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

(11) **EP 2 258 241 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
08.12.2010 Bulletin 2010/49

(51) Int Cl.:
A47C 23/06 *(2006.01)*

(21) Application number: **10005730.6**

(22) Date of filing: **02.06.2010**

(84) Designated Contracting States:
AL 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 SM TR
Designated Extension States:
BA ME RS

(30) Priority: **05.06.2009 BE 200900346**

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(54) **Mattress support**

(57) The invention relates to a method for making a mattress support which is made up of at least one textile fabric as a flexible material and of reinforcements, **characterized in that** the reinforcements (6, 9) are made by arranging the textile fabric in several layers one on top of the other and then locally hardening them with a hardening substance and alternating these pieces with pieces of non-hardened textile fabric (7).

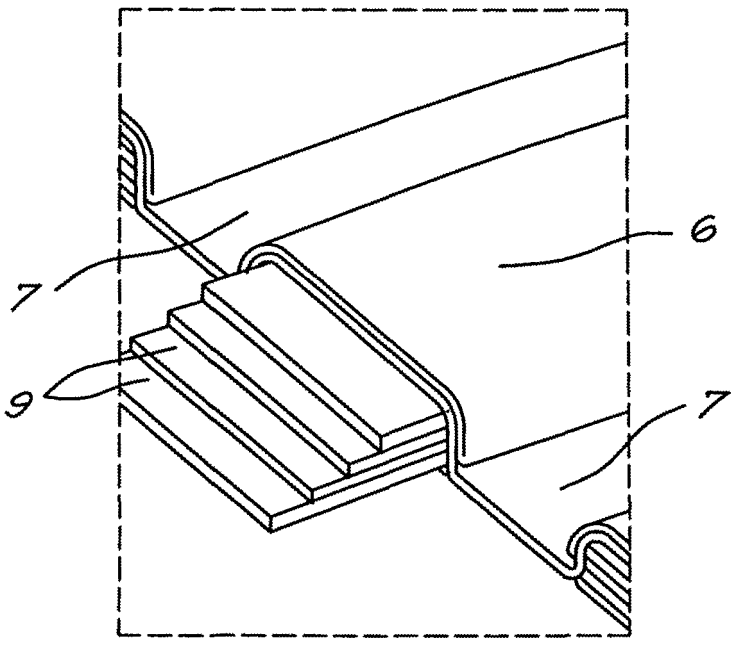

Fig.4

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Description

[0001] The present invention relates to a mattress support.

[0002] More specifically, the invention is conceived for a mattress support based on renewable composite materials.

[0003] In this context, the term mattress support must be interpreted in the broadest sense of the word and also comprises any type of support structure or frame conceived for supporting a user with certain comfort, and it therefore relates, in addition to a mattress support, to other types of furniture as well for sitting or lying down, lawn furniture, beach chairs, recliners, orthopedic apparatuses, etc.

[0004] Mattress supports called slatted mattress supports or Lattoflex are already known; these supports are made up of several parallel slats, oriented in the transverse direction and supported laterally on flexible rubber support points.

[0005] A drawback of this is that these slats are made in the classic manner from flexible strips of wood and therefore cannot adapt to all types of bodies.

[0006] Another drawback is that such mattress supports are made up of a large number of parts which means that the production process, the assembly, the installation and the maintenance require a great deal of manual labor, consume a lot of energy and are less environmentally friendly.

[0007] Mattress supports which are made up of a large amount of flexible frame elements or projections (Lattoflex 200-300) which are each assembled individually on support arms serving as torsion springs, are also known.

[0008] Although the multiple frame elements or projections can adapt better to each type of body, such mattress supports continue to have the drawback of being made up of a large number of components, which means that the production process, the assembly, the installation and the maintenance require a great deal of manual labor, consume a lot of energy and are much less environmentally friendly.

[0009] Document BE 1012356A3 of the company LS Bedding, of Belgium, also discloses a device for assembling in an elastic and height-adjustable manner with respect to the edge of the bed, the bending slats of a slatted mattress support, made up of a curved flexible arm which must be fixed inside the structure of the bed, in which every time the end of at least one slat of the slatted mattress support fits, and a height-adjustable casing which is fixed on the structure of the bed to support the previously mentioned flexible arm, which when being used mainly extends horizontally and has an upper end and a lower end, of which the upper end extends enough above to support one or more slats at the height of the structure of the bed and in which the upper and lower ends of the curved flexible arm previously mentioned are interconnected by an elastic intermediate part.

[0010] In the same context, document EP 1 127 520 B1 of the company Oniris SA of France describes a mattress for a solar bed in which transversely arranged slats of wood parallel with respect to one another are glued in a flexible material, which serves as an articulating element between the slats.

[0011] Otherwise, the assembly must have a series of steel springs and a protective layer of foam to make it a usable assembly.

[0012] Document NL 1029875 of Petrus Gerardus van der Ceelen describes, in contrast, a bed such as a grid element, arranged with separating elements for application in a bed.

[0013] The separating elements in fact consist of the elements that are generally known and used for slatted mattress supports and are installed in the grid element in an extractable and flexible manner.

[0014] This structure is arranged on a rigid board in which there are three separate bags filled with viscoelastic foam.

[0015] Document EP 1 281 339 A1 of the Compagnie des matelas Epeda et Merinos of France describes a frame for a bed made up of flexible slats oriented parallel in the longitudinal direction which allow lifting of the frame from a horizontal lying down position to a more vertical sitting position.

[0016] A huge drawback of all the mentioned systems is that they are always made up of many components which can furthermore be rather complicated, which means that the production process, the assembly, the installation and the maintenance require a great deal of manual labor, consume a lot of energy and are less environmentally friendly.

[0017] Another huge drawback is that the materials which are used in this case are often not recyclable or renewable, and therefore they are not CO_2 neutral either.

[0018] The aim of the present invention is to offer a solution for at least one of the previously mentioned drawbacks and others, given that it offers a method and a device which allow making a mattress support which is made up of at least one textile fabric as a flexible material and of reinforcements, in which the reinforcements are formed by arranging the textile fabric in several layers one on top of the other and then hardening them locally with a hardening substance and alternating these pieces with pieces of non-reinforced textile fabric.

[0019] One advantage is that the construction of a mattress support is thus substantially simplified.

[0020] The invention allows the manufacturing of the flexible material support, in the form of textile fabric, and the reinforced pieces, arranged, for example, in the form of a strip, from one single part and from one common material, which will then be locally reinforced with a second material.

[0021] Another advantage is that the entire design of a mattress support can be done by using biological and/or recyclable and/or renewable materials.

[0022] This means that after passing through the entire

production and assembly cycle, the mattress support is completely biodegradable and recyclable.

[0023] As a result, the environmental impact made by a mattress support according to the invention is reduced to a minimum.

[0024] Another advantage of the invention is that an elastic assembly can be formed in the manner previously mentioned which can be used as a mattress support of a desired shape and at the same time meets the user's comfort requirements.

[0025] Another advantage of this is that the mattress support can be made in a very simple manner and, where appropriate, even in a continuous process, with maximum savings in energy, emissions, production time, manual labor and raw materials.

[0026] Another advantage is that the method allows using the most common and classical production techniques for preparing the raw materials and assembling the mattress support according to the invention.

[0027] Another further advantage is that the reinforcements can be arranged in the most indicated places, in the most optimal shape and in a simple manner, to realize the best force distribution and reinforcements, but also at the same time to be able to achieve maximum sitting or lying comfort for the user.

[0028] In a preferred embodiment, a textile fabric is used as a flexible material which is completely or partially made up of natural fibers, such as linen, sisal, cotton, hemp, coconut, jute, balsa, for example, or the like, where appropriate, combined with synthetic fibers such as for example poly(ethylene terephthalate) (PET) or polypropylene or derivatives or mixtures thereof.

[0029] In another preferred embodiment the reinforcements are applied on or in it by arranging the textile fabric in several layers one on top of the other, then impregnating them locally and in strips with a hardening substance and then hardening the material.

[0030] In another preferred embodiment, a thermoplastic material is used as a hardening material, which is obtained, where appropriate, from of a recyclable and/or renewable source and is CO_2 neutral, particularly from a biomaterial, such as for example a polylactide or derivatives or mixtures thereof.

[0031] In another preferred embodiment, a heat-setting resin is used as a hardening material, which is obtained, for example, from a recyclable and/or renewable source and is CO_2 neutral, particularly from a biomaterial, such as for example furfuryl alcohol or derivatives and mixtures thereof.

[0032] In another preferred embodiment, a typical two-component resin is used as a hardening substance, which resin can be, for example, based on polyester, epoxy, polyurethane, ureaformaldehyde, melamine, polyimide, etc.

[0033] In yet another preferred embodiment, the reinforcements are previously made as individual mechanical components which are then introduced in or on the flexible material.

[0034] These components are, where appropriate, made up of several layers of textile fabric which have previously been arranged one on top of the other, molded in the desired shape, impregnated with hardening material and hardened.

[0035] In another preferred embodiment, the hardening takes place by areas and the hardened areas are interconnected to one another by non-hardened flexible textile fabric.

[0036] An advantage of this is that the hardened areas can still move independently of one another, which translates into an increased sensation of comfort for the user.

[0037] At the same time, it has the advantage that the forces exerted on them in the event of a large load can be distributed over several hardened areas, which reduces local deformation and considerably prolongs the general service life of a mattress support according to the invention.

[0038] In another preferred embodiment, the hardened areas are arranged according to straight lines crosswise along the length of the mattress support inside or on the flexible material.

[0039] In another preferred embodiment, the hardened areas are arranged according to a mechanically, dynamically and/or aesthetically optimized pattern.

[0040] In another preferred embodiment, the reinforcements are given a smooth and glossy surface structure; in another embodiment, however, they are given a rough and dull surface structure.

[0041] In another preferred embodiment, the local reinforcements are previously given a slightly curved and convex shape.

[0042] This has the advantage that additional resistance against impression, with its corresponding deformation which comes from above, for example, is thus obtained.

[0043] In yet another preferred embodiment, the elastic structure which, according to the invention, is obtained as previously mentioned, is used directly as a mattress support by installing it on a lower elastic structure.

[0044] In order to put this into practice, the elastic layer made up, for example, of polyether, polyurethane foam or of metal coil springs is arranged on a self-supporting structure made of wood or aluminum, for example.

[0045] In a preferred embodiment, linen is used as a flexible material.

[0046] This has the following advantages, among others:

- It is a natural, recyclable and renewable product, and therefore CO_2 neutral;
- It is locally available;
- It has shock absorbing and sound absorbing properties;
- It has moisture regulating properties;
- It has a low specific weight;
- The cost is relatively low;
- It is furthermore biodegradable.

[0047] When it is used in combination with bioresins, as is the case in a preferred embodiment of the invention, a biocomposite material will be formed which has the following advantages, among others:

- High specific strength;
- Low maintenance cost;
- Enormous design freedom;
- High chemical resistance;
- It is resistant to the elements and to water;
- Good wear properties;
- Possibility of a high degree of integration with

[0048] reinforcements, insertions, etc.;

- Possibility of mass production, and possibly even in a continuous process;
- Good impact properties;
- From the price point of view, it is very advantageous with respect to other composite fibers;
- It offers the possibility of being used for the design of a cradle-to-cradle product;
- The ecological impact is considerably lower than in similar materials;
- Easy to stain with color pigments in order to obtain a colored top layer;
- Very lightweight, which aids in reducing the ecological impact;
- Possibility to process inserts in the product in a simple manner;
- Possibility to use transparent resin so that the fabric continues to be visible;
- Possibility of using foams (PUR, PIR, PVC..) to create thicker sections;
- Possibility of screen printing, etc.

[0049] The advantages of the use of a bioresin such as a polylactide or polymerized furfuryl alcohol for forming reinforcements, as is done in a preferred embodiment of the invention, are, among others, that these resins are made from a biomass containing lignin, cellulose or hemicellulose, and because of that it can originate from, for example, residues of the sugar or agricultural industry.

[0050] These bioresins are made from CO_2 neutral and renewable raw materials, and they can be completely recycled.

[0051] Accordingly, as with the flexible material, they are produced and prepared with a minimal environmental impact.

[0052] In practice, the way to proceed is very simple, such as, for example, the following way.

[0053] The linen is supplied as a woven textile.

[0054] It is introduced in or on a preformed die or mold which, where appropriate, already has a release agent.

[0055] The band of linen is locally saturated with a hardening substance, for example with furfuryl alcohol, and the assembly will then be hardened by exposing it, for example, to an increased temperature.

[0056] After hardening in the textile, there are alternating, and according to a previously established pattern, hard areas (saturated with hardener) and non-hardened flexible areas (not saturated with hardener).

[0057] In order to do this, a number of conventional preparation techniques, such as, for example, manual impregnation and lamination, the use of preimpregnated and partially polymerized insertions (pre-pregs), fiber spraying, resin injection, reactive injection, wet pressing, sheet or bulk compound moulding, pultrusion, wrapping, steamer treatment, vacuum moulding, etc., can be used in a non-limiting manner.

[0058] For the purpose of better understanding the features of the invention, a preferred embodiment of a method according to the invention and a mattress support made according to said method are described below with a non-limiting character with reference to the attached drawings in which:

Figure 1 schematically shows a perspective view of the embodiment of a mattress support according to the invention;
Figure 2 shows an enlarged detail of the part indicated in Figure 1 with F2;
Figure 3 shows another practical variant of the embodiment shown in Figure 1;
Figure 4 shows on a larger scale a partial section of an enlarged detail of the part indicated as F4 in Figure 3;
Figure 5 shows a cross-section of a mattress support according to line V-V of Figure 3;
Figure 6 shows a general perspective view of a mattress support on which a vertical force is exerted;
Figure 7 shows a cross-section according to line VII-VII of Figure 6 of a reinforced part on which a vertical force is exerted;
Figure 8 shows a perspective view of a supporting construction according to the invention assembled on a foam core and a self-supporting frame for making a composite mattress support.

[0059] Figure 1 schematically shows a perspective view of the embodiment of a mattress support 1 according to the invention in which a textile fabric 2, in this case in the form of a linen fabric, is introduced in a die or mould 3 having the desired profile, in this case in the form of parallel cross members 4 which are oriented at a regular distance from one another in the longitudinal direction 5.

[0060] Upon doing this, the flexible material 2, here in the form of a linen fabric, is folded in the established manner by the profile of the cross members 4, and then it is locally impregnated with a hardening resin.

[0061] After sufficient hardening, the flexible material 2 is removed from the mould or die 3 on which, where appropriate, a suitable release agent was previously applied (not shown), whereby an impression of the profile of the die or mould 3 is formed in or on the flexible material 2, in this case in the form of the previously mentioned

parallel cross members 4, which now appear as reinforcements in or on the flexible material 2.

[0062] Figure 2 shows an enlarged detail of the part indicated in Figure 1 with F2.

[0063] In it, it can more clearly be seen how, for example by means of local impregnation of the flexible material 2 with a hardening substance, after the hardening, both above and below the flexible material 2 reinforcements 6 are formed which are separated from one another by non-reinforced strips 7 which are an impression of the profile that was originally given to the mould or die 3.

[0064] Figure 3 shows a practical variant 8 of the embodiment of Figure 1.

[0065] In this case, the reinforcements are made by additionally containing several layers of folded material 9 one on top of the other in the textile fabric 2, which material 9, where appropriate, can consist of the previously separately folded actual textile fabric 2.

[0066] Figure 4 shows on a larger scale a partial section of an enlarged detail of the part indicated with F4 in Figure 3.

[0067] In it, the structure of the reinforcements 9 of Figure 3 can more clearly be seen, consisting of folded layers of the textile fabric 2 one on top of the other.

[0068] These reinforcements 9 are introduced as insertions in the textile fabric 2 which, as is shown in Figure 1, is furthermore locally reinforced with the reinforcements 6, thanks to the impregnation above and below.

[0069] Multiple reinforced parts, shown in a simplified manner by 6, 9, are thus formed.

[0070] The multiple composite reinforced parts 6, 9 are alternated in this case with non-reinforced parts 7, which consist of non-reinforced textile fabric 2.

[0071] Figure 5 schematically shows a cross-section according to line V-V of Figure 3 of the mattress support 8, consisting of the supporting and elastic structure shown in Figures 3 and 4.

[0072] In it, it can be seen how the hardened strips 12, formed, for example, by means of the impregnation 6 and the containment of the linen fabric 9 folded on itself under the influence of a force indicated with the arrow 10, can move freely with respect to one another, for example, by rotating as indicated in a simplified manner in the direction of the arrows 11.

[0073] Figure 6 shows a general perspective view of a mattress support 1 on which a vertical force is locally exerted in the direction of the arrow 13.

[0074] Said figure shows, simplified by line 14, how this local force followed over a local deformation is caught and distributed by several reinforcements 12, given that the reinforcements 12, which are in the preferred embodiment shown made up of a series of elastic strips separated by non-reinforced textile fabric 7, are interconnected in a physically interactive manner and as a result cooperate in a mechanical manner.

[0075] Figure 7 shows a section according to line VII-VII of Figure 6 of a reinforced part 12 on which a vertical force is exerted according to the arrow 13.

[0076] In it, it can be seen in a simplified manner that by giving a pre-curved concave shape to this reinforced part 12, the vertical force represented by the arrow 13, accompanied by a vertical deformation 14, can be absorbed with this conformation.

[0077] Figure 8 finally shows a perspective view of a supporting elastic construction 15 made as previously mentioned, assembled on a foam core 16 and a self-supporting frame 17 to form a composite mattress support 1 according to the invention.

[0078] The present invention is by no means limited to the embodiment/embodiments and the method described as an example and shown in the drawings, but rather a method and mattress support according to the invention could be carried out in many ways and dimensions without departing from the scope of the invention as a result.

Claims

1. A method for making a mattress support which Is made up of at least one textile fabric as a flexible material and of reinforcements, **characterized in that** the reinforcements (6, 9) are made by arranging the textile fabric in several layers one on top of the other and then locally hardening them with a hardening substance and alternating these pieces with pieces of non-reinforced textile fabric (7).

2. The method according to claim 1, **characterized in that** the reinforcements (6, 9) are made by locally hardening the textile fabric (2).

3. The method according to claim 2, **characterized in that** the hardening is performed under the influence of a hardening substance.

4. The method according to claim 2, **characterized in that** the reinforcements (6, 9) are made by profiling the textile fabric and locally hardening it with a hardening substance.

5. The method according to claim 1, **characterized in that** the textile fabric (2) is selected from the group of natural fiber fabrics, particularly, linen, cotton, sisal, hemp, jute, coconut, kenaf, balsa or the like.

6. The method according to claim 1, **characterized in that** the textile fabric (2) is selected from the group of fabrics made up of synthetic fiber materials, whether or not combined with natural fibers.

7. The method according to one of the previous claims, **characterized in that** the hardening substance is selected from the group of unsaturated polymers, from the group of the two-component resins, or from the group of the heat-setting resins.

8. The method according to claim 11, **characterized in that** furfuryl alcohol or one of its mixtures or derivatives is used as a hardening substance.

9. The method according to one of the previous claims, **characterized in that** the hardening substance is selected from the group of thermoplastic synthetic materials, or more specifically it is made up of a polylactide or one of its derivatives or mixtures thereof.

10. The method according to one of the previous claims, **characterized in that** the hardened pieces are arranged in the form of hardened strips of hardened textile between loose strips (7) of non-hardened textile (2).

11. The method according to one of the previous claims, **characterized in that** the strips of hardened textile are arranged or are made in a pre-curved manner.

12. The method according to one of the previous claims, **characterized in that** the strips of hardened textile are made in an elastic manner and are interconnected in a mechanically interactive manner.

13. The method according to one of the previous claims, **characterized in that** the mattress support (1) is arranged on an elastic layer (16) of synthetic foam, particularly, on polyurethane or polyether foam, or on coil springs.

14. The method according to claim 18, **characterized in that** the mattress support (1) is arranged in a self-supporting structure (17), preferably made of wood or aluminum, and forms an integral part thereof.

15. A mattress support made up of at least one textile fabric as a flexible material and of reinforcements, **characterized in that** the reinforcements (6, 9) are made by arranging the textile fabric in several layers one on top of the other and then locally hardening them with a hardening substance and alternating these pieces with pieces of non-hardened textile fabric (7).

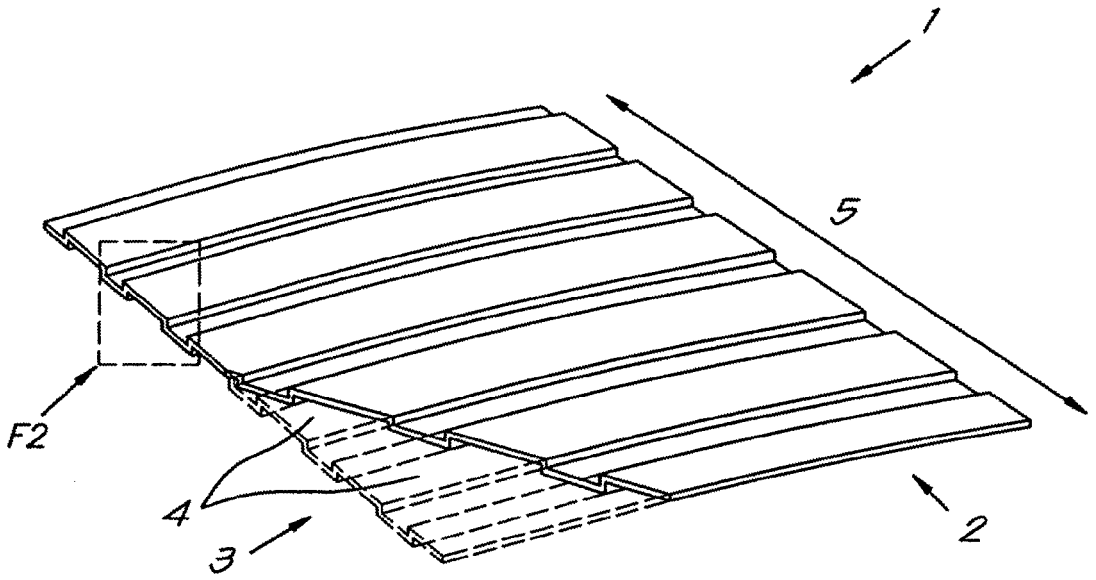

Fig.1

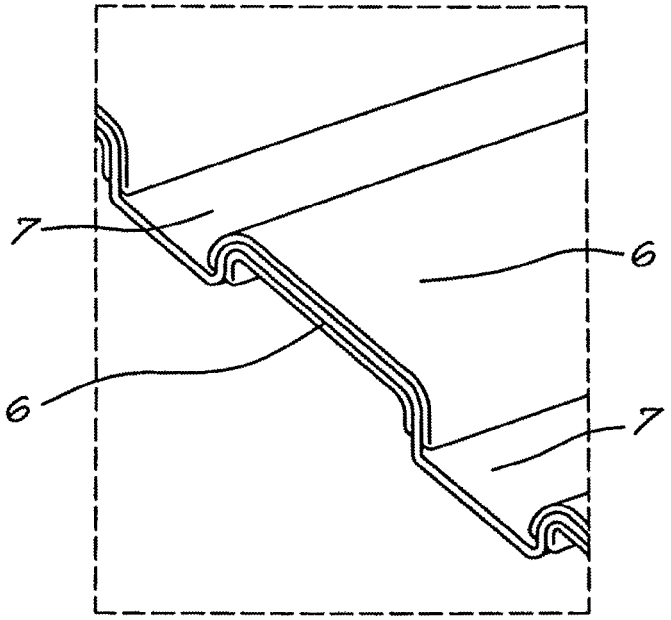

Fig.2

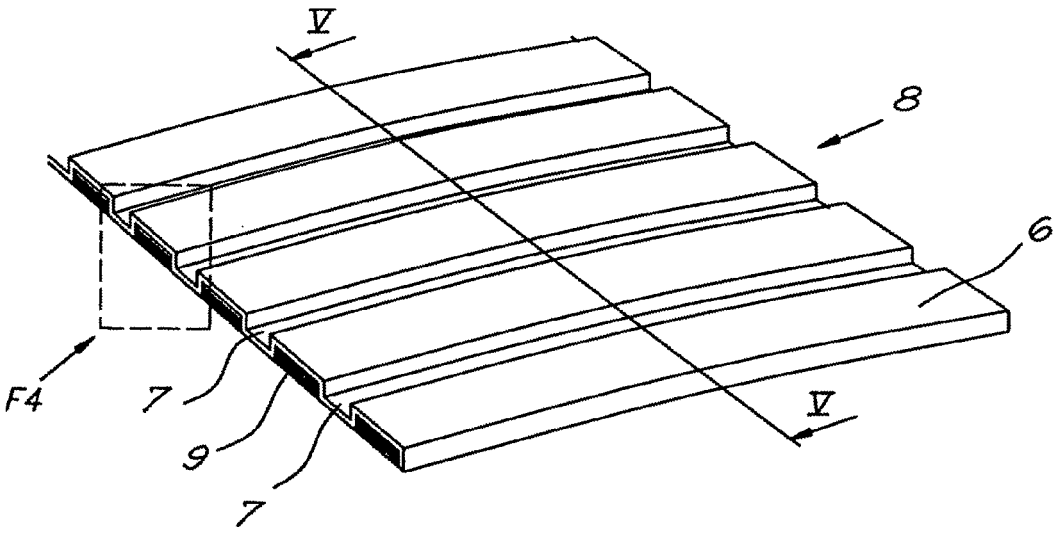

Fig.3

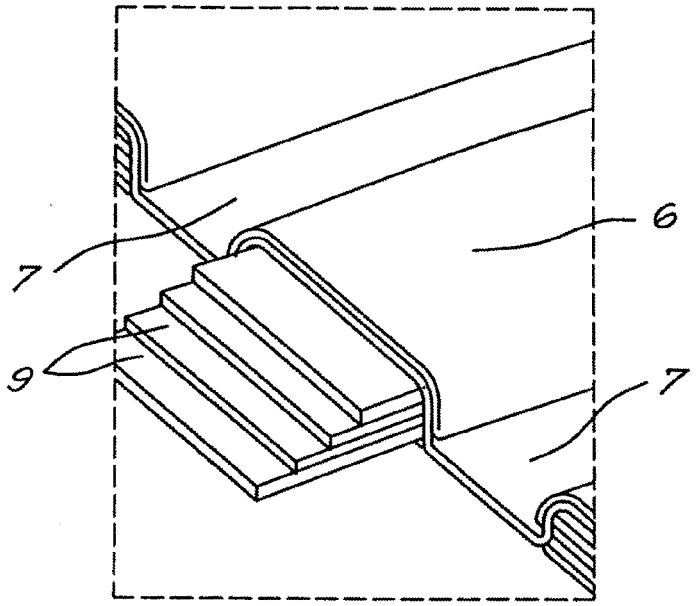

Fig.4

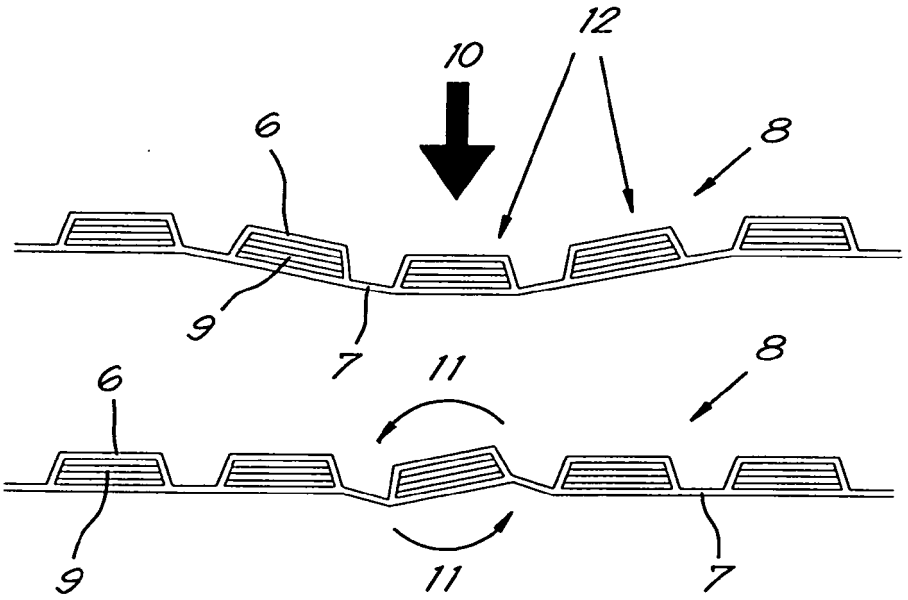

Fig.5

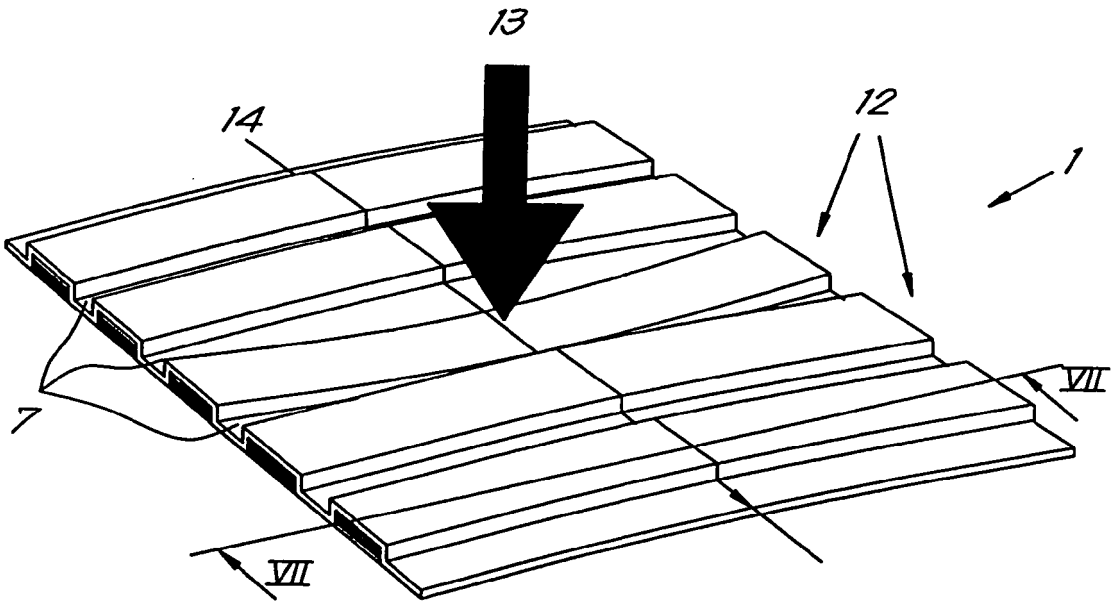

Fig.6

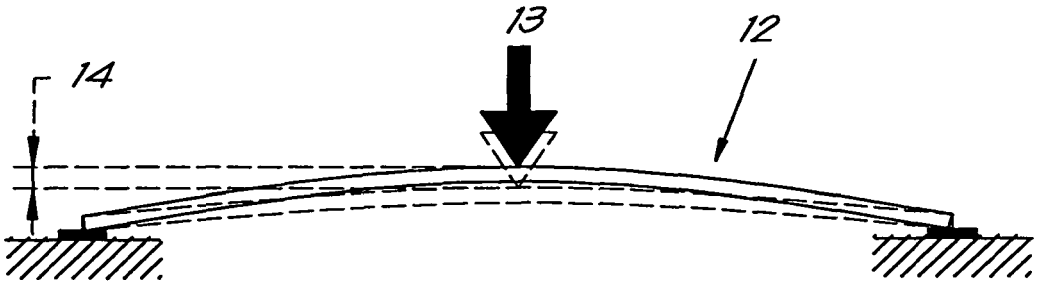

Fig.7

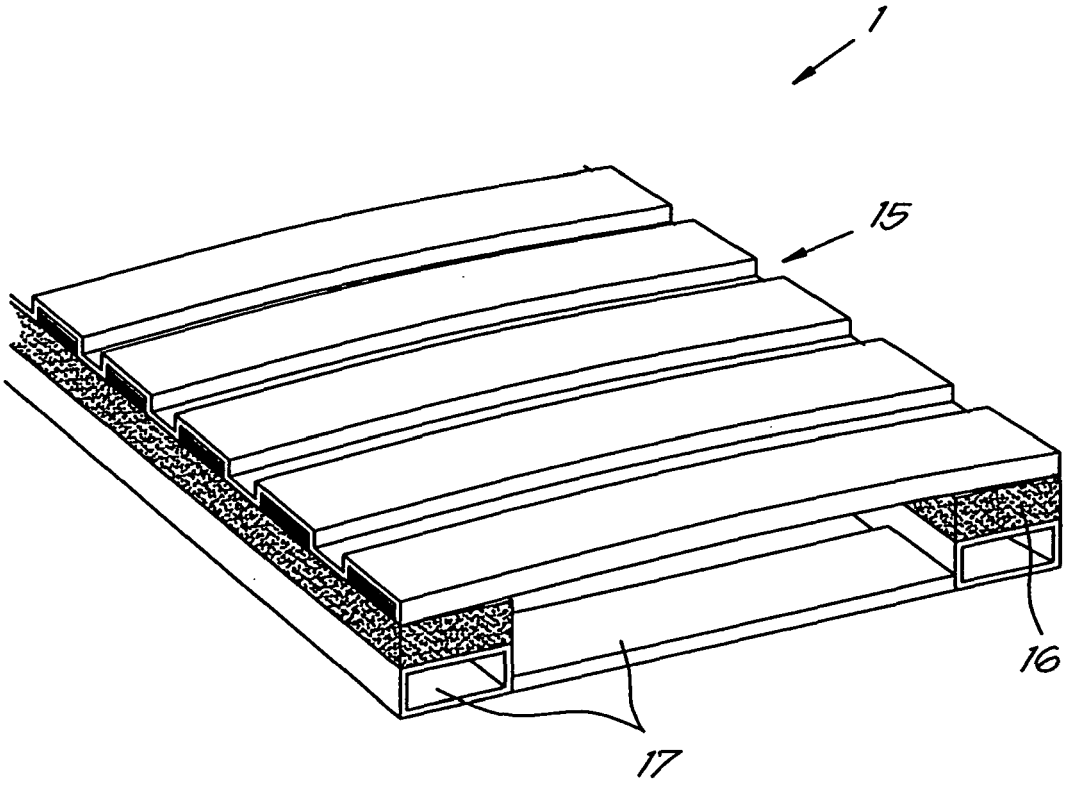

Fig.8

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EUROPEAN SEARCH REPORT

Application Number
EP 10 00 5730

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	5 August 2010	van Bilderbeek, Henk

CATEGORY OF CITED DOCUMENTS

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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