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(54) Padded structure

(57) There is disclosed a padded structure comprising:

at least one core of a rolled, vertically lapped non-woven fabric; and

a padding material.

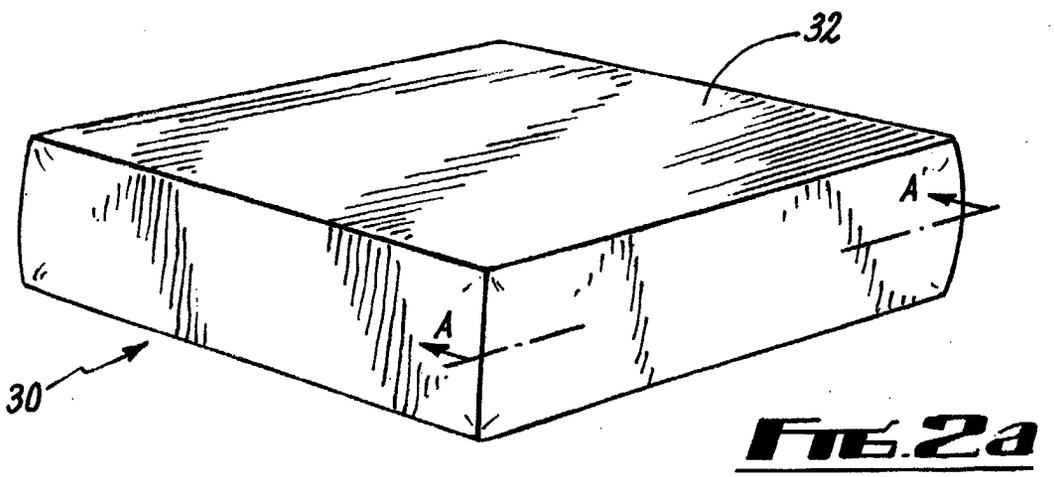

FIG.2a

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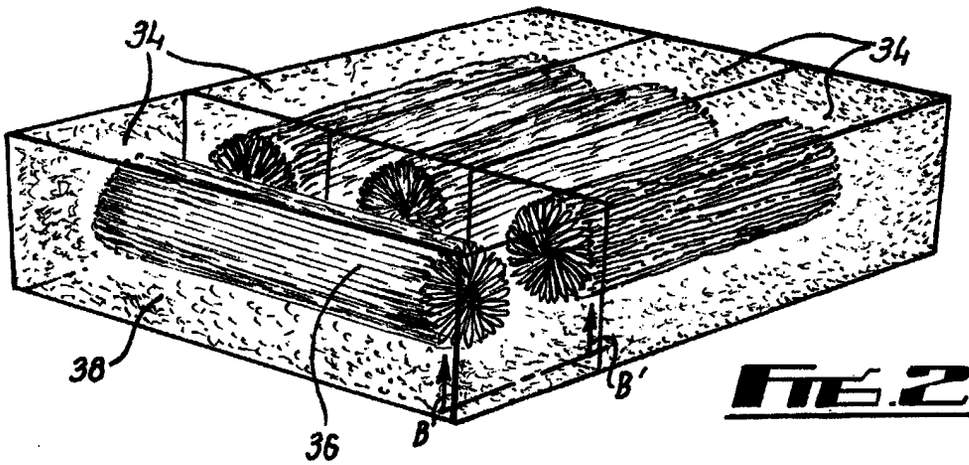
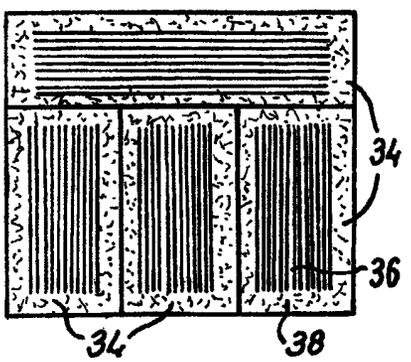


FIG.2b

FIG.2c



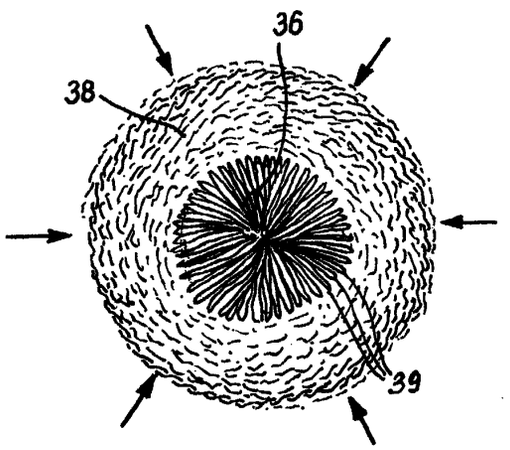


FIG.2d

Description

[0001] This invention relates to padded structures and to various articles incorporating said padded structures, with particular, but by no means exclusive, reference to the field of upholstered furniture, commercial seating, transportation vehicle seating, bedding products and general load bearing support structures.

[0002] It is common practice to provide articles of furniture upon which persons may sit or recline, such as a sofa or a chair, with some form of cushioning in order to improve comfort for a person disposed upon the article of furniture. Such cushioning may be incorporated within the body of the article of furniture itself, or may comprise a cushion, which may be attached by way of a zip or other attachment means, or merely placed in contact with the main body of the article of furniture. Particularly important regions from the point of view of cushioning are those portions of the article of furniture which are intended to come into contact with the buttocks and the back of a person using the article of furniture. It is particularly important that such cushioned areas should be compliant enough to provide comfort for a person, yet be resilient enough to provide proper support for the person. A further important consideration is that the cushioning should be robust enough to retain its properties over the lifetime of the article of furniture. The nature of the cushioning in the seat region of the item of furniture is particularly important in this regard, since this region of an item of furniture should be able to withstand the considerable compression forces placed upon it when persons sit down (often in an uncontrolled manner) upon the item of furniture.

[0003] Figure 1 shows cross sectional views through a number of prior art cushions 10 which have been used for upholstery purposes. Figure 1(a) shows a cushion 10 which is filled with a horizontally cross lapped fibre that has been carded to produce a web which is built up by cross lapping and then rolled to produce a generally cylindrical configuration 13 which is inserted into a cushion compartment 12. Such cushions exhibit a high degree of compliance, and thus provide a soft feel. However, cushions of this type do not display great resilience, and do not retain their shape upon repeated use. Rather, the structure of such cushions tends to collapse after repeated use. Figure 1 (b) shows a second cushion construction in which a block of foam 14 is wrapped in carded fibre 16. The use of the foam core 14 is quite effective in preventing collapse of the cushion over a period of time, but unfortunately exhibits attendant drawbacks. In particular, the foam core 14 can impart an overly resilient, hard feel to the cushion. Typically, a polyurethane foam is used, in which instance there is the added drawback of the flammability of this material. It is known to use foams comprising a modified urethane which exhibits improved flammability properties. Unfortunately, such materials possess an even greater degree of resiliency, and thus impart an extremely hard feel. Figure 1 (c) shows a cushion which contains a filling 18 comprising a mixture of feathers and fibre. Typically the fibre is carded but the feather components are not, the feathers being sprinkled onto the web after combing. Such cushions are very compliant and impart a very soft feel, but are even more prone to collapse than the carded fibre arrangements of Figure 1 (a). Figure 1 (d) depicts a prior art cushion which is filled with a blown fibre 20. In this arrangement, fibre is lightly carded and then blown directly into the cushion compartments. Such arrangements are relatively inexpensive, but are very prone to collapse after repeated use and do not retain their shape at all well. Additionally, it is noted that it is known to provide pillows which have an inner core comprising a rolled up layer of an horizontally lapped non-woven fabric, but this approach is not known in respect of upholstery cushions.

[0004] An additional disadvantage associated with prior art fibre filled cushions is that, for good performance, such cushions should be plumped on a fairly regularly basis. The process of plumping cushions can be time consuming and is generally not liked by users of articles of furniture.

[0005] From the foregoing, it will be apparent that there is a need for upholstery cushions and cushioning arrangements which are compliant enough to impart a pleasing, soft feel when used, but which are resilient and mechanically strong enough to provide adequate support to a user and to maintain adequate mechanical properties over a period of time and after repeated use. Furthermore, there is a need for cushions and cushioning arrangements which require limited or no plumping. The present invention meets these needs and provides cushions and cushioning arrangements which exhibit such properties. In a more general context, the present invention provides improved padded structures, which can be utilised in a variety of end uses.

[0006] According to a first aspect of the invention there is provided a padded structure comprising:

at least one core of a rolled, vertically lapped non-woven fabric; and

a padding material.

[0007] Such structures can exhibit an excellent combination of compliance, providing a soft feel and comfort for a user, together with resilience, high load bearing capability, high mechanical strength and durability. Furthermore, padded structures of the invention are convenient and economical to manufacture. Possible areas of application include upholstery cushions, cushions *per se,* bed mattresses, pillows, and other load bearing applications.

[0008] Typically the padded structure further comprises a coverstock enclosing the padding material and maintaining the structural integrity of the padded structure.

[0009] In a preferred embodiment, the padding material forms an outer core which is disposed around the core of the rolled, vertically lapped non-woven fabric. Alternatively, the padding material may form an inner core, with the rolled, vertically lapped non-woven fabric being disposed around the inner core. Alternatively still, the padding material may be incorporated within the core of the rolled, vertically lapped non-woven fabric, for example by i) providing a two layer arrangement comprising a layer of padding material and a layer of vertically lapped, non-woven fabric and ii) rolling the two layer arrangement up into a spiral configuration. In further alternatives, combinations of these configurations are provided. For example, a padded structure may comprise an inner core of a padding material, a middle core of the rolled up, vertically lapped non-woven fabric disposed around the inner core, and an outer core of a padding material disposed around the middle core.

[0010] The rolled, vertically lapped non-woven fabric may be substantially cylindrical. Preferably, the fabric is rolled so as to provide a single walled structure of substantially circular transverse cross sectional form. Alternatively, the fabric may be rolled in a spiral transverse cross sectional form so as to provide a multiple walled arrangement (at least over a portion of the perimeter of the inner core). Other transverse cross sectional forms, such as a substantially elliptical form, may be employed.

[0011] The rolled, vertically lapped non-woven fabric may comprise polyester or modified polyester fibres. Other natural, re-engineered or synthetic fibres may be used, such as acrylic, viscose, wool, polycyclohexlenedimethylene terephthalate, polyolefins, polyamides, polyvinylchlorides and polylactic acid.

[0012] The rolled, vertically lapped non-woven fabric may comprise an arrangement of bonded matrix fibres. The rolled, vertically lapped non-woven fabric may further comprise bonding fibres which are at least partially melted so as to bond the matrix fibres. The bonding fibres may be bi-component fibres. Alternatively, the matrix fibres may be bonded with a bonding agent, such as a resin or in other ways.

[0013] The bonded matrix fibres may comprise polyester or modified polyester fibres.

[0014] The padding material may comprise a fibrous material. The padding material may comprise a carded fibrous material. Alternatively, the padding material may comprise a foam or feathers.

[0015] The padding material may comprise polyester or modified polyester fibres. Other natural, re-engineered or synthetic fibres may be used, such as polycyclohexlenedimethylene terephthalate, polyolefins, polyamides, acrylics, polyvinylchlorides, polylactic acid, viscose and wool.

[0016] According to a second aspect of the invention there is provided an item of furniture or seating comprising at least one padded structure, in which the padded structure comprises:

at least one core of a rolled, lapped non-woven fabric; and

a padding material.

[0017] The padding material may form an outer core which is disposed around the core of the rolled, lapped non-woven fabric. Alternative configurations, described above in the context of the rolled, vertically lapped non-woven fabric of the first aspect of the invention, might also be employed recognising that in the context of the second aspect of the invention the non-woven fabric is not necessarily vertically lapped.

[0018] The item of furniture or seating may comprise at least one padded structure according to the first aspect of the invention. This arrangement is preferred, since it provides greatest resilience and load bearing capacity. However, the use of differently lapped non-woven fabric, eg, horizontally lapped non-woven fabric, is possible.

[0019] An item of furniture or seating may be a sofa or a chair.

[0020] Seating may comprise seating for automotive vehicles.

[0021] The padded structure may be disposed in a seat region of the item of furniture or seating.

[0022] The padded structure may form part of a cushion, which cushion is detachable from the item of furniture or seating.

[0023] According to a third aspect of the invention there is provided a bed mattress comprising at least one padded structure, in which the padded structure comprises:

at least one core of a rolled, lapped non-woven fabric; and

a padding material.

[0024] The padding material may form an outer core which is disposed around the core of the rolled, lapped non-woven fabric. Alternative configurations, described above in the context of the rolled vertically lapped non-woven fabric of the first aspect of the invention, might also be employed, recognising that in the context of the third aspect of the invention the non-woven fabric is not necessarily vertically lapped.

[0025] The bed mattress may comprise at least one padded structure according to the first aspect of the invention. This arrangement is preferred, since it provides greatest resilience and load bearing capacity. However, the use of differently lapped non-woven fabric, eg, horizontally lapped non-woven fabric, is possible.

[0026] According to a fourth aspect of the invention there is provided a cushion comprising a padded structure according to the first aspect of the invention and at least one cushion cover enclosing said padded structure.

[0027] According to a fifth aspect of the invention there is provided a pillow comprising a padded structure according to the first aspect of the invention and at least one pillow cover enclosing said padded structure.

[0028] According to a sixth aspect of the invention there is provided the use of a cushion according to the fourth aspect of the invention to support the buttocks or back of a person.

[0029] According to a seventh aspect of the invention there is provided the use of a pillow according to the fifth aspect of the invention on a bed to support the head or neck of a person.

[0030] Embodiments of padded structures, items of furniture, mattresses, cushions, and pillows in accordance with the invention will now be described with reference to the accompanying drawings, in which:

Figure 1 shows cross sectional views through prior art seat cushions filled with (a) carded fibre, (b) carded fibre with a foam core, (c) a feather and fibre mix, (d) blown fibre;

Figure 2 shows (a) a perspective view of the cushion of the present invention, (b) a stylised perspective view of the cushion of (a) without cushion cover and showing the interior components of the cushion, (c) a cross sectional view of the cushion of (a) along the line A-A', and (d) a cross sectional view of the cushion of (b) along the line B-B'; and

Figure 3 shows (a) a vertical cross sectional view through a planar section of vertically lapped non-woven fabric, (b) a vertical cross sectional view through a planar section of horizontally lapped non-woven fabric, and (c) a cross sectional view of a rolled up section of vertically lapped non-woven fabric.

[0031] Figure 2 (a) shows a seat cushion 30 of the present invention. The seat cushion 30 comprises a cushion cover 32 and, as shown in Figure 2 (b), an interior structure which comprises a plurality of padded structures 34. Each padded structure 34 comprises an inner core of a lapped non-woven fabric 36 and an outer core of a padding material 38. As can be seen from Figures 2 (b), (c), and (d) the inner core 36 is of a substantially cylindrical configuration. Such a configuration can be obtained by rolling a substantially planar sheet of a lapped non-woven fabric into a cylindrical shape. It has been found that the substantially circular cross sectional shape of the inner core 36 imbues the padded structure with enhanced properties, in particular enhanced mechanical properties which can be associated with the circular cross sectional symmetry of the inner core 36. It is particularly preferred that the inner core 36 comprises a vertically lapped non-woven fabric. As can be seen to best advantage in Figure 2 (d), when a vertically lapped non-woven fabric is assembled into a substantially cylindrical form, a strut like arrangement is produced in which the lapped layers 39 of the non-woven fabric act in a manner somewhat akin to the spokes of a wheel to provide a structure which is mechanically strong, particularly with respect to axial loading. The construction employing vertically lapped non-woven fabric in the inner core 36 provides excellent resilience and load bearing capability.

[0032] The lapped non-woven fabric used to form the inner core of the padded structure should possess suitable mechanical properties in order to provide a padded structure of the desired degree of resilience. In a preferred, but non-limiting, embodiment the lapped non-woven fabric comprises a bonded non-woven web.

[0033] A suitable bonded non-woven web can be produced from a mixture of matrix fibres and low melt fibres, the latter being melted so as to bond to the matrix fibres and thus provide a strong structure. Bi-component low melt fibres, which comprise a core fibre and an outer sheath of a relatively low melting point material, are particularly suitable in this regard. Typically, the bi-component fibres comprise polymeric materials which soften or melt at temperatures in excess of 60°C, preferably with melting points in the range 90 to 190°C. Typically the bi-component fibres are present in relatively low proportions, such as 70% matrix fibre to 30% bi-component fibre. After layering, the web is formed through thermobonding using a suitable heat treatment process such as an air chamber. Heat treatment at around 180°C is usual. Such processes are well known in the art, and thus greater detail is not provided herein. It should be noted that whilst the use of bi-component fibres is convenient, the invention is certainly not limited in this regard. For example, a bonding agent such as a resin may be used to bond matrix fibres together. Fibres which have been pre-coated with a suitable bonding agent might be used to form the non-woven fabric. Alternatively still, it may be possible to impart suitable structure to the non-woven fabric through the use of other techniques such as needling. In a typical example, a non-woven fabric comprising 12 denier fibre might be used, although the invention is not limited in this regard. Polyester matrix fibres are typically used.

[0034] An example of a vertically lapped non-woven fabric which is suitable for use in the present invention is available from Struto International Inc of 2021 Midwest Road, Suite 200, Oak Brook, IL 60523, USA under the tradename Struto (RTM). Additionally, Struto (RTM) is manufactured under licence by Granstand Limited, Providence Mills, Wormald Street, Heckmondwike, West Yorkshire WF 15 6AR, UK (amongst others). The Struto (RTM) material is produced in a substantially planar form. Figure 3 (a) shows a cross sectional view through the plane of the Struto (RTM) material. It can be seen that the material comprises a plurality of layers 40 which are aligned substantially perpendicularly to the plane of the material. Such a material is commonly

known as a vertically lapped fabric. In contrast, Figure 3 (b) shows a cross sectional view through the plane of a horizontally lapped (or cross layered) non-woven fabric. It can be seen that the horizontally lapped non-woven fabric comprises a plurality of layers 42 which extend in parallel with the plane of the material. Figure 3 (c) is a cross sectional view of a vertically lapped non-woven fabric when rolled so as to produce a single walled inner core of the type described above. It can be seen that in the rolled configuration, the vertical layers of the planar material assume a radial configuration which provides excellent resilience and load bearing capability with respect to axially applied forces.

[0035] Devices and techniques for producing vertically lapped fabrics (which are also referred to as substantially perpendicularly stratified planar fibrous layers) are known from WO 99/61693, CZ AO 273997, US 2638960, CZ P 37 619, CZ P 56 029, CZ P 87 556, CZ AO 235494 and CZ AO 269300, the contents of all of which are herein incorporated by reference.

[0036] The padding material 38 is chosen to provide a desired degree of compliance. Preferably carded fibres, such as carded polyester fibres are used, in which instance the inner core 36 may be wrapped with carded fibre. An exemplar range of suitable fibre deniers is 1 to 50. However, it may be possible to augment or even replace such fibres with other materials such as non-carded fibres, and non-fibrous materials such as feathers or foam.

[0037] Padded structures of the present invention can be incorporated into a variety of end uses. It will be appreciated that typically a plurality of padded structures is used to produce an upholstery cushion. However, there may be some applications in which a single padded structure might be used, such as a padded roll for supporting the neck or head of a person. In upholstery applications, padded structures of the present invention might be incorporated directly into the main body of an item of furniture rather than into a cushion. Thus, padded structures of the invention may be disposed in a back panel of an item of furniture (so as to support the back region of a person sitting upon the item of furniture) or in a seat portion of an item of furniture (so as to support the buttocks of a person using the item of furniture). The excellent resilience provided by padded structures of the present invention renders such padded structures particularly useful for seat applications in which a great deal of wear and tear is experienced due to repeated application of the forces associated with persons sitting down upon the item of furniture. Padded structures of the present invention might also be incorporated into other forms of cushions, pillows, and bed mattresses, and used in other load bearing structures and applications.

[0038] It will be appreciated that numerous variations to the approaches and structures described above are within the scope of the invention. For example, the configuration of the inner core might be varied in a number of ways. It may be possible to roll the non-woven fabric around a central axle formed from another material. The central axle may be formed from a padding material, in which instance the outer core of padding material may be dispensed with. Also, it is possible to roll the non-woven fabric around a number of times in order to form a spiral configuration. It is convenient from a manufacturing point of view to utilise the substantially cylindrical configuration shown in Figure 2 which has a substantially circular transverse cross sectional configuration. However, other transverse cross sectional configurations might be contemplated, such as a substantially elliptical configuration.

Claims

1. A padded structure comprising:

at least one core of a rolled, vertically lapped non-woven fabric; and

a padding material.

2. A padded structure according to claim 1 further comprising a coverstock enclosing the padding material and maintaining the structural integrity of the padded structure.

3. A padded structure according to claim 1 or claim 2 in which the padding material forms an outer core which is disposed around the core of the rolled, vertically lapped non-woven fabric.

4. A structure according to any of claims 1 to 3 in which the rolled, vertically lapped non-woven fabric is substantially cylindrical.

5. A structure according to any of claims 1 to 3 in which rolled vertically lapped non-woven fabric has a substantially elliptical transverse cross sectional form.

6. A structure according to any previous claim in which the rolled, vertically lapped non-woven fabric comprises polyester or modified polyester fibres.

7. A structure according to any of claims 1 to 6 in which the rolled, vertically lapped non-woven fabric comprises an arrangement of bonded matrix fibres.

8. A structure according to claim 7 in which the rolled, vertically lapped non-woven fabric further comprises bonding fibres which are at least partially melted so as to bond the matrix fibres.

9. A structure according to claim 8 in which the bonding fibres are bi-component fibres.

10. A structure according to any previous claim in which the padding material comprises a fibrous material.

11. A structure according to claim 10 in which the padding material comprises polyester or modified polyester fibres.

12. An item of furniture or seating comprising at least one padded structure, in which the padded structure comprises:

at least one core of a rolled, lapped non-woven fabric; and

a padding material.

13. An item of furniture or seating according to claim 12 comprising at least one padded structure according to any of claims 1 to 11.

14. A sofa according to claim 12 or claim 13.

15. A chair according to claim 12 or claim 13.

16. Seating according to claim 12 or claim 13 comprising seating for automotive vehicles.

17. An item of furniture or seating according to any of claims 12 to 16 in which the padded structure forms part of a cushion, which cushion is detachable from the item of furniture or seating.

18. A bed mattress comprising at least one padded structure, in which the padded structure comprises:

at least one core of a rolled, lapped non-woven fabric; and

a padding material.

19. A bed mattress according to claim 18 comprising at least one padded structure according to any of claims 1 to 11.

20. A cushion comprising a padded structure according to any of claims 1 to 11 and at least one cushion cover enclosing said padded structure.

21. A pillow comprising a padded structure according to any of claims 1 to 11 and at least one pillow cover enclosing said padded structure.

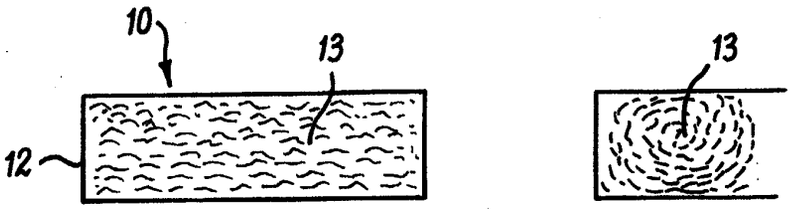


FIG. 1a Prior Art

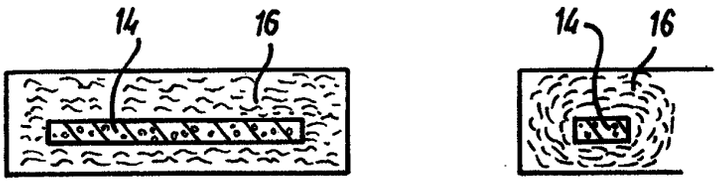


FIG. 1b Prior Art

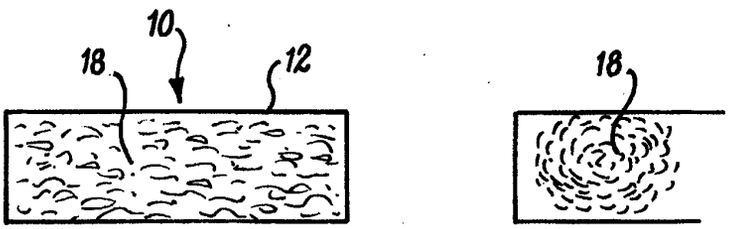


FIG. 1c Prior Art

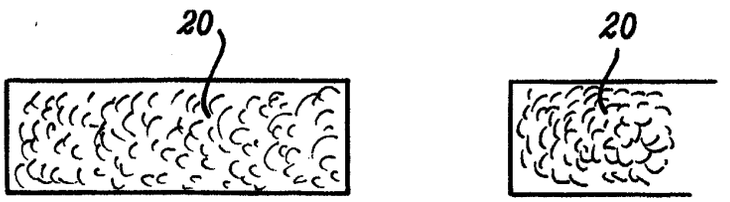


FIG. 1d Prior Art

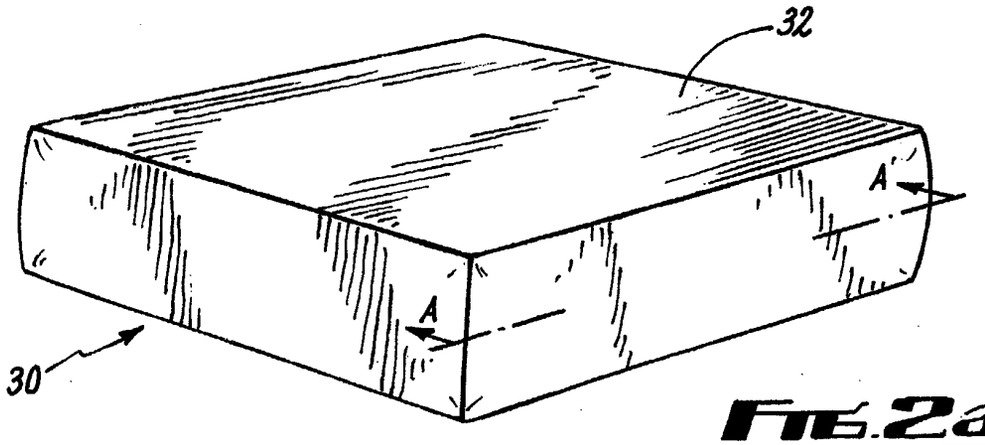


FIG.2a

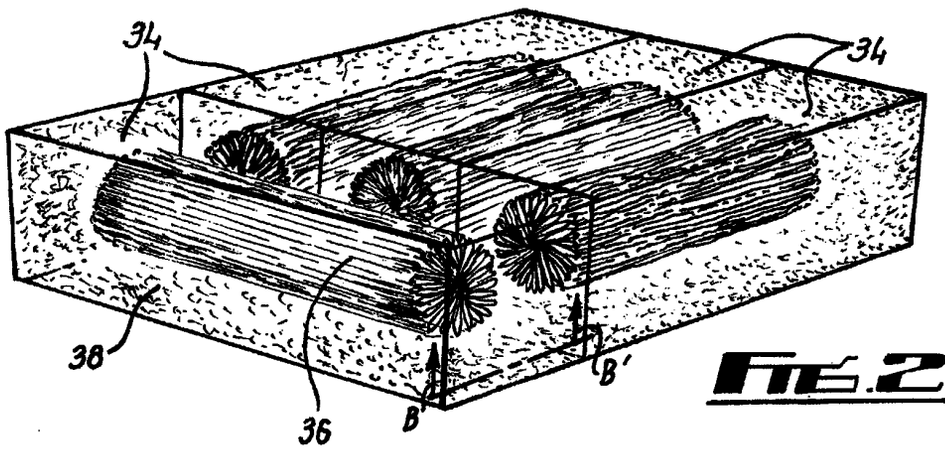


FIG.2b

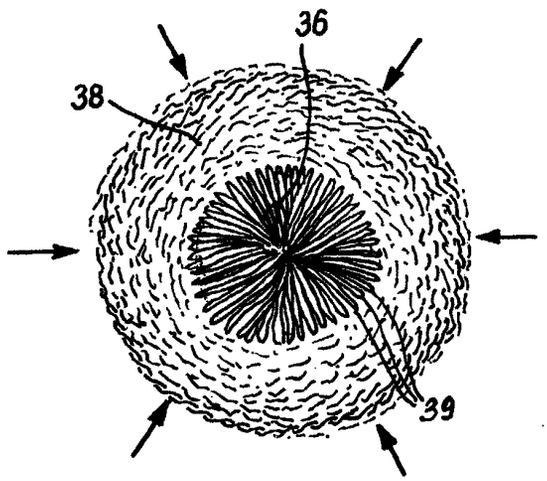
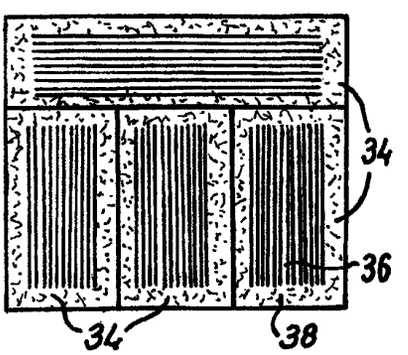


FIG.2d

FIG.2c



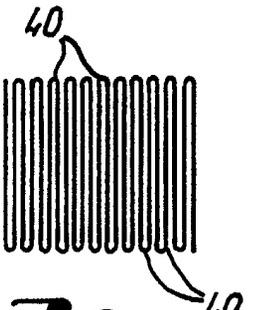


FIG. 3a

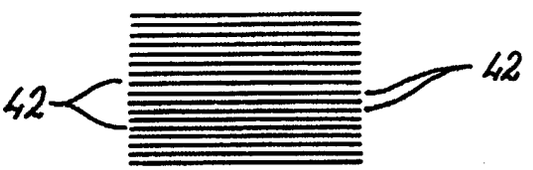


FIG. 3b

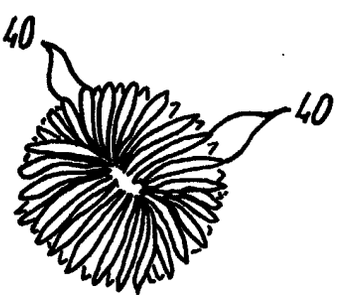


FIG. 3c

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 04 25 3651

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	US 1 256 088 A (WOLL) 12 February 1918 (1918-02-12) * claims 1,3; figures *	1-5	A47C27/12
A		6,7,11, 12,18-21	

X	US 3 373 455 A (KAPLAN) 19 March 1968 (1968-03-19) * claim 1; figures *	1-5,10	
A		6,7,11, 12,18-21	

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

A47C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	22 September 2004	VandeVondele, J

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
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E : earlier patent document, but published on, or after the filing date
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 04 25 3651

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22-09-2004

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 1256088 A		NONE	
US 3373455 A	19-03-1968	NONE	

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