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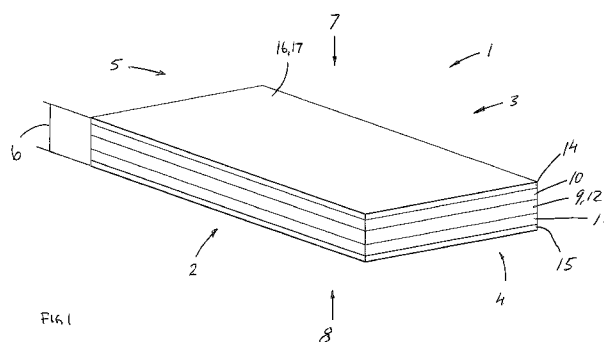
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(54) **Title:** MATTRESS



(57) **Abstract:** Mattress (1), intended to be used to reduce the risk of bedsores occurring on a person that lies on or in another manner resides on a mattress (1), said mattress (1) comprised of at least one center part (9) whose one side is provided with at least one first outer material layer (14) and at least one first intermediate material layer (10) and on its other side is provided with at least one second outer material layer (15) and at least one second intermediate material layer (11). The center part (9) includes at least one first material layer (12) which includes several holes (13), in the material layer's (12) transverse direction or essentially transverse direction, and that the holes (13) are distributed in at least the area of the mattress (1) on which a person during normal use lies on, and that the mattress includes at least one cover (16), or the like, said cover (16) being laminated with an excess amount of material, and that the cover's layer or layer's (17) elasticity stretches to at least 500 percent.

Mattress

Field of the Invention

The present invention concerns a mattress in accordance with the claims.

Background of the Invention

5 Mattresses and other types of cushioned pads have long been used to increase comfort for people who for various reasons need to lie down. Through the ages mattresses have developed in countless different variants for several different purposes. Mattresses have been further developed and adapted to the preferences and needs of different users. If a mattress is used only during sleep, such as for nighttime rest, the mattress is mostly tailored to the user's
10 personal preferences and requirements, such as hardness and size and body type, such as height, weight and so on. If a mattress is to be used by a bedridden person or a person who spends all or substantially all of their time in bed, such as in health care situations, it is then also necessary to take into account the specific problems arising from the prolonged use of the mattress.

15 A specific problem arising from prolonged bed rest (use of a mattress) is that the bedridden person runs the risk of developing so-called bedsores also called pressure ulcers, pressure sores or decubitus ulcers. Bedsores cause great inconvenience and suffering for those who suffer from them. Further, bedsores that arise in health care situations usually degrade the perceived quality of the performed medical treatment and the costs of treating these bedsores
20 may be substantial. The costs of treating chronic bedsores are relatively well documented. According to Reddy M, Gill SS, et al. "Preventing Pressure Ulcers - A Systematic Review" (JAMA 2006; 296:974-984), the total annual cost of treatment of bedsores in the United States alone amounts to more than 40 billion SEK, with a cost per patient of between 15 000 to 200 000 SEK. A similar cost structure also appears in Swedish studies. Bedsores occur for
25 example on the lower back, heels, shoulder blades, back of the head and tuber ischiadicum.

Currently, there exists a need for a mattress which reduces the risk for bedridden persons of contracting bedsores compared to known types of mattresses. Known types of mattresses, such as mattresses which include a wave-formed surface, essentially give no or a very limited pressure relief to the user. These mattresses may even be disadvantageous for the users of
30 them because these mattresses crease (crinkle) or the like when the user lies down on them.

Another problem with existing mattresses is that they are difficult to clean and kept clean in a cost effective and easy manner, and that they easily spread infections. In order to avoid spreading infection mattresses are many times provided with at least one protective layer of material that encloses the mattress and this layer may be easily cleaned. There are problems with many of the known types of protective material layers (covers) for mattresses. One of these problems consists of problems with wrinkling (creasing, crinkling) of the material layer when the patient lies on the mattress.

Prior Art

Mattresses intended to reduce the risk of bedsores occurring are previously known. For example, US5 179742 describes a mattress with a pressure reducing effect. The mattress has a bottom part, a center part, an upper part and a cover. The bottom part is comprised of a thin foam rubber portion. The upper part is comprised of one or two layers of foam rubber which are provided with indentations. These indentations are hemispherical and are arranged in rows and columns. The indentations that are shown and described in US5 179742 are however placed in the part that connects to the covering. The mattress according to its description differs to a significant extent from the design in accordance with the present patent application.

A variant of a cushion for a wheelchair that is composed of several layers of which the middle layer contains holes is shown and described in US3987507. The holes are positioned so that pressure is distributed more evenly. The holes are filled with a material which is softer than the surrounding material. The cushion according to its description differs to a significant extent from the design in accordance with the present patent application.

Even US6854144 shows and describes a mattress with through holes. The holes are intended to be filled with a material which is softer than the surrounding material. The mattress according to its description differs to a significant extent from the design in accordance with the present patent application. For example, the mattress does not provide the corresponding relief of pressure such as the present mattress does.

A variant of a mattress comprising a plurality of layers stacked on each other is also described in US58 19349. The different layers may have different hardness. The hardness varies in the longitudinal direction of the mattress. The mattress according to its description differs to a significant extent from the design in accordance with the present patent application.

Another variant of a mattress comprising a plurality of layers stacked on each other with a middle layer containing holes is also described in US5669094. The mattress according to its description differs to a significant extent from the design in accordance with the present patent application. For example the different layers of the mattress have different thicknesses within specific intervals and only the top layer consists of a visco-elastic layer. Further the mattress according to its description does not include a covering layer or the like that completely or partially surrounds the mattress having an elasticity which allows stretching to at least 500 percent.

Even GB2244000A describes a variant of a mattress comprised of a plurality of layers stacked on each other. The mattress according to its description differs to a significant extent from the design in accordance with the present patent application, cover or the like that completely or partially surrounds the mattress, and that the material layer's elasticity stretches to at least 500 percent

Brief Description of the Invention Concept

The main purpose of the present invention is to create an improved mattress, intended to reduce the risk of bedridden persons and other long-term users contracting bedsores. Another purpose of the present invention is to create a mattress favorable for rehabilitation of patients suffering from bedsores. Yet another purpose is to create a mattress that leads to improved resting (sleep) comfort for the person using (lying on) the mattress. A further purpose of the present patent application is to create a mattress which meets medical requirements. A still further purpose of the present patent application is to create a mattress which is easy to keep clean. An additional purpose of the present patent application is to create a mattress that is cost-effective to manufacture.

Brief Description of the Drawings

In the following detailed description of the present invention, reference and references to the figures will occur. Each figure is briefly described in the following figure list. The exemplifying embodiments of the mattress in the figures are not limiting for the scope of protection of the present patent application. Note that the figures are schematic and details may thus be omitted in these.

Fig. 1 shows schematically a mattress in accordance with a first embodiment the present invention.

Fig. 2 shows schematically a mattress in accordance with a second embodiment the present invention.

Fig. 3 shows a cross-sectional view of a mattress in accordance with the present patent application.

5 Fig. 4 shows the center part in more detail.

Fig. 5 shows a center part including a first and a second part with holes.

Fig. 6 shows examples of different types of holes.

Detailed Description of the Invention

With reference to the figures a mattress **1** in accordance with the present patent application is shown. The mattress **1**, in the exemplifying embodiment has a rectangular shape and includes at least one first long side **2**, at least one second long side **3**, at least one first short side **4** and at least one second short side **5**. The mattress **1** further has at least one measure of thickness **6** between the topside **7** of the mattress and the underside **8** of the mattress. In an alternative embodiment, the thickness may vary across the expanse (spread) of the mattress. The rectangular dimensions of the mattress in regards to width and length may vary within the scope of the present patent application.

In alternative embodiments, it is conceivable that the mattress **1** has a different shape that is suitable for the purpose. It is thus for instance conceivable that the mattress has a square, multi-angular, or a rounded shape. The mattress may further also be comprised of a combination of different geometric shapes.

The mattress **1** is comprised of at least one center part **9** and at least one first (intermediate) layer of material (stratum or the like) **10** on one side of the center part **9** of the mattress and at least one second (intermediate) layer of material (stratum or the like) **11** on the other side of the center part **9** of the mattress.

25 The center part **9** is comprised of at least one material layer **12**. In the exemplifying embodiment, the center part **9** consists of one material layer **12**. The material in the center part **9** is preferably composed of a foam material. The foam material may for example be comprised of a foam material of the Waterlilly ® type.

The material layer in the center part 9 in the preferred embodiment is provided with a plurality of holes 13, a series of holes or the like, which in the preferred embodiment extend through the thickness 6 of the mattress. The holes 13 are intended to contribute to a relief of pressure on the user's body where bedsores normally occur. The holes 13 allow the material in the surrounding material layer, relative to the holes, when for example burdened by a person lying on the mattress, to be pushed into the holes and thereby change the shape of the center layer. An adaptation to the user may thus take place in an efficient manner.

The first material layer 10 and the second material layer 11 may be of the same type of material. In alternative embodiments, the first material layer 10 and the second material layer 11 may be of various types of materials. In the exemplifying embodiment, at least one of the material layers 10 and 11 includes a visco-elastic foam material. The visco-elastic foam material has the advantage that it becomes softer and softer as its temperature (warmth) increases. In a preferred embodiment of the present mattress, both the first material layer 10 and the second material layer 11 may consist of a visco-elastic foam material.

The mattress 1 is further comprised of at least one first outer material layer 14 on one side of the mattress and at least one second outer material layer 15 on the other side of the mattress. The outer material layers consist preferably an ultra-soft foam material. The ultra-soft material may vary within the scope of the present patent application.

Furthermore, the thickness 6 of the mattress 1 may vary within the scope of the present patent application. Preferably, however, the thickness 6 of the mattress allows for it to be perceived as comfortable by the user. In the exemplifying embodiment, the thickness of the mattress lies within a range of 80 to 250 millimeters. Preferably, the mattress has a thickness measuring 200 millimeters. Further, the thickness of the mattress may vary across the expanse (spread) of the mattress.

In alternative embodiments, the center part 9 may consist of at least one first material layer 12 and at least one second material layer 12. In alternative embodiments, the center part may consist of additional material layers. The choice of the number of material layers in the center part is determined by the method of manufacture or by other reasons. In the alternative embodiment, the center part 9 of the mattress is therefore manufactured with a series of holes in the first material layer 12 that essentially coincide with the series of holes in the second material layer 12 as shown in Fig. 5. In alternative embodiments, it is conceivable that the

holes, series of holes placement and position in the first material layer 12 differs from the placement and position of the series of holes in the second material layer 12.

Referring to Fig. 6, it is shown that the shape of the cross-section of the holes 13 may vary within the scope of the present patent application. For example, the cross-section of the holes 13 may be round, oval, triangular, square, pentagonal, hexagonal, or have another suitable for the purpose multi-angular shape. It is also conceivable that the cross-section of the holes 13 is star-shaped, or has another for the purpose uniform or irregular shape. It is also conceivable that the cross-section of the holes 13 varies over the center part's expanse (by expanse is meant the lying area of the mattress or the area of the mattress 1 where a person during normal use lies on the mattress).

The distribution of the holes 13 over the center part's expanse of the mattress may vary greatly within the scope of the present patent application. The holes may, for example, over the expanse of the mattress be spread into rows and columns. The mutual spacing of the holes in the center part's longitudinal direction as well as transverse direction may be essentially constant. In alternative embodiments, however, the distance between the holes 13 may vary over the expanse of the mattress.

In an alternative embodiment, it is conceivable that the mattress be comprised of an additional layer of material. It is thus conceivable that the mattress includes a layer of material such as for example a cover 16 or other surrounding (enveloping) material layer. The cover 16 or material layer completely or partially encloses the topside, the bottom side, the first long side, the second long side, the first short side and the second short side of the mattress. The cover 16 consists of at least one material layer 17. In alternative embodiments, the cover may be comprised of multiple layers of material.

The material layer may consist of any previously known and suitable for the purpose material layer. In a preferred embodiment, the material layer 17 consists of or includes a material with a high elasticity (stretchability). One example of such a material consists of a material which is marketed under the trademark Lentex. Lentex is composed of a material which consists of polyurethane with an adhesive material layer laminated to the surface layer. In a preferred embodiment of the present mattress, the material layer 17 is laminated with an excess amount of material. The material layer is preferably stretchable to at least 500 percent and preferably up to 600 percent. The material layer is preferably laminated to the first outer layer 14 and the second outer layer 15 of the mattress. After the material layer 17 is stretched the material

layer will strive to return to its original shape. Because the material is stretchable in the above described range, an unexpected technical effect is achieved in that the surface of the mattress does not crease (wrinkle, crinkle) when the user lies on the mattress.

5 In the detailed description of the present invention, design details may have been omitted which are apparent to persons skilled in the art of the field of the method and device. Such obvious design details and methods are included to the extent necessary so that the proper and full performance of the present mattress is achieved.

10 Even if certain preferred embodiments have been described in more detail, variants and modifications of the method and device may become apparent for specialists in the field of the invention. All such modifications and variants are regarded as falling within the scope of the following claims.

15 In alternative embodiments, it is conceivable that the holes only extend partially through the thickness 6 of the mattress. The holes 13 may thus go completely through or consist of blind holes 13 which only extend through a certain portion of the material's thickness 6. It is further conceivable that all or some of the holes are oriented in a direction other than the direction of the thickness of the mattress.

Advantages of the Invention

20 With the present invention it is possible to achieve several advantages. The most obvious is that an improved mattress is obtained. Another advantage of the present mattress is that it leads to a reduced risk of bedsores occurring on persons lying on the mattress. Yet another advantage of the present mattress is that it essentially does not crease (crinkle, wrinkle) when a person lies on it. A further advantage of the present mattress is that it is substantially more cost-effective to manufacture.

Claims

1. Mattress (1), intended to be used to reduce the risk of bedsores occurring on a person that lies on or in another manner resides on a mattress (1), said mattress (1) comprised of at least one center part (9) whose one side is provided with at least one first outer material layer (14) and at least one first intermediate material layer (10) and on its other side is provided with at least one second outer material layer (15) and at least one second intermediate material layer (11) **characterized by** that the center part (9) includes at least one first material layer (12) which includes several holes (13), in the material layer's (12) transverse direction or essentially transverse direction, and that the holes (13) are distributed in at least the area of the mattress (1) on which a person during normal use lies on, and that the mattress includes at least one cover (16), or the like, said cover (16) being laminated with an excess amount of material, and that the cover (16) completely or partially surrounds the mattress, and that the cover's layer or layer's (17) elasticity stretches to at least 500 percent.
2. Mattress (1) according to claim 1 **characterized by** that the holes (13) are evenly distributed over the expanse of the mattress in its longitudinal and transverse direction.
3. Mattress (1) according to claim 1 **characterized by** that the holes (13) distribution over the expanse of the mattress in its longitudinal and transverse direction varies across the surface of the mattress.
4. Mattress (1) according to at least one of the previous claims **characterized by** that the first intermediate material layer (10) is comprised of a visco-elastic foam material.
5. Mattress (1) according to at least one of the previous claims **characterized by** that the second intermediate material layer (11) is comprised of a visco-elastic foam material.
6. Mattress (1) according to at least one of the previous claims **characterized by** that the first outer material layer (14) and the second outer material layer (15) consist of an ultra-soft foam material.
7. Mattress (1) according to at least one of the previous claims **characterized by** that the center part (9) consists of a water blown foam material.

8. Mattress (1) according to at least one of the previous claims **characterized by** that the center part (9) includes at least one first material layer (12) and at least one second material layer (12).
9. Mattress (1) according to claim 8 **characterized by** that the first material layer (12) and the second material layer (12) have essentially the same size, shape and hole distribution and that the holes in the first material layer and the holes in the second material layer coincide with each other.
10. Mattress (1) according to at least one of the previous claims **characterized by** that the cover (16) includes polyurethane.

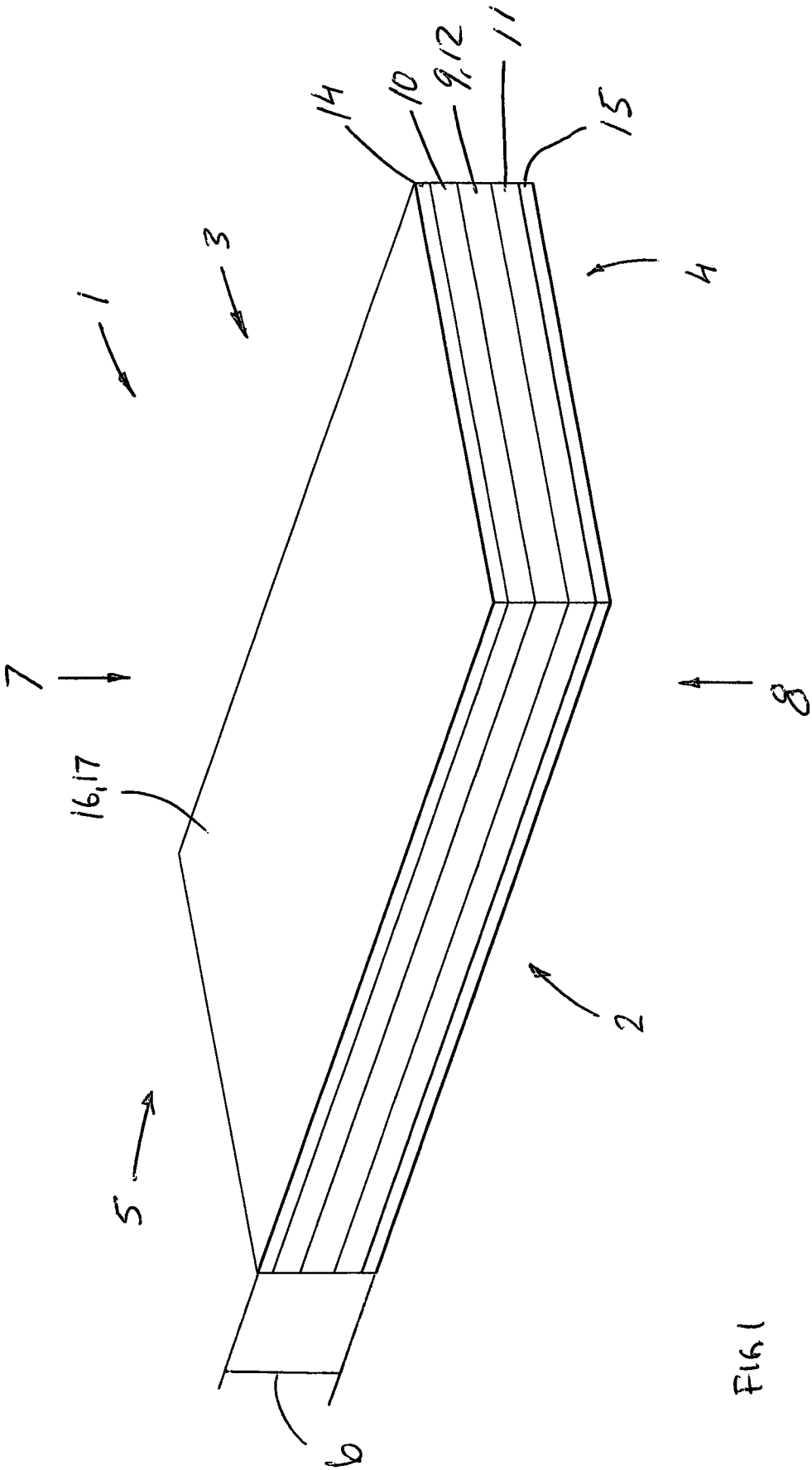


FIG. 1

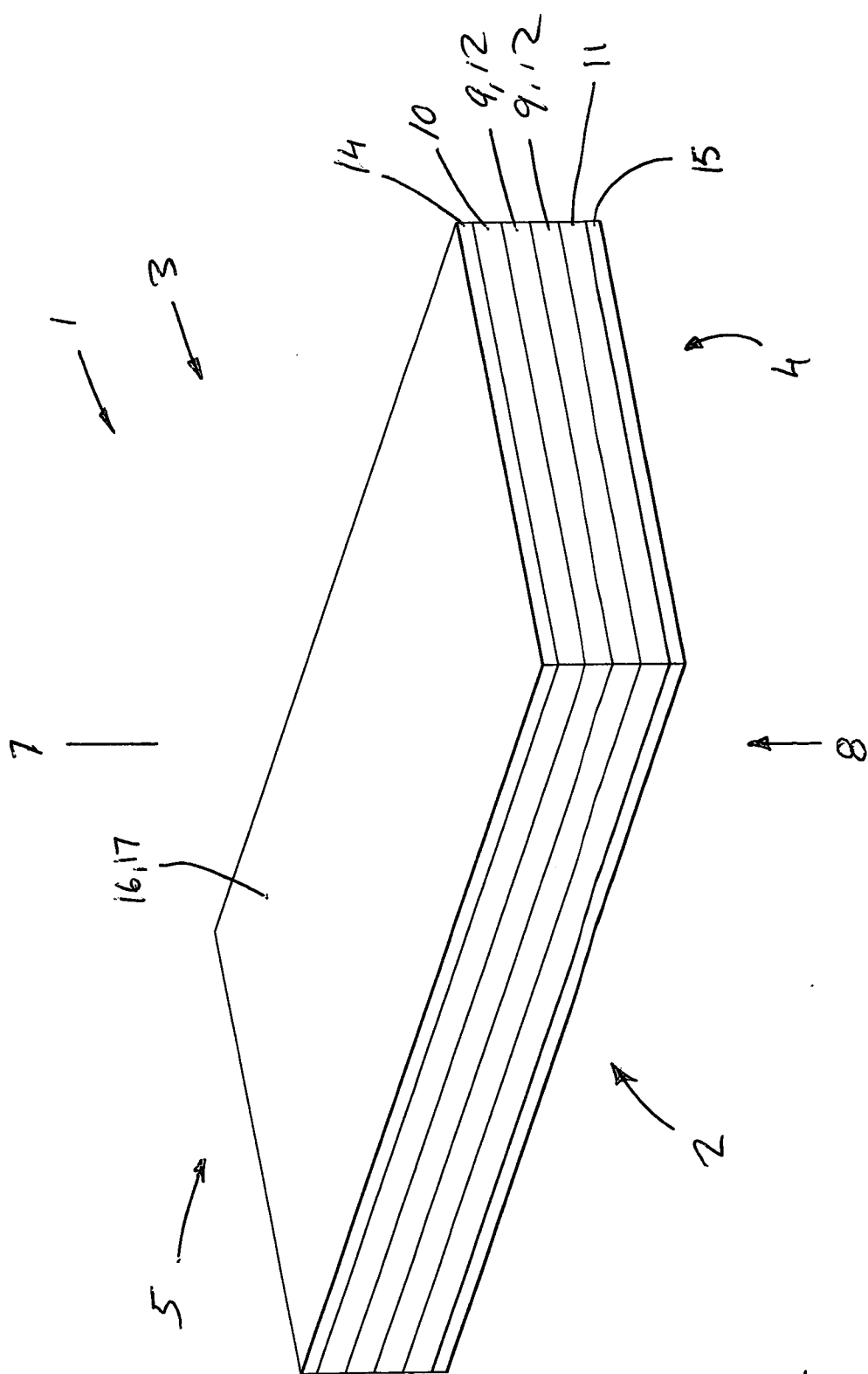


Fig 2

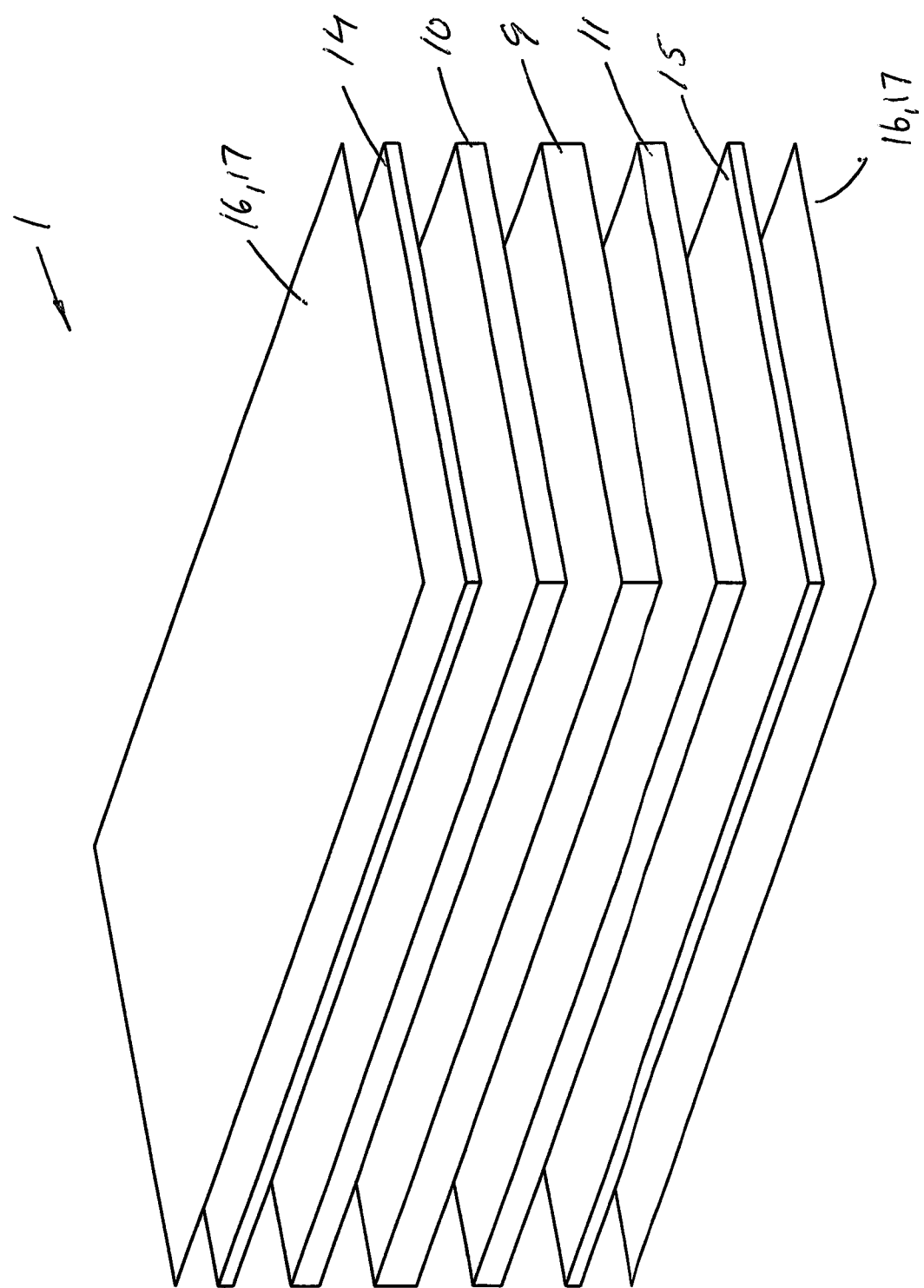


FIG. 3

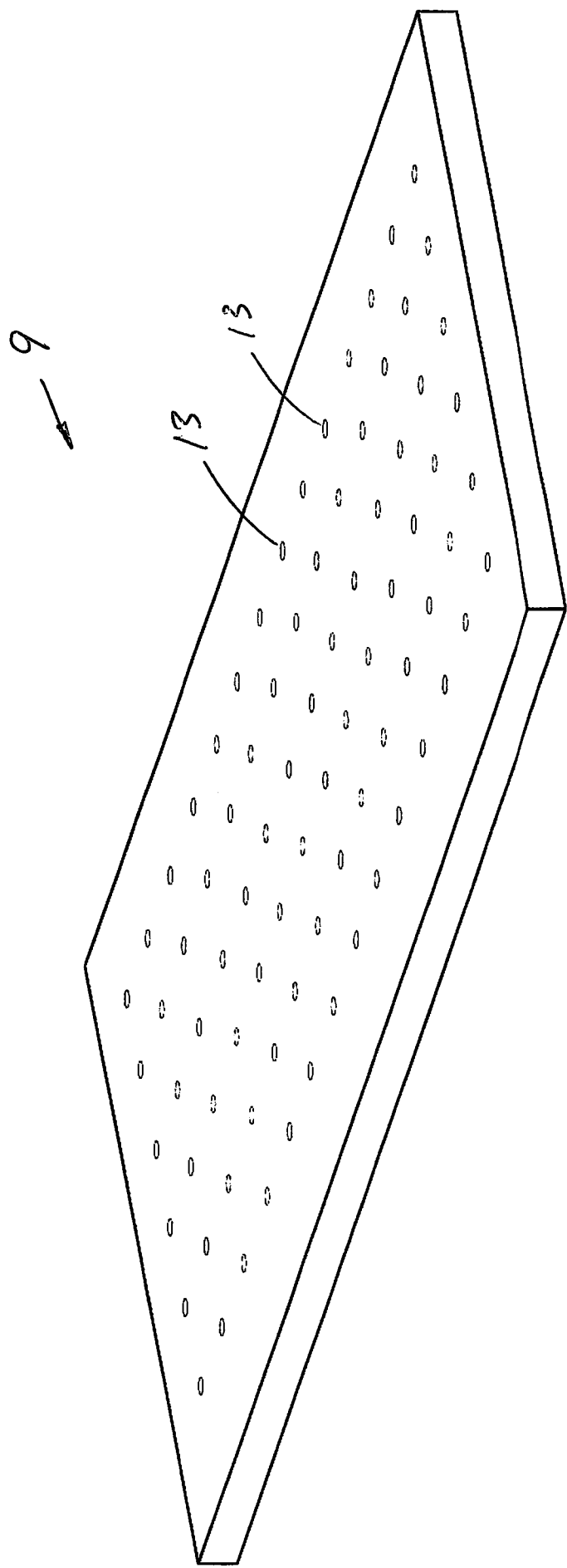


FIG 4

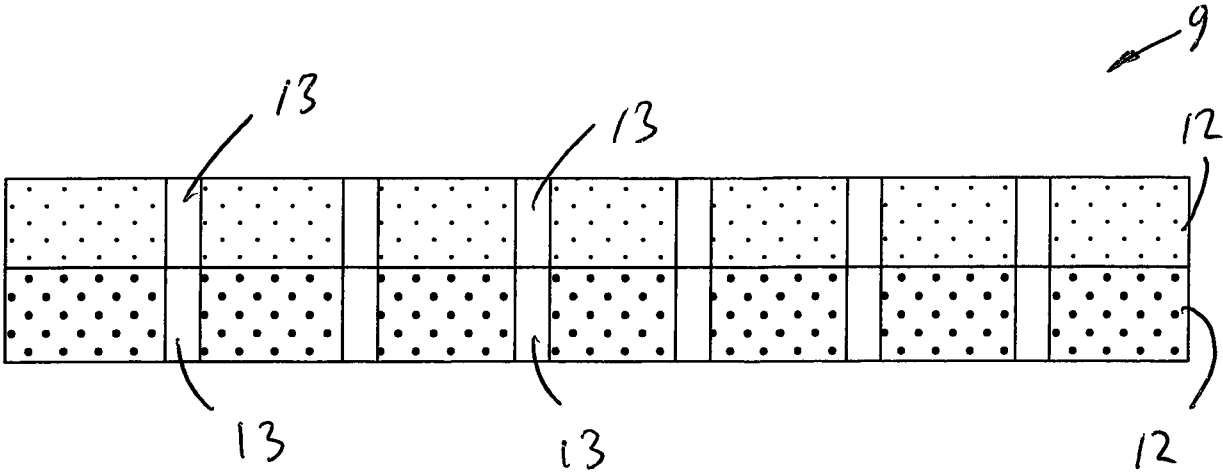


FIG 5

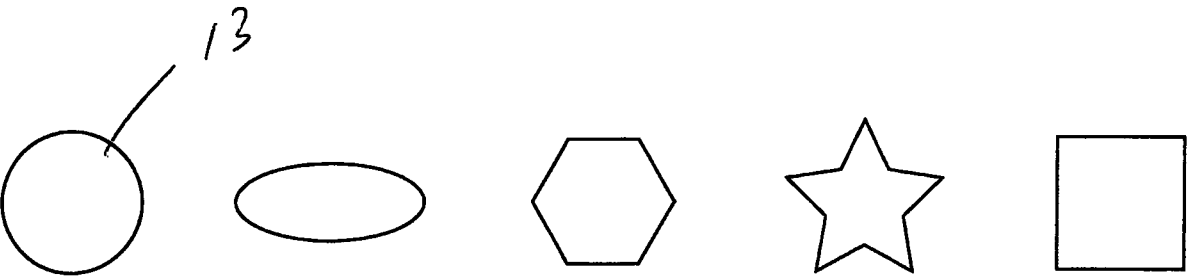


FIG 6

INTERNATIONAL SEARCH REPORT

International application No.
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A. CLASSIFICATION OF SUBJECT MATTER

IPC: see extra sheet

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)

IPC: A47C, A61 G

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

SE, DK, FI, NO classes as above

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

EPO-Internal, PAJ, WPI data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5669094 A (SWANSON LARRY SVEN), 23 September 1997 (1997-09-23); column 2, line 22 - line 25; column 3, line 21 - line 23; column 4, line 22 - line 23; figures 1-2 --	1-10
Y	GB 2244000 A (TEASDALE S), 20 November 1991 (1991-11-20); page 7, line 6 - line 14; figure 1 --	1-10
A	US 200501 88467 A (WOOLFSON DAVID), 1 September 2005 (2005-09-01); whole document --	1-10
A	WO 0103551 A1 (TANAKA HIDEHIKO), 18 January 2001 (2001-01-18); abstract -- -----	1-10



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

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"&" document member of the same patent family

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Continuation of: second sheet

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

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US	5669094	A	23/09/1 997	NONE		
GB	2244000	A	20/1 1/1 991	NONE		
US	200501 88467	A	01/09/2005	AT	398990 T	15/07/2008
				DE	601 3451 9 D 1	07/08/2008
				EP	1192925 A2	03/04/2002
				IE	S2001 0867 A2	17/04/2002
				IE	2001 0866 A 1	17/04/2002
				US	20020040502 A 1	11/04/2002
				US	7059001 B2	13/06/2006
				US	20040031 102 A 1	19/02/2004
WO	0 103551	A 1	18/01/2001	JP	2001 025425 A	30/01/2001