Title: POCKET SPRING COMPONENT, A MATTRESS LAYER AND A MATTRESS

Abstract: The object of the invention is a pocket spring component (1) for a mattress, comprising an elastic element (3) arranged in a closed pocket (2) made of a woven or non-woven fabric, wherein the said elastic element (3) is made of a foam material. The object of the invention is also a mattress layer in the form of the pocket spring components (1) connected to each other, possibly further connected to pocket springs. The object of the invention is also a mattress comprising the pocket spring components (1).

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Pocket Spring Component, a Mattress Layer and a Mattress

FIELD OF INVENTION

The object of the invention is a pocket spring component, a mattress layer comprising the said component and a mattress comprising the pocket spring components or a mattress layer comprising the pocket spring components.

BACKGROUND OF INVENTION

Currently, in the construction of mattresses, a whole range of materials and components capable of achieving desired properties ensuring support and comfort for the user are used in the industry. These products and materials are used either in the form of a single element constituting the mattress structure (an example of such product can be a latex mattress made of a single layer of latex) or a combination of various materials and components is used to produce the final product. An example of such product may be a mattress in which a layer of latex is arranged on a set of metal springs. In addition to the mattress cover, the components currently used in the construction of mattresses can be divided into two categories: foams and springs.

The first category includes chemical foams which are usually used as mattresses layers with the purpose of ensuring comfort. However, these layers cannot be used as support layers. Polyurethane foams, viscoelastic foams and latexes are examples the said chemical foams. These foams can be cut, shaped, drilled and combined in various ways in order to provide various configurations and parameters of comfort and support.

The second category of components for the production of mattresses include springs made of metal, but also of other materials including plastics. The springs are also divided into Bonnell (open coil) springs and pocket springs, wherein a metal spring is inserted into a pocket made of a woven or non-woven fabric. Pocket springs have several advantages compared to the configuration with the use of open springs. In particular, the use of pocket springs minimises the transmission of movement by separation of vertical movement of each spring from the movement of other springs in the set of springs. Moreover, the use of pocket springs allows designing zones having different properties of support/comfort by using different parameters of wire in the spring and different configurations of springs in different parts of the mattress. This makes it possible to envisage, in the mattress, zones of various resilience, thereby providing more support in those parts of the mattress where specific body parts are heavier (for example in the diaphragmatic part, midriff). Furthermore, pocket springs are usually...
composed of a greater number of coils compared to corresponding Bonnell springs, which often results in a higher level of comfort and a higher price of retail sales in relation to a comparable mattress made on the basis of Bonnell springs.

Units constructed on the basis of pocket springs offer excellent quality and comfort compared to other solutions, but they are relatively expensive in the manufacturing and require complex manufacturing techniques. Therefore, there is a demand on the market to provide a cheaper and simpler alternative to pocket springs, which could also provide a similar comfort of use and versatility in terms of configuration of zones having varying degrees of support.

The aim of the present invention is, therefore, to provide a spring component for use in the mattress construction, which could be manufactured in a simple and cheap way and which simultaneously ensures the possibility to be configured in terms of hardness across different zones of the mattress.

The aim stated above is achieved by the solutions according to the invention, defined by the independent patent claims. Preferred embodiments of the invention are defined by dependent claims.

SUMMARY OF INVENTION

The object of the invention is a pocket spring component for the mattress, comprising an elastic element encased in a closed pocket made of a woven or non-woven fabric, characterised according to the invention in that the said elastic element is made of a foam material.

In a preferred embodiment of the invention, the said foam material is selected from latex foam, reticulated or non-reticulated viscoelastic foam, reticulated or non-reticulated non-viscoelastic foam, polyurethane foam, polyurethane foam of high resilience, expanded polymeric foam selected from expanded ethylene vinyl acetate, polypropylene, polystyrene or polyethylene.

In a preferred embodiment of the invention, the said elastic element constitutes a block made of a foam in a cuboid shape.

In a preferred embodiment of the invention, density of the said foam material ranges from 15 kg / m³ to 150 kg / m³, preferably is 25 kg / m³.

In a preferred embodiment of the invention, hardness of the foam material ranges from 10 N to 200 N, preferably is 120 N.
The object of the present invention is also a mattress layer characterised according to the invention in that the said layer comprises a plurality of the pocket spring components connected together, wherein the said pocket spring components constitute elastic elements made of a foam material and encased in a closed pocket made of a woven or non-woven fabric.

In a preferred embodiment of the mattress layer according to the invention, the said foam material is selected from latex foam, reticulated or non-reticulated viscoelastic foam, reticulated or non-reticulated non-viscoelastic foam, polyurethane foam, polyurethane foam of high resilience, expanded polymeric foam selected from expanded ethylene vinyl acetate, polypropylene, polystyrene or polyethylene.

In a preferred embodiment of the mattress layer according to the invention, the said elastic element constitutes a block made of a foam in a cuboid shape.

In a preferred embodiment of the mattress layer according to the invention, density of the said foam material ranges from 15 kg / m$^3$ to 150 kg / m$^3$, preferably is 25 kg / m$^3$.

In a preferred embodiment of the mattress layer according to the invention, hardness of the foam material ranges from 10 N to 200 N, preferably is 120 N.

In another preferred embodiment of the mattress layer according to the invention, the said mattress layer further comprises a plurality of pocket springs connected to the said pocket spring components.

The object of the present invention is also a mattress characterised according to the invention in that the mattress comprises a plurality of pocket spring components, preferably connected together, wherein the said pocket spring components constitute elastic elements made of a foam material and encased in closed pockets made of a woven or non-woven fabric.

In a preferred embodiment of the mattress according to the invention, the said foam material is selected from latex foam, reticulated or non-reticulated viscoelastic foam, reticulated or non-reticulated non-viscoelastic foam, polyurethane foam, polyurethane foam of high resilience, expanded polymeric foam selected from expanded ethylene vinyl acetate, polypropylene, polystyrene or polyethylene.

In a preferred embodiment of the mattress according to the invention, the said elastic element constitutes a block made of a foam in a cuboid shape.
In a preferred embodiment of the mattress according to the invention, density of the said foam material ranges from 15 kg / m$^3$ to 150 kg / m$^3$, preferably is 25 kg / m$^3$.

In a preferred embodiment of the mattress according to the invention, hardness of the foam material ranges from 10 N to 200 N, preferably is 120 N.

In another preferred embodiment of the mattress according to the invention, the said mattress further comprises a plurality of pocket springs, preferably connected to the said pocket spring components.

DETAILLED DESCRIPTION

The object of the invention is presented in further detail in the following description and in the drawing, in which:

Fig. 1 shows an exemplary pocket spring component for a mattress in cross section view.

Fig. 2 shows, in cross section, a view of the exemplary pocket spring components connected together, forming a series of components. Fig. 3 shows, in a perspective view, an exemplary series of the pocket spring components for which pockets were formed through welding of two bands of woven fabric.

Fig. 4 shows, in a perspective view, an exemplary mattress layer formed by the pocket spring components according to the invention.

Fig. 5 schematically shows an exemplary arrangement of the components in the mattress layer formed by the pocket spring components according to the invention connected to pocket springs known in the art.

Fig. 6 schematically shows another exemplary arrangement of the components in the mattress layer formed by the pocket spring components according to the invention connected to pocket springs known in the art.

Fig. 7 schematically shows another exemplary arrangement of the components in the mattress layer formed by the pocket spring components according to the invention connected to pocket springs known in the art.

Fig. 8 shows, in a perspective view, an exemplary arrangement of the pocket spring components according to the invention, contained in the mattress cover, a part of which is cut off in the drawing in order to show the layer of components. In the drawing, a part of the
pocket of two components is also cut off in order to show elastic elements contained in the pockets, in the form of blocks of foam in a cuboid shape.

Fig. 9 shows, in a perspective view, an exemplary arrangement of the pocket spring components according to the invention in connection to pocket springs known in the art. The layer of components is contained in the mattress cover a part of which is cut off in the drawing in order to show the layer of components. In the drawing, a part of the pocket of two adjacent components is also cut off in order to show the elastic element contained in the pockets, in the form of a block of foam in a cuboid shape, and the pocket spring.

Fig. 1 shows an embodiment of a pocket spring component 1, wherein the said component is formed of a closed pocket 2 and an spring element 3 contained in the said closed pocket. The spring element 3 is in the form of a block of foam in a cuboid shape, as best shown in Fig. 4. In another preferred embodiment of the invention, the spring element 3 can be envisaged as a block of foam in a cubic shape. In yet another preferred embodiment of the invention, the component pocket can be filled with a foam which has previously been divided into smaller parts which together constitute the spring element 3 (not shown in the drawing). In the most preferred embodiment, the spring element 3 is formed as a single block of foam. Dimensions of such a block of foam can be appropriately selected depending on the desired application. Thus, width of the block may vary from 1 cm to 100 cm, its length may vary from 1 cm to 100 cm, and its height may vary from 1 cm to 100 cm. In a preferred embodiment, dimensions of the block are as follows: width of 50 mm, length of 50 mm, height of 55 mm. A pocket is configured in such a manner that, after placing the elastic element 3 in the pocket, a certain amount of free space 4 remained on all sides, between the elastic element 3 and the pocket 2.

As shown in Fig. 1, the pocket 2 defines a closed space in which the elastic element 3 in the form of a block of foam is contained. The pocket can be prepared from any type of non-elastic material, in the form of woven or non-woven fabric, which can be connected in order to form a closed pocket. The preferred method for connecting the edges of the said non-elastic material, e.g., in order to form a pocket, is to weld the material by application of heat and pressure, which results in obtaining a desired shape of the pocket. Such welding methods are known in the art and include thermal or ultrasonic welding. The pocket can be prepared in a manner analogous to the preparation of the pocket for springs. Methods for preparing pockets for springs are well known to those skilled in the field of upholstered furniture.
Appropriate materials which can be used to prepare the pocket comprise thermoplastic fibres, known in the art, such as polymer-based non-woven fabric, polyester or polypropylene non-woven fabric. When preparing the pocket, its size is designed so as to allow a certain amount of free space which allows the block of foam to move inside the pocket during compression, when pressure is applied to the pocket spring component.

The foam used to prepare the spring element should be able to support and distribute the weight coming from the body of the user of the mattress. In preferred embodiments of the invention, the foam is selected from latex foam, reticulated or non-reticulated viscoelastic foam, reticulated or non-reticulated non-viscoelastic foam, polyurethane foam, polyurethane foam of high resilience (HR), expanded polymeric foam selected from expanded ethylene vinyl acetate, polypropylene, polystyrene or polyethylene. Density of the foam material may vary from 15 kg / m³ to 150 kg / m³, preferably is 25 kg / m³, whereas hardness of the foam material varies from 10 N to 200 N, and in a preferred embodiment is 120 N, wherein the hardness of the foam material should be understood as hardness measured according to the standard ISO 2439.

Individual components according to the invention may be joined together by methods known in the art, in particular they can be adhesive-bonded or welded to each other. In a preferred embodiment, as shown in Fig. 2, spaces for the pockets are formed from two bands of material, preferably of non-woven interlining, 5 and 6, welded to each other at regular intervals with a joint 7, so as to form pockets in which blocks of foam are arranged, and then upper and lower edges of the bands 5 and 6 are welded (not shown in the drawing), thereby forming a pocket filled with an elastic element and closed at the top and bottom.

As also shown in Fig. 3, the pocket spring components connected to each other with the joint 7 form a component row 8.

Fig. 4 shows the rows 8 of the components 1 connected with the joint 7, adhesive bonded to each other in order to form a mattress layer of the pocket spring components according to the invention. The rows 8 may be connected to each other by any means known to those skilled in the art, in particular by applying an adhesive-bonded joint, clamps, stitches, Velcro straps. In a preferred embodiment, individual rows of the components are adhesive bonded to each other.

In certain preferred embodiments, the pocket components according to the invention can be also connected to pocket springs known in the art. The mattress layer formed by the
components according to the invention connected to the pocket springs is shown in the embodiment in Figs. 5, 6 and 7, where the pocket spring components 10 connected to the pocket springs 9 are schematically shown.

The components according to the invention may be used to prepare supporting layers or layers ensuring comfort for the user of the mattress, wherein with this function, they can be used in combination with existing solutions. The mattress can be also made exclusively of a layer of the components according to the invention, the components being used either independently or in combination with traditional pocket springs. Fig. 8 shows the layer of the pocket spring components 1 according to the invention, the said components being arranged in the cover 11 of the mattress. In the solution shown, the layer of the components 1 constitutes the core the mattress.

Fig. 9 shows, on the other hand, an embodiment of the mattress, where the mattress core is constituted by the layer of the pocket spring components 1 according to the invention in connection to the pocket springs 9, known in the art, the said layer being arranged in the cover 11 of the mattress.

Use of the components according to the invention allows the structure of the mattress layers and its core to be flexibly configured. In particular, the pockets can contain blocks of foam having the same or different density, which allows creation of zones of different hardness within a single layer. Width and length of the elastic element in the form of a block of foam can be changed to form zones of different hardness. The material prepared using the components according to the invention, in combination with conventional pocket springs, combines the advantages of the foam layer with the advantages of pocket springs, and this means ensuring comfort of the foam layer and support of the springs. The solution according to the invention allows the pocket springs and the foam to be connected in a single layer. Furthermore, the use of the components according to the invention allows different zones to be configured by using different foams as the elastic elements of the component. The use of the components according to the invention to produce the mattress or a layer thereof ensures minimisation of the phenomenon of movement transmission within the mattress. The structure of the component layer according to the invention, where the blocks of foam are divided in separate pockets, ensures existence of air channels which ensure breathability of the mattress. Finally, the finished component layer according to the invention can be folded and compressed for transport, which improves logistics and ease of manufacturing of mattresses based on the pocket spring components according to the invention.
Claims

1. A pocket spring component for a mattress, comprising an elastic element encased in a closed pocket made of a woven or non-woven fabric, characterised in that the said elastic element is made of a foam material.

2. The component according to claim 1, characterised in that the said foam material is selected from latex foam, reticulated or non-reticulated viscoelastic foam, reticulated or non-reticulated non-viscoelastic foam, polyurethane foam, polyurethane foam of high resilience, expanded polymeric foam selected from expanded ethylene vinyl acetate, polypropylene, polystyrene or polyethylene.

3. The component according to claim 1 or 2, characterised in that the said elastic element constitutes a block made of a foam in a cuboid shape.

4. The component according to claims 1-3, characterised in that density of the said foam material ranges from 15 kg/m³ to 150 kg/m³, preferably is 25 kg/m³.

5. The component according to claims 1-4, characterised in that hardness of the foam material ranges from 10 N to 200 N, preferably is 120 N.

6. A mattress layer characterised in that the layer comprises a plurality of the pocket spring components connected to each other, wherein the said pocket spring components constitute elastic elements made of a foam material and encased in a closed pocket made of a woven or non-woven fabric.

7. The layer according to claim 6, characterised in that the said foam material is selected from latex foam, reticulated or non-reticulated viscoelastic foam, reticulated or non-reticulated non-viscoelastic foam, polyurethane foam, polyurethane foam of high resilience, expanded polymeric foam selected from expanded ethylene vinyl acetate, polypropylene, polystyrene or polyethylene.

8. The layer according to claim 6 or 7, characterised in that the said elastic element constitutes a block made of a foam in a cuboid shape.
9. The layer according to claims 6-8, characterised in that density of the said foam material ranges from 15 kg/m³ to 150 kg/m³, preferably is 25 kg/m³.

10. The layer according to claims 6-9, characterised in that hardness of the foam material ranges from 10 N to 200 N, preferably is 120 N.

11. The layer according to claims 6-10, characterised in that the said mattress layer further comprises a plurality of pocket springs connected to the said pocket spring components.

12. A mattress comprising the pocket spring components, characterised in that the mattress comprises a plurality of the pocket spring components, preferably connected together, wherein the said pocket spring components constitute elastic elements made of a foam material and encased in closed pockets made of a woven or non-woven fabric.

13. The mattress according to claim 12, characterised in that the said foam material is selected from latex foam, reticulated or non-reticulated viscoelastic foam, reticulated or non-reticulated non-viscoelastic foam, polyurethane foam, polyurethane foam of high resilience, expanded polymeric foam selected from expanded ethylene vinyl acetate, polypropylene, polystyrene or polyethylene.

14. The mattress according to claim 12 or 13, characterised in that the said elastic element constitutes a block made of a foam in a cuboid shape.

15. The mattress according to claims 12-14, characterised in that density of the said foam material ranges from 15 kg/m³ to 150 kg/m³, preferably is 25 kg/m³.

16. The mattress according to claims 12-15, characterised in that hardness of the foam material ranges from 10 N to 200 N, preferably is 120 N.

17. The mattress according to claims 12-16, characterised in that the mattress further comprises a plurality of pocket springs, preferably connected to the said pocket spring components.
Fig. 1.
**INTERNATIONAL SEARCH REPORT**

**A. CLASSIFICATION OF SUBJECT MATTER**

INV. A47C27/06 A47C27/14

ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

A47C A61G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

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**[X] Further documents are listed in the continuation of Box C.**

**[X] See patent family annex.**

* Special categories of cited documents:
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**Date of the actual completion of the international search**

22 June 2017

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Form PCT/ISA2/10 (second sheet) (April 2005)
C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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