The present invention relates to a sleeping device, such as a mattress, quilt or pillow, wherein the sleeping device is adapted to be used by a person during rest and comprises a core element, wherein said core element is covered by a first layer of a material having temperature regulating properties by absorbing and releasing heat and a second layer of down. By using a material with temperature regulating properties together with a layer of down filling, very good properties of minimizing temperature variations are obtained.
SLEEPING DEVICE COMPRISING AN ACTIVE HEAT ABSORBING/RELEASEING LAYER IN COMBINATION WITH A SPACER MATERIAL LAYER

FIELD OF THE INVENTION

The present invention relates to a sleeping device, such as a mattress, pillow or quilt.

BACKGROUND OF THE INVENTION

During sleep the human body goes through different phases, and in these phases the body temperature varies both as a result of internal temperature changes in the body during sleep and because of variations of the temperature in the surroundings. These temperature variations disturb the sleep. It is especially important in connection with the sleep that the most important phase—the REM phase—is undisturbed, because in this phase the brain is recharged and prepared for the next waken period. Another effect of the temperature changes is that the quilt covering the person is kicked off during sleep, which often results in the person waking up later by freezing. Further, the temperature changes might also result in a sweaty, wet mattress. In both cases the temperature change does not only disturb the sleep, but might also result in sickness.

New materials have been developed in an attempt to address special clothing and other thermal regulating system requirements. For example, microencapsulated phase change materials have been described as a suitable component for substrate coatings when exceptional heat transfer and storage capabilities are desired.

In U.S. Pat. No. 5,290,904 substrates are described, which are coated with a binder containing microcapsules filled with energy absorbing phase change material. These microcapsules enable the substrate to exhibit extended or enhanced heat retention or storage properties.

Also by way of example, microencapsulated phase change materials have been described as a suitable component for inclusion in fibres, when exceptional heat transfer and storage capabilities are desired. In U.S. Pat. No. 4,756,958 a fibre with integral micro spheres filled with phase change material or plastic crystals has enhanced thermal properties at predetermined temperatures. This document further teaches that such fibres may be woven to form a fabric having the enhanced thermal storage properties.

Generally speaking, phase change materials have the capability of absorbing or releasing thermal energy to reduce or eliminate heat transfer at the temperature stabilizing range of the particular temperature stabilizing material. The phase change material inhibits or stops the flow of thermal energy through the coating during the time where the phase change material is absorbing or releasing heat, typically during the material’s change of phase. This action is transient, i.e. it will be effective as a barrier to thermal energy until the total latent heat of the temperature stabilizing material is absorbed or released during the heating or cooling process. Thermal energy may be stored or removed from the phase change material, and can effectively be recharged by a source of heat or cold. By selecting an appropriate phase change material, a substrate can be coated or a fibre manufactured incorporating a phase change material for use in a particular application where the stabilization of temperatures is desired.

One approach of solving the above-mentioned sleeping problem is by introducing a layer of phase change material above the core of the sleeping device such as the mattress, pillow or quilt. A phase change material has the ability of absorbing and releasing heat to/from said body depending on the temperature of the body during sleep, and by using phase change material in the sleeping device it is the intention that temperature variations of the body should be minimized during sleep. A problem with this solution is that during sleep moist from the body is generated, and the moist is then absorbed in the layer following the phase change material which typically could be the core of a mattress or a layer of synthetic filling between the core and the phase change material. The moist decreases the effect of the phase change material considerably, whereby the introduction of the phase change material does not sufficiently solve the problem of minimizing the temperature variations during sleep.

OBJECT AND SUMMARY OF THE INVENTION

It is therefore an object of the present invention to provide a sleeping device solving the above-mentioned problems.

This is obtained by a sleeping device, such as a quilt, pillow or mattress comprising a core element, wherein said core element is covered by a first layer of a material having temperature regulating properties by absorbing and releasing heat and a second layer of spacer material.

By using a material with temperature regulating properties together with a layer of spacer material, very good properties of minimizing temperature variations are obtained. By using a spacer material, moist can easily vanish because of air circulation from the surroundings, and by minimizing the moist tests have shown that the functionality of temperature regulating materials such as e.g. phase change materials is improved considerably. Thereby, the temperature regulating material can be used to fulfill the quite strict requirements to temperature variation which is necessary in order to get an undisturbed sleep—and especially an undisturbed REM sleep. Further, by using the temperature regulating material in the sleeping device, such as the mattress, it is avoided that the user gets sick, both because a better sleep improves the immune system and because the risk of the person unintentionally kicking off the quilt or making the mattress wet because of sweat is reduced. Further, since the risk of the mattress getting sweaty is reduced, the frequency of which the mattress and/or mattress covers has/have to be cleaned can be reduced.

Examples of spacer material are distance mesh, a 3mesh® product from Müller Textil. By using this product it is possible to adjust the hardness and the spring characteristics.

In an embodiment the temperature regulating material comprises a phase change material. This material has proven to be a good material to be used in a sleeping device and can be adapted to optimally minimize the temperature variations in temperature ranges around the human body temperature.

In an embodiment the sleeping device further comprises a third layer of down above said second layer.
Compared to e.g. fiber filling, down filling has very good moist absorbing properties, and this therefore further reduces the moist and improves the functionality of the phase change layer.

[0013] In an embodiment the sleeping device further comprises a fourth layer of spacer material, said fourth layer being positioned on the opposite side of the core element in relation to the second layer, whereby each spacer material covers each side of said core element. This ensures that moist from both sides of said sleeping device is minimized because of a possible air circulation around the sleeping device.

[0014] In an embodiment the third layer of down comprise goose downs. Goose downs have proven to be very good at absorbing moist, whereby the functionality of the temperature regulating material is improved.

[0015] In an embodiment the second layer has a thickness between 3 mm and 50 mm.

[0016] In an embodiment the third layer has a thickness between 1 mm and 20 mm.

[0017] In an embodiment the sleeping device further comprises at least one cover layer. This protects the layer of phase change material.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] In the following, preferred embodiments of the invention will be described referring to the figures, where

[0019] FIG. 1 illustrates an embodiment of a sleeping device being a mattress according to the present invention,

[0020] FIG. 2 illustrates another embodiment of a sleeping device in the form of a mattress according to the present invention,

[0021] FIG. 3 illustrates the functionality of the sleeping device according to the present invention,

[0022] FIG. 4 illustrates the human body temperature variations when using a sleeping device according to the present invention compared to the human body temperature variations when using prior art sleeping devices,

[0023] FIG. 5 illustrates a further embodiment of a sleeping device according to the present invention,

[0024] FIG. 6 illustrates a further embodiment of a sleeping device according to the present invention,

[0025] FIG. 7 illustrates the functionality of the sleeping device according to the embodiment of the sleeping device illustrated in FIG. 6.

DESCRIPTION OF PREFERRED EMBODIMENTS

[0026] FIG. 1 illustrates a sleeping device according to the present invention. The mattress 101 is in contact with a large part of the human body 103 during sleep. A cross section of the mattress 101 is illustrated at 102. The mattress comprises a core element 105, e.g. a support element based on foam and/or springs, wherein the core element is covered by a first layer of a material having temperature regulating properties such as phase change material 107 and a second layer of spacer material 109.

[0027] As an alternative, a top mattress to be placed on top of an existing spring based mattress could comprise the second layer of spacer material and the first layer of temperature regulating material. Further, a layer could be provided above the temperature regulating material 107 to protect the temperature regulating layer.

[0028] In FIG. 2, another embodiment of a sleeping device according to the present invention is illustrated, here beside the first layer of temperature regulating material 207, the mattress comprises a third layer of down 201 positioned between the spacer material layer 209 and the core element 205.

[0029] In FIG. 3, the functionality of the sleeping device according to the present invention is illustrated. The human body is illustrated at 301, the temperature regulating material is illustrated at 303 and the spacer material layer is illustrated at 305. When the temperature of the human body 301 increases, the extra heat is stored in the temperature regulating layer 303, and the body temperature is lowered. When the body temperature of the human body 301 decreases, the stored extra heat is released from the temperature regulating layer 303 whereby the body temperature is raised. Further, the spacer material layer makes it possible for air circulation, which minimises moist from the surroundings and moist released from the human body 301.

[0030] In FIG. 4, the human body temperature variations when using sleeping devices according to the present invention are compared to the human body temperature variations when using prior art sleeping devices. On the horizontal axis the time is shown, and on the vertical axis the body temperature is shown. The body temperature when using a prior art sleeping device is illustrated by the curve 405, whereas the body temperature when using a sleeping device according to the present invention is illustrated by the curve 403. Further, the interval 401 on the vertical axis is the interval defined as the optimal sleeping temperature. By using a sleeping device according to the present invention, the body temperature variations are minimized and kept within the optimal sleeping temperature interval 401, whereas when using a prior art sleeping device large temperature variations occur.

[0031] In FIG. 5, another embodiment of a sleeping device according to the present invention is illustrated, here, besides the first layer of temperature regulating material 507, the mattress comprises a third layer and a fourth layer of spacer material 501, 503 on each side of the core element 505.

[0032] In FIG. 6, a further embodiment of a sleeping device according to the present invention is illustrated; here cover layers 601, 603 are positioned as the outer parts on each side of the mattress.

[0033] In FIG. 7, the functionality of the sleeping device according to the embodiment of the sleeping device shown in FIG. 6 is illustrated. The human body is illustrated at 701, the temperature regulating material is illustrated at 703 and the down layer is illustrated at 705. Further, the third and fourth layers of spacer material 707, 709 are illustrated on each side of the core element 708. When the temperature of the human body 701 increases, the extra heat is stored by the temperature regulating layer 703, and the body temperature is lowered.
When the body temperature of the human body 701 decreases, the stored extra heat is released from the temperature regulating layer 703 whereby the body temperature is raised. Further, the down layer, being a very effective moist absorber, absorbs moist from the surroundings and moist released from the human body 701. The spacer material layers 707, 709 allow air circulation through the mattress and thereby further minimize the amount of moist.

The mattresses can be filled uniquely, e.g. based on the climate in which the mattress is to be used and based on the comfort temperature of the person intending to use the mattress.

In the above description, mattresses comprising down filling are described. In this connection the word down relates to both down, feathers or a combination thereof and should therefore be interpreted correspondingly.

Examples have been given where the sleeping device is a mattress, alternatively the sleeping device could also be a pillow or a quilt and other elements having contact with a user during sleep. In case of a pillow the core element could be the inner down filled core or it could be a foam piece in case of a foam pillow. In case of a quilt the core element could be a piece of core fabric or it could be the inner down filled core.

It should be noted that the above-mentioned embodiments illustrate rather than limit the invention, and that those skilled in the art will be able to design many alternative embodiments without departing from the scope of the appended claims. In the claims, any reference signs placed between parentheses shall not be construed as limiting the claim. The word ‘comprising’ does not exclude the presence of other elements or steps than those listed in a claim. The invention can be implemented by means of hardware comprising several distinct elements, and by means of a suitably programmed computer. In a device claim enumerating several means, several of these means can be embodied by one and the same item of hardware. The mere fact that certain measures are recited in mutually different dependent claims does not indicate that a combination of these measures cannot be used to advantage.

1. A sleeping device comprising a core element, characterized in that said core element is covered by a first layer of a material having temperature regulating properties by absorbing and releasing heat and a second layer of spacer material.

2. A sleeping device according to claim 1, characterized in that the temperature regulating material comprises a phase change material.

3. A sleeping device according to claim 1, characterized in that the sleeping device further comprises a third layer of down above said second layer.

4. A sleeping device according to claim 3, characterized in that the sleeping device further comprises a fourth layer of spacer material, said fourth layer positioned on the opposite side of the support element than the second layer, whereby each spacer material covers each side of said support element.

5. A sleeping device according to claim 1, characterized in that the third layer of down comprises goose downs.

6. A sleeping device according to claim 1, characterized in that the second layer has a thickness between 3 and 50 mm.

7. A sleeping device according to claim 2, characterized in that the third layer has a thickness between 1 mm and 20 mm.

8. A sleeping device according to claim 1, characterized in that the mattress further comprises at least one cover layer.

9. A sleeping device according to claim 1, characterized in that the sleeping device is a mattress, quilt or pillow.