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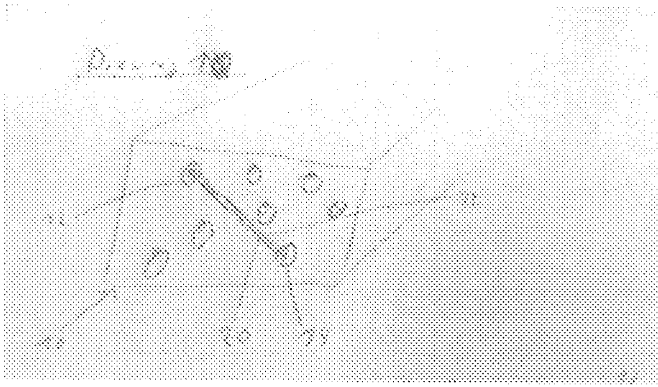
(54) A PADDING HAVING HOLLOW VOLUMES AND A FLEXIBLE BAND.

(57) A foam padding (10) having sections (32, 34), each covering at least one hollow volume (12, 14) of the padding said padding (10) including a flexible elongated band (20) for transferring thermal energy from at least one hollow volume (12) in a first one of said sections (32) in the event of excess thermal energy towards at least one hollow volume (14) in a second section (34) in the padding (10) not containing excess thermal energy, said band (20) having a continuous metal layer (22) with a defined area extending from at least one first section (32) to another different second section (34).



Title: A padding having hollow volumes and a flexible band

Cross References to Related Applications

[0001] None

Field of the Invention

[0002] The invention relates to a padding having hollow volumes and a flexible band and to the use of such a padding as a mattress. The flexible band being capable of transporting excess thermal energy from the hollow volumes and surrounding material, thereby allowing e.g. to reduce temperature in certain sections of a body resting on said padding.

Prior Art

[0003] Various paddings are known. In the state of the art paddings are known that comprise hollow volumes, usually provided for giving comfort to the padding. On example of a known padding is a so called innerspring mattresses. These had a very open air-filled space within and around the springs. In any event a spring does not have any real thermal benefit and at least does not extent from one hollow volume or space to another. In foam-based paddings the hollow volumes will be much smaller and indeed one section of the padding will cover many of such hollow spaces.

[0004] Furthermore, some mattresses have been proposed using cooling or heating fluid or propelled air, however those approaches have proven to be unpractical and therefore there is a need for an improved padding that can improve the comfort of a user of such a padding

Summary of the Invention

[0005] The invention provides for an improved padding as defined in the independent claim, preferred embodiments are defined in the dependent claims. According to one aspect of the invention a padding is provided with a band which if positioned as claimed, allows to at least locally reduce temperature in a padding, such as a mattress so that the user feels more comfortable. Unlike state of the art invention to solve the problem of overheating of a user of mattresses (being most likely made from at least some Polyurethane foam) this invention is not using air as the medium to move thermal energy. Using air (i.e. with ventilators or air channels cut into foam) will mostly trigger the air to move upwards, towards the user. Also, this invention is not using material to absorb thermal energy (i.e. PCM's, Gel) as a typical use situation of a mattress is sleeping on a mattress for an extended time, typically several hours. Any material just absorbing thermal energy would be thermally exhausted long before finishing use, as the body heat is emitting consistently a high amount of thermal energy during use.

[0006] This invention is based on research and many tests performed to invent a solution where the thermal energy load is in fact transported and not just stored, this solution being mechanically flexible as not to impact the comfort parameters of the mattress negatively, furthermore taking into account the existence of hollow volumes and this transportation of thermal energy being consistent over an extended period of time.

[0007] It was found that paddings generally incorporate hollow volumes. These might be large hollow volumes as created by springs or small hollow volumes as found in all polyurethane foams. These hollow volumes store excessive thermal energy and only release them slowly over time, as they contain air, which releases excessive thermal energy slowly. The invention describes a method to remove that excessive thermal energy in those hollow volumes.

[0008] To achieve this, a material with a high thermal conductivity is used in a complete different way than previously. Instead of blending material with high thermal conductivity into the whole padding it is proposed to manufacture a band with high thermal conductivity, this band having a good mechanical flexibility. This band being able to transport thermal energy is placed in a very specific way into the mattress. It should be noted that only by placing the band as claimed and described in this document a consistent flow of thermal energy is achieved. Just placing the band any different into a mattress will not work. It had been observed that the placement of this band has to be done carefully, knowing very well the distribution of thermal energy within the hollow volumes of a padding to achieve satisfying results. It should be noted that the distribution of thermal energy in the hollow sections within a padding (for example a padding for a mattress) must be analyzed during use (during impact of body heat) and for an extended period of time. The band must be placed so that it touches sections with hollow volumes within the mattress with higher thermal energy (most likely just below the body of the user) and running uninterrupted to a section of the mattress with hollow volumes without higher thermal energy. The band described in this invention incorporates a layer of metal, this layer itself also being uninterrupted or in other words continuous. Any interruption of the metal layer or the band itself will prohibit the band to work thermally. The only exception to this rule would be puncturing or perforating the band carefully, this is not reducing the thermal effect as has been found. This invention describes further variation of use, especially meaningful combination of the invention with other thermally effective methods previously known.

Detailed description of the Invention

[0009] In the following aspects of the invention will be described in more detail referring to preferred embodiments as illustrated in the figures. The following description is for illustrative purposes, only and is not intended to restrict the scope of protection as defined by the appended claims. Features shown in one embodiment may be combined with features of other embodiments and the person skilled in the art will appreciate, that the illustrated embodiments are merely provided for a better understanding of the inventive concept.

Short description of the Figures

Fig.1 shows a first embodiment of a padding in a schematic illustration.

Fig.2 shows a second embodiment of a padding in a schematic illustration.

Fig.3 shows another embodiment of a padding in schematic illustration.

Fig.4 shows the flexible band with a laminating layer.

Fig.5 shows another embodiment in a schematic illustration.

Fig.6 shows another embodiment in a schematic illustration.

Fig.7 shows the test set up of a test described.

[0010] In the following a mattress as an embodiment of the padding according to the present invention will be described in more detail. The thermal comfort of a mattress is critical to obtaining a comfortable experience. There is a growing trend in the mattress industry to employ new materials which create a cooling effect for users with the use of innovative phase change materials (PCMs) or cooling gels included in the near-surface foam of a product. These materials seek to alleviate overheating during use or provide a more comfortable environment for those who may suffer from medical conditions which cause excess heat production.

[0011] The comfortable temperature window during sleep is relatively narrow as the body must try to maintain its core body temperature of 98.6℉ (or 37℃). Haex reports that the optimal insulating sleep system should ensure a bed temperature between 28℃ and 32℃ which should allow the contact temperature between the body and bed to stabilize between 30℃ and 35℃. Too high of a bed insulation will result in temperature rise which leads to excessive sweating and an increase in relative humidity. On the other hand, if insulation is too low, the body will cool off which may cause shivering and similar issues with sleep disturbance. These insulating properties are mainly dependent on the core materials and design. Cores made out of latex or PU for instance, will carry higher insulation values than a spring mattress. Aside from the core, the contact temperature itself is mainly dependent on the top layer and its ability to hold air.

[0012] There are not many solutions to this challenge for designing a mattress. Since ‘feeling hot’ is a feel of temperature, designers are looking for methods to reduce temperature. They are looking for ‘cooling’ – may it be active or passive. This leads to solutions with an air conditioner combined with a mattress, with ventilators, materials with high thermal connectivity blended into foam or with channels cut into foam materials running along the mattress. These methods are either expensive (air conditioner), noisy (ventilator) or not working at all (blending thermal conductive materials into foam, channels).

[0013] The main problem is that product designers see temperature as the parameter to be changed, so they end up with ‘cooling’ materials or methods. But temperature is only the result of the change of other parameters and not an elemental parameter by its own. The temperature of any material is the result of

$$T_{(Mat@t)} = T_{(Mat@t-1)} + E_{(therm\text{-}inflow)} - E_{(therm\text{-}outflow)}$$

With $T_{(Mat@t)}$ being the Temperature of a given material at a given time, $T_{(Mat@t-1)}$ being the Temperature of this material before this given time, $E_{(therm\text{-}inflow)}$ being the thermal energy reaching the material between t-1 and t and $E_{(therm\text{-}outflow)}$ being the thermal energy leaving the material between t-1 and t. Based on this assumption a change of the temperature is not done by changing the temperature of the material itself but rather analyzing and optimizing the thermal energy flows effecting the materials.

[0014] In analyzing the thermal energy flows within a mattress, most product designers assume that thermal energy moves upward, like warm air, which rises if within cooler air. But as this invention teaches this assumption is not helping to design a mattress having superior thermal properties. It is true that warmer air rises within cooler air, but this only effect air. It is not directly the thermal energy itself which rises, but the physical effect that air with a higher level of thermal energy is lighter than air with a lower level of thermal energy. As air molecules can slide past each other easily, as the density of air is gaseous, the lighter air will have the tendency and capability to rise above the heavier air. But thermal energy itself has no weight and there is no gravity involved in moving thermal energy. Also helping warmer air to move upwards would only get the elevated thermal energy closer to the user instead of further away, as the user will in most cases lie on top of the mattress. But any method to reduce temperature should move thermal energy away from the user – not towards him.

[0015] Taking above mentioned formula, in order to lower the temperature in a material you either have to lower the inflow of thermal energy or raise the outflow. In a typical mattress, most inflow of thermal energy is from the impact of body heat. The body during sleep emits a heat flux of 40W/qm skin, approx. 70-80 W/person which translates to an influx of 230 kJ per night. Additional influx of thermal energy can be heating devices used, or thermal energy used in conjunction with dynamic foams. There is no realistic method to reduce the inflow of thermal energy into a mattress, and the quantity of this inflow is obviously high.

[0016] The invention raises the outflow of thermal energy within a mattress. It uses materials itself flexible, so they can be incorporated in a mattress without reducing the comfort feeling. The invention is not using energy and is not transporting the excessive thermal energy upwards as warmer air would do. Therefore, the invention can be used to transport excessive thermal energy to the side or bottom of a mattress or to any section not felt by the user.

[0017] The invention utilizes a property of modern – mostly foam based – mattresses that thermal energy is not distributed evenly within the product. Old innerspring mattresses had a very open air-filled space within and around the springs. Thermal energy could move freely within the mattress therefore distributing excessive thermal energy from the body heat to sections of the body with less impact of body heat and therefore, the excessive thermal energy could not be felt by the user. But modern foam-based mattresses are very different in this respect. Polyurethane foam typically has many hollow volumes (usually called cells), which are either open (connected to each other) or closed (not connected to each other). These hollow volumes contain air, which gradually is becoming warmer with use. Even with open cell foams the movement of this air is very restricted and also air would move upwards towards the user, but not away from him. Besides the air as a transport medium for thermal energy within the mattress the foam material itself could be a transport medium for thermal energy. But foam has a low thermal conductivity. Foam material cannot transport thermal energy very well or rather not at all. There are solutions to blend material with a higher thermal conductivity with foam, so that the material can transport thermal energy away from the body. But these blended materials cannot transport thermal energy as the molecule chains with higher thermal conductivity are usually interrupted by molecule chains of Polyurethane stopping thermal energy flow. So, the molecule chains blended into foam can absorb some but not transport the excessive thermal energy. As mattresses are used for long periods up to 10 hours thermal energy must be transported away and not only absorbed.

[0018] This is also the reason why PCM's (Phase Change Material) are not effective in mattresses. The PCM will absorb some thermal energy (i.e. 9 KJ/m^2) but by far not the 230 kJ emitted during a typical night.

[0019] Therefore, this invention is not absorbing thermal energy from the air within the hollow volumes but effectively transporting it to sections with hollow volumes where it is not felt by the user or to the outside air. The form factor of the invention is a band, as this is a form which is flexible in both dimension. Even though a metal layer is used in the invention a band is usually bended only in one direction (along the length) as the width is too short to bend the material. A band can also affect larger sections within a mattress, as several bands can be used with distance between it, so that moisture or humidity can pass easily between the bands.

[0020] The band has a metal layer as metal has a high thermal conductivity. This parameter is not enough to really transport thermal energy, but it is necessary for function. Usually metal with carbon content is preferred like graphite but also copper or aluminum could be used. To achieve some kind of flexibility the thickness of the metal layer needs to be reduced to below 0,5mm, but higher thickness is also allowed as per this invention as long as a certain flexibility is achieved.

[0021] This metal layer within the band has to be uninterrupted, meaning thickness, composition and width need to be above the minimum values along the whole length of the band. This condition is most important. Only by connecting the metal layer based on this principle a consistent flow of thermal energy can be observed in case also the following condition is met.

[0022] The last condition is the positioning of the band in a way that it touches the hollow volumes in section with excessive thermal energy i.e. direct under the body or any heating device and at the same time also touches uninterrupted at least one hollow volume in a section with normal or reduced thermal energy. These sections can be found in any mattress.
The sections of lower thermal energy are the left and right side of the mattress, or the feet portion. If the mattress is placed on a surface allowing air to reach the lower side of a mattress (i.e. slated frame, spring box) also this lower side can be used. There are two principles governing this invention.

1. The higher the difference of thermal energy content between both sections the better the thermal energy flow. As the thermal energy below the body is rather fixed it is worthwhile to search for section with lower thermal energy carefully. Some of the variations described below are based on lowering the thermal energy level in those sections.
2. The larger the section of the band is in a section of the mattress with lower thermal energy content in relation to the section of the band in a section of the mattress with excessive thermal energy the better the thermal energy flow. Therefore, the invention recommends that at least 30% of the band is in a section with lower thermal energy, but 50% would be preferred, especially if the temperature difference is not really large.

[0023] The effects of this invention can be clearly measured. Figure 7. describes a test setting used. A sleeper was placed on a mattress containing a padding with the bands having a continuous metal layer. The bands were running along the length of the mattress. Three foam layers were placed on each other, being foam layer 1 on top, foam layer 2 in the center and foam layer 3 at the bottom of the mattress. The bands were placed between layer 2 and 3. Temperature sensors were placed around two locations, one being the hip zone on top of foam layer 1 just beneath the body, the other being the hip zone between layer 1 and 2. So the sensors were between body and the bands which were positioned one layer below. Temperature values were taken for every minute during a full night with a sleeper sleeping on top. Tests were done with the test setting described above, a test setting without the thermal bands, a test setting were the foam layer 1 was gel-infused foam (with and without the bands). The tables below show the delta temperature values comparing always two test settings with each other.

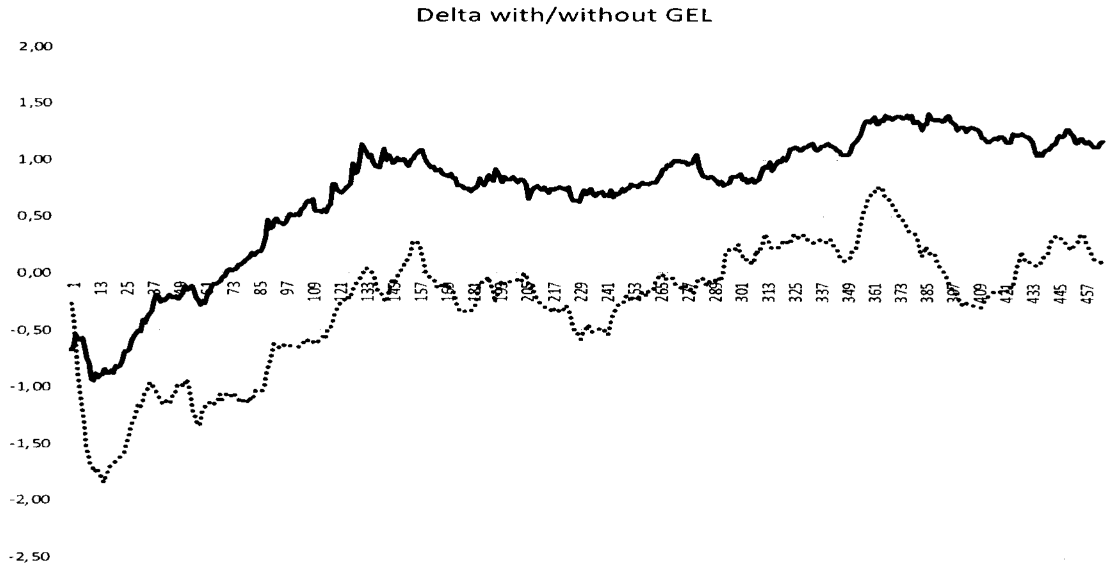


Table 1 delta Temperature values across a full night period comparing a normal mattress (no bands, no gel-infused foam) with a gel-infused mattress (also having no bands)

[0024] The upper solid line are the average delta values of the sensors atop foam layer 1, the lower dotted line the average delta values of sensors between foam layer 1 and 2. The x-axis is minutes, the y-axis is delta Temperature in Kelvin. Negative values denote that the gel-infused foam has lower temperature values compared to the conventional foam mattress. The result demonstrates that the gel-infused foams indeed lead to lower temperature values compared to conventional foam – but only in the first hour. After that time the thermal capacity of gel is filled, and temperature rises again. Temperature values after two hours are even higher with gel-foam compared to conventional foam.

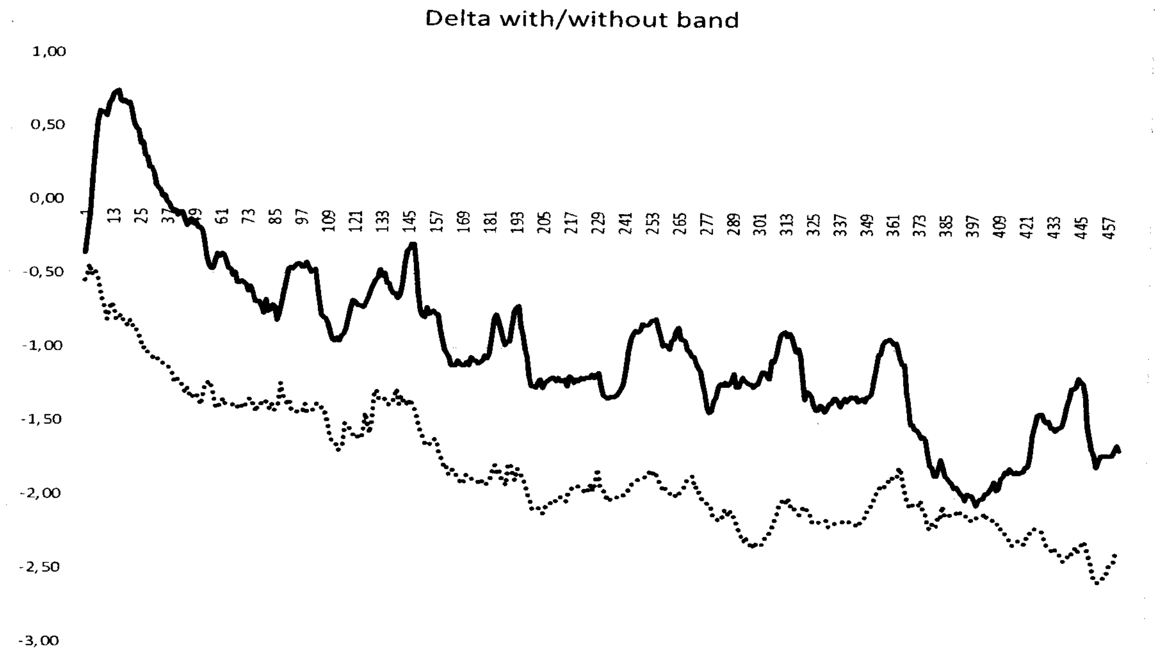


Table 2. delta Temperature values across a full night period comparing a normal mattress (no bands, no gel-infused foam) with a mattress using conventional foam and having the bands as described between foam layer 2 and 3.

[0025] The upper solid line are the average delta values of the sensors atop foam layer 1, the lower dotted line the average delta values of sensors between foam layer 1 and 2. The x-axis is minutes, the y-axis is delta Temperature in Kelvin. Negative values denote that the foam with the bands below has lower temperature values compared to the conventional foam mattress without bands. It can be seen that apart from a small increase of temperature in the beginning the values are much lower with the bands than without through the full night. The effect increases even with time, as the normal foam mattress becomes warmer. The effect is significant with -2°K after 6 hours.

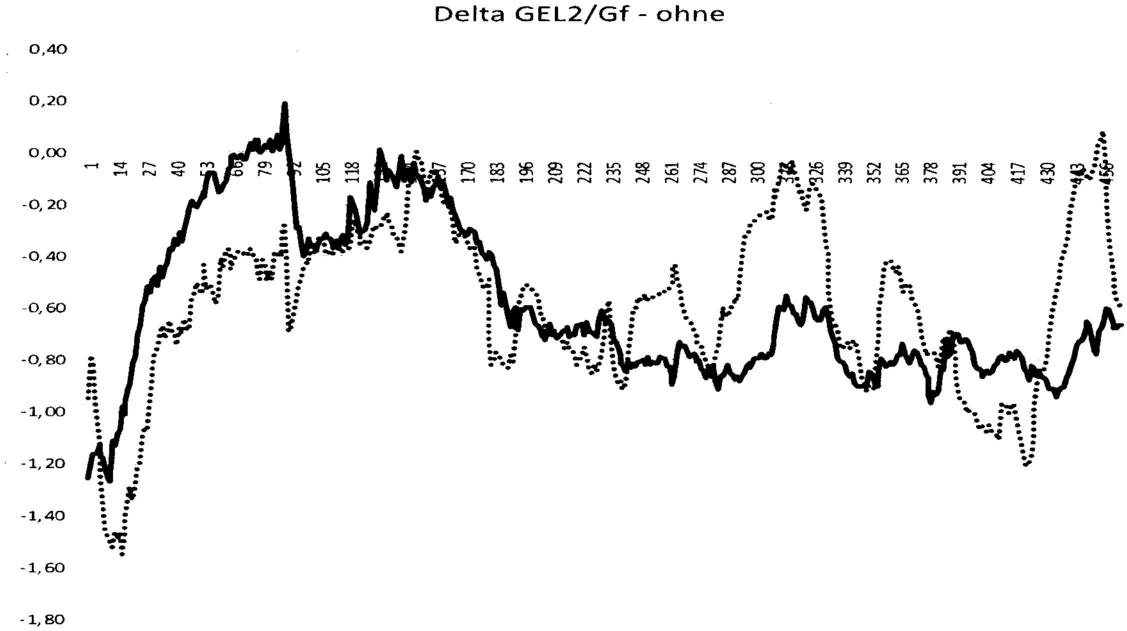


Table 3. delta Temperature values across a full night period comparing a normal mattress without bands below with a mattress using gel-infused foam and having the bands as described between foam layer 2 and 3.

[0026] The upper solid line are the average delta values of the sensors atop foam layer 1, the lower dotted line the average delta values of sensors between foam layer 1 and 2. The x-axis is minutes, the y-axis is delta Temperature in Kelvin. Negative values denote that the foam with the bands and the Gel-infused foam has lower temperature values than the conventional mattress. Table 3 shows that both effects, the immediate one of gel-infused foam and the long-term one of the bands described in this invention can be combined. The resulting mattress is cooler in the beginning and throughout the night. The offset is that the temperature lowering effect of the bands is reduced by the gel-infused foam.

[0027] The band itself is small and therefore not a blockade to humidity passing through the mattress. But if the humidity should pass through the band this can be punctured well with holes in regular patterns. The thermal energy flow will pass around these holes and not be interrupted. The puncture can be so dense that it is similar to a perforation which is also allowed within this invention. It is recommended to keep the holes as small as possible.

[0028] A band being flexible and consisting purely from metal will typically be sensitive to punctual impact and react with break. The break should be especially avoided as this creates an interruption of thermal energy flow. It has been found that a laminating of a very thin PE layer (< 0,18mm thickness) is enough to prevent a break of the band. This lamination can of course also be applied on both sides but usually this is not necessary. Also, other material adding stability can be applied as long as it is flexible i.e. Polyurethane.

[0029] The band connecting the two sections with excessive and lower thermal energy can pass through or end in a section of the mattress filled with gel infused foam. Gel infused foam ("Gelfoam") is usually used to prevent the user from feeling too hot, so it answers a similar question. But typically, the invention described in this document creates a much higher thermal energy flow than gel infused foam. This combination adds up the thermal capabilities of the gel infused foam and of the band described in this document.

[0030] The band connecting the two sections with excessive and lower thermal energy can pass through or end in a section of the mattress filled with PCM material. PCM material is usually used to prevent the user from feeling too hot, but it can only work for a rather short time before it cannot absorb thermal energy anymore. So, combining it with the band would take thermal load from the PCM so that the PCM can absorb energy for a longer period.

[0031] A further variation is based on the observation that the thermal energy level in the section with lower thermal energy should be as low as possible. It might be that based on the specific shape of the mattress even this section is penetrated by thermal energy from the body. So, any thermal shield (insulating layer) between said section and the body would lower the thermal energy level in that section, increases the thermal energy difference between said section and the section of excessive thermal energy and therefore increases flow of thermal energy within the band.

[0032] The band can be positioned purely within the mattress, but it can also be positioned that the band runs from the section of excessive thermal energy outside the body, i.e. along a side or the lower side of the mattress or completely outside (i.e. from the mattress into a spring box below). Typically, the outside thermal energy level is determined by room temperature this temperature being much lower than the temperature of sections of excessive thermal energy. It could be observed that this difference in thermal energy level is large enough to create a superior flow of thermal energy through the band. A section of the band of 20% outside the mattress or along the side of the mattress is more than enough to increase the flow of thermal energy to an optimal value.

[0033] The band described should have a thickness between 0,1mm to 0,5mm. A thin band is more flexible but also more sensitive to break whereas a thicker band is the opposite. Also, the capacity of the band to absorb and transport thermal energy can be affected by the thickness of the band.

[0034] The band was observed to fit well into a mattress if the width is between 4cm to 10 cm, though also smaller or wider dimensions are allowed. In case wider dimensions are used the puncturing or perforating variation is preferred as not to reduce humidity flow within the mattress.

[0035] Most superior thermal effect of the band was observed when using graphite as the metal layer of choice. As graphite comes in very different variations good results were achieved using graphite with a carbon content greater than 99% and/or a content of ash lower than 1% and /or a density of greater than 1g/qcm and/or a content of Sulphur lower than 1.800 ppm.

[0036] Also, there are very different types of graphite available. The type called highly oriented pyrolytic graphite (HOCG) is very capable to transport thermal energy based on the special molecular structure. Highly oriented pyrolytic graphite (HOPG) is a highly pure and ordered form of synthetic graphite. It is characterized by a low mosaic spread angle, meaning that the individual graphite crystallites are well aligned with each other. The best HOPG samples have mosaic spreads of less than 1 degree. It had been found that this graphite type is generating very good results in transporting thermal energy.

Detailed description of the Figures and the embodiments

[0037] Fig. 1 demonstrates the general concept of the invention. A padding 10 is illustrated having several hollow volumes 12 and 14. Usually such a padding 10 will be partly occupied by a user and a thermal gradient can be present within the padding. Under such a situation it is possible that some of hollow volumes contain excessive thermal energy 12 some not 14. In the illustrated embodiment a band 20 having a continuous metal layer 22 is extending such that it extends into at least two hollow volumes such that a thermal gradient can be smoothened. Although the band 20 is illustrated as ending in one hollow volume, respectively it is to be noted that the band may as well extend beyond them, provided that the extension is at least such that several or at least two of the hollow volumes 12, 14 are connected with each other, allowing thermal energy transfer beyond the limits of one single hollow volume or preferably from one hollow volume towards another hollow volume. The metallic band 20 is thus provided and configured for allowing to improve a padding having sections, each covering at least one hollow volume of the padding. Indeed, the band 20 is flexible and elongated for transferring thermal energy from a first section with hollow volumes in the event of excess thermal energy towards at least one second section with hollow volumes in the padding not containing excess thermal energy. Since the band is having a continuous metal layer with a defined area extending from at least one first section to another different second section a thermal gradient within the padding can be smoothened and the comfort for a user using such a padding can be drastically improved without substantially impairing other comfort characteristics of the padding. One of the main advantages is that the band is a passive thermal element not requiring any additional elements such as a power supply, a fluid driving device or the like. Since the band is preferably extending such as to extend from or beyond at least one hollow volume in a first section to or beyond another hollow volume in another section thermal energy can be easily transferred between the respective sections and preferably as well between the respective hollow volumes. It is to be noted that in practice a section will include a multitude of hollow volumes. It is furthermore to be noted that the invention is not excluding that one or more hollow volumes may extend in either section.

[0038] Fig. 2 shows a possible configuration of the invention. A mattress 30 contains a padding 10. Within the padding 10 is a section of excess thermal energy 32, e.g. the section where the hip of a sleeper is located. Therefore, this section has several hollow volumes also containing excessive thermal energy 12. The edges of the mattress 30 and therefore padding 10 are not affected by the body of a sleeper and the emittance of thermal energy. Therefore, these edges are sections without excessive thermal energy 34 and will have one or more hollow volumes without excessive thermal energy 14. Two bands 20 having a continuous metal layer 22 are positioned crossing each other at the section with excess thermal energy 32. Both bands 20 are running from edge to edge connecting at least one section including a first hollow volume with excess thermal energy 12 with at least a second section including at least another hollow volume without excess thermal energy 14. Using such a configuration allows improved thermal dissipation as crossing bands are used. The double layer in section 32 with hollow volumes 12 with excess thermal energy has two bands 20 to absorb excess thermal energy and four different directions to transport this energy. The section (34) with hollow volumes (14) with the lowest thermal energy load will generally receive the most thermal energy in a configuration like this, with positive effect on thermal efficiency.

[0039] Fig. 3 shows as another embodiment of the inventive padding a mattress 30 having a top layer 36 made from foam and a padding 10 filling the lower section of the mattress 30. The section with excess thermal energy 32 having hollow volumes with excess thermal energy 12 would be most probable in the center of the mattress 30. The band 20 with a continuous metal layer 22 runs through the padding 10 to the outside of the mattress 30 and continues along the side. This side – not affected by body heat will most likely be a section having hollow volumes 14 without excess thermal energy or be a section without excess thermal energy 34 having hollow volumes without excess thermal energy 14. The band 20 connects both sections 32, 34.

[0040] Fig 4. shows a band 20 having a continuous metal layer 22 being laminated by a PE-layer 24 along the whole length and width of said band to stabilize the metal layer 22. Such a band may be implemented in the previous embodiments.

[0041] Fig. 5. shows a full bed 40 made from a Box spring base 42 and a mattress 30 having a padding 10. It is assumed that both parts 30, 42 are fixed together. The section with excess thermal energy 32 containing hollow volumes with excess thermal energy 12 is located in the center of the mattress 30. Two bands 20 having a metal layer 22 are running across the padding 10 of the mattress 30, continuing to inner sections of the base 42. This base – being far away from the body- is most likely having at least one section without excess thermal energy 34 with at least one hollow volume without excess thermal energy 14. By correctly positioning the bands 20 runs through both sections 32, 34 connecting them with each other.

[0042] Fig. 6. shows a mattress 30 having a section made from gel-infused foam 38 being part of a padding 10. The band 20 having a continuous metal layer 22 runs through a section with excess thermal energy 32 having hollow volumes with excess thermal energy 12 through the section made from gel-infused foam 38 this section being the section without excessive thermal energy 34 having hollow volumes without excess thermal energy 14.

[0043] Fig. 7 shows the test situation used to elaborate the further below description for demonstrating the benefits of the invention as described above.

References Numeral

10 Padding

12 First hollow volume (with excess thermal energy)

14 Second hollow volume (without excess thermal energy)

20 Flexible Band

22 Metal layer on flexible Band

24 Lamination on flexible Band

30 Mattress

32 Section with excessive thermal energy

34 Section without excessive thermal energy

36 Top Foam Layer of a mattress

38 Section of mattress with Gel-infused foam

40 Bed

42 Box spring base of a Bed

Claims

1. A foam padding (10) having sections (32, 34), each covering at least one hollow volume (12, 14) of the padding said padding (10) including a flexible elongated band (20) for transferring thermal energy from at least one hollow volume (12) in a first one of said sections (32) in the event of excess thermal energy towards at least one hollow volume (14) in a second section (34) in the padding (10) not containing excess thermal energy, said band (20) having a continuous metal layer (22) with a defined area extending from at least one first section (32) to another different second section (34).
2. Padding (10) according to claim 1, wherein said band (20) is positioned such that at least 30% of the defined area is positioned outside of the first section (32).
3. Padding (10) according to any one of claims 1 and 2, wherein the first section (32) is a section prone to be warmer than said second section (34) and/or prone to be used for supporting a human body or a part of a human body, whereas the second section (34) isn't.
4. Padding (10) according to any one of claims 1 to 3, wherein said band (20) is having dimensions of at least 4 cm in width and/or at least 25 cm in length.
5. Padding (10) according to any one of claims 1 to 4, wherein said sections (32, 34) are dimensioned to cover at least a surface of the padding (10) corresponding to 0,08 m^2 or 10 % of the overall surface
6. Padding (10) according to any one of claims 1 to 5, wherein said band (20) is punctured and/or perforated.
7. Padding (10) according to any one of claims 1 to 6, wherein said band (20) is laminated on one or both sides with PE, PU or other stabilizing materials (24).
8. Padding (10) according to any one of claims 1 to 7, comprising at least one section with gel-infused foam (38) wherein said band (20) extends through said at least one section with gel-infused foam (38).
9. Padding (10) according to any one of claims 1 to 8, comprising at least one section with PCM wherein said band (20) extends through said at least one section with PCM.
10. Padding (10) according to any one of claims 1 to 9, comprising at least one insulating layer, preferably said insulating layer being positioned at the second section (34) such that the second section is shielded from external heat, in particular from body heat.
11. Padding (10) according to any one of claims 1 to 10, wherein the band (20) is arranged such that at least 20% of the defined area are exposed or outside of the padding.

12. Padding (10) according to any one of claims 1 to 11, wherein the band (20) is 0,1mm to 0,5mm thick and/or has a width of 4-10cm.
13. Padding (10) according to any one of claims 1 to 12, wherein the metal layer (22) is made from graphite, preferably the graphite is having a carbon-content greater than 99%, more preferably the band is having a content of ash lower than 1 % or being highly oriented pyrolytic graphite (HOCG)
14. Padding (10) according to any one of claims 1 to 13, wherein the band (20) is having density greater 1 g/cm^3.
15. Padding (10) according to any one of claims 1 to 14, wherein the metal layer (22) is having a content of Sulphur lower than 1800 ppm.
16. Padding (10) according to any one of claims 1 to 15, wherein the padding (10) is a mattress.

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Ansprüche

1. Schaumstoffpolster (10) mit Abschnitten (32, 34), wobei jeder Abschnitt zumindest einen Hohlraum (12, 14) des Polsters (10) umfasst, das Polster ein flexibles längliches Band (20) enthält um thermische Energie von zumindest einem Hohlraum (12) in einem der Abschnitte (32) im Falle überschüssiger thermischer Energie zu zumindest einem Hohlraum (14) in einem zweiten Abschnitt (34) des Polsters (10) ohne überschüssige thermische Energie zu führen, wobei das Band (20) eine durchgehende Metallschicht (22) aufweist und sich bei einem definierten Flächeninhalt von zumindest einem ersten Abschnitt (32) zu einem anderen zweiten Abschnitt (34) erstreckt.

2. Polster (10) nach Anspruch 1, wobei das Band (20) so positioniert ist, dass zumindest 30% des definierten Flächeninhaltes/der definierten Fläche außerhalb des ersten Abschnittes (32) positioniert ist.

3. Polster (10) nach einem der Ansprüche 1 und 2, bei welchem der erste Abschnitt (32) ein Abschnitt ist, der dazu neigt wärmer als der zweite Abschnitt (34) zu sein und/oder benutzt wird um einen menschlichen Körper oder einen Teil davon zu stützen während der zweite Abschnitt (34) dies nicht wird.

4. Polster (10) nach einem der Ansprüche 1 bis 3, bei welchem das Band (20) eine Größe von zumindest 4 cm in der Breite und/oder 25 cm in der Länge aufweist.

5. Polster (10) nach einem der Ansprüche 1 bis 4, bei welchem die Abschnitte (32, 34) so dimensioniert sind, dass diese eine Oberfläche des Polsters (10) einnehmen welche 0,08qm entspricht oder 10% der gesamten Oberfläche.

6. Polster (10) nach einem der Ansprüche 1 bis 5 bei welchem das Band (20) punktiert oder perforiert ist.

7. Polster (10) nach einem der Ansprüche 1 bis 6 bei welchem das Band (20) auf einer Seite oder beiden Seiten mit PE, PU oder anderen stabilisierenden Materialien (24) laminiert ist.

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8. Polster (10) nach einem der Ansprüche 1 bis 7 zumindest einen Abschnitt mit gelbasierten Schaum (38) enthaltend, bei welchem sich das Band (20) durch zumindest einen Abschnitt mit gelbasierten Schaum (38) erstreckt.

9. Polster (10) nach einem der Ansprüche 1 bis 8 zumindest einen Abschnitt mit PCM enthaltend, bei welchem sich das Band (20) durch zumindest einen Abschnitt mit PCM erstreckt.

10. Polster (10) nach einem der Ansprüche 1 bis 9 zumindest eine isolierende Schicht enthaltend, bevorzugt ist die isolierende Schicht so an dem zweiten Abschnitt (34) positioniert, dass die zweite Abschnitt vor äußerer Hitze insbesondere Körperhitze geschützt ist.

11. Polster (10) nach einem der Ansprüche 1 bis 10, bei welchem das Band (20) so positioniert ist, dass zumindest 20% des definierten Flächeninhaltes freiliegt oder außerhalb des Polsters ist.

12. Polster (10) nach einem der Ansprüche 1 bis 11, bei welchem das Band (20) 0,1mm bis 0,5 mm dick ist und/oder eine Breite von 4 – 10 cm hat.

13. Polstern (10) nach einem der Ansprüche 1 bis 12 bei welchem die Metallschicht (22) aus Graphit gefertigt ist, bevorzugt hat das Graphit einen Carbon Gehalt größer als 99%, weiter bevorzugt hat das Band einen Aschegehalt von weniger als 1% oder ist ‚highly oriented pyrolactic' Graphit.

14. Polster (10) nach einem der Ansprüche 1 bis 13 bei welchem das Band eine Dichte von größer 1 g/qm aufweist

15. Polster (10) nach einem der Ansprüche 1 bis 14, bei welchem die Metallschicht (22) einen Sulfit Gehalt von weniger als 1800 ppm aufweist.

16. Polster nach einem der Ansprüche 1 bis 15 bei welchem das Polster (10) eine Matratze ist.

Fig. 1

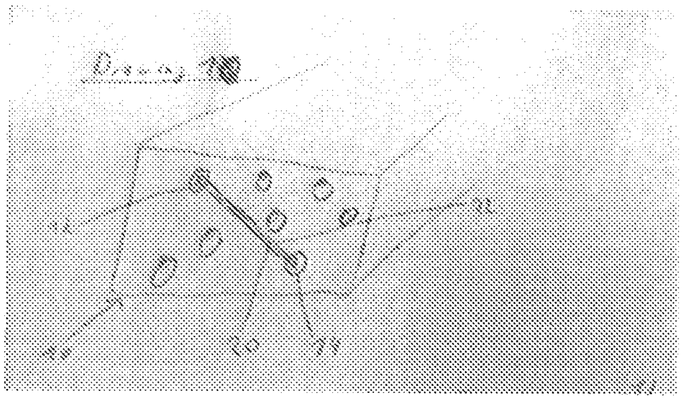

Fig. 2

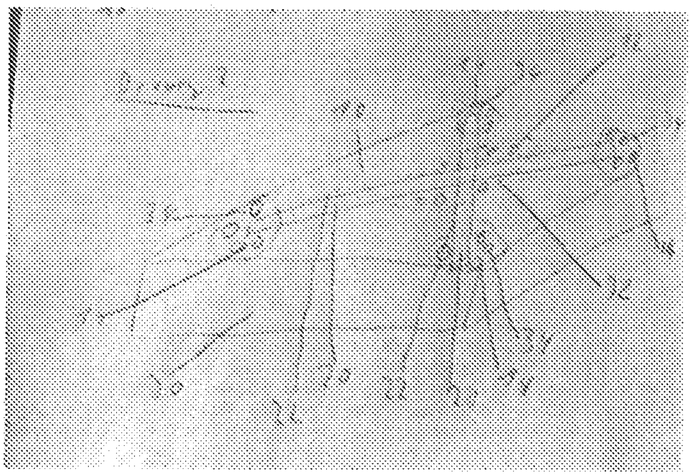

Fig. 3

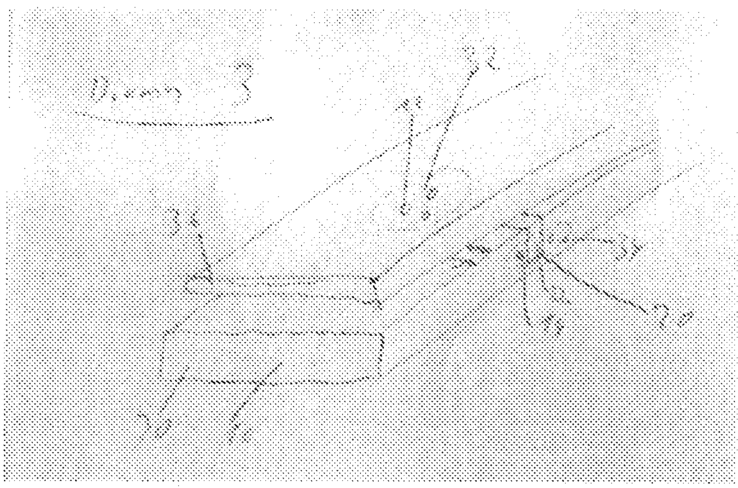

Fig. 4

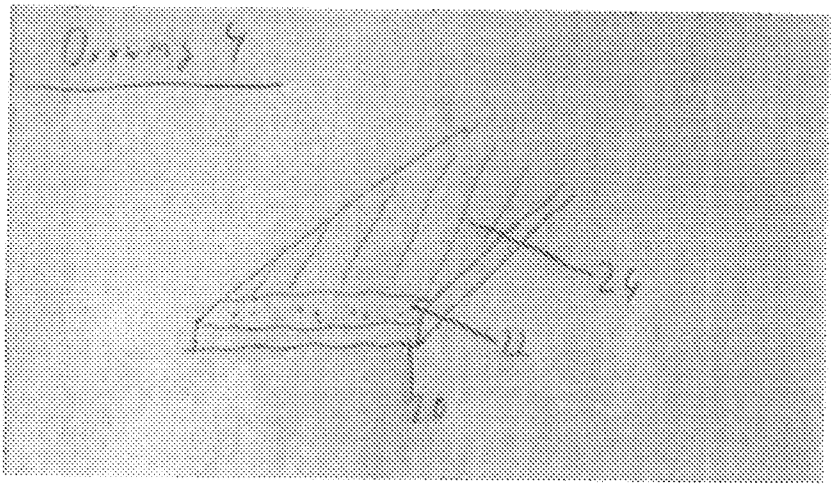

Fig. 5

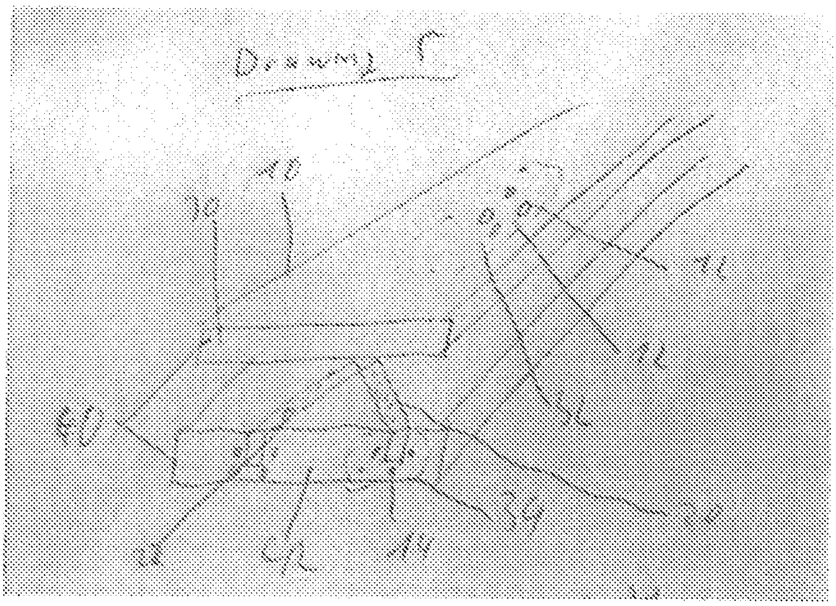

Fig. 6

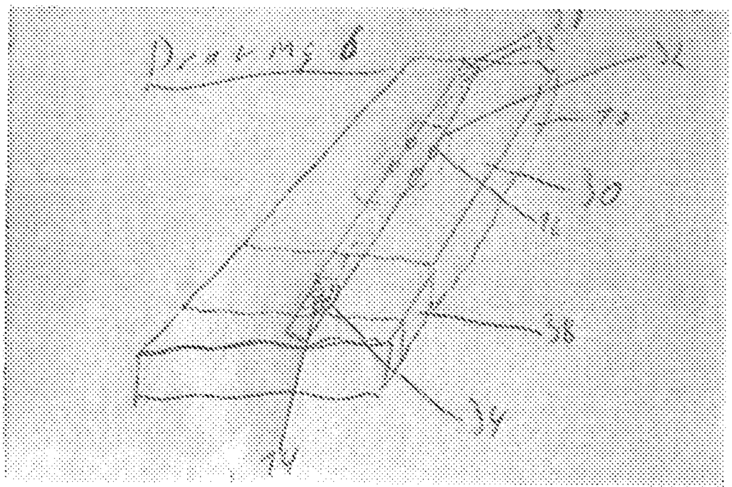

Fig. 7