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(54) **ABRASIVE MATERIAL, ACCESSORIES FOR A TOOL CONTAINING SUCH ABRASIVE MATERIAL AND METHOD OF MANUFACTURING SUCH ABRASIVE MATERIAL**

SCHLEIFMATERIAL, ZUBEHÖRTEILE FÜR EIN WERKZEUG MIT SOLCH EINEM SCHLEIFMATERIAL UND VERFAHREN ZUR HERSTELLUNG SOLCH EINES SCHLEIFMATERIALS

MATÉRIAU ABRASIF, ACCESSOIRES POUR UN OUTIL CONTENANT UN TEL MATÉRIAU ABRASIF ET PROCÉDÉ DE FABRICATION D'UN TEL MATÉRIAU ABRASIF

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Description

[0001] The present invention concerns an abrasive material and accessories to a tool containing such abrasive material.

[0002] Abrasive materials are used to clean and/or polish floors, in particular stone floors, steel objects, wood surfaces and other elements.

[0003] These abrasive materials are often incorporated into a cleaning pad, sanding pad, polishing pad or briefly also called "pad". These elements are indicated here as accessories to an instrument.

[0004] The known abrasive materials contain interconnected but nonwoven fibres with resins and scattered with abrasive particles.

[0005] Most of these known materials are manufactured using the felting method. The fibres are hooked together or connected at various intersections.

[0006] This always results in layered cell structures.

[0007] An accessory to a tool containing such abrasive material always involves a three-dimensional element, often developed as a thin layer but always with a thickness.

[0008] These three-dimensional elements are always provided with at least one sanding or polishing surface, here often called the horizontal surface.

[0009] Horizontal originates from the orientation of these structures in a pad when placed on a horizontal surface.

[0010] The nonwoven structure of the fibres results in layered cell structures, and in the above context these are also referred to as horizontal cell structures.

[0011] A disadvantage of these well-known abrasive materials is that they are easily hidden or clogged.

[0012] The residues released during the cleaning or polishing process fill the pores of the material, with the adverse effect that these residues are deposited on the above-mentioned sanding or polishing surface, i.e. at the surface that makes contact with the surface to be sanded, polished or cleaned.

[0013] Sometimes the residues will accumulate on the surface and thus result in an uneven surface. This occurs, for example, when sanding plaster plates.

[0014] Other sanding materials are made of paper, resin and sanding particles.

[0015] WO 96/07509 describes an abrasive material based on a flat tissue with loops, where the loops are fitted with abrasive particles. One variant also reveals flat tissue with short, straight hairs, which are equipped with abrasive particles.

[0016] DE 198 43 267 provides an abrasive material with standing hairs on one side of the abrasive material, but when in use, the hairs tend to come loose, which is detrimental to the durability of the material.

[0017] The present invention therefore aims to offer a solution to one or more of the aforementioned or possible other disadvantages.

[0018] This concerns the invention of an abrasive material as provided in the appended claims, that includes a first side (5) and an opposite side (9), with the hairs (4) or fibers (4) on the first side of the abrasive material obtained from a double layer of fabric with a threaded connection cut in the middle to form the hairs or fibres on the first side of the abrasive material, where the hairs are post-treated so that the shape of the hairs is permanently changed, and where the hairs are equipped with abrasive particles.

[0019] Characteristic of the double-layer fabric and as further explained here, is that the wires (3) that form the connection in the double-layer fabric are connected by a W-connection to the layers of the double-layer fabric. The abrasive material is therefore characterised by the fact that the wires are connected by a W-connection to the first (5) and an opposite second side (9) of the abrasive material.

[0020] The after-treatment in question may be a heat treatment whereby the shape of the hairs is permanently changed by heating or a chemical treatment using chemicals that produce a similar effect. Such treatments are known from the fake fur industry.

[0021] The after-treatment may also involve relaxation of the fibres from which the wire connection is made. This occurs, for example, when using a composite wire with multiple fibres of a rigid plastic such as nylon. The fibres in such a composite wire are subject to a torsion tension that is released when cutting such a composite wire so that the constituent fibres detach completely or partially and open up spatially similar to the umbel (umbrella) inflorescence of a plant.

[0022] In addition to the aforementioned W-shape for the connection of the wires with both sides of the abrasive material, the preparation from a cut double-layer fabric also ensures that the wires on the front of these sides stand up. A configuration that clearly differs from the aforementioned layered cell structures that we obtain based on the felting method. As explained in more detail, this vertical orientation of the wires results in a different function of the abrasive material obtained using the method described here.

[0023] The abrasive particles mentioned are, for example, but not limited to, silicon carbide, diamond, cerium oxide, quartz, aluminium oxide or similar or a combination of two or more of the above.

[0024] The application is carried out in a machine with the addition of the desired sanding particles. These abrasive particles are injected into the hair in the correct consistency.

[0025] The above-mentioned first side (5) is also called the abrasive material's abrasive surface.

[0026] The change in the shape of the fibres, also known as hairs, as a result of the aforementioned heat after-treatment or as a result of the relaxation of the torsion tension in the composite wires, contributes to the resilience of these fibres. This means that the fibres have a certain resilience.

[0027] As a result, the fibres will be able to exert a force on each other, whereby the fibres extend spatially in different directions, but without losing their predominantly upright orientation on the front of the sanding surface.

[0028] During the cleaning, sanding or polishing of a surface, the resilience and different orientation of the hairs will allow one hair or allow the other hair to penetrate, allowing an uneven surface to be cleaned, sanded or polished without loss of surface texture.

[0029] In other words, because the fibres extend in the upright space on the surface of the sanding surface in several directions and because some fibres are directed transversely (perpendicularly) on the surface to be cleaned or polished, also called the "vertical" hairs or fibres, they will be able to clean, polish or sand in depth. As indicated above, the orientation of the fibres in the upright space on the front of the sanding surface can be compared with the space occupied by the side axles in an umbel (umbrella) inflorescence of a plant.

[0030] The name 'vertical' therefore originates from the orientation of these hairs on the front of the sanding surface in a pad when laid on a horizontal surface.

[0031] The hairs preferably have a curly shape, round spiral shape, angular spiral shape or zigzag shape.

[0032] As a result of this design, these vertical hairs or fibres exhibit resilient properties or display the necessary flexibility.

[0033] Preferably, the length of the hair is between three millimetres and eighty millimetres.

[0034] Such a long length of the hairs ensures that the abrasive material can clean even deeper, i.e. that a deeper effect of sanding, polishing or cleaning is obtained in the material. For example, it will be possible for the hairs to penetrate into wood grains and sand or clean them.

[0035] It should be noted that the resilient properties of the hairs are essential to achieve a good function.

[0036] Preferably, the connection of the double-layer fabric is made of heat-resistant material.

[0037] This means that the aforementioned fibres or hairs are made of this heat-resistant material.

[0038] The vertical hairs or fibres are preferably made from a heat-resistant plastic, which is heat-resistant up to 320°C with a melting point of 250°C under pressure, e.g. nylon 6,6, in order to allow the hairs to undergo the aforementioned after-treatment with heat or chemicals.

[0039] Nylon 6,6 exists under different qualities, these are determined by the monomers and their repetitive unit that goes from 2000 to 3000 units, where 2000 stands for stiff and 3000 for flexible. This is important for compiling the basic tissue to obtain the correct end product for the various applications and application fields. In a preferred form, the wires are multi-filament composite wires, also called Bulk Continuous Filament (BCF) wires. More specifically, BCF wires made of polyamide fibres such as nylon 6 and/or nylon 6,6. An example of such a BCF wire is described in detail in the European Patent EP3497272.

[0040] In a preferred form, the wires are BCF wires composed of multiple nylon 6,6 fibres, more specifically 8 nylon 6,6 fibres.

[0041] In addition to the aforementioned characteristics relating to the method of connection and orientation of the wires, the method of preparation from a double-layer weave has an additional advantage. It allows the wires to be placed in a pattern on the sanding surface, as for example grouped in rows, hereinafter also called brush rows.

[0042] Preferably, the connection of the double-layer fabric is such that after the mid-cutting of this fabric, the hairs are grouped in brush rows.

[0043] The spaces between the brush rows are also called rills. The distance between the open rills is set according to the application.

[0044] The pattern may vary depending on the application and may range from completely densely woven to any combination of openings or rills, i.e. areas where hairs are left out. The quantity of hairs per cm² and their combined length is also decisive in this claim and determines the application and application field.

[0045] An advantage of this is that the particles or residues that come loose during the cleaning, polishing or sanding process can be removed via these rills when they are pushed out by the centrifugal force. They can then be sucked up by the machine.

[0046] In other words, there will be no accumulation of these particles between the surface that is cleaned, polished or sanded and the abrasive material.

[0047] Preferably, the hairs are provided with a binder to attach the abrasive particles to the hair.

[0048] For example, this binder is a resin, a resin compound, a phenol resin, a compound of phenol resin, a polyurethane, an adhesive, or the like, which may be natural or chemical, or a combination or compounds thereof.

[0049] In a so-called spraying machine, the aforementioned sanding particles are mixed together with a binder and sprayed onto the hairs under the correct consistency.

[0050] The basic fabric can be produced in different ways.

[0051] For example, a double layer connected fabric which is cut in the middle with an additional bouclé yarn as a

weft yarn.

[0052] This bouclé yarn is used to form a kind of Velcro layer. After the weaving process, the semi-finished product is dried with a whipped coating (shaving foam) under an infrared table so that the loop remains facing upwards to create the Velcro effect.

[0053] Alternatively, the tuft method is used whereby, after tufting, a Velcro weave is laminated or burned against a second side of the abrasive material, also called the back.

[0054] In another embodiment, a layer of nonwoven, knitted textiles or the like (10) is applied a second side (9) of the abrasive material.

[0055] Such a layer of nonwoven, knitted fabric or such is used to attach the abrasive material to a tool. To this end, the latter will contain a holder, also called a pad holder, to which the abrasive material can be attached. The shape of this pad holder will also influence the shape of the abrasive material, such as a disc shape for a disc-shaped pad holder, or a rectangular shape for attachment to a cylindrical pad holder, also called a roller brush. In a special embodiment, the pad holder will be disc-shaped, and will be fitted with hook-and-loop hooks on both sides, thus enabling a wraparound attachment of the abrasive material around the pad holder (See figures 7 and 8). With such a wrapped pad holder there is a better range of the abrasive material in corners and edges of an object/surface to be treated. For the wrapping of a pad holder, the abrasive material's sanding or polishing surface may contain one or more cutouts. These cutouts are preferably configured to allow close connection of the abrasive material on the pad holder, for example in the form of flower cutouts.

[0056] An additional advantage of such a layer of nonwoven, knitted textiles or the like (10) is that it also serves as a membrane to prevent the aforementioned binder from sinking to the bottom and to prevent the loops from losing their function attachment with the Velcro hooks.

[0057] As indicated above, the upright orientation of the hair is understood to mean that they focus spatially in line with the umbel (umbrella) inflorescence of a plant. If we continue this analogy, we find that in this inflorescence, the side axles are mainly at an angle between 45° and 135° to the main axle or flower stem from which they depart. Also in the abrasive material according to this invention, the hairs will preferably be directed mainly at an angle between 45° and 135° with respect to the aforementioned first side or abrasive material sanding surface.

[0058] The aforementioned part is preferably at least 15%, preferably at least 250 or at least 350 of the hair.

[0059] The abrasive material can be applied in various ways.

[0060] The invention also concerns an accessory to a tool containing an abrasive material according to the invention, where the accessory has a three-dimensional design and where the accessory concerns an abrasive brush pad, cleaning pad, sanding pad, polishing pad, roller brush or the like, which accessory is fitted with an abrasive or polishing surface as described herein.

[0061] With regard to the constituents of the abrasive material according to the invention, the aforementioned sanding or polishing surface is often referred to here as the horizontal surface.

[0062] According to a preferred form of implementation, the accessories to a tool containing such abrasive material are an abrasive roller brush where the diameter is determined by the tube and not by the length of the bristles.

[0063] According to a preferred form of implementation, the accessories of a tool containing such abrasive material are an abrasive sanding pad for cleaning floors, consisting of stone, plastic, wood, metal or other compositions.

[0064] According to a preferred form of implementation, the accessories of a tool containing such abrasive material are an abrasive roller brush for cleaning floors, consisting of stone, plastic, wood, metal or other compositions.

[0065] Alternatively, the accessories, albeit an abrasive sanding pad or an abrasive roller brush, are used for sanding surfaces with the intention of removing material on stone, plastic, wood, metal or other compositions.

[0066] The invention also involves a working method for the manufacture of an abrasive material having a first (5) and an opposite (9) side, including hairs (4) or fibres (4) on the first side (5) of the abrasive material (1), which means that the working method includes the following steps:

A providing double-layer weave with a W-connection joint of a wire (3) through a top and bottom layer of the double-layer weave;

B cutting the W-connection joint of the double-layer fabric in between the top and bottom layer of the double layer fabric to form a W-connection through the first side (5) and opposite (9) side of the abrasive material (1), and hairs or fibres on the first side of the abrasive material;

C treat the hairs so that the shape of the hairs is changed;

D the application of abrasive particles to the hairs.

[0067] This method has the advantage that the abrasive material with the predominantly upright oriented hairs is manufactured according to the invention. As indicated above, this preparation method not only provides the aforementioned orientation, but also allows the wires to be placed in patterns on the sanding surface, including an orientation in brush rows with open rills, as well as in a variable density (number of wires per surface).

[0068] Step C treatment may be heat treatment or chemical treatment with chemicals as mentioned above.

[0069] Preferably, the procedure after the above-mentioned step C includes the additional step of applying a layer of nonwoven or knitting, textile or similar on a second side of the abrasive material.

5 [0070] The advantage of this layer is that it can be used to attach the abrasive material, when incorporated in an accessory, to a tool by means of the Velcro principle.

[0071] Preferably, the procedure for the aforementioned step D includes the additional step of applying a binder to the hairs to attach the abrasive particles to the hairs.

[0072] With the help of this binder, the sanding particles can adhere well to the hairs or fibres.

10 [0073] In this case, the above-mentioned layer of nonwoven or knitting has the additional advantage that the binder, for example a resin or other adhesive, when it passes through the abrasive material, is held back by this layer of nonwoven or knitting.

[0074] In a further embodiment, the procedure may include a further step E in which the abrasive material obtained after step D is thermally compressed. By thermally compressing the material, the wires are shortened and the material gets more sanding power, without losing the aforementioned advantages associated with the upright orientation of the wires.

15 [0075] With the insight to better demonstrate the characteristics of the invention, a few preferential variants of an abrasive material are described here according to the invention, an accessory to an instrument containing such abrasive material and the method of manufacturing such abrasive material, with reference to the accompanying drawings, in which:

20 figure 1 schematically represents a cross-section of an abrasive material according to the invention;

figures 2 to 6 show the consecutive steps of the method according to the invention;

figure 7 shows an accessory according to the invention;

figure 8 shows an alternative of figure 7;

25 figure 9 schematically represents a cross-section of an abrasive material according to the invention;

[0076] Figure 1 schematically represents a cross-section of an abrasive material 1 according to the invention.

[0077] It comprises half of a double layer of fabric 2 with connection 3 that is cut in the middle as shown in figure 2. In the example shown, this connection 3 is a so-called W-connection 3 through a first side 5 and opposite second side 9 of each layer from which the double layer fabric is constructed.

30 [0078] The connection 3 is therefore a wire 3 that is woven or stitched through both layers (top and bottom in figure 2) of the double layer fabric 2 and connected by a W-connection to the first (5) and an opposite second side (9) of the abrasive material.

[0079] The connection 3 of the double layer fabric 2, more specifically the wire 3 with which this connection 3 is made, is in this case, but not necessarily, made of a heat-resistant material. In a preferred form, the wire is a composite wire containing multiple hairs or fibres.

[0080] By cutting this connection 3, hairs 4 or fibres 4 are formed on the first side 5 of the abrasive material 1. In this embodiment in which the wires are composed, the fibres will open spatially after cutting as shown in Figure 8.

[0081] The fibres 4 are preferably grouped in so-called brush rows 6. The open spaces 7 between these brush rows 6 are also called rills 7.

40 [0082] The fibres 4 or hairs 4 thus created have been re-treated, resulting in permanent changes to their shape.

[0083] In this case, the shape of the fibres 4 is a curl shape, but this can also be a round spiral shape, angular spiral shape, a zigzag shape or the like.

[0084] The length L of these hairs 4 is in this case five millimetres, but this could also be ten, fifteen, thirty or, for example, fifty millimetres. Preferably the length L of the hairs 4 is between three millimetres and eighty millimetres.

45 [0085] According to the invention, the hairs 4 have sanding particles 8.

[0086] In this case the hairs 4 have a binder to attach the sanding particles 8 to the hairs 4. This binder is not shown on the figures.

[0087] Although in figure 1 all hairs 4 are represented as perpendicular to the first side 5 of the abrasive material 1, it must be taken into account that this is only a schematic representation. As described above, this upright orientation of the hairs means that they focus spatially in line with the umbel (umbrella) inflorescence of a plant, as shown, for example, in Figure 9.

[0088] In practice, not all hairs 4 will be oriented perpendicular to the first side 5.

[0089] Preferably, at least part of the hairs 4 is directed mainly at an angle between 45° and 135° with respect to the aforementioned first side 5 of the abrasive material 1.

55 [0090] This property can be obtained by the post-treatment of the hairs 4 or fibres 4, including the cutting of a composite thread, where the post-treatment also involves relaxation of the fibres from which the wire connection is made. This leads to the straightening of the hairs or fibres similar to the umbel inflorescence of a plant as shown, for example, in Figure 9.

[0091] The aforementioned part is preferably at least 15%, or better at least 250 or at least 350 of the hairs 4 upright oriented on the front of the first side 5 or the abrasive material sanding surface.

[0092] The second side 9 of the abrasive material 1 is in this case, but not necessary for the invention, provided with a layer nonwoven 10. This can also be a layer of textiles or the like.

5 **[0093]** The method for manufacturing the abrasive material 1 is very simple and as follows.

[0094] Figures 2 to 6 show the successive steps.

[0095] Starting from one double layer fabric 2 with connection 3.

[0096] In this case, this connection is a W-connection 3, which can be derived from the stitching of the connection 3.

[0097] In this case, the connection 3, as already mentioned, is made using a heat-resistant material.

10 **[0098]** The connection of this double layer of fabric 2 is cut, as shown schematically in Figure 2.

[0099] This forms the hairs 4 on the first side 5.

[0100] In a possible next step, as shown in Figure 3, the connection 3 is fixed. This can be done, for example, by stitching the fabric 2.

[0101] Figure 4 shows the next step, in which the hairs 4 are treated so that the shape of the hairs 4 is changed.

15 **[0102]** The shape of the hairs 4 is curly after treatment. This gives the hairs 4 a resilience.

[0103] The above treatment can be thermal or chemical, with the hairs 4 permanently deformed.

[0104] In another embodiment, the wires 3 are made of a composite wire with multiple fibres of a rigid plastic such as nylon. The fibres in such a composite wire are subject to a torsion tension that is released when cutting such a composite wire so that the constituent fibres detach completely or partially and open up spatially similar to the umbel (umbrella) inflorescence of a plant. This relaxation step replaces or forms part of the aforementioned thermal or chemical treatment and gives rise to a material as shown in Figure 9.

[0105] The next step shown in Figure 5 is an optional additional step where a layer of nonwoven 10, but this may also be textile or similar, is applied to the second side 9 of the abrasive material 2.

25 **[0106]** Then, in an optional step not shown in the figures, a binding is applied to the hairs 4. This binder will allow sanding particles 8 to attach to the hairs 4.

[0107] The binder is a resin, for example.

[0108] The nonwoven layer 10 from the previous step will stop the resin which is coming through the abrasive material 1.

[0109] Figure 6 shows the last step where the abrasive particles 8 are applied to the hairs 4.

[0110] For example, these abrasive particles 8 are diamond particles.

30 **[0111]** In this way, the abrasive material 1 is manufactured and ready for use.

[0112] A possible application for the use of abrasive material 1 is shown in figures 7 and 8.

[0113] Figure 7 shows an accessory 11 to a tool 12 containing an abrasive material 1 according to the invention.

[0114] The accessory 11 has a three-dimensional design and in this case concerns a pad 11, for example a brushing, cleaning, sanding or polishing pad.

35 **[0115]** The pad 11 has a disc shape and is covered with the abrasive material 1.

[0116] To this end, the pad 11 is equipped with, for example, Velcro hooks which can attach to the nonwoven 10 on the second side 9 of the abrasive material 1, so that the abrasive material 1 can attach to the pad 11.

[0117] By applying the abrasive material 1, the pad 11 has a sanding or polishing surface 13.

[0118] The tool 12 on which the pad 11 is applied will allow the pad 11 to rotate at high speed.

40 **[0119]** The tool 12 can then be placed on a surface to be sanded, brushed, cleaned or polished.

[0120] The resilient hairs 4 will be able to sand, brush, clean or polish in the depth of the surface. The particles thus removed from the surface will be removed via the rills 7 and will not accumulate between the surface and the polishing surface 13 of the pad 11.

45 **[0121]** Figure 8 shows a variant of an accessory 11 according to figure 7, in which case the shape of the pad 11 is changed.

[0122] After all, it will be possible to give a specific shape to pad 11, which will allow for the sanding, brushing, cleaning or polishing of corners or special shapes.

[0123] By giving the pad 11 a complementary shape according to the surface to be treated, special non-flat surfaces can also be treated.

50 **[0124]** The sanding and polishing surface 13 will exert an equal force throughout the surface due to its shape, so that the treatment will take place uniformly over the entire surface. The present invention is by no means limited to the embodiments described as examples and shown in the figures, but an abrasive material according to the invention, an accessory to an instrument containing such abrasive material and the method of manufacturing such abrasive material can be achieved according to different variants without acting outside the scope of the invention as defined by the
55 appended claims.

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Experimental comparison.

[0125] A characteristic of the abrasive according to the invention has to do with the upright orientation of the hairs, and in particular an orientation similar to the umbel (umbrella) inflorescence of a plant.

[0126] A number of tests compared the effects of the abrasive material according to the invention (Ecoforce Green) with a classic nylon abrasive brush with stiff hairs without abrasives, and a nonwoven abrasive material with a horizontal open cell structure with silica, diamond and alum oxide as abrasives.

1. Wet cleaning of a wooden surface

[0127]

Nylon Brush	Nonwoven pad	Ecoforce green
Teak 3 min /rotation /water	Teak 3 min /rotation /water	Teak 3 min /rotation /water

- Remove surface contamination - No deep cleaning - No material damage	- Remove surface contamination - Limited visual damage to materials	- Good surface area and deep cleaning - No visible damage to materials
Result after 3 min idle cleaning	Result after 3 min idle cleaning	Result after 3 min idle cleaning
- The brush only removes dirt on the surface - No deep cleaning - No material damage	- Abrasion is obtained. - Visible damage to the material	- Good surface area and deep cleaning - No visible damage to materials

2. Wet cleaning of a linoleum surface

[0128]

Nylon Brush	Nonwoven pad	Ecoforce green
Linoleum 3 min /rotation /water	Linoleum 3 min /rotation /water	Linoleum 3 min /rotation /water
No visible effect on this material.	A superficial effect, with hints of abrasion on the treated material.	A clear cleaning effect both at the surface and in depth without leaving sanding stripes. Visually innovative effect for the treated material.

3. Wet cleaning of ceramic floor tiles and joints

[0129]

Nylon Brush	Nonwoven pad	Ecoforce green
Floor tiles 3 min /rotation /water	Floor tiles 3 min /rotation /water	Floor tiles 3 min /rotation /water
Surface cleaning of the tiles. No effect on joints.	Surface cleaning of the tiles. No effect on joints	Surface cleaning of the tiles. Deep cleaning of the joints.

4. Wet cleaning of a granite surface

[0130]

	Nylon Brush	Nonwoven pad	Ecoforce green
5	Granite top 3 min /rotation /water	Granite top 3 min /rotation /water	Granite top 3 min /rotation /water
10	Surface cleaning. No deep cleaning.	Visible effect after a few minutes. Fast pad wear. Limited deep cleaning and requires additional chemicals for this.	Visible effect after a few minutes. No visible pad wear. Deep cleaning without additional chemicals. Visually innovative effect for the treated material

15 **[0131]** The above experiments show that according to the invention, the abrasive material can add value to the various applications where typical nonwovens and brush hairs are used today. We have found that because of the upright fibre form, its resilience really allows for better penetration in depth and more effective cleaning without compromising on chemical agents, like ordinary waste deposits. The slightly abrasive grains applied to the fibres help loosen dirt on the material to be cleaned.

20 **[0132]** The shape, structure, and upright orientation of the bristles provide the necessary resilience, which we can also call brush power, as we zoom more closely into function and resilience, we see that because of the spatial orientation of the fibre ends, the strength is not only developed on the upper surface, but also in lower sections of the ecoforce, this in contrast to the classic sanding brushes and nonwoven open cell structures that generate these forces only at the front, at the highest points of their surface.

25 **[0133]** The tests also showed that the resilience ensures that the structure of a surface is not affected and only the dirt is detached, unlike the other materials tested.

[0134] The tests have also shown that the length and resilience of the hairs ensures that sanding is not possible or only to a limited extent, even with coarse grains, (data not shown). To achieve an abrasive effect, the fibres must be shortened.

30 **[0135]** The Ecoforce pad thus overlaps the current operation of the nonwovens and the brush pads and has unique properties with completely different end results without damaging the surface.

Claims

- 35 **1.** Abrasive material, wherein the abrasive material (1) includes a first (5) and an opposite (9) side, including hairs (4) or fibres (4) on the first side (5) of the abrasive material, **characterized in that** the hairs (4) or fibers (4) on the first side (5) of the abrasive material (1) are formed by starting from one double layer fabric (2) with a woven or stitched W-connection of a wire (3) through a top and a bottom layer of the double layer fabric (2) and cutting this W-connection in between the top and bottom layer of the double layer fabric (2), thereby obtaining a W-connection through the
- 40 first side (5) and opposite side (9) of the abrasive material (1) and forming the hairs (4) or fibers (4) on a first side (5) of the abrasive material (1), in which the hairs (4) are post-treated so that the shape of the hairs (4) is permanently changed, and in which the hairs (4) are equipped with abrasive particles (8).
- 2.** Abrasive material according to claim 1, thus characterised that the wires are composite wires with fibres of a rigid plastic such as nylon.
- 45 **3.** Abrasive material according to claim 1, thus characterised that the hairs (4) are equipped with a binder to attach the abrasive particles (8) to the hairs.
- 4.** Abrasive material according to claim 1 or 2, thus characterised that the hairs (4) have a curly shape, round spiral shape, angular spiral shape or zigzag shape.
- 50 **5.** Abrasive material according to claim 1 or 2, therefore **characterised by** the hairs (4) extending in multiple directions in the upright space on the first side (5).
- 55 **6.** Abrasive material according to one of the previous claims, therefore characterised that at least part of the hairs (4) is directed at an angle between 45° and 135° compared to the aforementioned first side (5) of the abrasive material (1) .

7. Abrasive material according to one of the previous claims, thus characterised that on the opposite side (9) of the abrasive material (1) a layer of nonwoven (10) textile is applied.
- 5 8. Abrasive material according to one of the previous claims, therefore characterised that the length (L) of the hairs (4) is between three millimetres and eighty millimetres.
9. Abrasive material according to one of the previous claims, therefore characterised that the double-layer fabric (2) is fitted with a weft yarn of bouclé yarn.
- 10 10. Abrasive material according to one of the previous claims, **characterised in that** the hairs (4) are grouped in brush rows (6).
11. Abrasive material according to one of the previous claims, **characterised in that** the fibres or hairs are made of heat-resistant material.
- 15 12. Method of manufacture of an abrasive material, wherein the abrasive material (1) includes a first (5) and an opposite (9) side, including hairs (4) or fibres (4) on the first side (5) of the abrasive material (1) **characterised by** the following steps:
- 20 A - providing double layer fabric (2) with connection (3) with a woven or stitched W-connection of a wire (3) through a top and a bottom layer of the double layer tissue (2);
B - cutting the W-connection (3) of the double-layer fabric in between the top and bottom layer of the double layer fabric (2) to form a W-connection through the first side (5) and opposite side (9) of the abrasive material (1) and hairs (4) or fibres (4) on the first side (5) of the abrasive material (1);
25 C - treating the hairs (4) so that the shape of the hairs is changed;
D - applying abrasive particles (8) to the hairs (4).
13. Method according to claim 12, wherein after the aforementioned step C, the method includes the additional step of applying a layer of nonwoven (10), textile or similar on the opposite side (9) of the abrasive material (1).
- 30 14. Method according to claim 12 or 13, **characterised by** the fact that for the aforementioned step D, the working method includes the additional step of applying a binder to the hairs (4) to attach the abrasive particles (8) to the hairs (4).
- 35 15. Method according to one of the previous claims 12 to 14, wherein the working method includes a further step E in which the abrasive material obtained after step D is thermally compressed.
- 40 16. Accessory for a tool (12), the accessory containing an abrasive material in accordance with one of the previous claims 1 to 11, **characterised by** the fact that the accessory (11) has a three-dimensional design and that the accessory is in use an abrasive brush pad, cleaning pad, sanding pad, polishing pad or roller brush, which has through the application of the abrasive material a sanding or polishing surface (13).

Patentansprüche

- 45 1. Schleifmaterial, wobei das Schleifmaterial (1) eine erste (5) und eine gegenüberliegende (9) Seite einschließt, einschließlich Haare (4) oder Fasern (4) auf der ersten Seite (5) des Schleifmaterials, **dadurch gekennzeichnet, dass** die Haare (4) oder die Fasern (4) auf der ersten Seite (5) des Schleifmaterials (1) ausgebildet sind, durch ein Starten von einem doppellagigen Gewebe (2) mit einer gewebten oder genähten W-Verbindung eines Drahtes (3) durch eine obere und eine untere Lage des doppellagigen Gewebes (2) und ein Schneiden dieser W-Verbindung zwischen der oberen und der unteren Lage des doppellagigen Gewebes (2), dadurch ein Erhalten einer W-Verbindung durch die erste Seite (5) und die gegenüberliegende Seite (9) des Schleifmaterials (1) und das Ausbilden der Haare (4) oder Fasern (4) auf einer ersten Seite (5) des Schleifmaterials (1), an der die Haare (4) nachbehandelt werden, sodass die Form der Haare (4) dauerhaft verändert wird, und an der die Haare (4) mit Schleifpartikeln (8) ausgestattet sind.
- 50
- 55 2. Schleifmittel nach Anspruch 1, **dadurch gekennzeichnet, dass** die Drähte Verbunddrähte mit Fasern aus einem starren Kunststoff wie Nylon sind.

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3. Schleifmittel nach Anspruch 1, **dadurch gekennzeichnet, dass** die Haare (4) mit einem Bindemittel ausgestattet sind, um die Schleifpartikel (8) an den Haaren zu befestigen.
- 5 4. Schleifmittel nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** die Haare (4) eine lockige Form, eine runde Spiralform, eine eckige Spiralform oder eine Zickzackform aufweisen.
5. Schleifmittel nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** sich die Haare (4) in mehrere Richtungen in den aufrechten Raum auf der ersten Seite (5) erstrecken.
- 10 6. Schleifmittel nach einem der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** mindestens ein Teil der Haare (4) in einem Winkel zwischen 45° und 135° verglichen mit der vorgenannten ersten Seite (5) des Schleifmittels (1) ausgerichtet ist.
- 15 7. Schleifmittel nach einem der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** auf der gegenüberliegenden Seite (9) des Schleifmittels (1) eine Lage aus Textil aus Vlies (10) aufgebracht ist.
8. Schleifmittel nach einem der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** die Länge (L) der Haare (4) zwischen drei Millimetern und achtzig Millimetern liegt.
- 20 9. Schleifmittel nach einem der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** das doppellagige Gewebe (2) mit einem Schussfaden aus Bouclé-Garn versehen ist.
- 25 10. Schleifmittel nach einem der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** die Haare (4) in Bürstenreihen (6) gruppiert sind.
- 30 11. Schleifmittel nach einem der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** die Fasern oder die Haare aus hitzebeständigem Material bestehen.
12. Verfahren für die Herstellung eines Schleifmaterials, wobei das Schleifmaterial (1) eine erste (5) und eine gegenüberliegende (9) Seite einschließt, einschließlich Haare (4) oder Fasern (4) auf der ersten Seite (5) des Schleifmaterials (1), **gekennzeichnet durch** die folgenden Schritte:
 - 35 A - Bereitstellen von doppellagigem Gewebe (2) mit einer Verbindung (3) mit einer gewebten oder genähten W-Verbindung eines Drahtes (3) durch eine obere und eine untere Lage des doppellagigen Gewebes (2);
 - B - Schneiden der W-Verbindung (3) des doppellagigen Gewebes zwischen der oberen und der unteren Lage des doppellagigen Gewebes (2), um eine W-Verbindung durch die erste Seite (5) und die gegenüberliegende Seite (9) des Schleifmaterials (1) und Haare (4) oder Fasern (4) auf der ersten Seite (5) des Schleifmaterials (1) auszubilden;
 - 40 C - Behandeln der Haare (4), sodass die Form der Haare verändert wird;
 - D - Aufbringen von Schleifpartikeln (8) auf die Haare (4).
- 45 13. Verfahren nach Anspruch 12, wobei das Verfahren nach dem vorgenannten Schritt C den zusätzlichen Schritt des Aufbringens einer Lage aus Vlies (10), Textil oder ähnlichem auf der gegenüberliegenden Seite (9) des Schleifmaterials (1) umfasst.
- 50 14. Verfahren nach Anspruch 12 oder 13, **gekennzeichnet durch** die Tatsache, dass das Arbeitsverfahren für den vorgenannten Schritt D den zusätzlichen Schritt des Aufbringens eines Bindemittels auf die Haare (4) einschließt, um die Schleifpartikel (8) an den Haaren (4) zu befestigen.
15. Verfahren nach einem der vorstehenden Ansprüche 12 bis 14, wobei das Arbeitsverfahren einen weiteren Schritt E einschließt, bei dem das nach Schritt D erhaltene Schleifmaterial thermisch verdichtet wird.
- 55 16. Zubehörteil für ein Werkzeug (12), wobei das Zubehörteil ein Schleifmaterial nach einem der vorstehenden Ansprüche 1 bis 11 enthält, **gekennzeichnet durch** die Tatsache, dass das Zubehörteil (11) eine dreidimensionale Gestalt aufweist und dass das Zubehörteil in Verwendung ein Schleifbürstenpad, ein Reinigungspad, ein Anschleifpad, ein Polierpad oder eine Walzenbürste ist, das durch die Aufbringung des Schleifmaterials eine Anschleif- oder Polier-

berfläche (13) aufweist.

Revendications

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1. Matériau abrasif, le matériau abrasif (1) comportant un premier côté (5) et un côté opposé (9), comportant des poils (4) ou des fibres (4) sur le premier côté (5) du matériau abrasif, **caractérisé en ce que** les poils (4) ou les fibres (4) sur le premier côté (5) du matériau abrasif (1) sont formés en partant d'un tissu à double couche (2) présentant une liaison en W tissée ou cousue d'un fil (3) à travers une couche supérieure et une couche inférieure du tissu à double couche (2) et en coupant cette liaison en W entre la couche supérieure et la couche inférieure du tissu à double couche (2), ce qui permet d'obtenir une liaison en W à travers le premier côté (5) et le côté opposé (9) du matériau abrasif (1) et de former les poils (4) ou les fibres (4) sur un premier côté (5) du matériau abrasif (1), dans lequel les poils (4) sont traités postérieurement de sorte que la forme des poils (4) est modifiée de façon permanente, et dans lequel les poils (4) sont pourvus de particules abrasives (8).

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2. Matériau abrasif selon la revendication 1, ainsi **caractérisé en ce que** les fils sont des fils composites avec des fibres d'un plastique rigide tel que le nylon.

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3. Matériau abrasif selon la revendication 1, ainsi **caractérisé en ce que** les poils (4) sont pourvus d'un liant afin de fixer les particules abrasives (8) sur les poils.

4. Matériau abrasif selon la revendication 1 ou 2, ainsi **caractérisé en ce que** les poils (4) ont une forme bouclée, une forme spirale ronde, une forme spirale angulaire ou une forme en zigzag.

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5. Matériau abrasif selon la revendication 1 ou 2, de ce fait **caractérisé en ce que** les poils (4) s'étendent dans des directions multiples dans l'espace à la verticale du premier côté (5).

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6. Matériau abrasif selon l'une des revendications précédentes, de ce fait **caractérisé en ce qu'**au moins une partie des poils (4) est orientée selon un angle compris entre 45° et 135° par rapport au premier côté (5) susmentionné du matériau abrasif (1).

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7. Matériau abrasif selon l'une des revendications précédentes, ainsi **caractérisé en ce qu'**une couche de textile nontissé (10) est appliquée sur le côté opposé (9) du matériau abrasif (1).

8. Matériau abrasif selon l'une des revendications précédentes, de ce fait **caractérisé en ce que** la longueur (L) des poils (4) est comprise entre trois millimètres et quatre-vingts millimètres.

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9. Matériau abrasif selon l'une des revendications précédentes, ainsi **caractérisé en ce que** le tissu double couche (2) est doté d'un fil de trame en fil bouclé.

10. Matériau abrasif selon l'une des revendications précédentes, **caractérisé en ce que** les poils (4) sont regroupés en rangées de brosses (6).

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11. Matériau abrasif selon l'une des revendications précédentes, **caractérisé en ce que** les fibres ou les poils sont constitués d'un matériau résistant à la chaleur.

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12. Procédé de fabrication d'un matériau abrasif, dans lequel le matériau abrasif (1) comporte un premier côté (5) et un côté opposé (9), comportant des poils (4) ou des fibres (4) sur le premier côté (5) du matériau abrasif (1), **caractérisé par** les étapes suivantes :

A - fournir à un tissu double couche (2) une liaison (3) présentant une liaison en W tissée ou cousue d'un fil (3) à travers une couche supérieure et une couche inférieure du tissu double couche (2) ;

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B - couper la liaison en W (3) du tissu à double couche entre la couche supérieure et la couche inférieure du tissu à double couche (2) afin de former une liaison en W à travers le premier côté (5) et le côté opposé (9) du matériau abrasif (1) et des poils (4) ou des fibres (4) sur le premier côté (5) du matériau abrasif (1) ;

C - traiter les poils (4) de manière à modifier leur forme ;

D - appliquer des particules abrasives (8) sur les poils (4).

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13. Procédé selon la revendication 12, dans lequel, après l'étape C susmentionnée, le procédé comporte l'étape supplémentaire consistant à appliquer une couche de nontissé (10), de textile ou similaire sur le côté opposé (9) du matériau abrasif (1).
- 5 14. Procédé selon la revendication 12 ou 13, **caractérisé par le fait que** pour l'étape D susmentionnée, le procédé de travail comporte l'étape supplémentaire consistant à appliquer un liant sur les poils (4) afin de fixer les particules abrasives (8) sur les poils (4).
- 10 15. Procédé selon l'une des revendications précédentes 12 à 14, dans lequel le procédé de travail comporte une étape supplémentaire E dans laquelle le matériau abrasif obtenu après l'étape D est compressé thermiquement.
- 15 16. Accessoire destiné à un outil (12), l'accessoire contenant un matériau abrasif selon l'une des revendications précédentes 1 à 11, **caractérisé par le fait que** l'accessoire (11) a une conception tridimensionnelle et que l'accessoire est, en usage, un tampon de brosse abrasive, un tampon de nettoyage, un tampon de ponçage, un tampon de polissage ou une brosse à rouleau, qui possède par le biais de l'application du matériau abrasif une surface (13) de ponçage ou de polissage.

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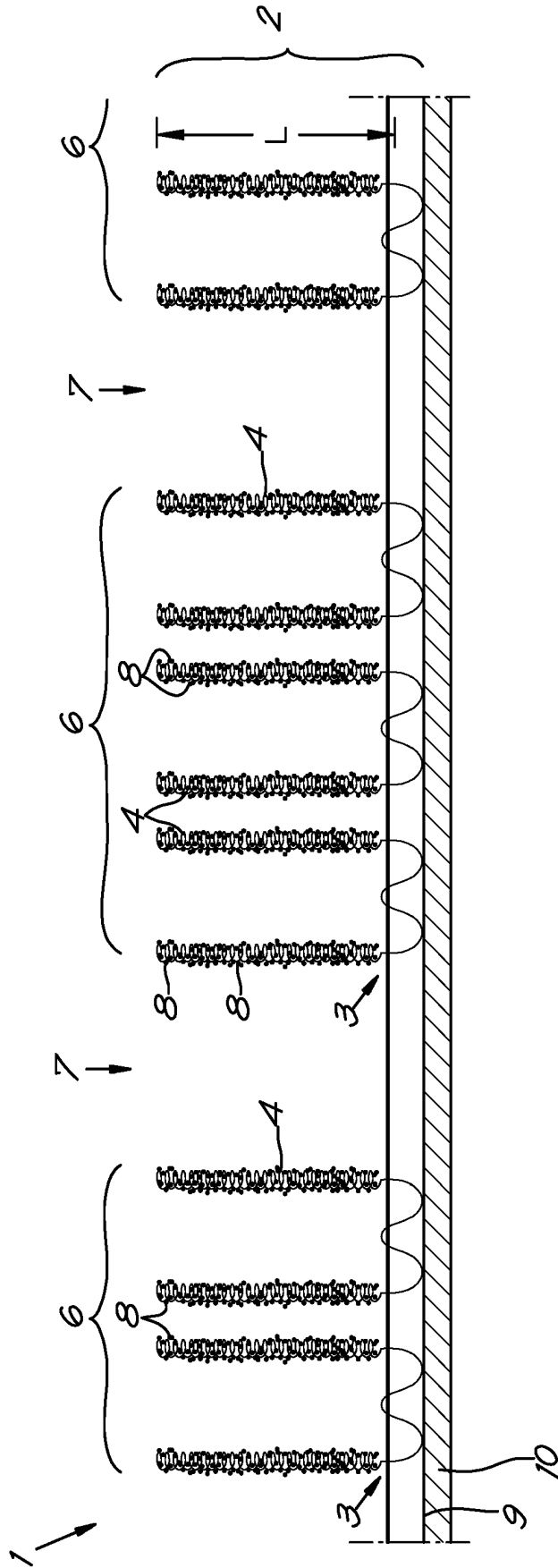


Fig. 1

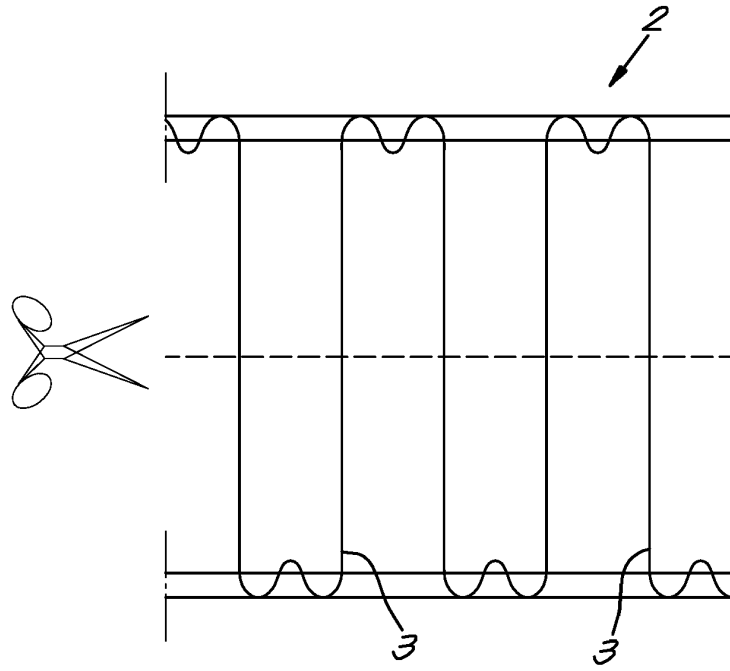


Fig. 2

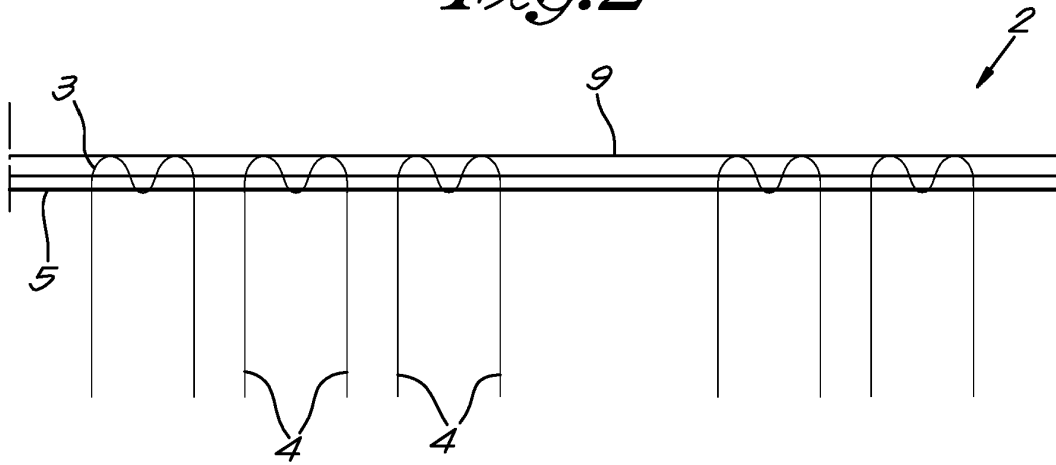


Fig. 3

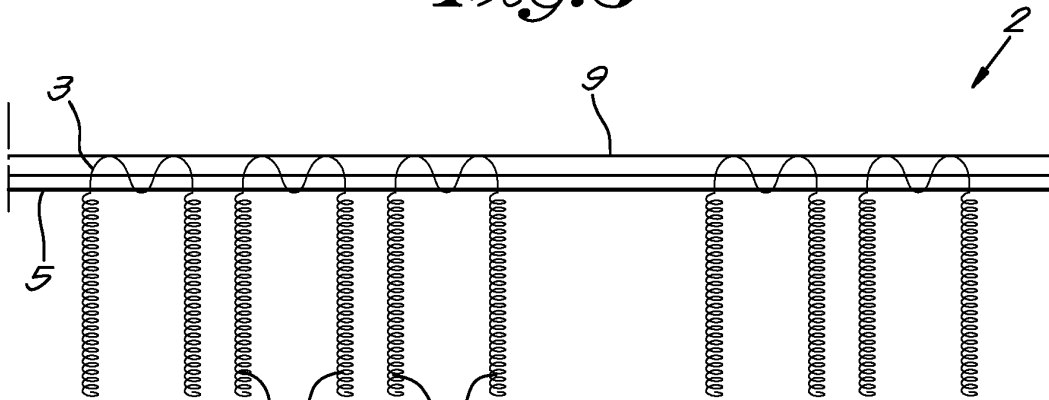


Fig. 4

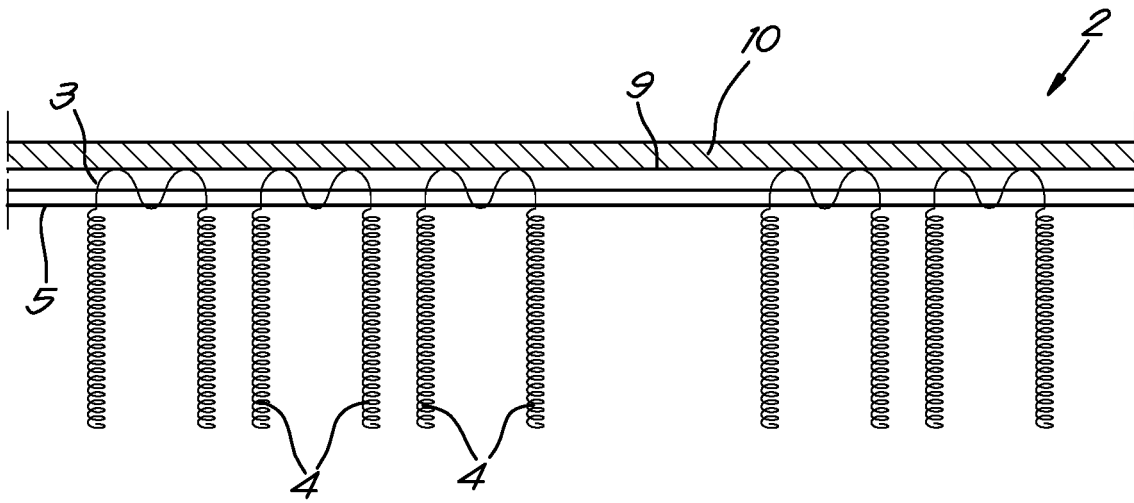


Fig. 5

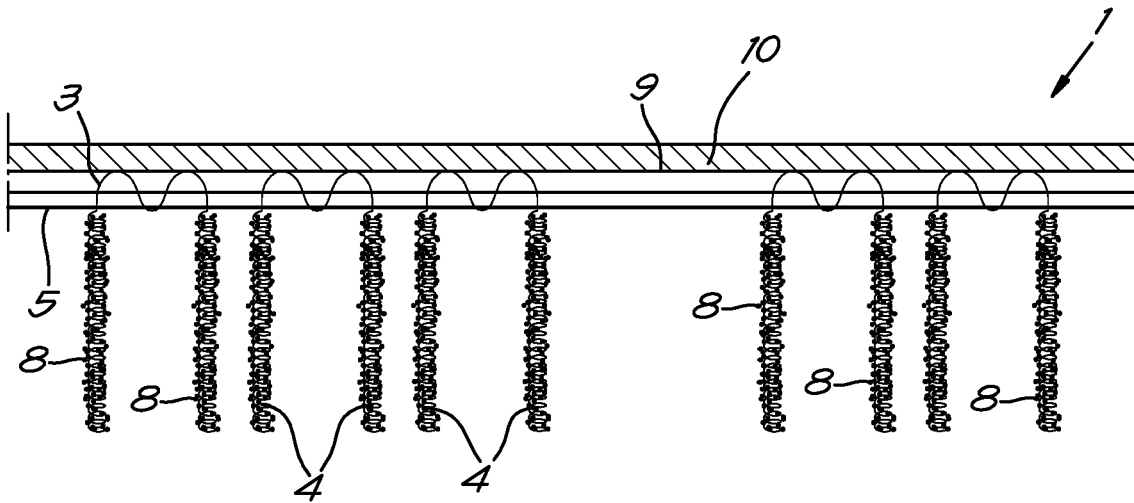


Fig. 6

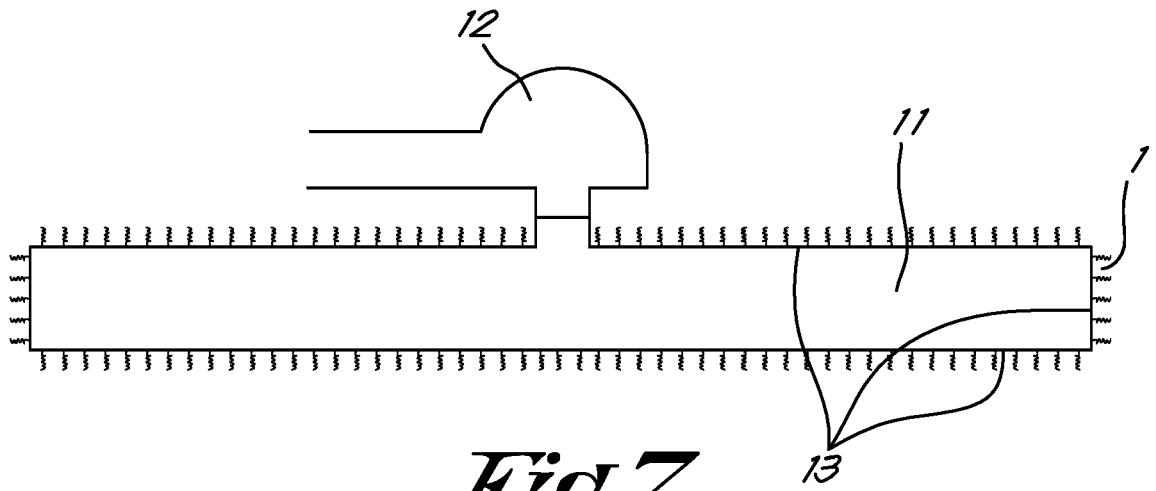


Fig. 7

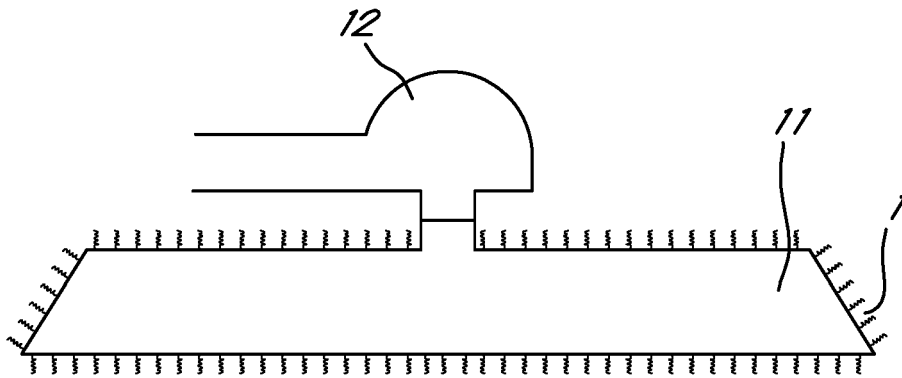


Fig. 8

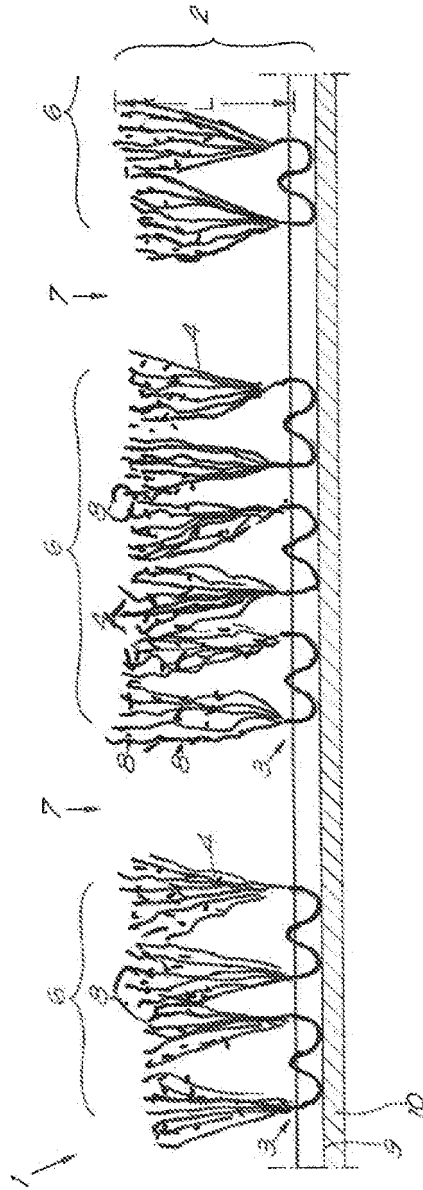


Fig 9

REFERENCES CITED IN THE DESCRIPTION

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