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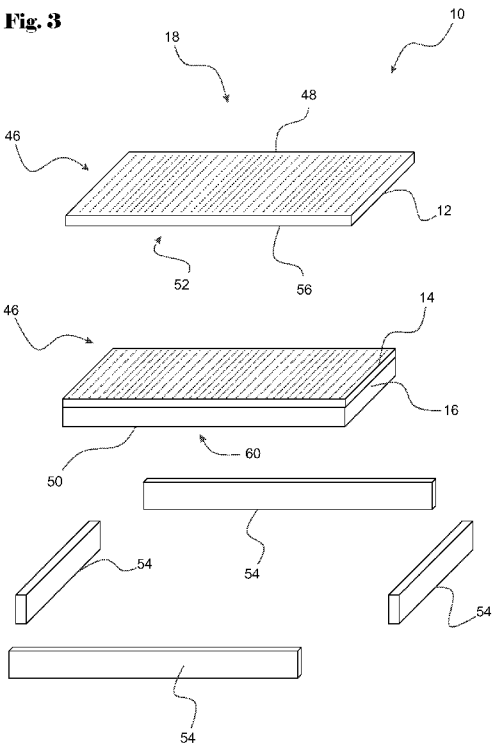
(54) **Title**: BEDDING SYSTEMS

Fig. 3



(57) **Abstract**: In one preferred form there is provided a mattress (10) for a bed. The mattress (10) includes an upper layer (12) formed from visco elastic foam material of a first kind; an intermediate layer (14) formed from visco elastic foam material of a second kind; and a lower layer (16) formed from foam material of another kind. The intermediate layer (16) is provided between the upper layer (12) and the lower layer (16). The upper layer (12) and the intermediate layer (14) have a combined thickness of at least 50 mm. The lower layer (16) has a thickness of at least 70mm.

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BEDDING SYSTEMS

FIELD OF THE INVENTION

The present invention relates to bedding systems and in particular to mattresses.

BACKGROUND TO THE INVENTION

A number of mattresses presently exist on the market. The applicants wish to provide an improved mattress for sleeping and possibly therapeutic purposes.

It is against this background and the problems and difficulties associated therewith that the present invention has been developed.

SUMMARY OF THE INVENTION

According to a first aspect of preferred embodiments herein described there is provided a mattress for a bed, the mattress comprising: an upper layer formed from visco elastic foam material of a first kind; an intermediate layer formed from visco elastic foam material of a second kind; a lower layer formed from foam material of another kind; wherein the intermediate layer is provided between the upper layer and the lower layer; the upper layer and the intermediate layer have a combined thickness of at least 50 mm; and the lower layer has a thickness of at least 70mm.

The upper layer, intermediate layer and the lower layer may each consist of a single unitary layer.

Preferably the upper layer and intermediate layer each consist of single unitary layer and the lower layer consists of two layers, namely an upper-lower layer and a lower-lower layer.

Preferably the layers are glued together with the upper layer being at least 25mm in thickness, the intermediate layer being at least 30mm in thickness and the lower layer being at least 100mm in thickness.

Preferably the upper layer is formed from visco elastic foam of a hardness between 30 and 60 N; the intermediate layer is formed from visco elastic foam of a hardness betwecen 70 and 110 N; and the lower layer is formed from foam of a hardness between 85 and 130 N.

Preferably the mattress includes a plurality of boundary members extending along the lateral sides of the mattress to provide the mattress with relatively firm side support portions.

Preferably the mattress includes a plurality of boundary members extending along the ends of the mattress to provide the mattress with relatively firm end support portions.

Preferably the upper layer is of a larger planar size than the intermediate layer and the lower layer, the boundary members surrounding the periphery of the intermediate layer and the lower layer, with the upper layer being disposed above the intermediate layer, the lower layer and the boundary members.

Preferably the density of the upper layer of visco elastic foam material is between 47 and 57 kg/m3; the density of the intermediate layer of visco elastic foam material is between 55 and 65 kg/m3; and the density of the lower layer of foam material is between 31 and 41 kg/m3.

Preferably the hardness of the upper layer of visco elastic foam material is between 30 and 60 (IFD 40%); the hardness of the intermediate layer of visco elastic foam material is between 75 and 105 (IFD 40%); and the hardness of the lower layer of foam material is between 115 and 155 (IFD 40%).

According to a second aspect of preferred embodiments herein described there is provided a mattress for a bed, the mattress comprising: at least one layer of visco elastic foam material; wherein a number of vertically extending ventilation passages extend through the at least one layer of visco elastic material so as to provide the mattress with a number of supportive zones.

Preferably the ventilation passages provide the mattress with seven supportive zones

Preferably at least some of the zones are of a depth of least 250mm in the longitudinal direction along the mattress.

Preferably at least some of the zones are of a depth of least 300mm in the longitudinal direction along the mattress.

Preferably the ventilation passages provide the sleeping zones with relatively soft and relatively firm sleeping zones that alternate along the length of the mattress.

Preferably the relatively firm sleeping zones each include only two or three internal rows of vertically extending passages.

Preferably the relatively soft sleeping zones each include less than 10 internal rows of vertically extending passages.

Preferably the relatively soft sleeping zones each include less than 6 internal rows of vertically extending passages.

According to a third aspect of preferred embodiments herein described there is provided a mattress for a bed, the mattress comprising: an upper layer formed from visco elastic foam material of a first kind; an intermediate layer of foam formed from visco elastic foam material of a second kind; and a lower layer formed from foam material of a third kind; wherein the mattress includes a number of vertically extending ventilation passages extending through the mattress from the upper surface of the upper layer through the lower surface of the lower layer.

According to a fourth aspect of preferred embodiments herein described there is provided a mattress for a bed comprising at least one layer of foam material wherein a number of vertically extending ventilation passages extend through the at least one layer of foam material so as to provide the mattress with a number of supportive zones.

According to a fifth aspect of preferred embodiments herein described there is provided a method of manufacturing a mattress, including: proactively forming a number of vertically extending ventilation passages in at least a one layer of visco elastic foam material, despite the visco elastic foam material having an open core structure allowing natural ventilation; and using the at least one layer of visco elastic foam material in the construction of the mattress.

Preferably proactively forming a number of vertically extending ventilation passages in the at least one layer of visco elastic foam material comprises forming the vertically extending passages in a first layer of visco elastic foam material of a first hardness and second layer of visco elastic foam material of a second hardness.

Preferably using the at least one layer of visco elastic foam material comprises fixing the second layer to a third layer of foam material in a manner in which the second layer provides an intermediate layer between the first layer of visco elastic foam material and the third layer of foam material.

Preferably applying the at least one layers of visco elastic foam material comprises fixing the first layer of visco elastic foam material to the second layer of visco elastic foam material .

Preferably the first layers of visco elastic foam material is larger than the second and third layers such that boundary members can be positioned around the periphery of the second and third foam layers to support the periphery of the first layer of foam material from below.

According to a sixth aspect of preferred embodiments herein described there is provided a method of manufacturing a mattress comprising: providing number of layers of visco elastic foam material; and forming a mattress using the layers of visco elastic foam material wherein a number of ventilation passages are provided that extend all the way through the mattress.

Preferably the method includes providing a first layer formed from visco elastic foam material of a first kind, gluing thereto a second and third layer of visco elastic material of a second and third kind to form a layered structure.

Preferably gluing thereto includes gluing a first pair of end supportive portions to the first, second and third layers at a respective upper end and a respective lower end of the layers.

Preferably the outward surface of third layer in the layered structure is then glued to a fourth layer of visco elastic material and a second pair of end supportive portions are glued to the first pair of end support portions to provide end supports extending from beneath the first layer.

Preferably the method includes gluing lateral side support portions that extend from beneath the first layer.

Preferably the ventilation passages extend through the first, second, third and fourth layers and the support portions do not include any ventilation passages.

Hardness measurements are to be understood as referring to compressing a standard sized piece of foam to 40% with the force required to achieve that compression being measured in Newtons. Hardness tests are those applied to standard Dunlop foams. For example Dunlop Enduro™ EN36-130 foam has a hardness range of 120-150. Density refers to the weight of the foam in kilograms per cubic meter. For example Dunlop Enduro™ EN36-130 foam has a density of about 36 kg/m3. Resilience and indentation factors are also standard measures. For example Dunlop Enduro™ EN36-130 has an indentation factor of about 2.39 and a resilience of about 55%. Dunlop foam technical manuals and standards are readily available.

BRIEF DESCRIPTION OF DRAWINGS

In order to facilitate a better understanding of the present invention, several preferred embodiments will now be described with reference to the accompanying drawings, in which:

Figure 1 provides a perspective view of a mattress according to a first preferred embodiment of the present invention;

Figure 2 provides a plan view of the mattress shown in Figure 1;

Figure 3 provides an exploded perspective view of the mattress shown in Figure 1;

Figure 4 provides a detailed plan view of the mattress shown in Figure 1;

Figures 5a and 5b illustrate a method according to a second preferred embodiment of the present invention;

Figures 6 and 7 provide spacing views illustrating rows of apertures in mattresses according to further preferred embodiments of the present invention;

Figure 8 to 10 illustrate further preferred embodiments; and

Figures 11 to 20 provide several views illustrating yet further preferred embodiments of the present invention.

DETAILED DESCRIPTION OF THE EMBODIMENTS

It is to be appreciated that each of the embodiments is specifically described and that the present invention is not to be construed as being limited to any specific feature or element of any one of the embodiments. Neither is the present invention to be construed as being

limited to any feature of a number of the embodiments or variations described in relation to the embodiments.

Referring to Figures 1 to 3 there is shown a mattress 10 according to a first preferred embodiment of the present invention. The mattress 10 includes an upper layer 12, an intermediate layer 14 and a lower layer 16. The mattress 10 is considered to be of advantageous form as well to provide a number of advantageous supportive zones 18. This is described in further detail below.

The upper layer 12 is formed from visco elastic foam material of a first density & hardness and provides a unitary visco elastic foam top layer. The intermediate layer 14 is formed from visco elastic foam material of a second density & hardness and provides a unitary visco elastic foam middle layer. The lower layer 16 comprises a supportive standard foam layer formed from foam material of a third density & hardness. In the embodiment the layers are glued together with a non-toxic water based adhesive to form the advantageous mattress 10.

More particularly, the upper layer 12 comprises visco elastic foam material for providing relative slow recovery support to the neck, shoulders, knees and back of the user. The intermediate layer 14 comprises visco elastic foam for providing relatively slow recovery support.

The upper layer 12 has a hardness of about 40N. The intermediate layer 14, on the other hand, has a hardness of about 90N. This provides a factor about 2 times the hardness of the upper layer 12. Of course various embodiments are possible including embodiment where the factor is greater than 2 times.

The lower layer 16 comprises a resilient standard foam designed to support the upper layer 12 and the intermediate layer 14. The lower layer 16 assists in distributing pressure while providing a suitable mattress core. The lower layer 16 has a hardness of about 130 N.

Advantageously the mattress 10 provides a triple layer comprising three (3) distinct layers and grades of foam.

The applicant considers that in the industry a single layer of visco elastic foam is typically used to provide a mattress. It may be also that occasionally, the visco elastic foam is provided together with a standard foam base. The present embodiment is considered to

provide a substantial improvement to existing visco elastic foam beds in terms of the support provided to the head, neck, shoulders, hips, body and limbs of the user.

In the present embodiment the lower layer 16 comprises a premium grade standard foam base. As described there is provided a relatively firm premium visco elastic foam intermediate layer 14 above the lower layer 16. A softer further premium visco elastic foam upper layer 12 is provided above the intermediate layer 14.

In the advantageous combination, the lower layer 16 provides a good firm supportive base for the intermediate layer 14 and the upper layer 12. The lower layer 16 affords sufficient "give" to allow a relatively high degree of comfort.

In the embodiment, the lower layer 16 is not a visco elastic "memory foam" layer but comprises a premium grade open cell foam. The open cell foam does not include any CFCs or any other toxins.

By virtue of the intermediate layer 14 being formed from relatively firm premium visco elastic foam ("memory foam") this is considered to advantageously even out and distribute pressure from the heavier/bulkier parts of the body, such as the shoulders and hips, and advantageously promotes improved spinal posture.

The upper layer 12 provides an added comfort layer advantageously configured to provide a softer supportive layer catering, in particular, for the user's limbs and face.

In the present embodiment it has been found that Dunlop Viscoflex™ VF52-40 and VF60-90 provide a particularly advantageous combination for the upper layer 12 and the intermediate layer 14. A Dunlop Enduro™ EN36-130 foam has been found to be advantageous for the lower layer 16. Associated characteristics of the layers of foam tabulated below.

Grade	Density (kg/m3)	Hardness (IFD 40%)	Indentation Factor	Resilience MIN%
VF52-40	52	35-55	2.67	5

VF60-90	60	80-100	2.19	15
EN36-100	36	95-120	2.44	55
EN36-130	36	120-150	2.39	55

*Source Dunlop Catalogue June 2007

In the embodiment the upper layer 12 has a thickness of about 35mm, the intermediate layer 14 has a thickness of about 50mm and the lower layer has a thickness of about 130mm. Such thicknesses have been seen to advantageously provide sleeping comfort and, in the applicant's opinion, a degree of therapeutic comfort as well. Different thicknesses of the layers are of course possible.

In preferred embodiments upper layer and intermediate layer combined thicknesses are preferably at least 60mm and the lower layer thickness is at least 80 mm. Other ranges are of course possible. In addition, the provision of the layered sandwich structure is considered to be particularly advantageous in combination with the seven distinct supportive zones 18.

As shown in Figure 2 the zones 18 start from a first end 20 of the mattress 10 and are spaced therealong. The zones 18 terminate at an opposite end 22. A first zone 24 is provided at the first end 20 of the mattress 10 and comprises a relatively firm zone 26. A second zone 28 is provided adjacent the first zone 24 and comprises a relatively soft zone 30. A third zone 32 adjacent the second zone 28 comprises another relatively firm zone 26.

A fourth zone 34 adjacent the third zone 32 provides a central relatively soft zone. The zones described alternate along the full length of the mattress 10. The fourth zone 34 provides a mirror axis 36. As a result a fifth zone 38, a sixth zone 40 and a seventh zone 42 are also provided.

In order to provide the zones 18, a plurality of relatively small apertures 44 are provided. The apertures 44 extend through the upper layer 12, the intermediate layer 14 and the lower layer 16 to provide a plurality of ventilation passages 46. As shown in Figure 3, the ventilation passages 46 extend all the way through the mattress 10 from the upper surface 48 of the upper layer 12 to the lower surface 50 of the lower layer 16.

The ventilation passages 46 are advantageously spaced in rows 52. As shown the rows 52 are spaced apart along the length of the mattress 10. The ventilation passages 46 in each row extend across the mattress 10.

The ventilation passages 46 are advantageously sized to be about 5mm in diameter which serves to retain a consistency of the foam support as well as provide advantageous breathability. The ventilation passages 46 are spaced about 15mm apart in reach row.

The supportive zones 18 are provided using a longitudinal spacing of about 70mm between adjacent rows in the relatively firm zones 30 and a spacing of about 50mm in the relative soft zones 26. The size of each relatively soft zone 30 is advantageously about 1.5 times the size of each relatively firm zone 26. This has been seen to advantageously provide comfort to the end user in the 3 layer mattress 10 as described.

As a combination, the mattress 10 is considered to form an advantageous "sandwich" of various open cell foams. The open cell foams advantageously provide breathability due to their open cell structure already known as being 'fully ventilated'. The applicant has further provided additional ventilation passages 46 as described. The applicant further considers that, to the best of the applicant's knowledge, this goes against conventional judgement and provides a significant improvement to existing visco elastic mattresses. The applicant considers that, to the best of the applicant's knowledge, such mattresses have never been ventilated in such a manner in the past and that this provides significant advantages.

More particularly the ventilation passages 46 are provided by punching out (in a predetermined ratio) the series of 5mm diameter cores. The addition of the apertures 44 provides the advantageous zoning structure in addition to the open cell structure of the foam. To the best of the applicant's knowledge, the applicant is not aware of any mattresses having punched out cores to provide several comfort zones along the length of the mattress.

In the embodiment the spacing of the ventilation passages 46 is carefully selected to ensure than pressures above 45mmHg are not provided even in the case of a 100kg male in a normal sleeping position that is: (i) when lying on his back; or (ii) when lying on his side.

In such a case the seven zoned 3 layered visco elastic structure is considered to advantageously serve to reduce pressure on the hips and shoulders and provide a comfortable and therapeutic sleeping position. Pressures less than 45mmHg are

advantageously provided for this purpose. In comparison to standard foam mattresses, the mattress 10 is considered to reduce pressure relatively significantly on all body parts.

As discussed, the ventilation passages 46 in the zoned structure are considered to provide advantageous ventilation to assist with ensuring comfortable sleeping. This ventilation provides a notably comfortable sleeping experience in terms of current known issues. With the present embodiment the ventilation passages 46 serve to limit adverse heat build up as well as to provide the advantageous supportive zones 18. By varying the distance between rows of the ventilation passages 46 softer zones advantageously accommodate the heavier/ bulkier parts of the body. This further enhances the various functions of the triple layer foam sandwich. With standard bedding mattresses of foam material may act as a heat trap and may far exceed comfortable sleeping temperatures.

Each of the foams described is, in this case, an Australian made breathable visco elastic foam that does not contain formaldehyde or CFCs. Furthermore, the mattress 10 does not contain any metal or metal fittings. The applicant considers that this may be advantageous because there is some evidence that metal beds and spring mattresses amplify electro-magnetic radiation and may cause restless sleep, and some health disorders. As such, in the present embodiment, the advantageous comfort and breathability is provided without the provision of metal springs. In terms of the support provided by the foam material, it is preferred that the foam is not vacuum packed such that the visco foam material maintains a good appearance without any cell wall collapse.

In addition to providing comfort while sleeping, the mattress 10 includes four elongate boundary members 54 positioned underneath the upper layer 12 as shown. Each boundary member 54 is arranged to abut the lower surface 56 of the upper layer 12 and extend along the four sides 58 of the mattress 10. The elongate members 54 are advantageously provided as standard high hardness foam of about 200N. This hardness is greater than 1.4 times the hardness of the lower layer 16. The applicants have found boundary members made of Dunlop Endure EN38-200 foam advantageously maintain mattress strength and rigidity. The upper layer 12 provides a relatively soft touch at the edge around the boundary members 54.

The upper layer 12 is of a relatively larger planar size than the intermediate layer 14 and the lower layer 16. The boundary members 54 extend around the periphery 60 of the

intermediate layer 14 and the lower layer 16. The upper layer 12 is disposed above the intermediate layer 14, the lower layer 16 and the boundary members 54.

As shown in Figure 4, the boundary area 62 adjacent the edge of the mattress 10 from above is advantageously provided with an increased degree of firmness due to support from the relatively firm boundary member 54 with the upper layer 12 being relatively soft to the touch.

As would be apparent from the drawings the passages 46 extend though the entire mattress 10 and also define the way the zoning is provided. The elongate members 54 provide a firm edge support arrangement where the members 54 are glued in position. The elongate members 64 are about 5cm by 5cm in cross-section.

In terms of the upper layer 12, the distance 64 to the ventilation passages is about 5cm. In preferred embodiments the distance 64 is between 5 to 20cm. The longitudinal edge spacing distance 66 is approximately 75 mm. The upper layer 12 covers the firm edge over the top to give an advantageously soft feel. The elongate members 54 (firm edges) are not perforated and neither is the portion of the upper layer 12 above the elongate members 54. In some embodiments the upper layer 12 is perforated above the elongate members 54.

The following three rows 68 of passages 46 are spaced at 70mm. This provides a first inner zone depth 70 of about 280mm less the distance 66. The following 6 rows are spaced at 50mm. This provides a second inner zone depth 72 of about 300mm. Following this the zoning arrangement includes: a third inner zone depth 74 of 280 mm ; a fourth inner zone depth 78 of 300mm ;a fifth inner zone depth 80 of 280 mm; a sixth inner zone depth 82 of 300 mm ; and a seventh inner zone depth 84 of 280 mm.

The zones alternate in a manner wherein relatively firm zones 26 are provided at each end of the mattress 10. The soft firm zones 30 are positioned between the relatively soft zones 26. As a result, at least some of the zones are of a width of least 300mm in the direction along the mattress 10.

The mattress 10 is symmetrical through the mirror axis 36 midway along the length of the mattress 10. A longitudinal mirror axis 76 is also provided. The symmetrical nature of the mattress allows the mattress to be rotated with no real change in configuration.

In preferred embodiments the depth from the edge of the bed to the second zone is preferably between 95% to 100% of the second zone depth 72. The second zone depth 72, the fourth zone depth 78 and the sixth zone depth 82 are preferably equal in size. The third zone depth 74 and the fifth zone depth 78 are preferably between 95% to 100% of the second zone depth 72. The upper row 77 and the lower row 79 shown in Figure 3 are not present in one embodiment.

A method 86 according to a further preferred embodiment of the present invention is shown in Figures 5a and 5b. In the method 86 at block 88 an upper layer 90 of VF52-40 material is ventilated with an advantageous 7 zone sleeping pattern that is similar to the patterns previously described. This is achieved by proactively forming a number of vertically extending ventilation passages through the upper layer 90. This is despite the upper layer 90 including visco elastic material that has an open core structure allowing ventilation.

In the method 86 at block 92 an upper lower layer 94 and lowermost layer 96 are fixed together to form a lower core 98.

As detailed at block 100 the upper lower layer 94 and the lowermost layer 96 are ventilated with an advantageous 7-zone sleeping pattern prior to gluing. The upper lower layer 94 and the lowermost layer 96 are then advantageously glued together using non toxic adhesives. As part of the method 86 this includes aligning the apertures by inserting a number of alignment elements in the form of rods through apertures in both the upper lower layer 94 and lowermost layer 96 during the gluing process.

The upper layer 90 and the lower core 98 are then arranged and glued in a similar manner to provide continuous and aligned ventilation passages. The method 86 is accordingly used to provide a 3 layered mattress of substantial thickness. It is to be appreciated that the upper layer is 50mm on both sides and at the top and foot more than the intermediate and lower layers. In embodiments, at least two layers need to be aligned prior to and for gluing after the holes have been punched.

The intermediate layer (upper lower layer) comprises VF60-90 foam of dimensions 1940x1730x50mm. The lower layer (lowermost layer) comprises EN36-130 foam of dimensions 1940x1730x130mm. The ventilation is provided with a hole punching system.

At block 102 a number of side rails 104 are provided for abutting against the lower surface of the upper layer 98 to provide continuous peripheral support. At block 106 the upper layer 90, the side rails 104 and the lower core 98 are glued to provide a complete mattress 108. This provides an advantageous three layer open cell foam mattress with seven zones of comfort as described.

Various sizes of mattress are presently preferred including the sizes detailed below.

Size	Length	Width
King	2,030mm	1,830mm
Queen	2,030mm	1,530mm
Double	1,870mm	1,370mm
King Size Single	2,030mm	1,060mm
Long Single	2,030mm	920mm
Single	1,870mm	920mm

In this case the apertures are 5mm in diameter. It is presently preferred that apertures are between 2 to 5mm in diameter. In each horizontal row of cores (i.e. from side to side) the spacing between holes is 15mm. It is presently preferred that the spacing ranges between say 10 to 30mm.

Figure 6 illustrates a further preferred embodiment of the present invention. The ratio of spacing between relatively soft zones and relatively firm zones is about 7/5 (1.4). Ratios between 1.2 to 1.7 are presently preferred.

Figure 6 illustrates an embodiment where the first zone depth is precisely 95% of the second zone depth. The first zone depth and the seventh zone depth are equal. The first zone depth and the seventh zone depth are only slightly larger than the third zone depth and the firth zone depth. The third zone depth and the firth zone depth are also equal). The bed is advantageously formed symmetrically about x and y axes. Each of the soft zones has three intermediate rows and each of the hard zones have five intermediate rows. A further preferred embodiment is shown in Figure 7. Again the bed is dominated by a 1.4 relatively firm to soft row spacing (70/50mm). In the embodiment the first zone depth and the seventh zone depth are reduced in size each having only two intermediate rows.

The embodiment described comprises rails on both the sides and top of the bed for further reinforcing the firmness of the peripheral zone. Thus in the embodiment the mattress advantageously comprises 3 separate layers of foam and rails on both sides and on the top and foot. In yet further designs rails are provided only on both sides or only on the top and foot of the beds. Yet further embodiments do not includes rails at all. Of course several variations are possible. Preferably the rails are not punched in order to advantageous provide a relatively rigid peripheral zone.

Figure 8 illustrates a seven zoned mattress 110 according to a further embodiment of the present invention. The mattress 110 includes an upper layer 112 formed from visco elastic foam material of a first kind, an intermediate layer 114 formed from visco elastic foam material of a second kind and a lower layer 116 formed from visco elastic foam material of another kind.

The upper layer 112 and the intermediate layer 114 are formed from foam material to provide single unitary layers (without any sub-layers). The lower layer 116 is provided as a layered structure 117 comprising an upper-lower layer 118 and a lower-lower layer 120. In the embodiment shown in Figure 8, the upper lower layer 118 and the lower-lower layer 120 are formed from visco elastic foam material of the same kind.

Figure 9 illustrates a further embodiment in the form of a mattress 122. In the mattress 122 an upper-lower layer 124 and a lower-lower layer 126 are formed from foam material, each of a different kind. The upper-lower layer 124 is formed from EN-36-100 having a density of about 36kg/m3 and a hardness of about 90-120 IFD 40%. The lower-lower layer 126 is formed from EN-36-30 having a density of about 36kg/m3 and a hardness of about 120-150 IFD 40%.

The manufacture and form of the mattress 110 and the mattress 120 are similar, apart from the difference in the lower layer.

As shown in the embodiment of Figure 8, the upper layer 112, the intermediate layer 114, the upper-lower layer 118 and the lower-lower layer 120 are provided as layers of visco elastic foam material. A number of end rails 128 are also provided. In the mattress 110 a number of ventilation passages 130 extend all the way through the mattress 110.

At block 132 the upper layer 112 is glued to the intermediate layer 114 and the upper lower layer 118 to form a layered structure 134. A first pair of end supportive portions 136 are also glued in the gluing step at a respective upper end 138 and a respective lower end 140 of the layered structure 134, underneath the upper layer 112.

At block 142, the layered structure 134 and the lower-lower layer 120 are separately ventilated. The holes are aligned using dowels that are positioned to extend through corresponding holes such that the ventilation passages 130 will extend through the full thickness of the mattress 110 in a relatively uninterrupted manner.

The outward surface 144 of the upper-lower layer 118 is then glued to a lower-lower layer 120 and a second pair 146 of end supportive portions and side rails 148 are glued in position to from the mattress 110. The side rails 148 and the end rails 128, 146 extend from beneath the upper layer 112. Figure 10 illustrates the component parts of the mattress 110.

Several further preferred embodiments are illustrated in Figures to 11 to 18.

In a further preferred embodiment the mattress is provided with a washable certified organic cotton cover. This advantageously allows the end user to keep the mattress cover clean and healthy. Skin cells and dust mites can be removed and the mattress can be advantageously aired.

Thus it will be apparent that there has been described an advantageous mattress that is designed to promote beneficial posture when sleeping and which is considered to reduce localised pressure on the entire body.

Further advantages and preferred features will be apparent from a reading of the specification as a whole. Other advantageous features are shown in the drawings.

It is to be recognised that various alterations and equivalent forms may be provided without departing from the spirit and scope of the present invention. This includes modifications within the scope of the appended claims along with all modifications, alternative constructions and equivalents. There is no intention to limit the present invention to the specific embodiments shown in the drawings. The present invention is to be construed beneficially to the applicant and the invention given its full scope.

In the present specification, the presence of particular features does not preclude the existence of further features. The words 'comprising', 'including' and 'having' are to be construed in an inclusive rather than an exclusive sense.

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THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A mattress for a bed, the mattress comprising:

an upper layer formed from visco elastic foam material of a first kind;

an intermediate layer formed from visco elastic foam material of a second kind;

a lower layer formed from foam material of another kind;

wherein the intermediate layer is provided between the upper layer and the lower layer; the upper layer and the intermediate layer have a combined thickness of at least 50 mm; and the lower layer has a thickness of at least 70mm.

2. A mattress as claimed in claim 1 wherein the upper layer, intermediate layer and the lower layer each consist of a single unitary layer.

3. A mattress as claimed in claim 1 wherein the upper layer and intermediate layer each consist of single unitary layer and the lower layer consists of two layers, namely an upper-lower layer and a lower-lower layer.

4. A mattress as claimed in claim 1, 2 or 3 wherein the layers are glued together with the upper layer being at least 25mm in thickness, the intermediate layer being at least 30mm in thickness and the lower layer being at least 100mm in thickness.

5. A mattress as claimed in any one of claims 1 to 4 wherein the upper layer is formed from visco elastic foam of a hardness between 30 and 60 N; the intermediate layer is formed from visco elastic foam of a hardness between 70 and 110 N; and the lower layer is formed from foam of a hardness between 85 and 130 N.

6. A mattress as claimed in any one of claims 1 to 5 including a plurality of boundary members extending along the lateral sides of the mattress to provide the mattress with relatively firm side support portions.

7. A mattress as claimed in any one of claims 1 to 4 including a plurality of boundary members extending along the ends of the mattress to provide the mattress with relatively firm end support portions.

8. A mattress as claimed in claim 6 and 7 wherein the upper layer is of a larger planar size than the intermediate layer and the lower layer, the boundary members surround the periphery of the intermediate layer and the lower layer, and the upper layer is disposed above the intermediate layer, the lower layer and the boundary members.

9. A mattress as claimed in any one of claims 1 to 8 wherein the density of the upper layer of visco elastic foam material is between 47 and 57 kg/m3; the density of the intermediate layer of visco elastic foam material is between 55 and 65 kg/m3; and the density of the lower layer of foam material is between 31 and 41 kg/m3.

10. A mattress as claimed in any one of claims 1 to 9 wherein the hardness of the upper layer of visco elastic foam material is between 30 and 60 (IFD 40%); the hardness of the intermediate layer of visco elastic foam material is between 75 and 105 (IFD 40%); and the hardness of the lower layer of foam material is between 115 and 155 (IFD 40%).

11. A mattress as claimed in any one of the preceding claims, when dependent on claim 3 wherein the hardness of the upper-lower layer less than the hardness of the lower-lower layer.

12. A mattress for a bed, the mattress comprising: at least one layer of visco elastic foam material; wherein a number of vertically extending ventilation passages extend through the at least one layer of visco elastic material so as to provide the mattress with a number of supportive zones.

13. A mattress as claimed in claim 12 wherein the ventilation passages provide the mattress with seven supportive zones

14. A mattress as claimed in claim 12 or 13wherein and at least some of the zones are of a depth of least 250mm in the longitudinal direction along the mattress.

15. A mattress as claimed in any one of claims 7 to 14 wherein the ventilation passages provide the sleeping zones with relatively soft and relatively firm sleeping zones that alternate along the length of the mattress.

16. A mattress as claimed in claim 15 wherein the relatively firm sleeping zones each include only two or three internal rows of vertically extending passages.

17. A mattress as claimed in claim 15 or 16 wherein the relatively soft sleeping zones each include less than 10 internal rows of vertically extending passages.

18. A mattress as claimed in claim 15 or 16 wherein the relatively soft sleeping zones each include less than 6 internal rows of vertically extending passages.

19. A mattress for a bed, the mattress comprising:

an upper layer formed from visco elastic foam material of a first kind;

an intermediate layer of foam formed from visco elastic foam material of a second kind; and

a lower layer formed from foam material of a third kind;

wherein the mattress includes a number of vertically extending ventilation passages extending all the way through the mattress from the upper surface of the upper layer through the lower surface of the lower layer.

20. A mattress as claimed in claim 19 wherein the upper layer, intermediate layer and the lower layer each consist of a single unitary layer.

21. A mattress as claimed in claim 1 wherein the upper layer and intermediate layer each consist of single unitary layer and the lower layer consists of two layers, namely an upper-lower layer and a lower-lower layer.

22. A mattress for a bed comprising at least one layer of foam material wherein a number of vertically extending ventilation passages extend through the at least one layer of foam material so as to provide the mattress with a number of supportive zones.

23. A mattress as claimed in claim 22 wherein the ventilation passages provide the mattress with seven supportive zones.

24. A method of manufacturing a mattress, including:

forming a number of vertically extending ventilation passages in at least a one layer of visco elastic foam material, despite the visco elastic foam material having an open core structure allowing natural ventilation; and

using the at least one layer of visco elastic foam material in the construction of the mattress.

25. A method of as claimed in claim 24 wherein proactively forming a number of vertically extending ventilation passages in the at least one layer of visco elastic foam material comprises forming the vertically extending passages in a first layer of visco elastic foam material of a first hardness and second layer of visco elastic foam material of a second hardness.

26. A method as claimed in claim 25 wherein using the at least one layer of visco elastic foam material comprises fixing the second layer to a third layer of foam material in a manner in which the second layer provides an intermediate layer between the first layer of visco elastic foam material and the third layer of foam material.

27. A method as claimed in claimed 25 or 26 wherein applying the at least one layers of visco elastic foam material comprises fixing the first layer of visco elastic foam material to the second layer of visco elastic foam material .

28. A method as claimed in claim 25, 26 or 27 wherein the first layers of visco elastic foam material is larger than the second and third layers such that boundary members

can be positioned around the periphery of the second and third foam layers to support the periphery of the first layer of foam material from below.

29. A method of manufacturing a mattress comprising:

providing number of layers of visco elastic foam material; and

forming a mattress using the layers of visco elastic foam material wherein a number of ventilation passages are provided that extend all the way through the mattress.

30. A method as claimed in claim 29 including providing a first layer formed from visco elastic foam material of a first kind, gluing thereto a second and third layer of visco elastic material of a second and third kind to form a layered structure.

31. A method as claimed in claim 30 wherein gluing thereto includes gluing a first pair of end supportive portions to the first, second and third layers at a respective upper end and a respective lower end of the layers.

32. A method as claimed in claim 31 wherein the outward surface of third layer in the layered structure is then glued to a fourth layer of visco elastic material and a second pair of end supportive portions are glued to the first pair of end support portions to provide end supports extending from beneath the first layer.

33. A method as claimed in any one of claims 29 to 32 including gluing lateral side support portions that extend from beneath the first layer.

34. A method as claimed in claim 33 wherein the ventilation passages extend through the first, second, third and fourth layers and the support portions do not include any ventilation passages.

35. A mattress substantially as herein described with reference to the accompanying drawings.

36. A method substantially as herein described with reference to the accompanying drawings.

Fig. 1

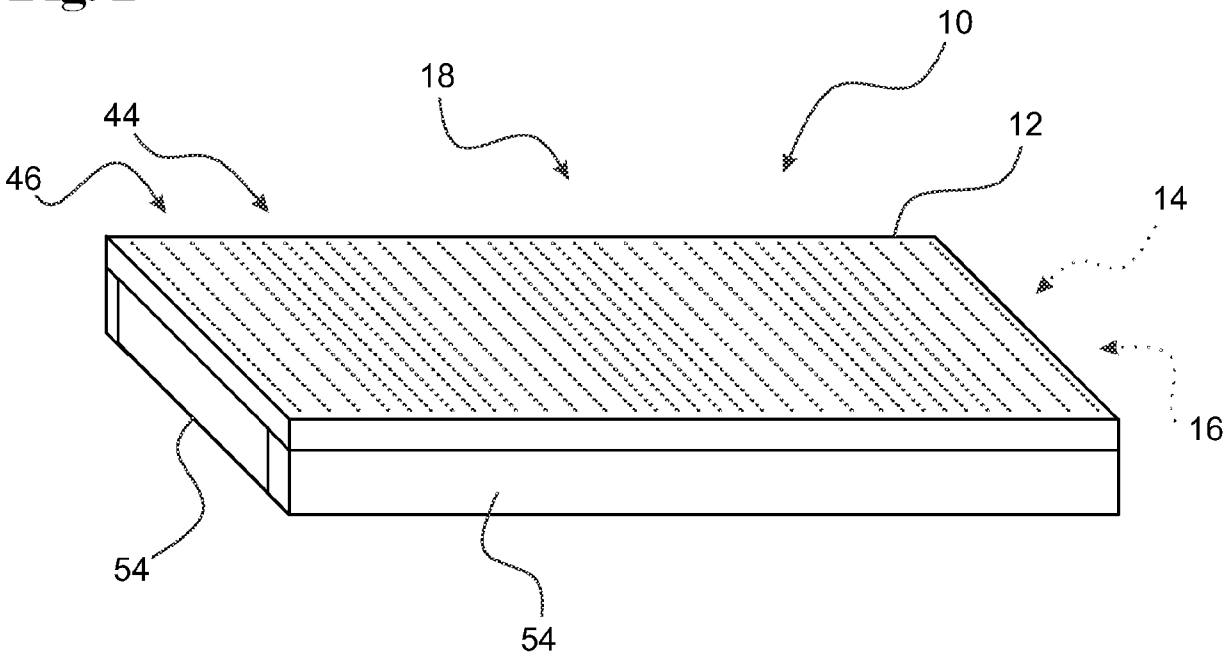
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Fig. 2

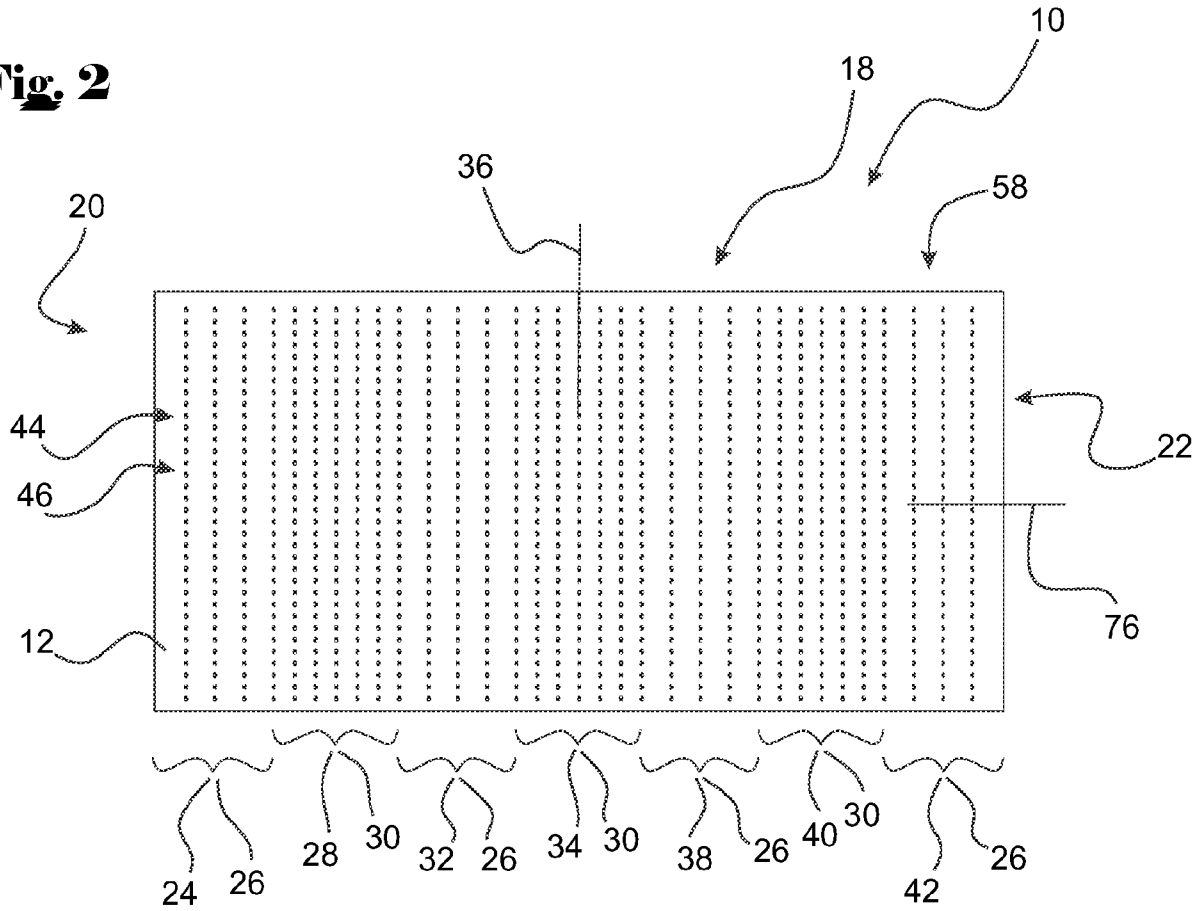
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Fig. 3

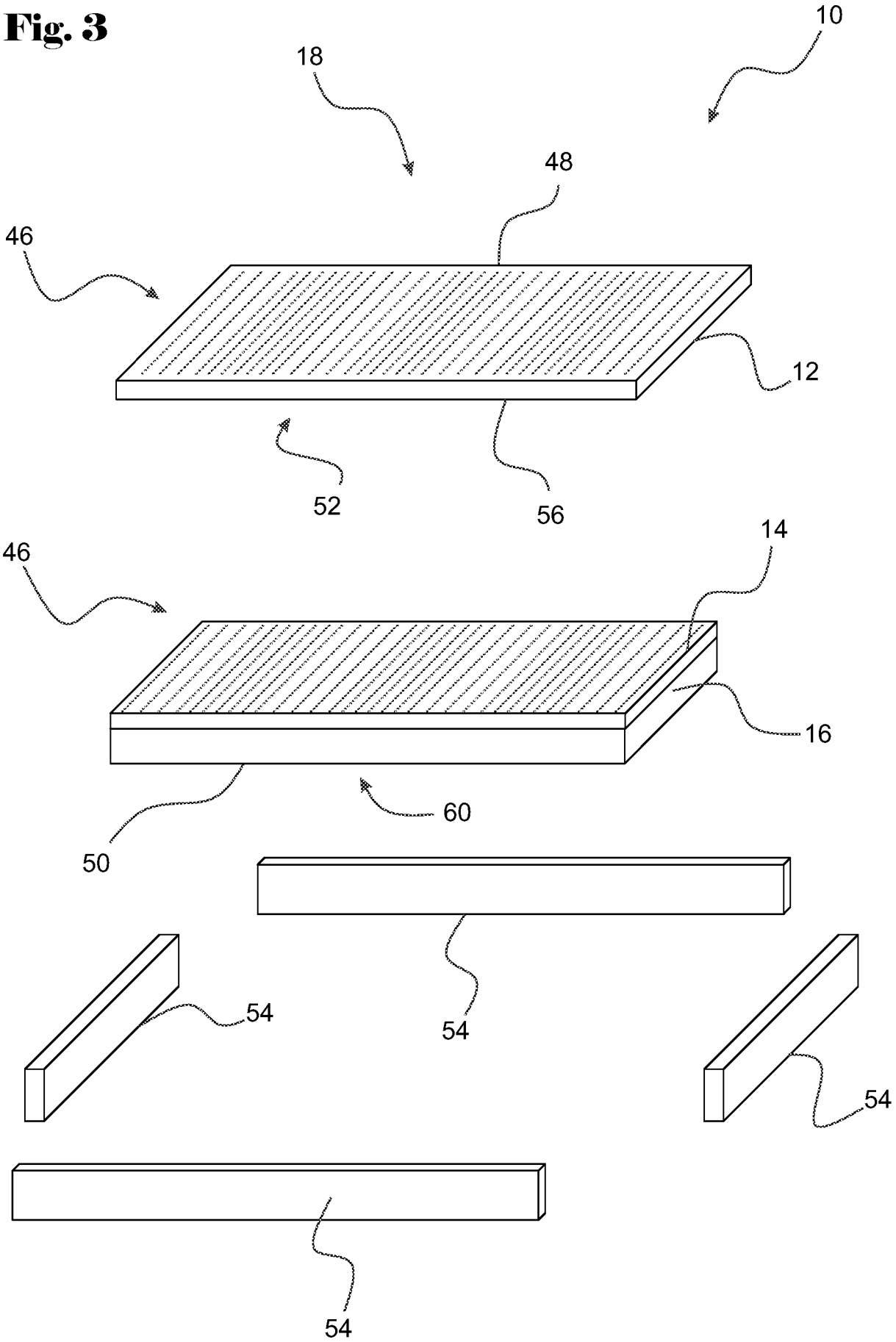

Fig. 4

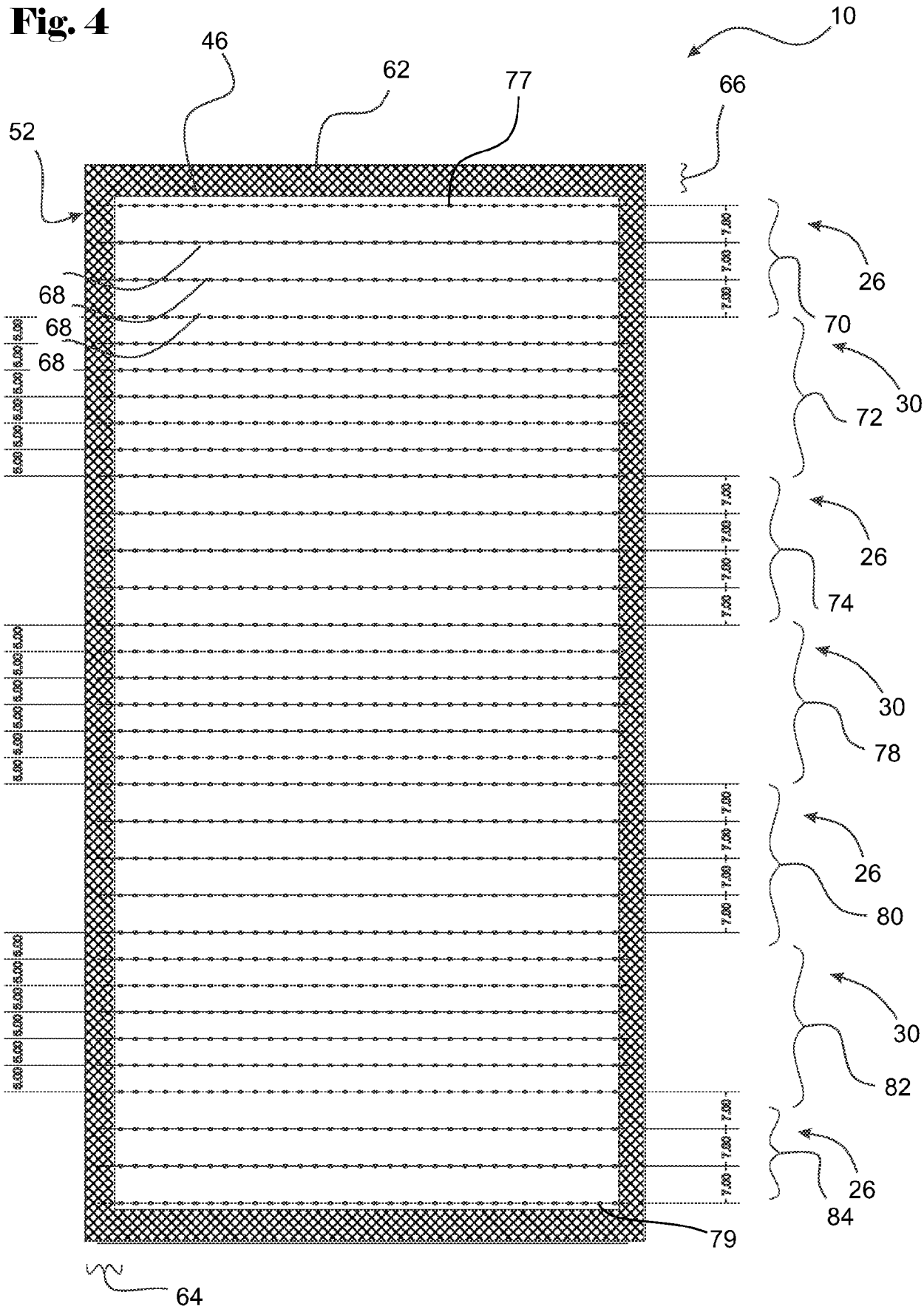
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Fig. 5a

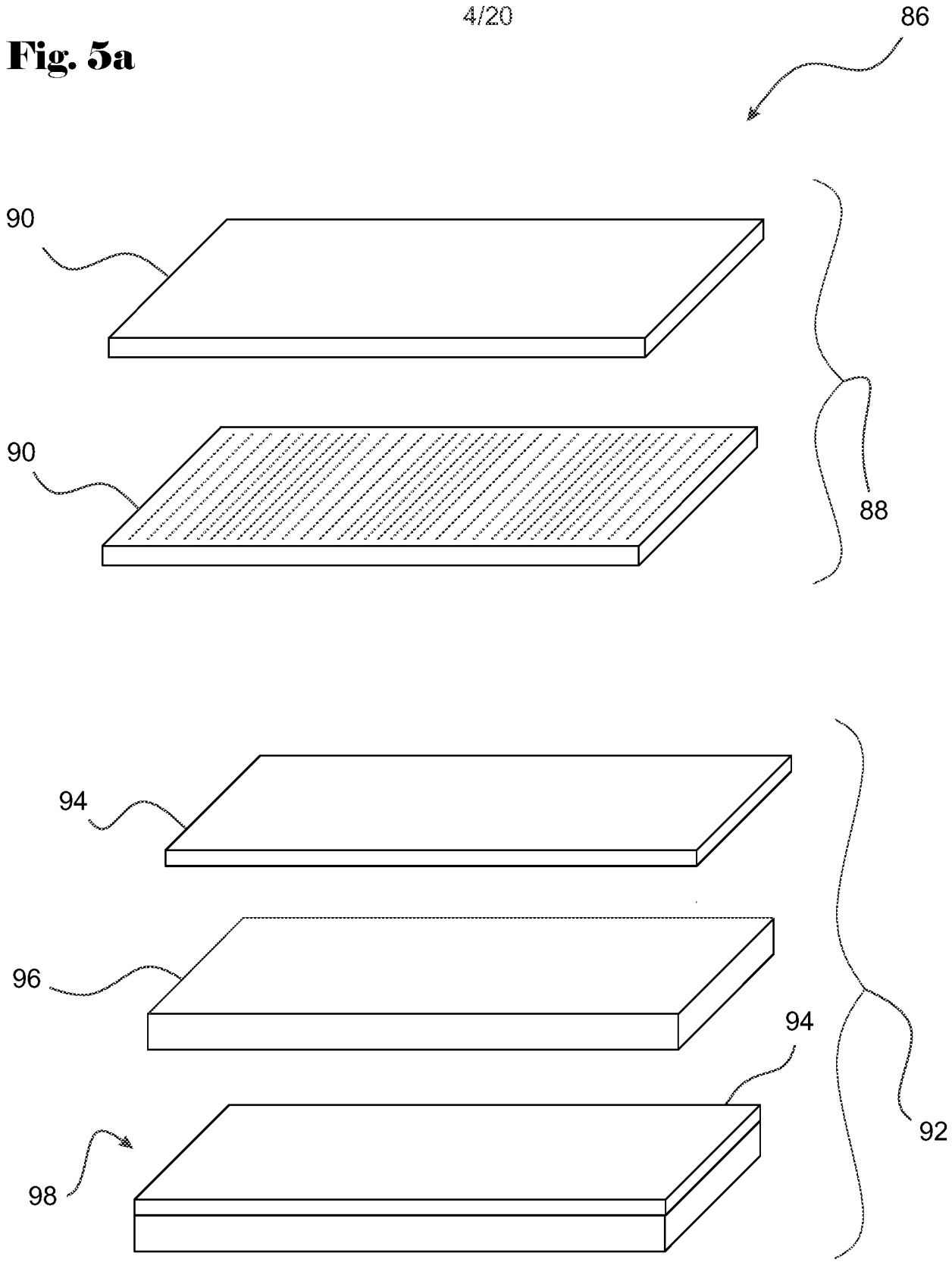


Fig. 5b

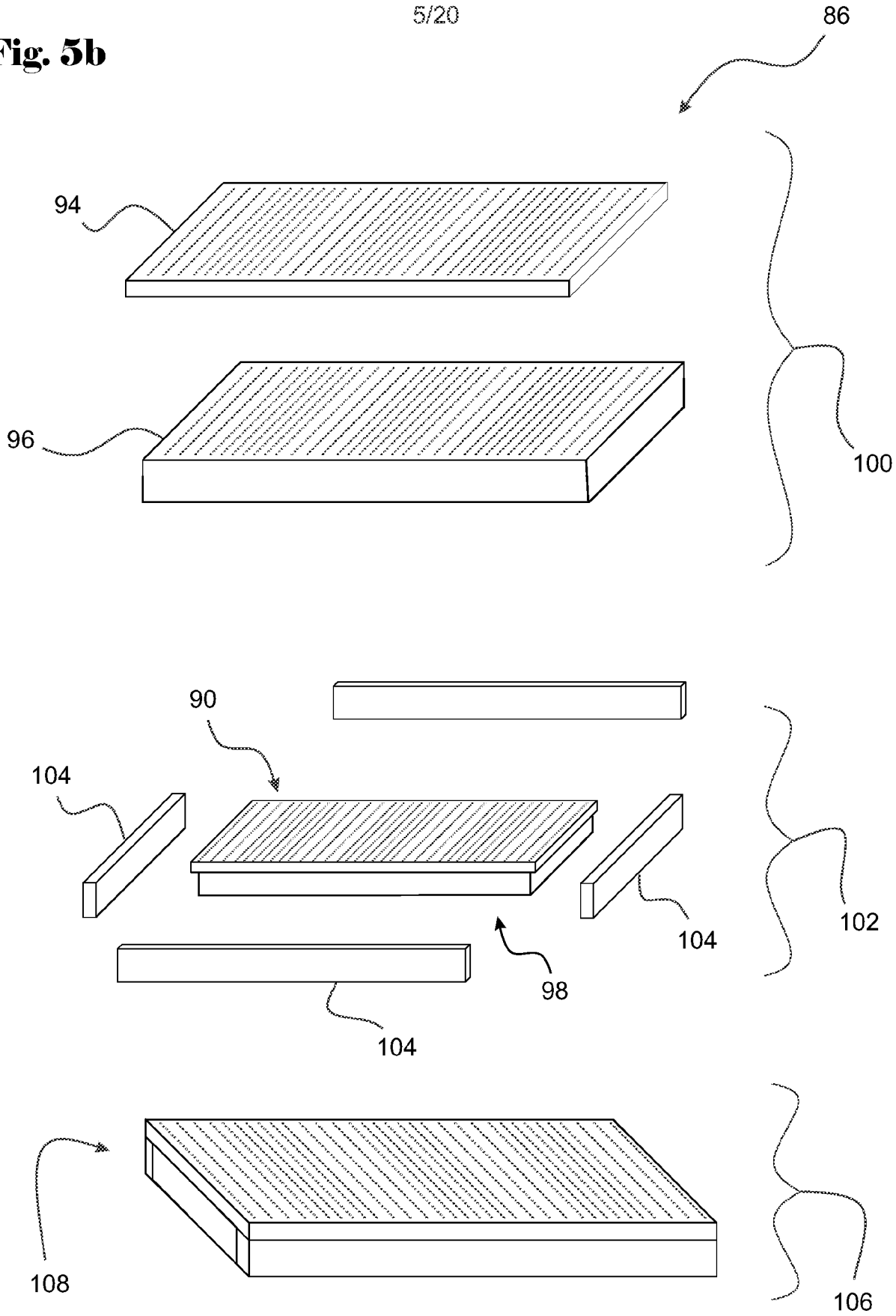


Fig. 6

Ventilated Hole Spacings for L Single K Single, Queen & King Size Mattress Cores.

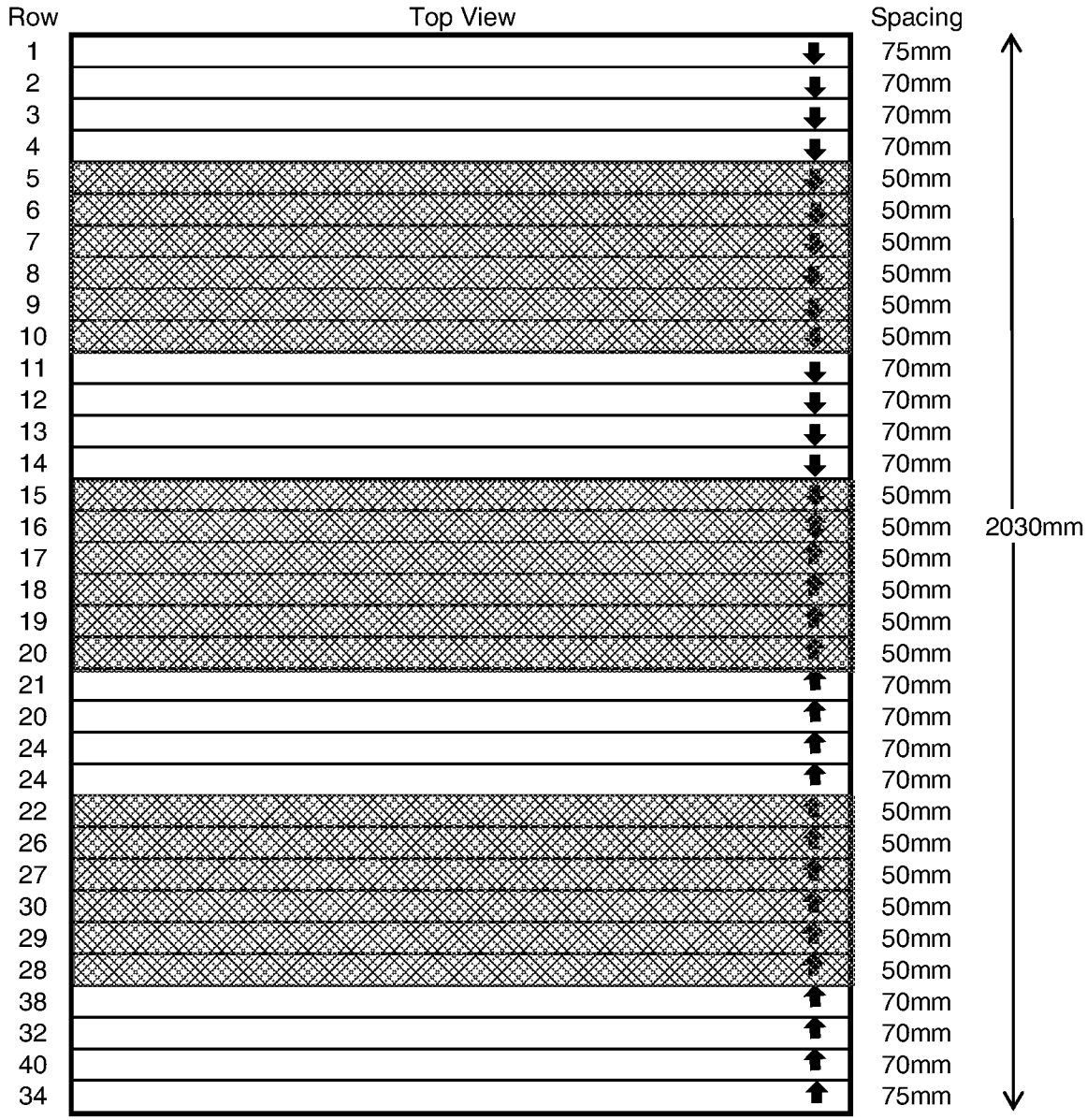


Fig. 7

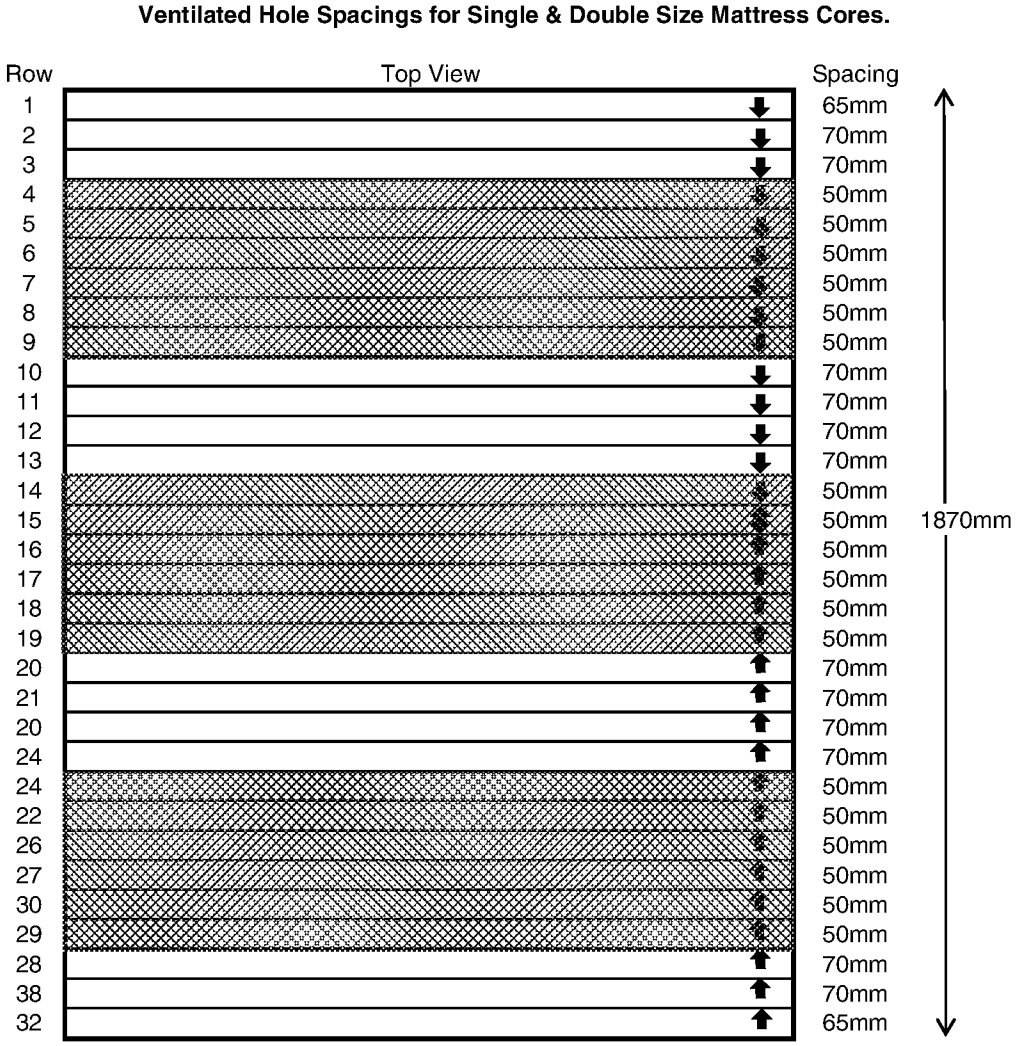
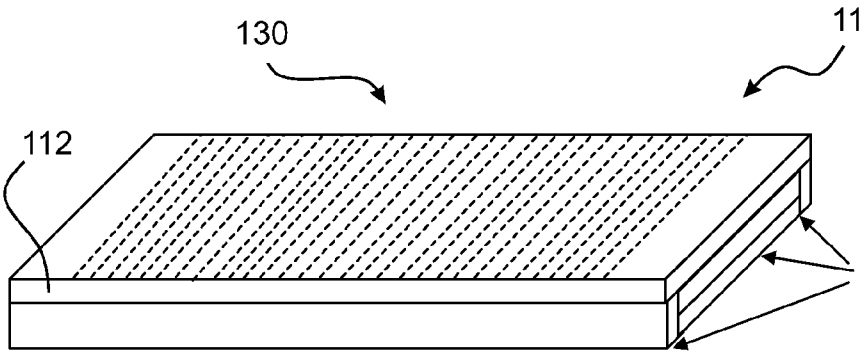

Ventilated Hole Spacings for Single & Double Size Mattress Cores.
Row
Top View
Spacing
1 65mm
2 70mm
3 70mm
4 50mm
5 50mm
6 50mm
7 50mm
8 50mm
9 50mm
10 70mm
11 70mm
12 70mm
13 70mm
14 50mm
15 50mm
16 50mm
17 50mm
18 50mm
19 50mm
20 70mm
21 70mm
20 70mm
24 70mm
24 50mm
22 50mm
26 50mm
27 50mm
30 50mm
29 50mm
28 70mm
38 70mm
32 65mm
1870mm

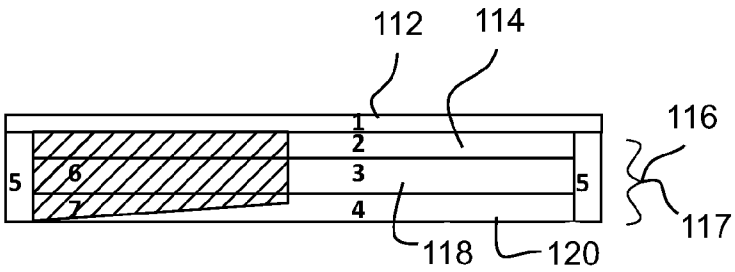
Fig. 8 7 Zone Ventilated Mattress Core with Side & End Support Rails

King Size 2040 x 1830 x 215mm



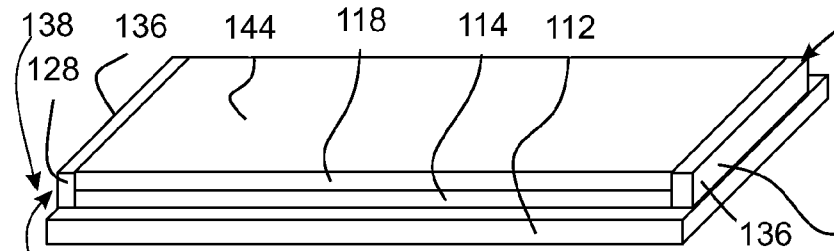
Sheet Layers
VF52-40 @ 35mm
VF60-90 @ 50mm
EN36-130 @ 130mm

Side & End Rails
EN38-200 @ 50mm Wide
180mm High



Combination Sheet Sizes
1. VF52-40 2040 x 1830 x 35mm
2. VF60-90 1940 x 1730 x 50mm
3. EN36-130 1940 x 1730 x 65mm
4. EN36-130 1940 x 1730 x 65mm
5. EN38-200 2040 x 180 x 50mm
6. EN38-200 1730 x 115 x 50mm
7. EN38-200 1730 x 65 x 50mm

Planned order of construction



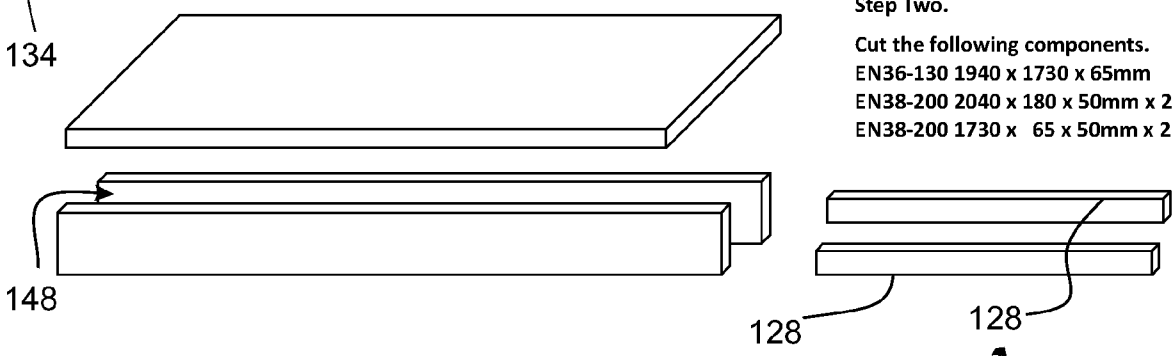
Step One. 140 132

Cut, assemble and glue as shown.
VF52-40 2040 x 1830 x 35mm
VF60-90 1940 x 1730 x 50mm
EN36-130 1940 x 1730 x 65mm
EN38-200 1730 x 115 x 50mm x2

128
136

Step Two.

Cut the following components.
EN36-130 1940 x 1730 x 65mm
EN38-200 2040 x 180 x 50mm x 2
EN38-200 1730 x 65 x 50mm x 2



Step Three.

Ventilate assembled VF52-40, VF60-90, EN36-130, EN38-200 panel with 7 Zone Ventilation pattern.

Ventilate
EN36-130 1940 x 1730 x 65mm

142 No ventilation for the side Rails

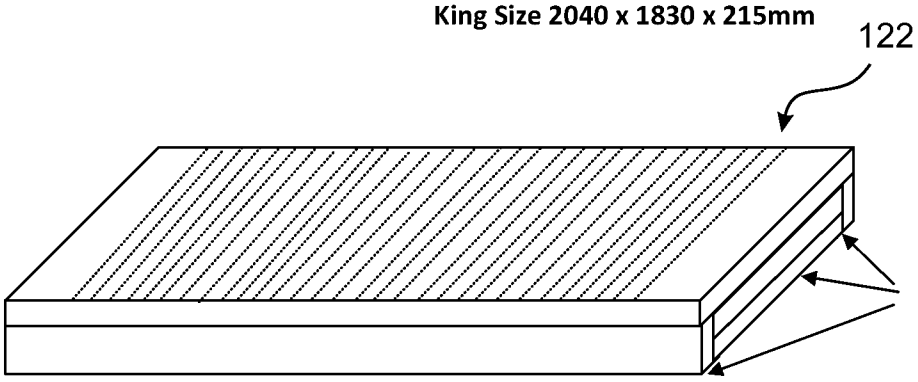
Step Four. 146

Assemble components

Fig. 9 7 Zone Ventilated Mattress Core with Side & End Support Rails

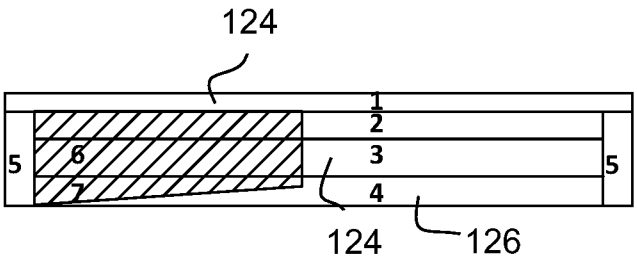
EN36-100 Mid Layer Option

King Size 2040 x 1830 x 215mm



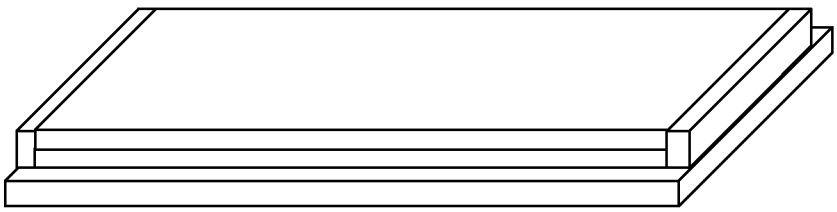
Sheet Layers
VF52-40 @ 35mm
VF60-90 @ 50mm
EN36-100 @ 65mm
EN36-130 @ 65mm

Side & End Rails
EN38-200 @ 50mm Wide
180mm High



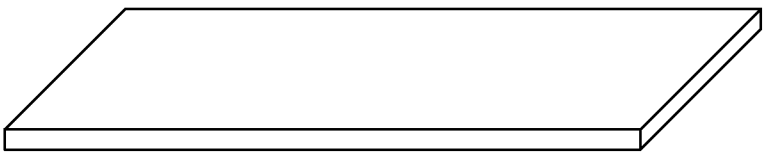
Combination Sheet Sizes
1. VF52-40 2040 x 1830 x 35mm
2. VF60-90 1940 x 1730 x 50mm
3. EN36-100 1940 x 1730 x 65mm
4. EN36-130 1940 x 1730 x 65mm
5. EN38-200 2040 x 180 x 50mm
6. EN38-200 1730 x 115 x 50mm
7. EN38-200 1730 x 65 x 50mm

Planned order of construction



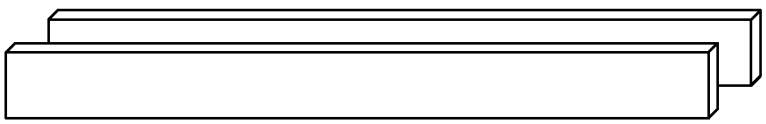
Step One.

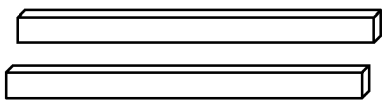
Cut, assemble and glue as shown.
VF52-40 2040 x 1830 x 35mm
VF60-90 1940 x 1730 x 50mm
EN36-100 1940 x 1730 x 65mm
EN38-200 1730 x 115 x 50mm x2



Step Two.

Cut the following components.
EN36-130 1940 x 1730 x 65mm
EN38-200 2040 x 180 x 50mm x 2
EN38-200 1730 x 65 x 50mm x 2





Step Three.

Ventilate assembled VF52-40, VF60-90, EN36-130, EN38-200 panel with 7 Zone Ventilation pattern.

Ventilate
EN36-130 1940 x 1730 x 65mm

No ventilation for the side Rails

Step Four.

Assemble components

Fig. 10

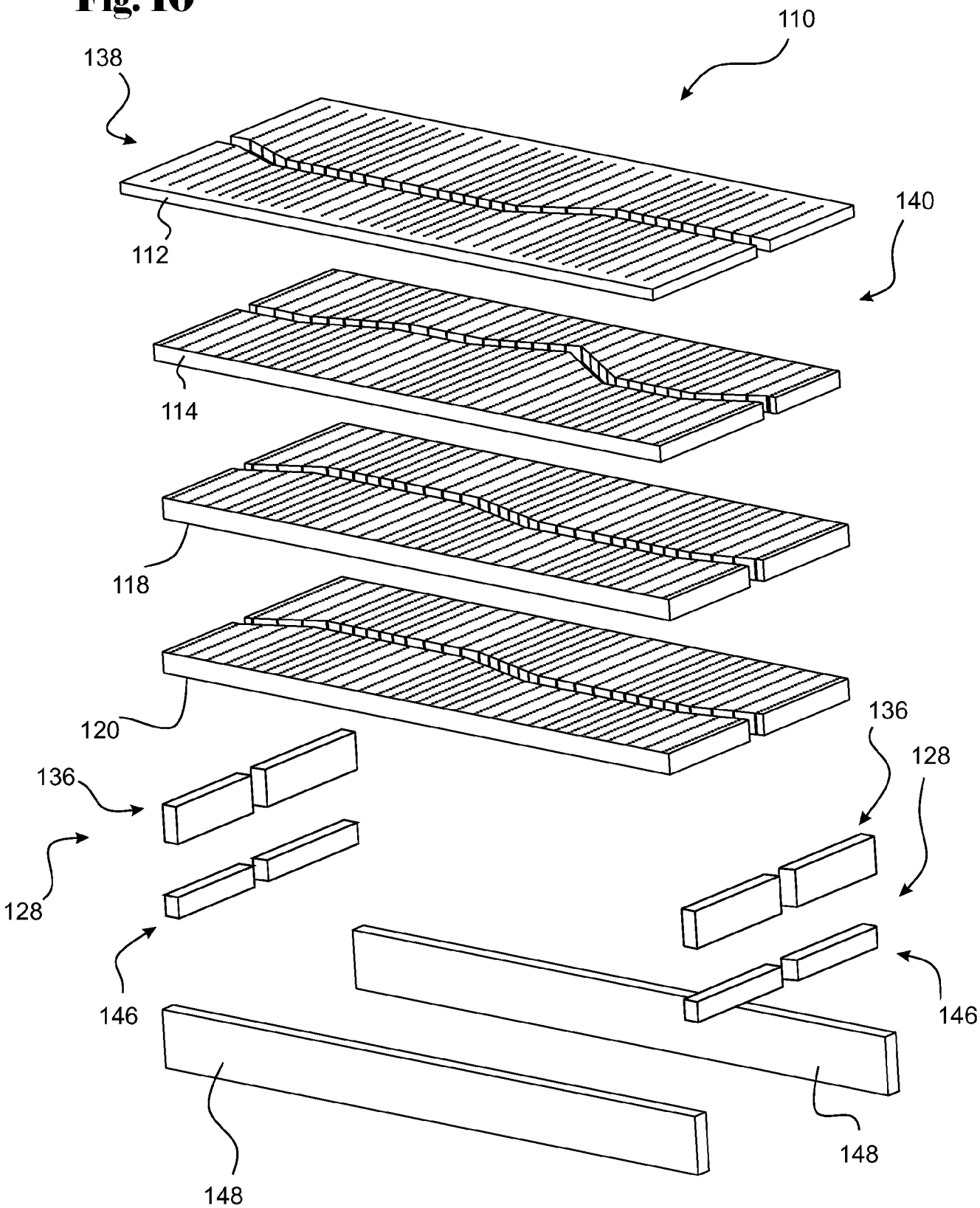
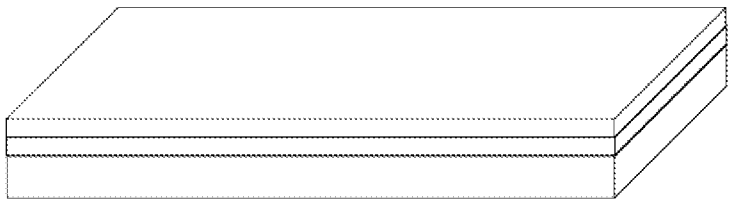
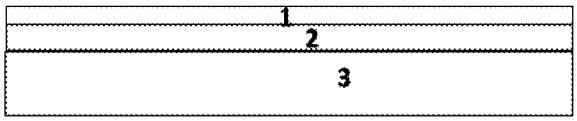


Fig. 11

7 Zone Ventilated Mattress Core with Dunlop Opulence OP50-120
Queen Size 2030 x 1530 x 215mm

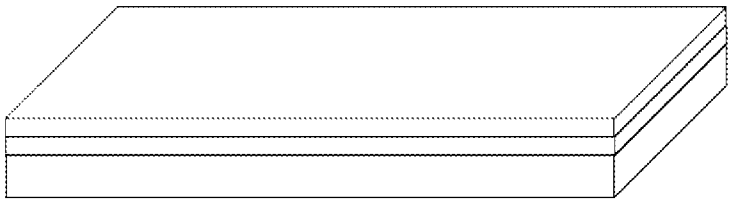


Sheet Layers
VF52-40 @ 35mm
OP50-120 @ 50mm
EN36-130 @ 130mm

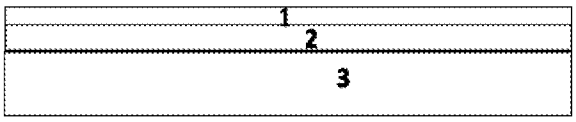


Combination Sheet Sizes
VF52-40 2030 x 1530x 35mm
OP50-120 2030 x 1530 x 50mm
EN36-130 2030 x 1530 x 130mm

7 Zone Ventilated Mattress Core with Dunlop Opulence OP50-120
King Size 2030 x 1830 x 215mm



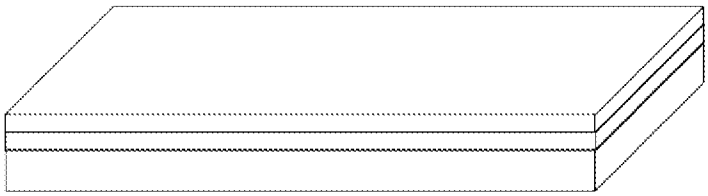
Sheet Layers
VF52-40 @ 35mm
OP50-120 @ 50mm
EN36-130 @ 130mm



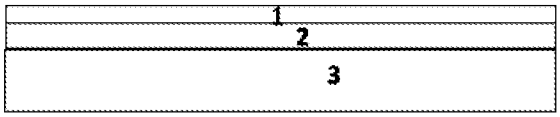
Combination Sheet Sizes
VF52-40 2030 x 1830x 35mm
OP50-120 2030 x 1830 x 50mm
EN36-130 2030 x 1830 x 130mm

Fig. 12

7 Zone Ventilated Mattress Core with Dunlop Viscoflex
Double Size 1870 x 1370 x 215mm

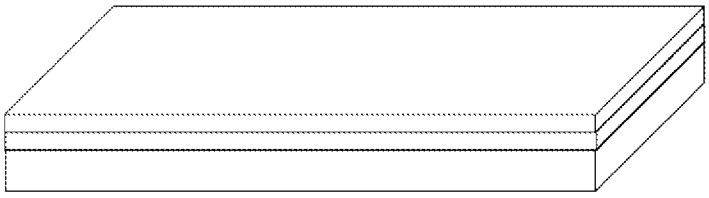


Sheet Layers
VF52-40 @ 35mm
VF60-90 @ 50mm
EN36-130 @ 130mm

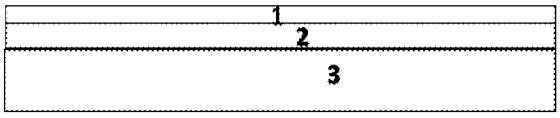


Combination Sheet Sizes
VF52-40 1870 x 1370 x 35mm
VF60-90 1870 x 1370 x 50mm
EN36-130 1870 x 1370 x 130mm

7 Zone Ventilated Mattress Core with Dunlop Viscoflex
King Single Size 2030 x 1060 x 215mm



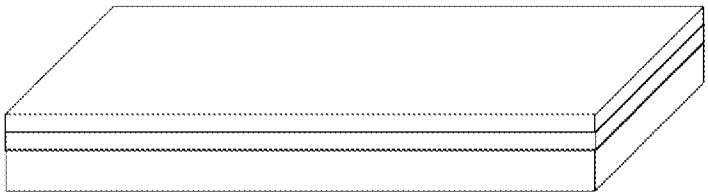
Sheet Layers
VF52-40 @ 35mm
VF60-90 @ 50mm
EN36-130 @ 130mm



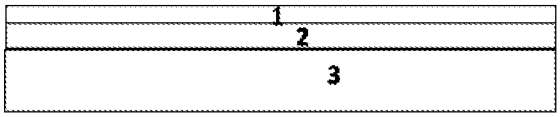
Combination Sheet Sizes
VF52-40 2030 x 1060 x 35mm
VF60-90 2030 x 1060 x 50mm
EN36-130 2030 x 1060 x 130mm

Fig. 13

7 Zone Ventilated Mattress Core with Dunlop Viscoflex
Queen Size 2030 x 1530 x 215mm

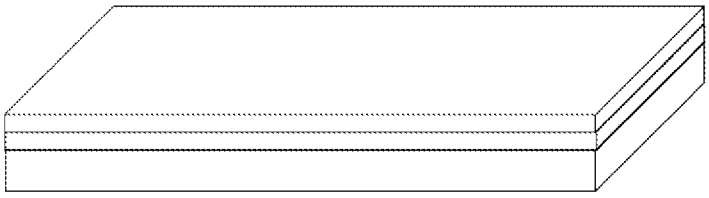


Sheet Layers
VF52-40 @ 35mm
VF60-90 @ 50mm
EN36-130 @ 130mm

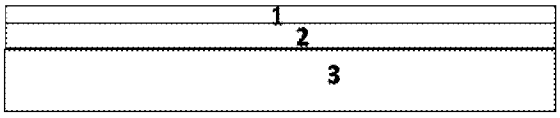


Combination Sheet Sizes
VF52-40 2030 x 1530 x 35mm
VF60-90 2030 x 1530 x 50mm
EN36-130 2030 x 1530 x 130mm

7 Zone Ventilated Mattress Core with Dunlop Viscoflex
King Size 2030 x 1830 x 215mm



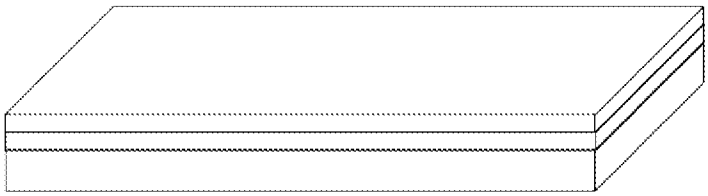
Sheet Layers
VF52-40 @ 35mm
VF60-90 @ 50mm
EN36-130 @ 130mm



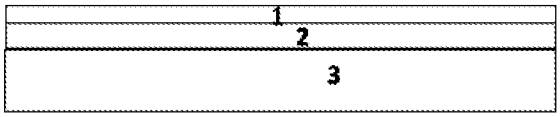
Combination Sheet Sizes
VF52-40 2030 x 1830x 35mm
VF60-90 2030 x 1830 x 50mm
EN36-130 2030 x 1830 x 130mm

Fig. 14

7 Zone Ventilated Mattress Core with Dunlop Viscoflex
Single Size 1870 x 920 x 215mm

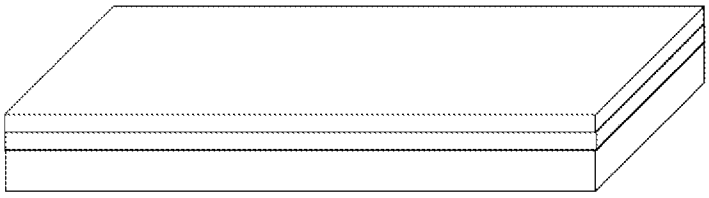


Sheet Layers
VF52-40 @ 35mm
VF60-90 @ 50mm
EN36-130 @ 130mm

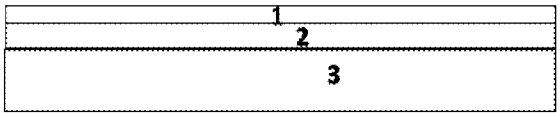


Combination Sheet Sizes
VF52-40 1870 x 920 x 35mm
VF60-90 1870 x 920 x 50mm
EN36-130 1870 x 920 x 130mm

7 Zone Ventilated Mattress Core with Dunlop Viscoflex
Long Single Size 2030 x 920 x 215mm

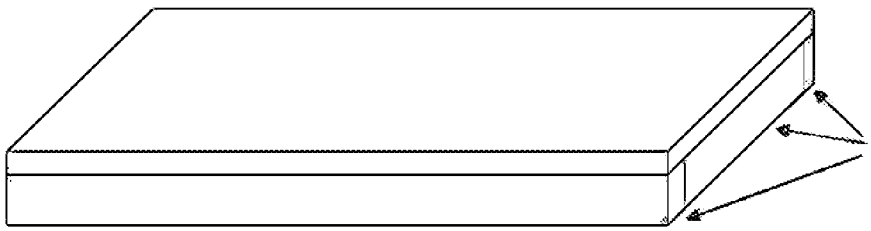


Sheet Layers
VF52-40 @ 35mm
VF60-90 @ 50mm
EN36-130 @ 130mm



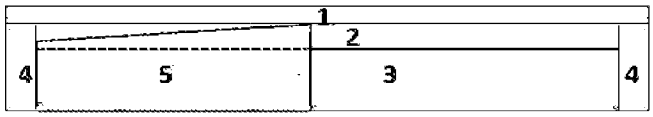
Combination Sheet Sizes
VF52-40 2030 x 920 x 35mm
VF60-90 2030 x 920 x 50mm
EN36-130 2030 x 920 x 130mm

Fig. 15 7 Zone Viscoflex Ventilated Mattress Core with Side & End Support Rails
Double Size: 1870 x 1370 x 215mm



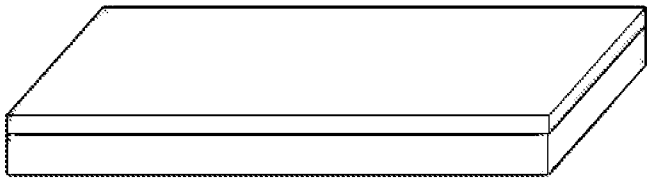
Sheet Layers
VF52-40 @ 35mm
VF60-90 @ 50mm
EN36-130 @ 130mm

Side & End Rails
EN38-200 @ 50mm
Wide & 180mm High



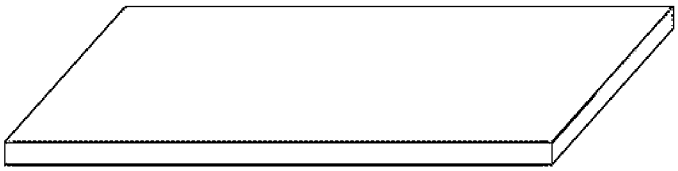
Combination Sheet Sizes
VF52-40 1870 x 1370 x 35mm
VF60-90 1770 x 1270 x 50mm
EN36-130 1770 x 1270 x 130mm
EN38-200 1870 x 180 x 50mm
EN38-200 1270 x 180 x 50mm

Order of construction



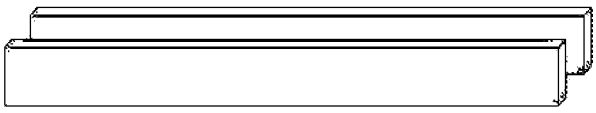
Step One.

Cut and glue.
VF60-90 1770 x 1270 x 50mm
EN36-130 1770 x 1270 x 130mm
And ventilate with the 7 zone pattern.



Step Two.

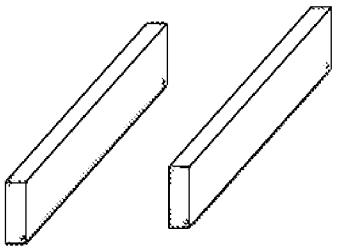
Cut and ventilate with the 7 zone pattern.
VF52-40 1870 x 1370 x 35mm



Step Three.

Cut
2 x EN38-200 1870 x 180 x 50mm
2 x EN38-200 1270 x 180 x 50mm

No ventilation for the side Rails

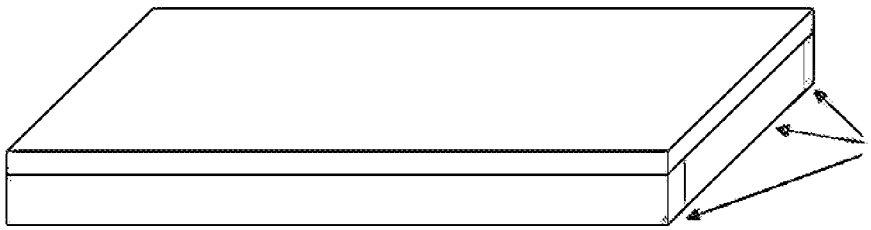


Step Four.

Assemble components

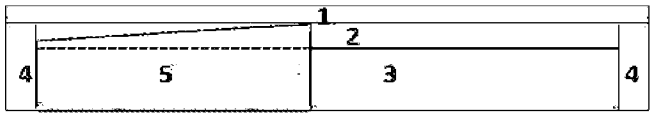
Fig. 16

7 Zone Viscoflex Ventilated Mattress Core with Side & End Support Rails
King Size: 2030 x 1830 x 215mm



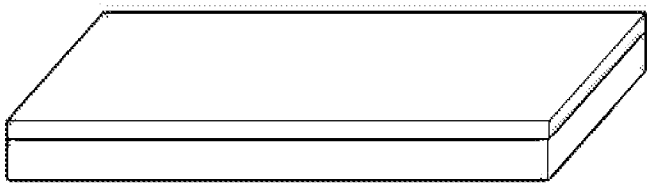
Sheet Layers
VF52-40 @ 35mm
VF60-90 @ 50mm
EN36-130 @ 130mm

Side & End Rails
EN38-200 @ 50mm
Wide & 180mm High



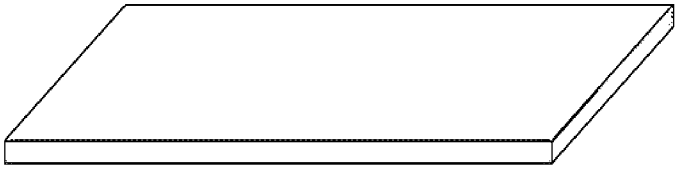
Combination Sheet Sizes
VF52-40 2030 x 1830 x 35mm
VF60-90 1930 x 1730 x 50mm
EN36-130 1930 x 1730 x 130mm
EN38-200 2030 x 180 x 50mm
EN38-200 1730 x 180 x 50mm

Order of construction



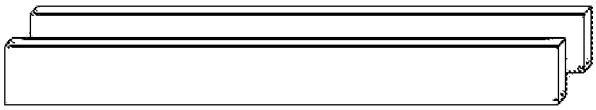
Step One.

Cut and glue.
VF60-90 1930 x 1730 x 50mm
EN36-130 1930 x 1730 x 130mm
And ventilate with the 7 zone pattern.



Step Two.

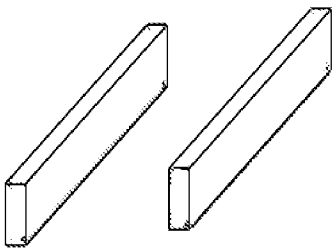
Cut and ventilate with the 7 zone pattern.
VF52-40 2030x 1830 x 35mm



Step Three.

Cut
2 x EN38-200 2030 x 180 x 50mm
2 x EN38-200 1730 x 180 x 50mm

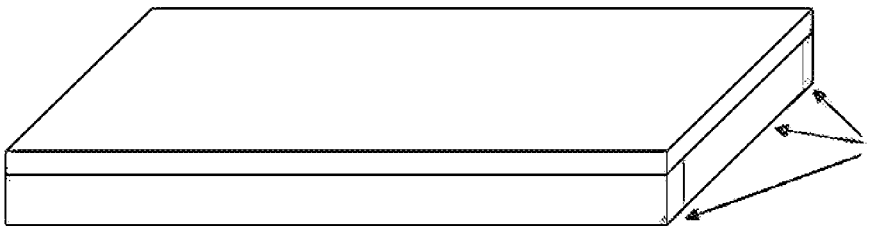
No ventilation for the side Rails



Step Four.

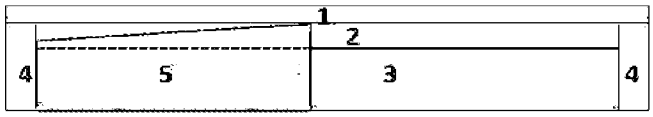
Assemble components

Fig. 17 7 Zone Viscoflex Ventilated Mattress Core with Side & End Support Rails
Long Single Size : 2030 x 920 x 215mm



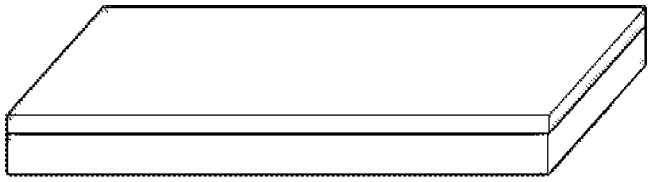
Sheet Layers
VF52-40 @ 35mm
VF60-90 @ 50mm
EN36-130 @ 130mm

Side & End Rails
EN38-200 @ 50mm
Wide & 180mm High



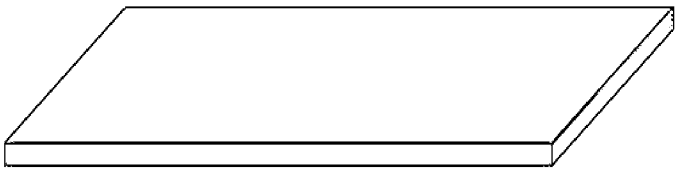
Combination Sheet Sizes
VF52-40 2030 x 920 x 35mm
VF60-90 1930 x 820 x 50mm
EN36-130 1930 x 820 x 130mm
EN38-200 2030 x 180 x 50mm
EN38-200 820 x 180 x 50mm

Order of construction



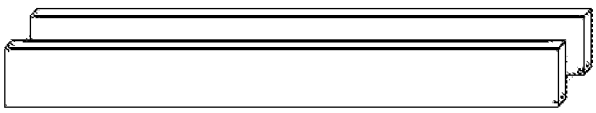
Step One.

Cut and glue.
VF60-90 1930 x 820 x 50mm
EN36-130 1930 x 820 x 130mm
And ventilate with the 7 zone pattern.



Step Two.

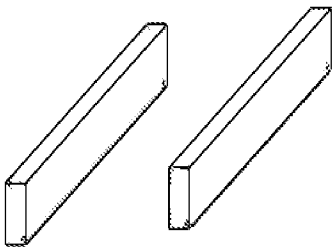
Cut and ventilate with the 7 zone pattern.
VF52-40 2030 x 920 x 35mm



Step Three.

Cut
2 x EN38-200 2030 x 180 x 50mm
2 x EN38-200 820 x 180 x 50mm

No ventilation for the side Rails

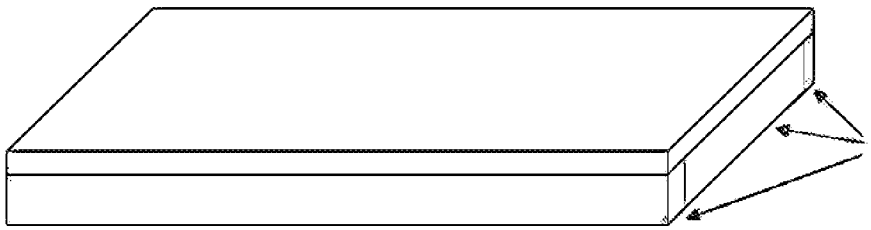


Step Four.

Assemble components

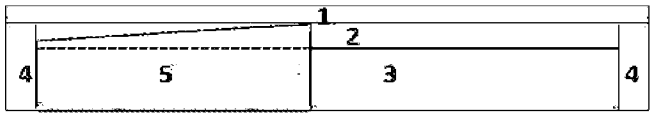
Fig. 18

7 Zone Viscoflex Ventilated Mattress Core with Side & End Support Rails
King Single Size: 2030 x 1060 x 215mm



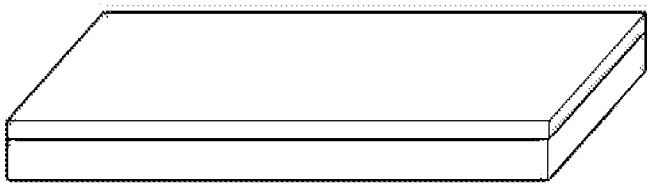
Sheet Layers
VF52-40 @ 35mm
VF60-90 @ 50mm
EN36-130 @ 130mm

Side & End Rails
EN38-200 @ 50mm
Wide & 180mm High



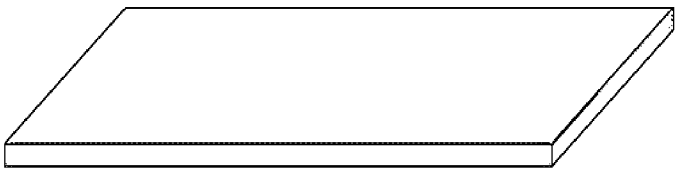
Combination Sheet Sizes
VF52-40 2030 x 1060 x 35mm
VF60-90 1930 x 960 x 50mm
EN36-130 1930 x 960 x 130mm
EN38-200 2030 x 180 x 50mm
EN38-200 960 x 180 x 50mm

Order of construction



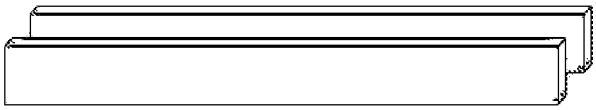
Step One.

Cut and glue.
VF60-90 1930 x 960 x 50mm
EN36-130 1930 x 960 x 130mm
And ventilate with the 7 zone pattern.



Step Two.

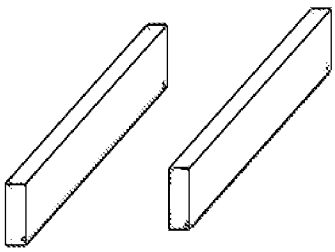
Cut and ventilate with the 7 zone pattern.
VF52-40 2030x 1060 x 35mm



Step Three.

Cut
2 x EN38-200 2030 x 180 x 50mm
2 x EN38-200 960 x 180 x 50mm

No ventilation for the side Rails

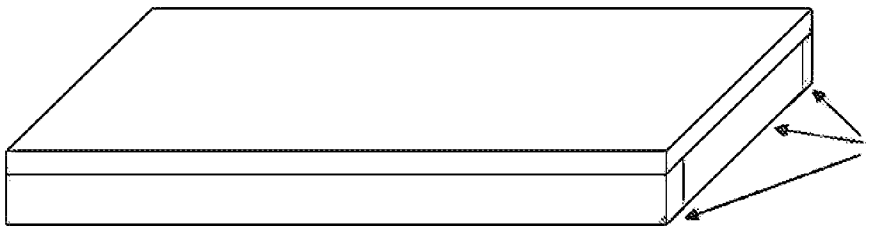


Step Four.

Assemble components

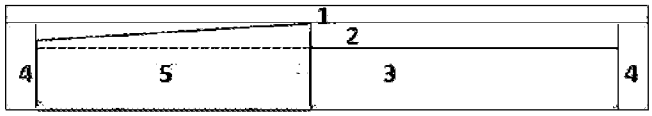
Fig. 19

7 Zone Viscoflex Ventilated Mattress Core with Side & End Support Rails
Queen Size: 2030 x 1530 x 215mm



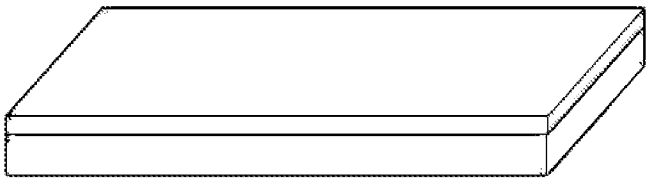
Sheet Layers
VF52-40 @ 35mm
VF60-90 @ 50mm
EN36-130 @ 130mm

Side & End Rails
EN38-200 @ 50mm
Wide & 180mm High



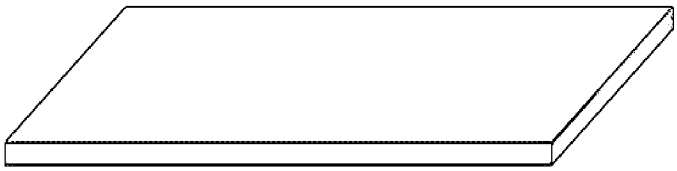
Combination Sheet Sizes
VF52-40 2030 x 1530 x 35mm
VF60-90 1930 x 1430 x 50mm
EN36-130 1930 x 1430 x 130mm
EN38-200 2030 x 180 x 50mm
EN38-200 1430 x 180 x 50mm

Order of construction



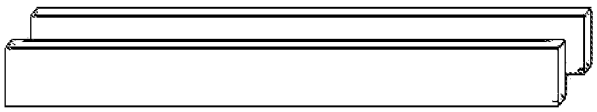
Step One.

Cut and glue.
VF60-90 1930 x 1430 x 50mm
EN36-130 1930 x 1430 x 130mm
And ventilate with the 7 zone pattern.



Step Two.

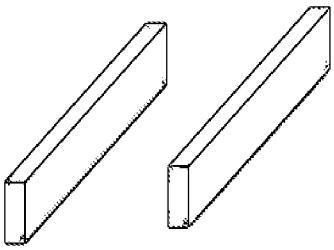
Cut and ventilate with the 7 zone pattern.
VF52-40 2030x 1530 x 35mm



Step Three.

Cut
2 x EN38-200 2030 x 180 x 50mm
2 x EN38-200 1430 x 180 x 50mm

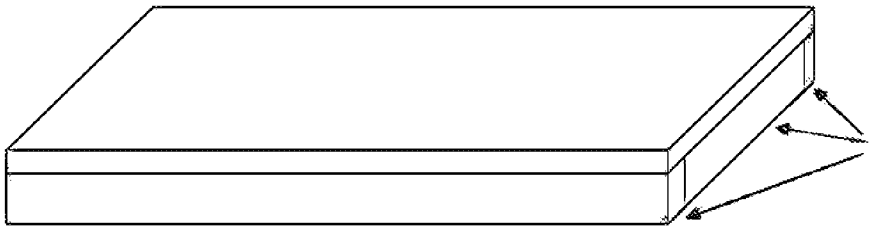
No ventilation for the side Rails



Step Four.

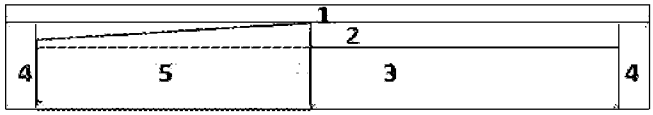
Assemble components

Fig. 20 7 Zone Viscoflex Ventilated Mattress Core with Side & End Support Rails
Single Size: 1870 x 920 x 215mm



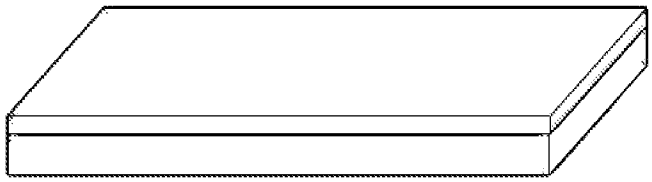
Sheet Layers
VF52-40 @ 35mm
VF60-90 @ 50mm
EN36-130 @ 130mm

Side & End Rails
EN38-200 @ 50mm
Wide & 180mm High



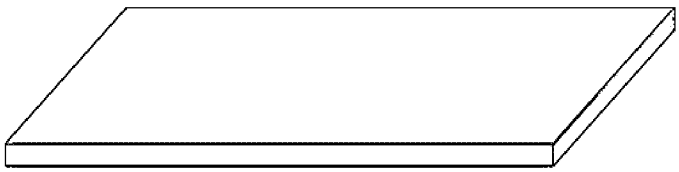
Combination Sheet Sizes
VF52-40 1870 x 920 x 35mm
VF60-90 1770 x 820 x 50mm
EN36-130 1770 x 820 x 130mm
EN38-200 1870 x 180 x 50mm
EN38-200 820 x 180 x 50mm

Order of construction



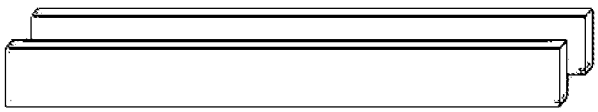
Step One.

Cut and glue.
VF60-90 1770 x 820 x 50mm
EN36-130 1770 x 820 x 130mm
And ventilate with the 7 zone pattern.



Step Two.

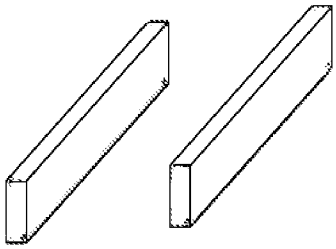
Cut and ventilate with the 7 zone pattern.
VF52-40 1870x 920 x 35mm



Step Three.

Cut
2 x EN38-200 1870 x 180 x 50mm
2 x EN38-200 820 x 180 x 50mm

No ventilation for the side Rails



Step Four.

Assemble components

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU2013/000457

A. CLASSIFICATION OF SUBJECT MATTER

A47C 27/14 (2006.01) A47C 27/15 (2006.01)

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)

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)

WPI, EPODOC;IPC, CPC A47C27, 27/14, 27/15 & Key words (foam, layer, polyurethane, memory, visco_elastic, multi, several, plural, sandwich, stack, three, composite, two, dual, double, thick, depth, dimension, sponge, mattress, tier) and key words alone & Google Patents with similar terms.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
	Documents are listed in the continuation of Box C	

[X] Further documents are listed in the continuation of Box C [X] See patent family annex

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
26 July 2013	26 July 2013

Name and mailing address of the ISA/AU

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Authorised officer

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AUSTRALIAN PATENT OFFICE
(ISO 9001 Quality Certified Service)
Telephone No. 0262832070

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU2013/000457

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☒ Claims Nos.: **35, 36**
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
See Supplemental Box

3. ☐ Claims Nos:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a)

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

See Supplemental Box for Details

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:
1-11

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		International application No. **PCT/AU2013/000457**
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	FR 2848817 A1 (PRAXIS MEDICAL TECHNOLOGIES SARL) 25 June 2004 abstract retrieved from EPODOC database, Translation of the document from Esp@cenet	1-11
A	GB 2244000 A (S.TEASDALE(HOSPITAL EQUIPMENT) LTD) 20 November 1991 Abstract & figs 1-2	1-11

INTERNATIONAL SEARCH REPORT	International application No. PCT/AU2013/000457

Supplemental Box

Continuation of **Box II**

The claim/s do/does not comply with Rule 6.2(a) because it/they rely on references to the description and/or drawings.

Continuation of **Box III**

This International Application does not comply with the requirements of unity of invention because it does not relate to one invention or to a group of inventions so linked as to form a single general inventive concept.

This Authority has found that there are different inventions based on the following features that separate the claims into distinct groups:

- Claims 1-11 are directed to a mattress. The feature of wherein the intermediate layer is provided between the upper layer and the lower layer; the upper layer and the intermediate layer have a combined thickness of at least 50mm; and the lower layer has a thickness of at least 70mm. is specific to this group of claims.

- Claims 12-34 are directed to a mattress. The feature of wherein a number of vertically extending ventilation passages extend through the at least one layer of visco elastic material is specific to this group of claims.

PCT Rule 13.2, first sentence, states that unity of invention is only fulfilled when there is a technical relationship among the claimed inventions involving one or more of the same or corresponding special technical features. PCT Rule 13.2, second sentence, defines a special technical feature as a feature which makes a contribution over the prior art.

When there is no special technical feature common to all the claimed inventions there is no unity of invention.

In the above groups of claims, the identified features may have the potential to make a contribution over the prior art but are not common to all the claimed inventions and therefore cannot provide the required technical relationship. Therefore there is no special technical feature common to all the claimed inventions and the requirements for unity of invention are consequently not satisfied *a priori*.

It is considered that search and examination for the second invention will require more than negligible additional search and examination effort over that for the first invention, and therefore an additional search fee is warranted.

INTERNATIONAL SEARCH REPORT Information on patent family members	International application No. **PCT/AU2013/000457**

This Annex lists known patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document/s Cited in Search Report		Patent Family Member/s	
Publication Number	**Publication Date**	**Publication Number**	**Publication Date**
FR 2848817 A1	25 Jun 2004	FR 2848817 B1	09 Sep 2005
GB 2244000 A	20 Nov 1991	GB 2244000 B	22 Sep 1993

End of Annex

Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.