(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 2 084 994 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
21.09.2011 Bulletin 2011/38

(51) Int Cl.:
A47C 27/00 *(2006.01)* ***A47C 27/20*** *(2006.01)*

(21) Application number: **09000138.9**

(22) Date of filing: **08.01.2009**

(54) **Mattress comprising a layer consisting of reticulated foam with relatively large cavities**

Matratze mit einer Schicht aus retikuliertem Schaumstoff mit relativ grossen Hohlräumen

Matelas comportant une couche constituée de la mousse réticulée avec d'espaces creux relativement larges

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

(30) Priority: **31.01.2008 NL 1034982**

(43) Date of publication of application:
05.08.2009 Bulletin 2009/32

(73) Proprietor: **Norma Boxmeer B.V.**
5831 AZ Boxmeer (NL)

(72) Inventor: **Oosterhout, Roland**
5707 PZ Helmond (NL)

(74) Representative: **Baeten, Ernest et al**
Algemeen Octrooi- en Merkenbureau
P.O. Box 645
5600 AP Eindhoven (NL)

(56) References cited:
WO-A-2008/009712
AU-A1- 2008 200 388
AU-B2- 450 041
FR-A- 1 552 214
GB-A- 1 483 433
US-A1- 2007 197 675

Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

EP 2 084 994 B1

Description

[0001] The present invention relates to a mattress according the preamble of claim 1. 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 with a mattress according to claim 1. A reticulated 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 porosity of more than 1000 cells per cm^3. 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. 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. The reticulated 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. A reticulated foam with relatively small cells having an average porosity of more than 500 cells per cm^3, preferably more than 1000 cells per cm^3 impart greater firmness to the core layer at the outer side thereof. 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.

[0005] Preferably, the porosity of said at least one layer of reticulated foam comprising relatively large cavities is less than 200 cavities per cm^3. It stands to reason that a porosity of 200 cavities per cm^3 provides even better ventilation characteristics of the core layer than a porosity of 200 to 500 cavities per cm^3 of a core layer comprising a reticulated foam.

[0006] From WO 2008/009712 A1 a mattress is known having a breathable cover inclosing a composite resilient core. The core has a top layer of visco-elastic foam mounted on a spacer fabric layer which in turn is mounted on a bottom layer of visco-elastic foam. Said bottom layer includes a number of air pockets which communicate with the spacer fabric layer to facilitate movement of air into and out of air pockets. The bottom layer is mounted on a resilient base layer of layered foam material. In one embodiment the mattress has a central layer in te base portion formed by a pocket spring assembly.

[0007] From FR 1.552.214 A a mattress is known having a central layer of foam material, which layer is provided with through holes comprising springs. The central foam layer is sandwiched between two layers that distribute forces and two outer sheets, which may be foamed sheets.

[0008] It is preferable if the through holes and the springs extend into said outer core layers of a reticulated foam. 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.

[0009] To obtain an adequate distribution of in particular the pressure exerted by the springs over the lying surfaces of the mattress, a distribution layer having pressure distribution characteristics may be provided on the top and bottom sides of the core layer. Suitable materials for such a distribution layer are, for example, jute, foam exhibiting a relatively high compression resistance, felt and the like. Since said at least one inner core 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 reticulated foam for said at least one inner core layer 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.

[0010] 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.

[0011] 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.

[0012] 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 6, respectively.

[0013] 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.

[0014] 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 (1) comprising two lying surfaces and a core layer having at least one inner core layer (7) extending between said lying surfaces, at least substantially parallel thereto, which consists of a reticulated foam comprising a plurality of through holes (8) extending through said at least one inner core layer (7), at least substantially perpendicular thereto, in which springs (9) are accommodated, **characterised in that** said at least one inner core layer (7) comprises reticulated foam with relatively large cavities in an average porosity of less than 500 cavities per cm^3, and **in that** said at least one inner core layer (7) is disposed between two outer core layers (6) comprising latex foam, polyester foam and/or polyurethane foam, with relatively small cells having an average porosity of more than 500 cells per cm^3.

2. A mattress according to claim 1, **characterised in that** the porosity of said at least one inner core layer (7) of the reticulated foam comprising relatively large cavities is less than 200 cavities per cm^3.

3. A mattress according to claim 1 or 2, **characterised in that** the through holes (8) and the springs (9) extend into said outer core layers of reticulated foam.

4. A mattress according to one or more of the preceding claims, **characterised in that** a distribution layer (5) having pressure distribution characteristics is provided on the top and bottom sides of the core layer.

5. A mattress according to one or more of the preceding claims, **characterised in that** the reticulated foam for said at least one inner core layer (7) comprises latex foam, polyester foam and/or polyurethane

foam.

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

Patentansprüche

1. Matratze (1) mit zwei Liegeflächen und einer Kernlage, die wenigstens eine innere Kernlage (7) aufweist, die sich zwischen den Liegeflächen zumindest im wesentlichen parallel zu diesen erstreckt und aus einem retikulierten Schaumstoff besteht, der mehrere Durchgangslöcher (8) aufweist, die sich durch die wenigstens eine innere Kernlage (7) zumindest im wesentlichen senkrecht zu dieser erstrecken und in denen Federn (9) aufgenommen sind, **dadurch gekennzeichnet, dass** die wenigstens eine innere Kernlage (7) retikulierten Schaumstoff mit verhältnismäßig großen Hohlräumen mit einer durchschnittlichen Porosität von weniger als 500 Hohlräumen pro cm^3 umfasst und dass die wenigstens eine innere Kernlage (7) zwischen zwei äußeren Kernlagen (6) gelegen ist, die Latexschaum, Polyesterschaum und/oder Polyurethanschaum mit verhältnismäßig kleinen Zellen mit einer durchschnittlichen Porosität von mehr als 500 Zellen pro cm^3 umfassen.

2. Matratze nach Anspruch 1, **dadurch gekennzeichnet, dass** die Porosität der wenigstens einen inneren Kernlage (7) des retikulierten Schaumstoffs, der verhältnismäßig große Hohlräume umfasst, weniger als 200 Hohlräume pro cm^3 beträgt.

3. Matratze nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** sich die Durchgangslöcher (8) und die Federn (9) in die äußeren Kernlagen aus retikuliertem Schaumstoff erstrecken.

4. Matratze nach wenigstens einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** auf der Oberseite und der Unterseite der Kernlage eine Verteilungsschicht (5) mit Druckverteilungseigenschaften vorgesehen ist.

5. Matratze nach wenigstens einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der retikulierte Schaumstoff für die wenigstens eine innere Kernlage (7) Latexschaum, Polyesterschaum und/oder Polyurethanschaum umfasst.

6. Matratze nach wenigstens einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** in den Durchgangslöchern Sprungfedern (9) aufgenommen sind.

Revendications

1. Matelas (1) comprenant deux surfaces de couchage et une couche centrale comportant au moins une couche centrale interne (7) s'étendant entre lesdites surfaces de couchage, au moins sensiblement parallèle à celles-ci, qui est constituée d'une mousse réticulée comprenant une pluralité de trous traversants (8) s'étendant à travers ladite au moins une couche centrale interne (7), au moins sensiblement perpendiculaires à celle-ci, dans lesquels sont reçus des ressorts (9), **caractérisé en ce que** ladite au moins une couche centrale interne (7) comprend une mousse réticulée avec des cavités relativement grandes à une porosité moyenne inférieure à 500 cavités par cm^3, et **en ce que** ladite au moins une couche centrale interne (7) est disposée entre deux couches centrales externes (6) comprenant une mousse en latex, une mousse en poly(ester) et/ou une mousse en poly(uréthane), avec des cellules relativement petites ayant une porosité moyenne de plus de 500 cellules par cm^3.

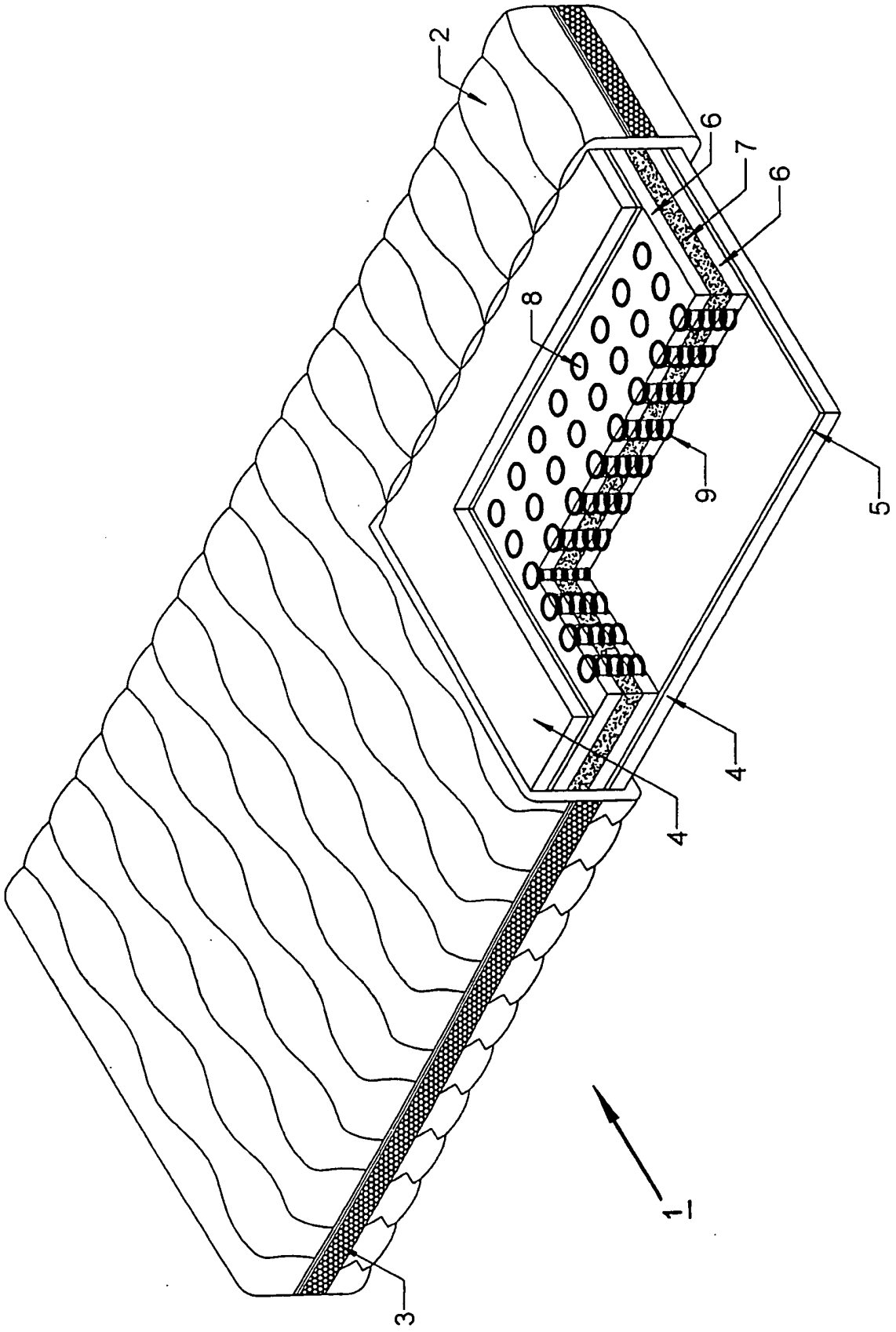
2. Matelas selon la revendication 1, **caractérisé en ce que** la porosité de ladite au moins une couche centrale interne (7) de la mousse réticulée comprenant des cavités relativement grandes est inférieure à 200 cavités par cm^3.

3. Matelas selon la revendication 1 ou 2, **caractérisé en ce que** les trous traversants (8) et les ressorts (9) s'étendent dans lesdites couches centrales externes de mousse réticulée.

4. Matelas selon une ou plusieurs des revendications précédentes, **caractérisé en ce qu'**une couche de distribution (5) ayant des caractéristiques de distribution de pression est disposée sur les côtés supérieur et inférieur de la couche centrale.

5. Matelas selon une ou plusieurs des revendications précédentes, **caractérisé en ce que** la mousse réticulée pour la dite au moins une couche centrale interne (7) comprend une mousse en latex, une mousse en poly(ester) et/ou une mousse en poly (uréthane).

6. Matelas selon une ou plusieurs des revendications précédentes, **caractérisé en ce que** des ressorts hélicoïdaux (9) sont reçus dans lesdits trous traversants.


2
6
7
6
8
9
5
4
4
1
3

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- WO 2008009712 A1 **[0006]**
- FR 1552214 A **[0007]**