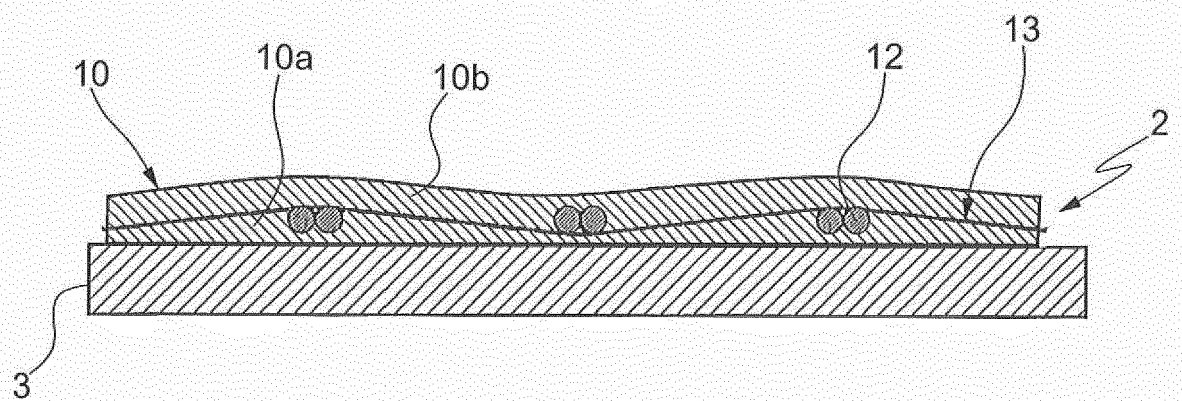


FIG. 4

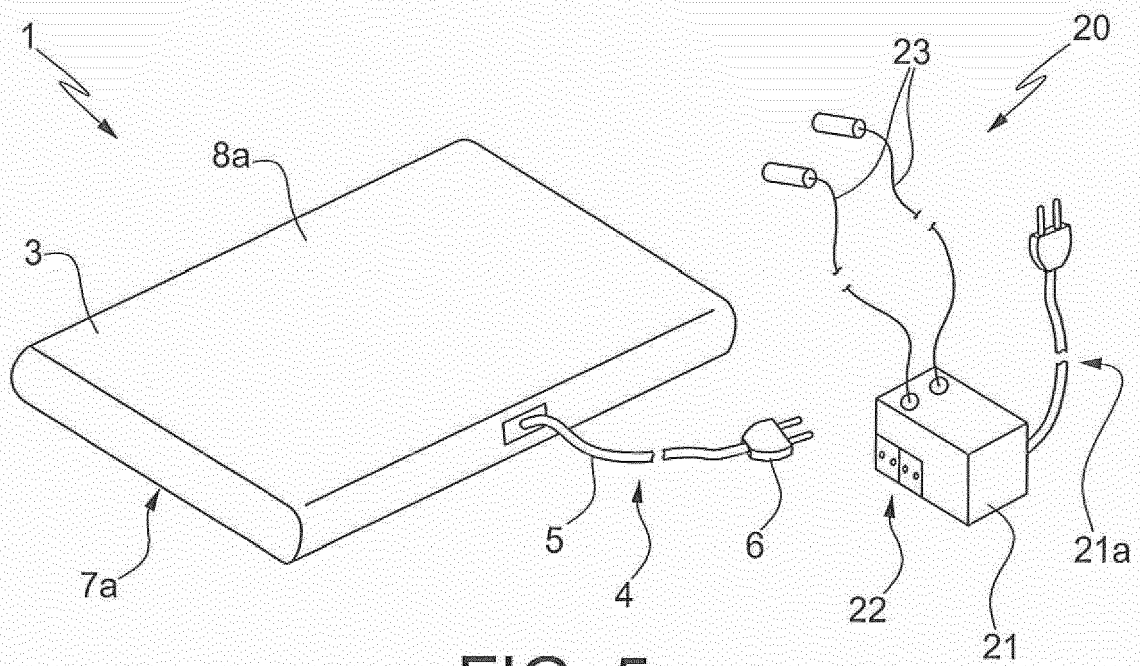


FIG. 5

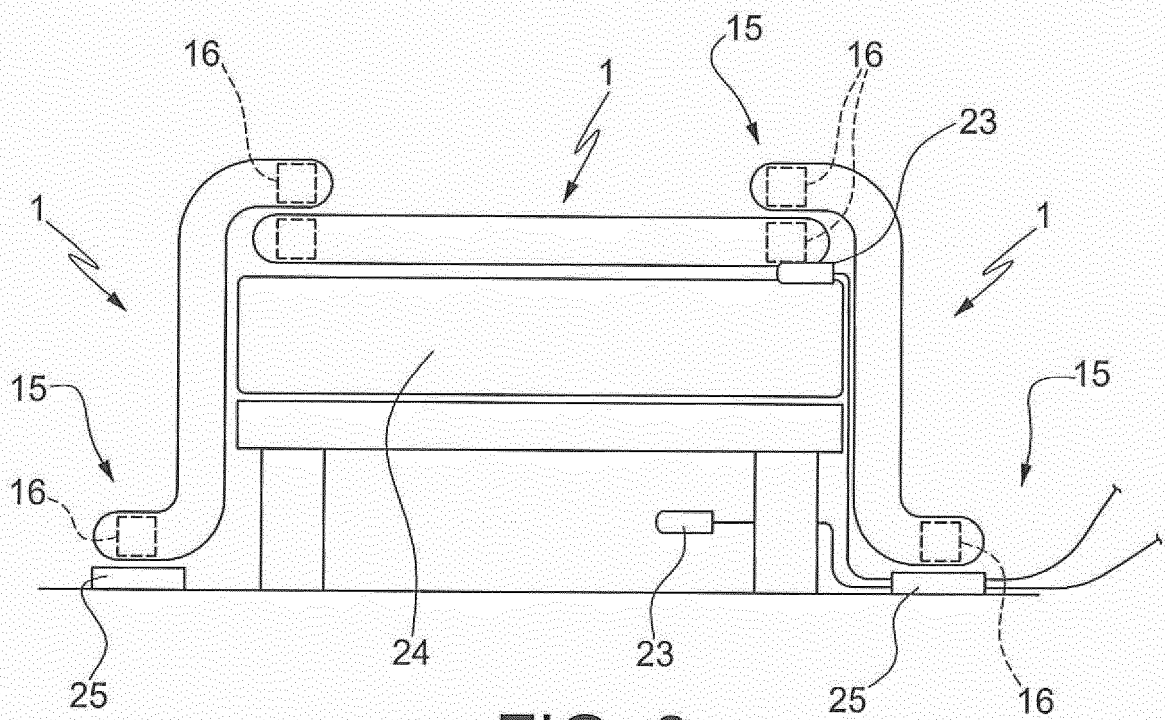


FIG. 6



EUROPEAN SEARCH REPORT

Application Number
EP 18 15 1447

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			H05B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 16 May 2018	Examiner Garcia Congosto, M
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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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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