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(54) **HYGIENIC MATTRESS AND METHOD FOR MANUFACTURING THE SAME.**

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Description

The present invention relates to a hygienic mattress intended to be used in hospital care of patients who are bed-ridden during long periods of time, as well as a process for manufacturing said mattress. These patients often are afflicted by bedsores which may be caused by the flat surface of the mattress. These flat mattresses often also are protected by a thin protective cover of a planar plastics material in order to make the mattress waterproof and easy to clean. This thin, waterproof protective cover enhances the disadvantages of the planar mattress regarding the tendency for the patient to develop bedsores. In hospitals and in geriatric nursing mattresses are used today intended for patients who are bed-ridden during long periods of time. These mattresses are often complicated to make and expensive to manufacture, and they are therefore not so commonly used as might be wished. Many patients do today easily develop bedsores due to the fact that they lie on even and tight materials.

One kind of such a mattress is for instance disclosed in US-A-3 258 791, disclosing a hygienic mattress consisting of a body or core including one or several layers and a surface layer covering generally the entire upper surface of the mattress which consists of a shaped layer of a cellular plastic, the side of said layer facing away from the core in section having a profiled surface of the form of a so-called egg-carton-shaped hump structure, i.e. having depressions and elevations mutually interconnected by saddle surfaces in such a way that an elevation is surrounded by four depressions in four mutually orthogonal directions, and connected to four elevations by means of said saddle surfaces, the surface of the layer facing the core having a planar surface.

The main object of the invention is to manufacture a hygienic mattress which prevents the development of bedsores, and which, if such have been developed by the use of a conventional mattress, facilitates the healing of these at the same time that a water proof mattress is obtained which is easy to keep clean and which is easy to manufacture at a reasonable cost.

These and other objects are obtained by means of a hygienic mattress wherein the cellular plastic is of a water repellent type, wherein the surface of the cellular plastic has a cell system which are generally closed to 100 %, forming a surface which per se is waterproof, smooth and water repellent, the mattress thus forming air cushions between the vertically seen lowest points, the hollows, and the saddle surfaces being located between adjacent elevations on which the resting body surface rests, as well as by means of a process for manufacturing the mattress wherein the relatively thin layer of similar plastic with a closed cell system is applied onto a core of polyurethane foam plastic comprising one or several layers by means of for instance glueing, and which core may comprise urethane foam, a core of metal coils or similar. The cellular plastic can be heat-treated by means of hot air in order to close the cells in the plastic to 100 %, whereafter the mattress is cut to a suitable size. Another process is to heat-treat the relatively thin layer of cellular plastic, cut this to a suitable size and to apply this thin layer onto a conventional mattress, for instance of the spring mattress type.

Advantageous developments and embodiments of the hygienic mattress according to the invention has the characteristics defined in claims 2 - 8.

The present invention has many advantages. The process is simple, and the invention makes it possible to give the patients a comfortable surface at a reasonable cost, and makes it easier for the staff to clean the mattress, also with cleaning and disinfectant agencies, including alcohol, simultanously that a mattress with a low weight is obtained. It is relatively simple to manufacture hygienic mattresses for different weight classes and sizes.

By means of the structure of the surface, air cushions are formed between the lowest points of the mattress and the saddle surfaces, on which cushions the body rests, and the mattress is therefore very suitable for patents having bedsores. Since the tips also massage the body surface, the blood circulation is enhanced, facilitating the healing of bedsores and preventing the development thereof.

For people suffering from incontinence the mattress functions in such a way that the urine is collected in the hollows and the person lies quite dry and does not need to use diapers. The mattress can easily be flushed clean and the bed can be reused immediately. If persons, for instance hospital staff having tired backs due to the lifting and the turning of patients, rest on a mattress according to the invention, tests show that these persons feel an appreciable rest of the back. This is due to the massaging effect of the mattress.

It has also been found that the mattress is suitable for patient with wounds such as burns or similar, since air having different temperatures can be circulated in the hollows, and the healing is facilitated since the mattress decreases the contact surface of the body against the bed and distributes the pressure of the mattress in an advantageous way over the whole body, thus minimizing the formation of moisture and heat between the body and the bed.

The hygienic mattress has proved to have a service life being about double the service life of a conventional hygienic mattress. The mattress does not need a plastic cover and/or mattress cover. No complicated accessories in the form of apparatuses or motors, requiring reparations and maintenance and which emit disturbing, droning noices, need to be used.

The invention will now be described more closely with reference to the preferred embodiments shown in the attached drawings by way of examples only:

Fig. 1 shows a sectional view in section of the hygienic mattress with the surrounding layer cut away and with the core projecting.

Fig. 2 shows the hygienic mattress in section seen from the side.

Fig. 3 shows a hygienic mattress in section seen from the side with a surface layer not covering the mattress entirely and which has a core consisting of several layers.

Fig. 4 shows examples of different hump profiles of the surface layer seen in perspective.

Fig. 5 shows the process according to the invention.

Figs. 1 and 2 show the invention wherein the surface layer consists of a profiled cellular polyethylene plastic having a cell system closed to 100 % which entirely surrounds a core or body comprising one or several layers of for instance polyurethane foam plastic.

This mattress core can consist of a homogenous block of polyurethane foam plastic or of two or several layers having a surface which is profiled on one side and even on the other side, the layers being located on the top of each other with the profiled surfaces facing each other and with a rigid sheet interposed between the layers, but the core may also comprise a conventional spring mattress.

Fig. 3 shows the invention wherein the surface layer of profiled cellular polyethylene plastic only covers part of the core or body 2. It is also shown that the body may comprise several layers, as for instance a profiled sheet 3 of polyurethane foam plastic, or a sheet of polyethene 4 and a sheet 5 of profiled polyurethane foam plastic.

Fig. 4 shows different profiles of humps suitable for use in connection with the invention.

Fig. 5 shows how the profiled cellular polyethylene plastic having a closed cell system is applied around the core or body 2, is cut and glued onto the core and is heat treated in order to seal the pores to 100 %.

These profiles are obtained in that a block of cellular plastic of polyethelene 6 is moved between two profiled rollers 7, 8, compressing the cellular polyethylene plastic with a great pressure in a zig-zag pattern.

The compressed cellular polyethylene plastic is then cut horizontially at about half its height by means of a knife 9, a permanent "egg-carton-like" configuration 10 thus being obtained on one side, and a planar, cut surface on the other side 11.

By wearing the thickness of the cellular polyethylene plastic, and by varying the pressure on the rollers, profiles with different heights and layers with different thicknesses may be obtained.

When this process is finished, the planar side of this layer is moved over a applicator 12 for applying an adhesive, and this surface is then attached to the mattress core, and a slight pressure 13 is applied in order to obtain a good contact so that the surface may be attached to the core.

A heat threatment by means of hot air 14 is performed in order to close the cells to 100 %.

The core with the glued, water repellent layer is then cut to a suitable size.

Within the scope of the invention it is also advantageous to move a block of cellular polyethylene plastic 6 through two profiled rollers 7, 8 which compresses the cellular polyethylene plastic with a great pressure in a zig-zag pattern. The compressed cellular polyethylene plastic is then cut horizontally at about half its height by means of a knife 7 which results in a permanent "egg-carton-like" hump structure 10, i.e. elevations respectively depressions which mutually are interconnected by means of saddle surfaces in such a way that an elevation is surrounded by four depressions in mutually orthogonal directions and is connected to four elevations by means of said saddle surfaces. The profiled, relatively thin layer of cellular polyethylene plastic is then heat-treated and cut into suitable lengths in order to fit a core which is to be covered by the layer. This profiled, thin layer of cellular polyethylene plastic is than applied arround the core and joined for instance by its short ends by means of for instance Velcro tapes, in order the layer may be easily dismountable. The core may comprise a conventional mattress of the spring mattress type, or may be other cushions, used for instance in chairs, sofas, wheel chairs or seats in cars and buses. By varying the height of the profiles, hygienic mattresses which are suitable for different weight classes are obtained. The larger the distance between the tips and valleys is, the greater the weight of the persons which is to use the mattress may be. Furthermore, the distance between the tops in the horizontal direction may be varied in dependence of the weight and the size of the user. A suitable mattress for a desired weight class can be made easily identifiable by colouring for instance the profiled plastic layer 1 in different colours, a blue colour on the profiled plastic may for instance be suitable for the weight class 75 - 85

kg, red for 65 - 75 kg, green for 55 -65 kg, yellow for 45 - 55 kg etc. In this way the storing and handling of the mattress according to the invention is facilitated both in the stores, at the large consumers, i.e. hospitals and institutions for geriatric nursing.

When the mattress according to the invention was tested in Autumn 1988 at the "Löwenströmska sjukhuset", ward 20 (patients suffering from senile dementia) the following results were obtained:

1. Woman born 1917, weight 46 kg. Suffering from incontinence and confined to a wheel chair. Lies in bed from about 19.00 to 09.00. Was given a mattress August 1988. Had sores earlier, but no sores today.
2. Woman born 1910, weight 36,9 kg, very thin. Sits in a relax chair, suffers from incontinence. Lies in be from about 14.30 to 09.30. Was given a mattress August 17, 1988. Did earlier develop bedsores which often returned. After having received the new mattress the bedsores disappeared within a few days. No new sores since about two months.
3. Woman born 1908, weight 35 kg. Confined to a wheel chair. Lies in bed from about 19.00 to 09.00. Was given the mattress in the period September 30, 1988 - October 20, 1988 when she was hospitalized for relief. Is normally nursed at home. She did earlier have sores, which disappeared during the stay at the hospital.
4. Man born 1922, weight 62,5 kg. Sits in a relax chair, suffer from incontinence, often diarrhoea. Lies in bed from about 14.30 to 10.00. Was given a mattress October 13, 1988. Had a small sore at the cleavage of the back. The sore had been healed October 14, 1988.
5. Woman born 1903, weight 54 kg. Sits in a relax chair. Lies in bed from about 18.30 to 09.30. Was given a mattress October 20, 1988. She earlier was red on buttocks and back and did sometimes also develop small sores. Has been better since she was given the mattress and is now free of sores.

The invention is not limited to the embodiments shown in the attached drawings and described in connections with these, and modifications may be conceived within the scope of the attached claims.

Claims

1. Hygienic mattress or cushion for counteracting bedsores and similar, comprising a body or core (2) including one or several layers and a surface layer (1) consisting of a shaped layer of a cellular plastic (1) covering generally the entire upper surface of the mattress, the side of said layer facing away from the core having a profiled surface in the form of a so-called egg-carton-shaped hump structure (10), i.e. having depressions and elevations mutually interconnected by saddle surfaces in such a way, that an elevation is surrounded by four depressions in four mutually orthogonal directions, and is connected to four elevations by means of said saddle surfaces, the surface of the layer facing the core having a planar surface (11), **characterized** in that the cellular plastic is of a water repellent type, that the surface of the cellular plastic has a cell system which is generally closed to 100 %, forming a surface which is per se is waterproof, smooth and water repellent, the mattress forming air cushions between the vertically seen lowest points, the hollows, and the saddle surfaces being located between adjacent elevations, when in direct contact with a human body.

2. Hygienic mattress or cushion according to claim 1, **characterized** in that the body or core (2) of the mattress consists of a polyurethane foam plastic made in one block.

3. Hygienic mattress or cushion according to claim 1, **characterized** in that the body or core of the mattress comprises two layers of polyurethane foam plastic and is planar on one side and profiled on the other side, the layers being located on top of each other with the profiled surfaces facing the center of the core, a planar, rigid sheet being interposed between the layers.

4. Hygienic mattress or cushion according to claim 1, **characterized** in that the body or core of the mattress comprises a spring mattress of a conventional type.

5. Hygienic mattress or cushion according to claim 1, **characterized** in that the under side of the mattress is covered by the profiled layer of cellular plastic.

6. Hygienic mattress or cushion according claim 1, **characterized** in that the profiled layer of plastic entirely surrounds the core of the mattress.

7. Hygienic mattress or cushion according to claim 1, **characterized** in that the profiled layer is made of a polyethylene foam plastic.

8. Hygienic mattress or cushion according to claim 1, **characterized** in that the heights of the tips of the profilations of the profiled layer

vary.

9. Process for manufacturing a hygienic mattress or cushion according to claim 1, **characterized** by the steps

1) a block of cellular plastic is moved between two profiled rollers which under great pressure compresses the cellular plastic in points located in a zig-zag pattern,

2) the deformed block of cellular plastic is cut horizontally at a level corresponding to about half the height, by which means a layer is formed which is planar on one side and which on the other side displays an egg-carton-like hump structure,

3) an attachment means is applied onto the planar side,

4) the planar surface is then pressed against the surface of the mattress core,

5) the surface shaped with humps is then heat-treated and

6) a suitably sized mattress is cut.

10. Process for manufacturing a hygienic mattress or cushion according to claim 4, **characterized** by the steps

1) a block of cellular plastic is moved between two profiled rollers compressing the cellular plastic under a great pressure in points located in a zig-zag pattern,

2) the deformed block of cellular plastic is then cut horizontally at about half its height, by which means a layer is formed which on one side is planar and whose other side displays a so-called egg-carton-shaped hump structure,

3) the surface with humps is heat-treated, for instance with hot air,

4) a suitably size is cut,

5) attachment means, if any, is attached to the short ends of the layer, and the layer is applied around a conventional spring mattress.

Patentansprüche

1. Hygiene-Matratze oder -Kissen zum Angehen gegen das Wundliegen und dergleichen, aufweisend einen Körper oder Kern (2) mit einer oder mehreren Schichten, und eine Oberflächenschicht (1), die aus einer geformten Schicht aus einem Schaumkunststoff (1) besteht und im wesentlichen die gesamte obere Fläche der Matratze bedeckt, wobei die von dem Kern wegweisende Seite der Schicht eine Profiloberfläche in Form einer sogenannten eierkartonförmigen Höckerstruktur (10) aufweist, d.h. Vertiefungen und Erhöhungen hat, die durch Satteloberflächen so wechselseitig miteinander verbunden sind, daß eine Erhöhung von vier Vertiefungen in vier zueinander orthogonalen Richtungen umgeben ist und mit vier Erhöhungen durch die Satteloberflächen verbunden ist, wobei die dem Kern zugewandte Oberfläche der Schicht eine ebene Oberfläche (11) hat, **dadurch gekennzeichnet**, daß der Schaumkunststoff ein wasserabstoßender Schaumkunststoff ist, daß die Oberfläche des Schaumkunststoffs ein Zellsystem aufweist, das im wesentlichen zu 100 % geschlossen ist und eine Oberfläche bildet, die als solche wasserdicht, glatt und wasserabstoßend ist, und daß die Matratze Luftkissen zwischen den senkrecht gesehen niedrigsten Punkten, den Höhlungen, und den zwischen benachbarten Erhöhungen befindlichen Satteloberflächen bildet, wenn sie in direktem Kontakt mit einem menschlichen Körper ist.

2. Hygiene-Matratze oder -Kissen gemäß Anspruch 1, **dadurch gekennzeichnet**, daß der Körper oder Kern (2) der Matratze aus einem in einem Block hergestellten Polyurethanschaumkunststoff besteht.

3. Hygiene-Matratze oder -Kissen gemäß Anspruch 1, **dadurch gekennzeichnet**, daß der Körper oder Kern der Matratre zwei Polyurethanschaumkunststoffschichten aufweist, auf einer Seite eben und auf der anderen Seite profiliert, wobei die Schichten mit den profilierten Oberflächen zur Mitte des Kerns weisend übereinander angeordnet sind, und ein ebenes, starres Flachmaterialstück zwischen den Schichten angeordnet ist.

4. Hygiene-Matratze oder -Kissen gemäß Anspruch 1, **dadurch gekennzeichnet**, daß der Körper oder Kern der Matratze eine Sprungfedermatratze herkömmlicher Art aufweist.

5. Hygiene-Matratze oder -Kissen nach Anspruch 1, **dadurch gekennzeichnet**, daß die Unterseite der Matratze von der profilierten Schaumkunststoffschicht bedeckt ist.

6. Hygiene-Matratze oder -Kissen gemäß Anspruch 1, **dadurch gekennzeichnet**, daß die profilierte Kunststoffschicht den Kern der Matratze vollständig umgibt.

7. Hygiene-Matratze oder -Kissen gemäß Anspruch 1, **dadurch gekennzeichnet**, daß die profilierte Schicht aus Polyethylenschaumkunststoff hergestellt ist,

8. Hygiene-Matratze oder -Kissen gemäß Anspruch 1, **dadurch gekennzeichnet**, daß die Höhen der Spitzen der Profilierungen der profilierten Schicht variieren.

9. Verfahren zur Herstellung einer Hygiene-Matratze oder eines Hygiene-Kissens gemäß Anspruch 1, **gekennzeichnet durch** die Schritte;
   1) Ein Schaumkunststoffblock wird zwischen zwei Profilwalzen bewegt, die den Schaumkunststoff unter großem Druck an in einem Zickzackmuster angeordneten Stellen zusammenpressen,
   2) der verformte Schaumkunststoffblock wird horizontal auf einem Niveau, das etwa der Hälfte der Höhe entspricht, geschnitten, wodurch eine Schicht gebildet wird, die auf der einen Seite eben ist und die auf der anderen Seite eine eierkartonartige Höckerstruktur zeigt,
   3) eine Befestigungsseinrichtung wird auf der ebenen Seite angebracht,
   4) die ebene Oberfläche wird dann gegen die Oberfläche des Matratzenkerns gedrückt,
   5) die mit Höckern ausgebildete Oberfläche wird dann wärmebehandelt und
   6) es wird eine Matratze von geeigneter Größe geschnitten.

10. Verfahren zur Herstellung einer Hygiene-Matratze oder eines Hygiene-Kissens gemäß Anspruch 4, **gekennzeichnet durch** die Schritte:
   1) Ein Schaumkunststoffblock wird zwischen zwei Profilwalzen bewegt, den Schaumkonststoff großen Druck an in einem Zickzackmuster angeordneten Stellen zusammenpressen,
   2) der verformte Schaumstoffblock wird dann horizontal in etwa der Hälfte seiner Höhe geschnitten, wodurch eine Schicht gebildet wird, die auf der einen Seite eben ist und deren andere Seite eine sogenannte eierkartonförmige Höckerstruktur zeigt,
   3) die Oberfläche mit Höckern wird wärmebehandelt, zum Beispiel mit Heißluft,
   4) es wird eine geeignete Größe geschnitten,
   5) eine eventuelle Befestigungseinrichtung wird an den kurzen Enden der Schicht angebracht, und die Schicht wird um eine herkömmliche Sprungfedermatratze herum angebracht.

Revendications

1. Matelas ou coussin hygiénique pour soigner des escarres et analogue, comportant un corps ou noyau (2) comportant une ou plusieurs couches et une couche de surface (1) constituée d'une couche formée de matière plastique cellulaire (1) recouvrant de manière générale la totalité de la surface supérieure du matelas, le coté de ladite couche éloigné du noyau ayant une surface profilée sous la forme d'une structure vallonnée (10) appelée en forme de carton à oeufs, c'est-à-dire comportant des bosses et des creux reliés mutuellement par des surfaces en forme de selle de telle sorte qu'une bosse est entourée par quatre creux s'étendant dans quatre directions mutuellement orthogonales, et est reliée à quatres bosses par l'intermédiaire desdites surfaces en forme de selle, la surface de la couche dirigée vers le noyau étant une surface plane (11), caractérisé en ce que la matière plastique cellulaire est du type hydrofuge, en ce que la surface de la matière plastique cellulaire a un système cellulaire qui est de manière générale fermé à 100%, en formant une surface qui est en soi étanche à l'eau, douce et hydrofuge, le matelas formant des coussins d'air entre les points les plus bas dans la direction verticale, les creux, et les surfaces en forme de selle étant situées entre des bosses adjacentes, lorsqu'il est en contact direct avec un corps humain.

2. Matelas ou coussin hygiénique selon la revendication 1, caractérisé en ce que le corps ou noyau (2) du matelas est constitué d'une matière plastique en mousse de polyuréthanne fabriquée en un seul bloc.

3. Matelas ou coussin hygiénique selon la revendication 1, caractérisé en ce que le corps ou le noyau du matelas est constitué de deux couches de matière plastique en mousse de polyuréthanne et est plan sur un côté et profilé sur l'autre côté, les couches étant situées l'une au-dessus de l'autre, les surfaces profilées étant dirigées vers le centre du noyau, une feuille rigide plane étant interposée entre les couches.

4. Matelas ou coussin hygiénique selon la revendication 1, caractérisé en ce que le corps ou le noyau du matelas est constitué d'un matelas à ressorts de type classique.

5. Matelas ou coussin hygiénique selon la revendication 1, caractérisé en ce que le côté inférieur du matelas est recouvert par la couche profilée de matière plastique cellulaire.

6. Matelas ou coussin hygiénique selon la revendication 1, caractérisé en ce que la couche

profilée de matière plastique entoure entièrement le noyau du matelas.

7. Matelas ou coussin hygiénique selon la revendication 1, caractérisé en ce que la couche profilée est réalisée en matière plastique en mousse de polyéthylène.

8. Matelas ou coussin hygiénique selon la revendication 1, caractérisé en ce que les hauteurs des crêtes des profils de la couche profilée varient.

9. Procédé de fabrication d'un matelas ou d'un coussin hygiénique selon la revendication 1, caractérisé en ce qu'il comporte les étapes suivantes :

1) un bloc de matière plastique cellulaire est déplacé entre deux rouleaux profilés qui compriment sous forte pression la matière plastique cellulaire à des emplacements situés selon un dessin en zigzag,
2) le bloc déformé de matière plastique cellulaire est découpé horizontalement à un niveau correspondant à environ la moitié de la hauteur, de telle sorte qu'une couche soit formée qui est plane sur un côté et qui sur l'autre côté affiche une structure vallonnée analogue à un carton à oeufs,
3) des moyens de fixation sont appliqués sur le côté plan,
4) la surface plane est ensuite appuyée contre la surface du noyau de matelas,
5) la surface formée de vallonnements est ensuite traitée à chaud et
6) un matelas de dimensions adaptées est découpé.

10. Procédé de fabrication d'un matelas ou d'un coussin hygiénique selon la revendication 4, caractérisé en ce qu'il comporte les étapes suivantes :

1) un bloc de matière plastique cellulaire est déplacé entre deux rouleaux profilés comprimant la matière plastique cellulaire sous une forte pression à des emplacements situés selon un dessin en zigzag,
2) le bloc déformé de matière plastique cellulaire est ensuite découpé horizontalement au niveau d'environ la moitié de sa hauteur, moyen par lequel une couche est formée qui sur un côté est plane et dont l'autre côté affiche une structure vallonnée appelée en forme de carton à oeufs,
3) la surface munie de vallonnements est traitée à chaud, par exemple à l'aide d'air chaud,
4) une découpe de dimensions adaptées est réalisée,
5) des moyens de fixation, s'il y en a, sont fixés aux extrémités courtes de la couche et la couche est appliquée autour d'un matelas classique à ressorts.

Fig. 1

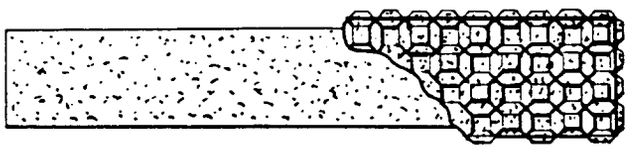

Fig. 2

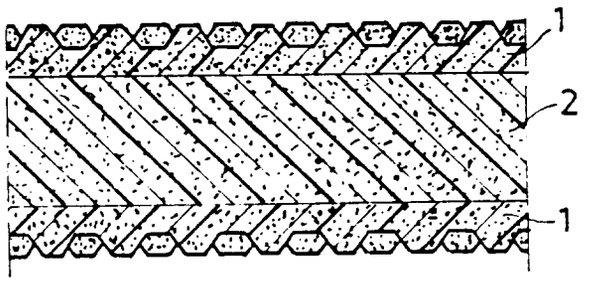

Fig. 3

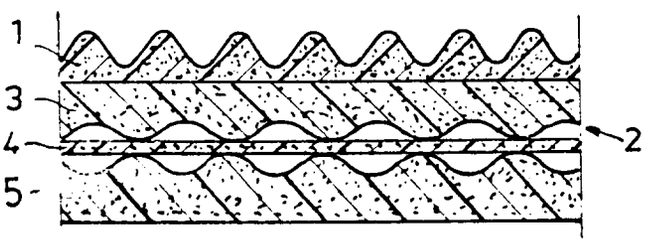

Fig. 4

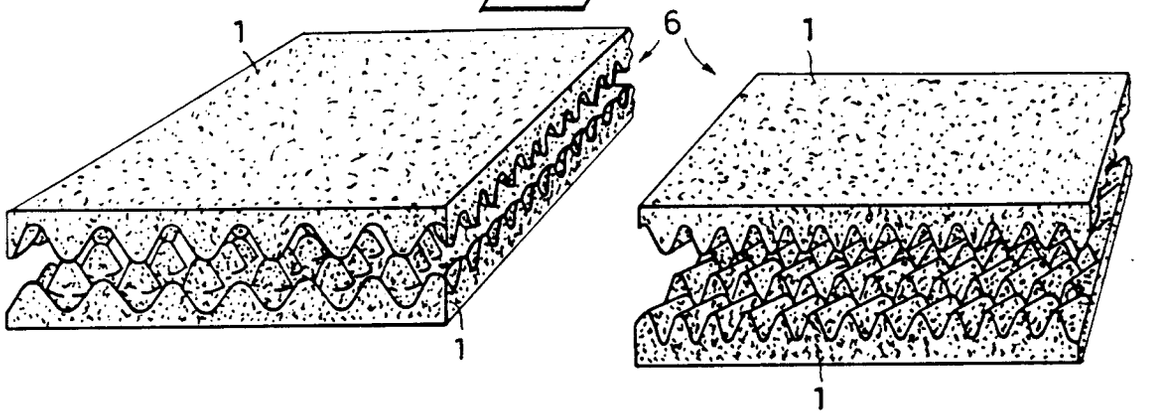

Fig. 5