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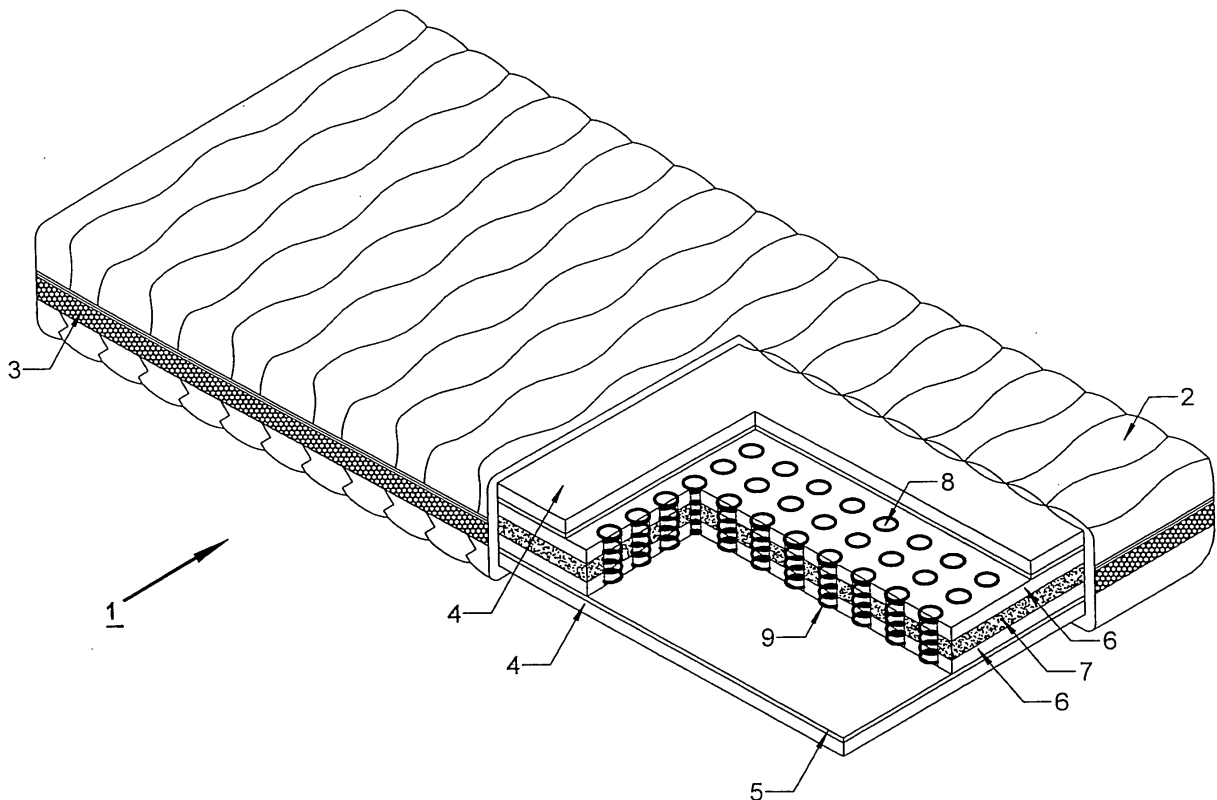
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(54) **Mattress comprising a layer consisting of a network of large, hollow spaces**

(57) The present invention relates to a mattress (1) comprising two lying surfaces and at least one layer (6,7) extending between said lying surfaces, at least substantially parallel thereto, which consists of a network of hollow spaces comprising a plurality of through holes (8)

extending through said at least one layer (6,7), at least substantially perpendicular thereto, in which springs (9) are accommodated, wherein said at least one layer (6,7) comprises a network of hollow spaces with relatively large cavities in an average cavity density of less than 500 cavities per cm³.



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Description

[0001] The present invention relates to a mattress comprising two lying surfaces and at least one layer extending between said lying surfaces, at least substantially parallel thereto, which consists of a network of hollow spaces comprising a plurality of through holes extending through said at least one layer, at least substantially perpendicular thereto, in which springs are accommodated. The mattress may also comprise through holes in which no springs are accommodated, in other words, the through holes in the mattress do not necessarily all need to have a spring accommodated therein.

[0002] Such a mattress is generally known. In the known mattress, a core layer of, for example, foam material in the form of a network of interconnected cells, in which a matrix of 12 x 30 through holes is bored, is disposed centrally between the two lying surfaces and surrounded by further mattress layers. Usually, the core layer is bounded on either side thereof by a layer which is suitable for distributing the pressure of the springs. The foam material and the springs thus provide a combined spring action. The matrix of through holes may comprise a different number of rows or columns, for example 8 to 15 rows and/or 25 to 35 columns.

[0003] A drawback of the known mattress is the fact that the network of interconnected cells impedes the movement of air and moisture in the mattress. An adequate ventilation is important, however, in the case of mattresses for dissipating heat and moisture from the position where a person is lying on a mattress. It is known to provide the core layer with ventilation channels, which extend parallel to the lying surfaces of the mattress, so as to provide a better ventilation.

[0004] Consequently it is an object of the present invention to provide a mattress as referred to in the introduction which exhibits improved ventilation characteristics, whilst no ventilation channels are provided. This object is accomplished by the present invention in that said at least one layer comprises a network of hollow spaces with relatively large cavities in an average cavity density of less than 500 cavities per cm³. A foam material comprising larger cavities can more easily dissipate air and moisture (vapour) through the network of hollow spaces from the position where a person is sleeping than the foam material comprising a network of interconnected cells of the known mattress, which exhibits a cell density of more than 1000 cells per cm³. A loss of resilience, or at least of resistance to compression, resulting from the use of the relatively large cavities may be compensated by the springs or by other layers in the mattress. The object of the present invention is thus accomplished.

[0005] Preferably, the cavity density of said at least one layer of the network of hollow spaces comprising relatively large cavities is less than 200 cavities per cm³. It stands to reason that a cavity density of 200 cavities per cm³ provides even better ventilation characteristics of the core layer than a cavity density of 200 to 500 cav-

ities per cm³ of a core layer comprising a network of hollow spaces.

[0006] In a preferred embodiment of the present invention, the cavities are defined by ribs, whilst walls between said ribs are least substantially lacking. In comparison with the foam layer of the known mattress, the walls between the interconnected cells are lacking. Since the walls between the cavities are lacking, even further improved ventilation characteristics are obtained. After all, an air or vapour flow through the core layer is not impeded by walls between the ribs in that case, so that the air or vapour can flow more or less freely between the interconnected cavities.

[0007] It is preferable in that regard if said at least one layer comprises a reticulated network of hollow spaces. The reticulated network of foam, i.e. foam having a structure of "cells" whose cell walls have melted away, is excellently capable of providing the desired ventilation characteristics. Reticulated foam is commercially available, for example of the Calipore® type from Draka.

[0008] If it is desirable to impart greater firmness to the core layer at the outer side thereof, said at least one layer may be disposed between two further layers of a network of hollow spaces with relatively small cells having an average cell density of more than 500 cells per cm³, preferably more than 1000 cells per cm³. The heights of the various layers may be varied as desired; a relatively thick layer of relatively large cavities will have comparatively better ventilation characteristics than a layer that is less thick.

[0009] It is preferable in that regard if the through holes and the springs extend into said further layers of a network of hollow spaces. Thus, a core layer is provided which may appear to be similar to a known core layer but which is internally provided with a layer that ventilates very well, and the springs are directly activated when a pressure is exerted on the mattress, or at least on the core layer in the mattress, when a person lies on the mattress.

[0010] To obtain an adequate distribution of in particular the pressure exerted by the springs over the lying surfaces of the mattress, a layer having pressure distribution characteristics may be provided on either side of the core layer. Suitable materials for such a layer are, for example, jute, foam exhibiting a relatively high compression resistance, felt and the like. Since said at least one layer comprising relatively large cavities will provide less resistance to compression, especially if no walls are present between the cavities, the springs may provide a relatively greater reactive force against compression than in the case of a known core layer. In such a case a proper pressure distribution between the core layer and the lying surfaces is desirable. The network of hollow spaces for said at least one layer and/or said further layers preferably comprises latex foam (foam rubber), polyester foam and/or polyurethane foam. In the past such foam materials have proved to be very suitable for use in a mattress.

[0011] Preferably, coil springs are accommodated in the through holes. The use of coil springs in mattresses is known. The coil springs may be barrel-shaped, cylindrical or Diabolo-shaped, for example.

[0012] The present invention will now be explained in more detail with reference to the appended figures, in which an embodiment of a mattress according to the present invention is shown in perspective view.

[0013] The appended figure shows a mattress 1 according to the present invention. The mattress 1 comprises a cover 2, which provides the lying surfaces of the mattress and which protects the interior of the mattress. Incorporated between the lying surfaces in the cover 2, on the sides of the mattress, is a ventilating strip 3 of textile, which functions to ventilate the mattress. The ventilating strip 3 thus provides an adequate flow-through connection for air and vapour between the interior of the mattress 1 and the environment. Disposed within the cover 2 are a number of layers, which determine or at least influence the characteristics of the mattress to a significant extent. Seen from the cover to the centre of the mattress 1, the mattress comprises foam plates 4, cover plates 5, outer core layers 6 and an inner core layer 7. Through holes 8, in which springs 9 are accommodated, extend through the inner and outer core layers 7 and 8, respectively.

[0014] The foam plates 4 may be made of latex, polyurethane foam or polyester foam, for example. The foam plates 4 have good resilience characteristics. The cover plates 5 are provided between each foam plate 4 and the core of the mattress 1, which is formed by the core layers 6, 7 with the holes 8 and the springs 9. The cover plates 5 act as pressure distributors for distributing the pressure exerted in the direction of the lying surfaces by the springs 9 in loaded condition of the mattress 1 so as to prevent a user from experiencing a non-uniform pressure of the mattress when lying on the mattress 1. Disposed between the cover plates 5 is the core of the mattress 1, the middle core layer 7 of which is made of reticulated polyurethane foam. The reticulated polyurethane foam is a network of ribs of hollow spaces, between which hollow spaces walls are substantially lacking. Because of this, the middle core layer 7 has a relatively high degree of elasticity, but certainly also good ventilation characteristics. In this embodiment, the middle core layer 7 is provided with an outer core layer 6 of polyurethane foam on both sides thereof. The outer core layer imparts firmness to the core of the mattress 1. Through holes 8, in which springs 9 are accommodated, extend through the inner and outer core layers 7 and 6, respectively. In this way a combined spring action is provided by the core of the mattress, consisting of the inner and outer core layers 7, 6 and the springs 9. The holes 8 furthermore form ventilation channels, for example for dissipating heat and moisture (vapour) which are generated and which are absorbed by the mattress 1 when a user is lying on the mattress 1. The holes 8 stimulate a vertical flow-through of air / vapour. The vertical holes 8 are in communication

inter alia with the inner core layer 7 of reticulated polyurethane, which thus provides an adequate ventilation in horizontal direction through the mattress. It will be understood that the mattress 1 according to the present invention provides an excellent ventilation in vertical direction from the position where a user is lying to the inner core layer 7 and subsequently through the inner core layer 7 and the ventilating strip 3 of textile.

[0015] Only one embodiment of the present invention is shown and described by way of example in the drawing and in the description. It will be understood, however, that several modifications to the mattress are possible within the scope of the present invention, which is defined by the appended claims. Thus, the use of a pressure distribution layer, for example, is optional. The outer core layers may furthermore be left out and the inner core layer may be made thicker. Furthermore it is possible to use other materials for the various layers than the materials mentioned in this document.

Claims

1. A mattress comprising two lying surfaces and at least one layer extending between said lying surfaces, at least substantially parallel thereto, which consists of a network of hollow spaces comprising a plurality of through holes extending through said at least one layer, at least substantially perpendicular thereto, in which springs are accommodated, **characterised in that** said at least one layer comprises a network of hollow spaces with relatively large cavities in an average cavity density of less than 500 cavities per cm³.
2. A mattress according to claim 1, **characterised in that** the cavity density of said at least one layer of the network of hollow spaces comprising relatively large cavities is less than 200 cavities per cm³.
3. A mattress according to claim 1 or 2, **characterised in that** the cavities are defined by ribs, whilst walls between said ribs are least substantially lacking.
4. A mattress according to claim 3, **characterised in that** said at least one layer comprises a reticulated network of hollow spaces.
5. A mattress according to one or more of the preceding claims, **characterised in that** said at least one layer is disposed between two further layers of a network of hollow spaces with relatively small cells having an average cell density of more than 500 cells per cm³.
6. A mattress according to claim 5, **characterised in that** the through holes and the springs extend into said further layers of a network of hollow spaces.

7. A mattress according to one or more of the preceding claims, **characterised in that** a layer having pressure distribution characteristics is provided on either side of the core layer.

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8. A mattress according to one or more of the preceding claims, **characterised in that** the network of hollow spaces for said at least one layer and/or said further layers comprises latex foam, polyester foam and/or polyurethane foam.

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9. A mattress according to one or more of the preceding claims, **characterised in that** coil springs are accommodated in said through holes.

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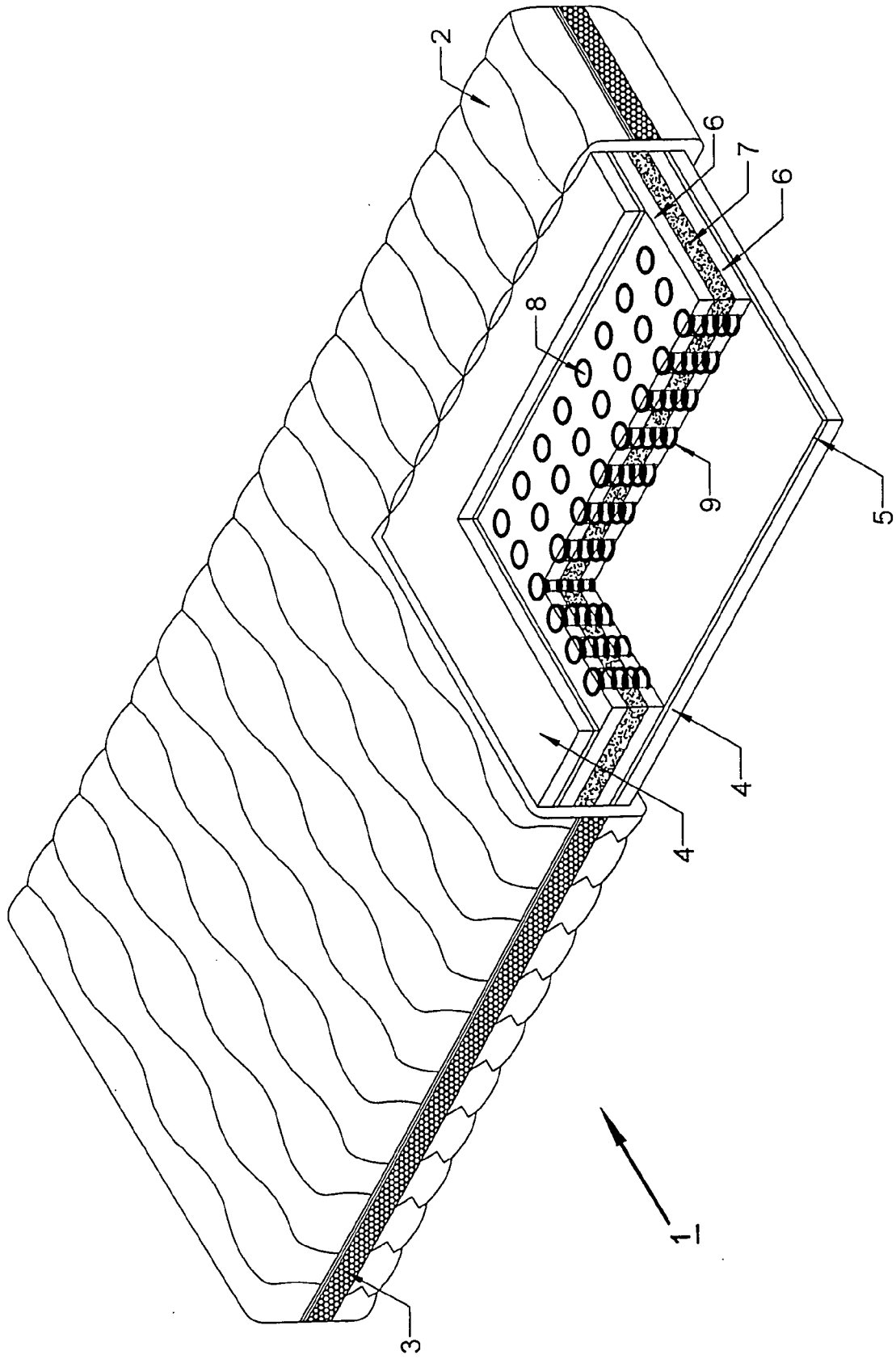
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EUROPEAN SEARCH REPORT

Application Number
EP 09 00 0138

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The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
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Place of search		Date of completion of the search	Examiner
The Hague		3 June 2009	Kis, Pál
CATEGORY OF CITED DOCUMENTS		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	
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			

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ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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