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(11) **EP 1 454 762 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:  
**08.09.2004 Bulletin 2004/37**

(51) Int Cl.7: **B44C 1/10**, B44C 1/17,  
B44C 5/04

(21) Application number: **04005228.4**

(22) Date of filing: **05.03.2004**

(84) Designated Contracting States:  
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR**  
**HU IE IT LI LU MC NL PL PT RO SE SI SK TR**  
Designated Extension States:  
**AL LT LV MK**

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(30) Priority: **06.03.2003 IT MO20030062**

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(54) **Method of decorating a flat element and decorated flat element**

(57) In a method of decorating a flat element (1), said decorating comprises transferring decorative means (16) from support means (15) to lamina means (4) of said flat element (1).

A flat element comprises lamina means (4) on which decorative means (8) is arranged, said decorative means (8) being free of cladding elements glued to said lamina means (4).

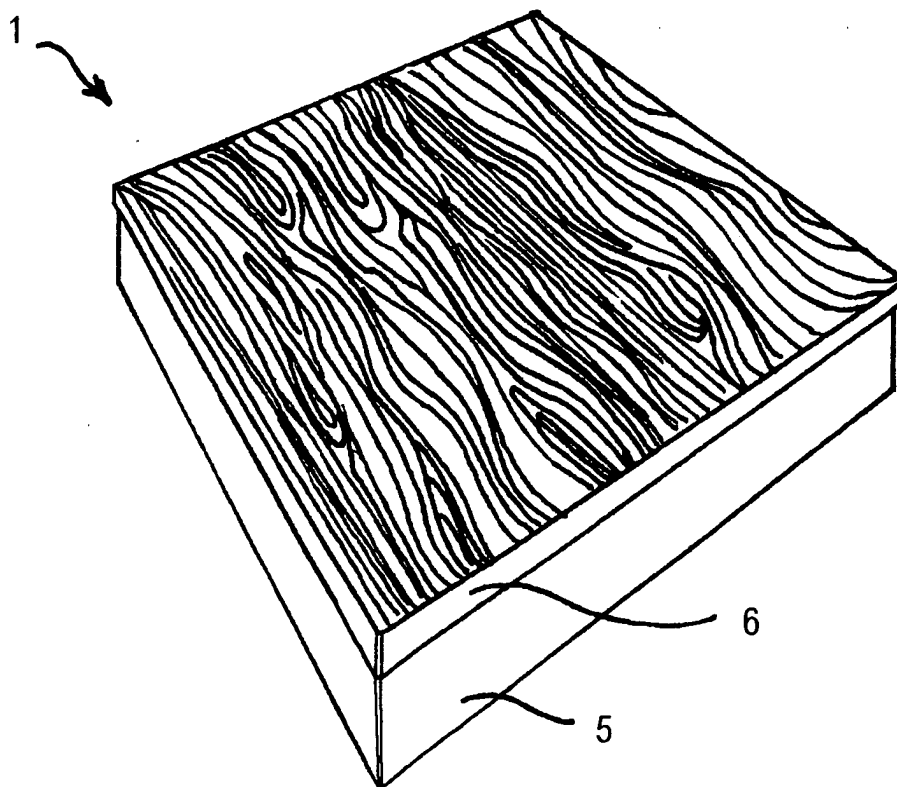


Fig. 3

## Description

**[0001]** The invention relates to a method of decorating a flat element, in particular a floor element, and a flat decorated element.

**[0002]** It is known to use floor elements, for example panels, to create raised floors. A raised floor, sometimes also called a floating floor, consists of: column supports, of adjustable length, which rest on the surface to be paved; a weight-bearing structure, for example a reticulated structure, consisting of beams arranged according to a flat net having generally square meshes, supported at the nodes of the meshes by the column supports; panels, generally square and of a size substantially analogous to the size of the meshes, resting on or fixed to the beams of the weight-bearing structure at the perimeter edges of each panel; a top cladding that covers each panel and performs several functions, including that of giving the desired appearance to the floor.

**[0003]** There are different types of top cladding such as PVC, linoleum, rubber, carpet, laminate, wood, ceramics, marble, granite or cement or resin agglomerate.

**[0004]** The panels comprise a bottom lamina which is rested on the weight-bearing structure, a central body arranged on the bottom lamina and possibly a further metallic lamina that acts as a base plane for the top cladding.

**[0005]** One disadvantage of the prior-art panels is that, in order to obtain a desired appearance, onto each panel a cladding element must be glued made of a material having the desired appearance. The process of manufacturing the clad panel is therefore complex and expensive. In fact, in order to be able to manufacture clad panels of various types, the manufacturer must use cladding elements of various materials and fix them to the base panel by means of adhesives and with applying methods that depend on the material of the cladding element. A manufacturer of clad panels must therefore have a warehouse supplied with many adhesives that are different from one another and use machines and equipment that are specially dedicated to preparing and applying each adhesive.

**[0006]** Another disadvantage is that in order to obtain clad panels having a standardised thickness, it is necessary to use, in combination with each type of cladding element, a special type of panel conformation. In fact, the thickness of the panel or the presence and type of lamina that covers the central body varies according to the chosen top cladding element. For example, the central body has low thickness when it has to be clad with a marble slab and has high thickness when it has to be covered with a rubber cladding element.

**[0007]** Furthermore, the cladding element causes a significant increase in the weight of the panel, particularly when said element is made from a material with a high specific weight such as marble or agglomerates. This complicates the operations of transport and maintenance of the panel.

**[0008]** A further disadvantage is that certain types of cladding elements such as linoleum, PVC, carpets and wood are flammable and when they burn they produce an enormous quantity of smoke; therefore, in the event of a fire, said cladding elements, by burning, cause the escape routes to be obscured and people to be possibly asphyxiated or intoxicated.

**[0009]** An object of the invention is to improve the methods of decorating panels, in particular floor elements.

**[0010]** A further object is to provide a method of decorating flat elements that enables a wide range of decorations to be obtained.

**[0011]** A still further object is to simplify and make more versatile the production systems of flat elements, particularly those intended to be used in raised floors.

**[0012]** A further object of the invention is to provide a flat element, in particular for floors, having a non-corrodible surface that is easily cleanable and washable with common detergents, having good resistance against fire and which does not require maintenance.

**[0013]** According to a first aspect of the invention, there is provided method of decorating a flat element, characterised in that said decorating comprises transferring decorative means from support means to lamina means of said flat element.

**[0014]** In one embodiment, the decorative means comprises a decal.

**[0015]** In a further embodiment, the decorative means comprises a sublimable decoration.

**[0016]** Owing to this aspect of the invention, it is possible to obtain on a flat element a wide range of decorations having high print definition. Since the decorative means can be printed on the support means with print techniques that ensure high definition, such as rotogravure or silkscreen printing, it is possible to transfer onto the flat element a pattern no matter how complex and multicoloured.

**[0017]** Furthermore, the process of manufacturing flat elements, particularly floor elements, for example for use in raised floors, is considerably simplified inasmuch as it is no longer necessary to use a top cladding element of a material having the desired appearance. In fact, if for example it is desired to obtain a flat element having the appearance of wood rather than marble, it is sufficient to modify the pattern defined by the decorative means and there is no need to change the material of the top cladding element as envisaged by the state of the art. This eliminates the need to use adhesives and application techniques that are specific to each type of chosen cladding element, and enables the same structure of the floor element to be used to produce floors with any desired appearance.

**[0018]** Since the decorative means transferred onto the flat element has a much lower thickness than the thickness of the top cladding elements envisaged by the state of the art, the weight of the flat element is reduced in relation to a flat element provided with a known clad-

ding element and the operations of transporting the flat element are simplified and less costly.

**[0019]** Furthermore, in the event of a fire, the decorative means produces a quantity of fumes or toxic substances that is much less than that occurring during the combustion of a carpet or of a linoleum cladding element.

**[0020]** According to a second aspect of the invention, there is provided a flat element comprising lamina means on which decorative means is arranged, characterised in that said decorative means is free of cladding elements glued to said lamina means.

**[0021]** Owing to this aspect of the invention, it is possible to obtain flat elements decorated in various ways according to the desired finish that are easily handled and transportable.

**[0022]** The invention can be better understood and carried out with reference to the enclosed drawings, which show an exemplifying and not restrictive embodiment thereof, in which:

Figure 1 is a perspective view of a raised floor according to the prior art;

Figure 2 is an enlarged and interrupted cross-section of a flat floor element according to the prior art;

Figure 3 is a perspective view of a flat element, for example a floor element;

Figure 4 is a front view of the flat element of Figure 3;

Figure 5 is an enlarged cross section taken along the plane V-V of Figure 4;

Figure 6 is a schematic view of a decorating apparatus for manufacturing the flat element of Figure 2.

**[0023]** With reference to Figures 1 and 2, a raised floor 101 is shown comprising column supports 102, which rest on the ground 103 to be paved, and a weight-bearing structure 104, composed of section bars 105 so arranged as to form a flat net with square meshes. The weight-bearing structure 104 is supported at the nodes of the mesh by the column supports 102. The raised floor 101 further comprises square panels 106 arranged in rows adjacent to one another, resting along their perimeter edge on the meshes of the weight-bearing structure 104. Each panel 106 comprises a top cladding 107 which defines the appearance of the floor. In the configuration in Figure 1, some panels 106, which are moved by suction cup means 108, still have to be positioned to complete the floor.

**[0024]** As shown in Figure 2, each known panel 106 consists of a bottom lamina 109 intended to rest on the weight-bearing structure 104, a central body 110 arranged on the lamina 109 and a metallic lamina 111, for example a galvanised sheet metal, that acts as a base plane for the top cladding 107. The top cladding 107 may be of various types of material such as PVC, linoleum, rubber, carpet, laminate, wood, ceramics, marble, granite or cement or resin agglomerate and is fixed to the

metallic lamina 111 by means of suitable adhesives or by exploiting the cohesive properties of the cladding (for example in the case of cement or resin agglomerate).

**[0025]** Figure 3 shows a flat element according to the invention, for example a floor element 1, intended to be installed on a weight-bearing structure of a raised floor, for example of the type shown in Figure 1. The decorative pattern on the floor element 1 may be complex and multicoloured as desired and may reproduce the veining of wood or the appearance of marble or granite or natural rock.

**[0026]** As shown in Figure 5, the floor element 1 comprises a central body 3, possibly a base lamina 2 and a top lamina 4. The base lamina 2 may be a sheet of aluminium or laminated plastic or galvanised metal or stainless steel. The central body 3 may be an agglomerate of cellulose fibres of wood, or of calcium sulphate or of calcium silicate. The top lamina 4 may be made of metallic material, and may comprise for example a sheet of galvanised or stainless steel.

**[0027]** In one embodiment, the base lamina 2 may be shaped like a tray, provided with side walls 5 suitable for containing the central body 3. The side walls 5 are obtained by bending by about 90° the edge zones of the sheet metal that forms the base lamina. The top lamina 4 may be shaped as a cover or it may have side edges 6 obtained by bending by an angle of about 90° the strips obtained on the sides of the sheet metal that forms the top lamina 4. The cover has a perimeter that is slightly greater than the perimeter of the tray and is arranged on the central body 3 in such a way that the side edges 6 extend from the top lamina 4 to the central body 3. In the same way, the side walls 5 of the tray extend from the base lamina 2 towards the central body 3. The tray and cover are reciprocally arranged in such a way as to give the floor element 1 the appearance of a box closed by a cover. The tray and cover are both firmly anchored on the central body 3, for example by gluing.

**[0028]** An alternative structure, which is not shown, of the floor element 1 comprises the central body 3, the top lamina 4, possibly the base lamina 2, and side walls covered by strips, each strip having a length equal to the length of the respective edge of the floor element and a height that is about the same as the thickness of the floor element. The strips are fixed or glued to the side walls. The strips may be of plastic material of various colours.

**[0029]** On the top lamina 4 there is a decoration 8, for example comprising a plurality of layers. The decoration 8 may comprise a base layer 9 in contact with the top lamina 4. The base layer 9 defines the base colour of the desired final decoration. The base layer 9 further improves adhesion of the subsequent layers to the top lamina 4.

**[0030]** The manufacturer of decorated floor elements 1 may apply the base layer 9 on the top lamina 4, or may purchase floor elements 1 provided with top laminas 4 on which the respective base layer 9 has already been

applied. In this latter case, the top lamina 4 is for example obtained from a sheet metal in the form of a strip continuously prepainted by means of a suitable system.

[0031] The base layer 9 may be absent if the colouring of the top lamina 4 already corresponds to the desired base colour.

[0032] The base layer 9 may comprise a thermosetting base paint, which uniformly covers the whole top lamina 4 and which becomes anchored to the top lamina 4 after setting. The base paint can be applied onto the top lamina 4 in liquid form by means of a spray or roller device. Subsequently, the base paint freely polymerises in air, possibly with the help of a catalyst, or in a suitable heating apparatus within which the element 1 is subjected to a time-temperature cycle that causes complete firing of the base layer 9. The base paint may also be applied onto the top lamina 4 in powder form by means of known methods, for example of electrostatic or spray type. In this case, the powder softens and polymerises in a suitable heating apparatus. The powder may also be exposed firstly to infrared rays which soften it and then to ultraviolet rays which polymerise it.

[0033] On the base layer 9 a decorative layer 10 is then applied by means of a transfer technique.

[0034] The decorative layer 10 may be applied by means of the decorating apparatus 12 shown in Figure 6. The decorating apparatus 12 comprises an unwinding roller 13 that unwinds from a reel 14 a transfer support 15. The transfer support 15 may comprise a film, for example made of polypropylene, on which the decorative pattern 16 to be transferred onto the surface of the floor element 1 has been printed. The decorating apparatus 12 further comprises a winding roller 17 that winds onto a further reel 18 the exhausted transfer support 15, i.e. the transfer support free of the decorative pattern 16 which has already been transferred onto the floor element 1. A pressing drum 19 is provided for pressing the transfer support 15 against the surface to be decorated. A supporting device, comprising for example a supporting roller 20, supports the floor element 1 when the pressing drum 19 presses the transfer support 15 against the floor element 1.

[0035] The decorative pattern 16 may comprise a decal previously printed on the transfer support 15 by means of known printing techniques, such as gravure or silkscreen printing, the decal being suitable for being transferred onto the floor element 1 by means of heat and pressure. The decal is transferred onto the floor element 1 by applying temperatures comprised between about 50°C and about 150°C.

[0036] In one alternative embodiment, the decorative pattern 16 may comprise a sublimable decoration that is transferred onto the floor element 1 by means of sublimation when heat and pressure are applied. The temperature at which the sublimable decoration is transferred onto the floor element 1 is between about 130°C and about 220°C.

[0037] Decals are particularly suitable for floor ele-

ments 1 made of materials that cannot be exposed to high temperature, as may happen to certain adhesives or glues used between the central body 3 and the top lamina 4 or the base lamina 2.

[0038] The unwinding roller 13, the winding roller 17 and the pressing drum 19 have respective rotation axes which are substantially parallel to one another and rotate in the same direction.

[0039] When the rollers 13 and 17 and the drum 19 rotate, the transfer support 15 unwinds from the reel 14 and rewinds around the further reel 18. The transfer support 15 is maintained in a substantially taut configuration by the drum 19 arranged in a roughly intermediate position along the path of the transfer support 15.

[0040] The pressing drum 19 exerts a pressure on the surface of the floor element 1 as shown by the arrow P, thereby allowing the decorative pattern 16 to be transferred from the transfer support 15 to the surface of the floor element 1, to form the decorative layer 10. To enable detachment of the decal or of the sublimable decoration from the transfer support 15, the pressing drum 19 is heated. Also the supporting roller 20 can be heated. The floor element 1 is conveyed along an advance direction A towards the pressing drum 19 by a conveying device arranged below the pressing drum 19. The conveying device may comprise a roller conveyor 23.

[0041] After transferring the decorative pattern 16 onto the floor element 1, a transparent and highly viscous liquid varnish 21 may be applied onto the decorative layer 10 by means of a curtain coating device 22. The varnish 21 forms a protective layer 11 for the decoration 8.

[0042] The protective layer 11, shown in Figure 5, can also be applied by means of roller or spray devices. The liquid varnish 21 may be capable of polymerising when subjected to ultraviolet radiation that activates photoinitiators possibly included in the liquid varnish 21. Polymerisation of the protective layer 11 is a rapid reaction that occurs by inserting the floor element 1 into a UV kiln.

[0043] It is noted that the protective layer 11 can also be applied in powder form.

[0044] To improve transfer of the decorative pattern 16 from the transfer support 15 onto the floor element 1 it is possible to preheat the floor element 1 before it enters the apparatus 12.

[0045] The floor element 1 may be preheated at temperatures of between approximately 30°C and approximately 100°C with an infrared lamp, or in a suitable kiln.

## Claims

1. A method of decorating a flat element (1), **characterised in that** said decorating comprises transferring decorative means (16) from support means (15) to lamina means (4) of said flat element (1).
2. A method according to claim 1, wherein said lamina means comprises metallic lamina means (4).

3. A method according to claim 1 or 2, wherein said flat element comprises a floor element (1).
4. A method according to any one of the preceding claims, wherein said decorative means (16) comprises decal means.
5. A method according to any one of claims 1 to 3, wherein said decorative means (16) comprises a sublimable decoration.
6. A method according to any one of the preceding claims, wherein said transferring comprises heating said decorative means (16).
7. A method according to any one of the previous claims, wherein said transferring comprises pressing said support means (15) against said lamina means (4).
8. A method according to claim 7 as appended to claim 6, wherein said pressing occurs during said heating.
9. A method according to any one of the preceding claims, wherein said decorating comprises distributing base layer means (9) on said lamina means (4).
10. A method according to claim 9, wherein said distributing is chosen from a group consisting of: spray distributing, roller distributing, electrostatic distributing.
11. A method according to claim 9 or 10, wherein said base layer means (9) is distributed on said lamina means (4) in a form selected between: liquid, powder.
12. A method according to any one of claims 9 to 11, wherein said base layer means (9) comprises a thermosetting material.
13. A method according to any one of claims 9 to 12, wherein said decorating comprises polymerising said base layer means (9).
14. A method according to any one of the preceding claims, wherein said decorating comprises coating said lamina means (4) with protective layer means (11), after said transferring.
15. A method according to claim 14, wherein said coating is chosen from a group consisting of: spray coating, roller coating, curtain coating.
16. A method according to claim 14 or 15, wherein said protective layer means (11), during said coating, is in a form selected from a group consisting of: liquid, powder.
17. A method according to any one of claims 14 to 16, wherein said protective layer means (11) comprises a polymeric material.
18. A method according to any one of claims 14 to 17, and further comprising setting said protective layer means (11) with ultraviolet rays.
19. A method according to any one of the preceding claims, and further comprising preheating said lamina means (4), before said decorating.
20. A flat element comprising lamina means (4) on which decorative means (8) is arranged, **characterised in that** said decorative means (8) is free of cladding elements glued to said lamina means (4).
21. A flat element according to claim 20, wherein said lamina means comprises metallic lamina means (4).
22. A flat element according to claim 20 or 21, wherein said decorative means (8) comprises polymeric decorative means (8).
23. A flat element according to any one of claims 20 to 22, wherein said decorative means (8) comprises a decorative layer (10).
24. A flat element according to any one of claims 20 to 23, wherein said decorative means (8) comprises base layer means (9).
25. A flat element according to claim 24, as appended to claim 23, wherein said base layer means (9) is interposed between said lamina means (4) and said decorative layer (10).
26. A flat element according to claim 23, or 25, or 24 as appended to claim 23, wherein said decorative means (8) comprises protective layer means (11) arranged on a side of said decorative layer (10) opposite to said lamina means (4).
27. A flat element according to claim 26, wherein said protective layer means (11) is transparent.
28. A flat element according to any one of the claims 20 to 27, and further comprising a supporting body (3) for supporting said lamina means (4) at a side of said lamina means (4) opposite to said decorative means (8).
29. A flat element according to claim 28, and further comprising base lamina means (2), said supporting body (3) being interposed between said lamina

means (4) and said base lamina means (2).

- 30.** Use of a flat element according to any one of claims 20 to 29 as a floor element (1).

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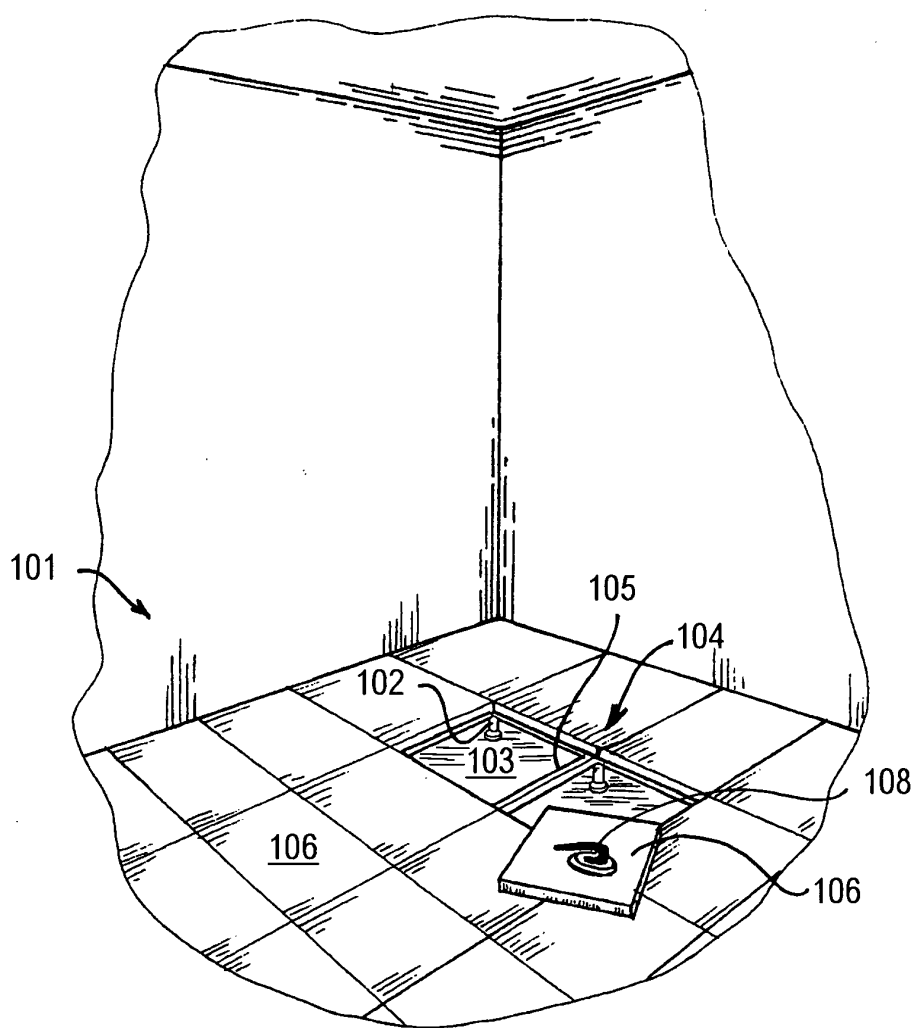
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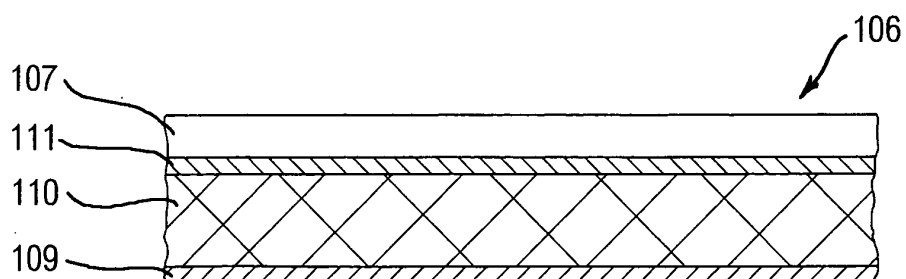
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PRIOR ART

Fig. 1



PRIOR ART

Fig. 2

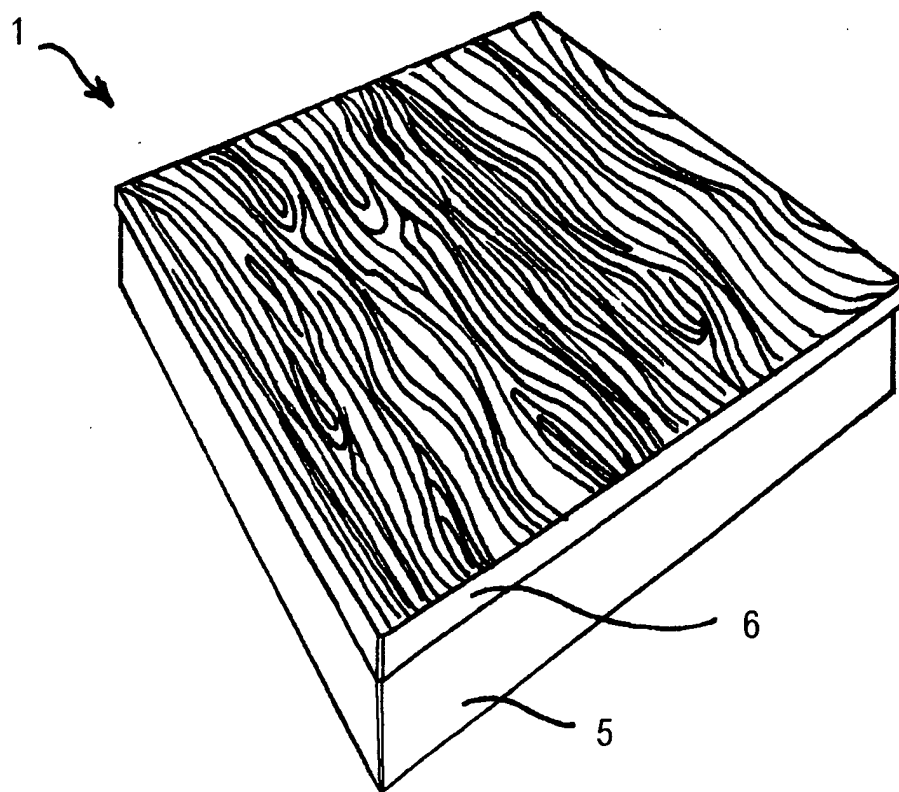


Fig. 3



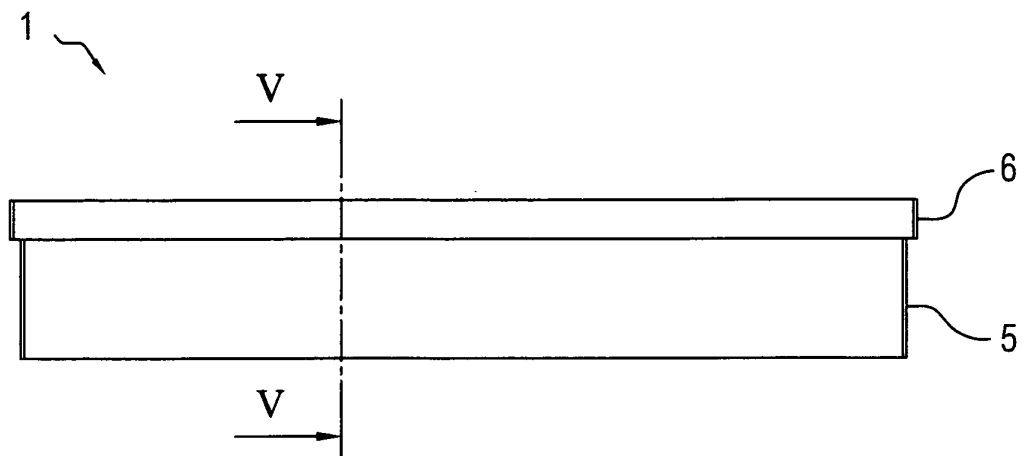


Fig. 4

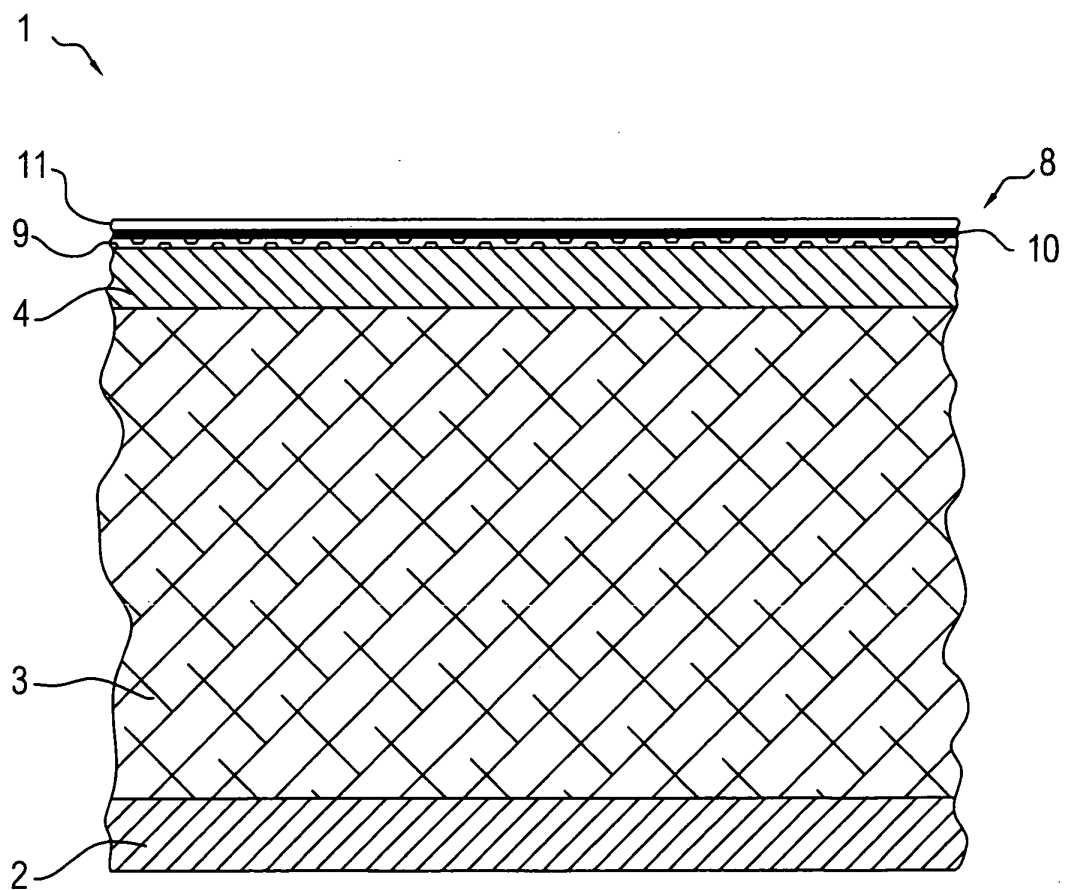


Fig. 5

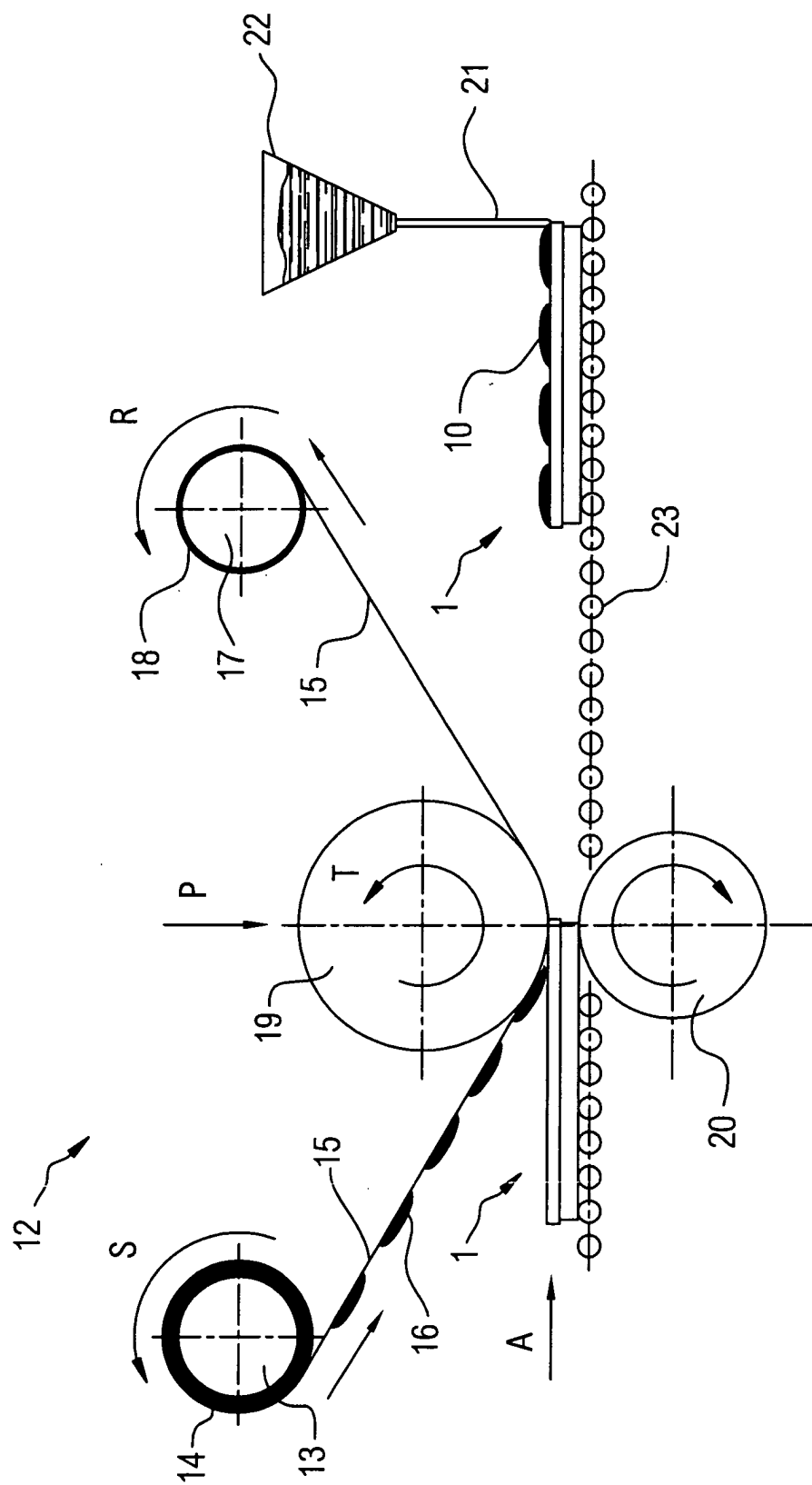


Fig. 6



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| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                 |                                                        |                                              |
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| The present search report has been drawn up for all claims                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                 |                                                        |                                              |
| Place of search<br><b>MUNICH</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                 | Date of completion of the search<br><b>9 June 2004</b> | Examiner<br><b>Sartor, M</b>                 |
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