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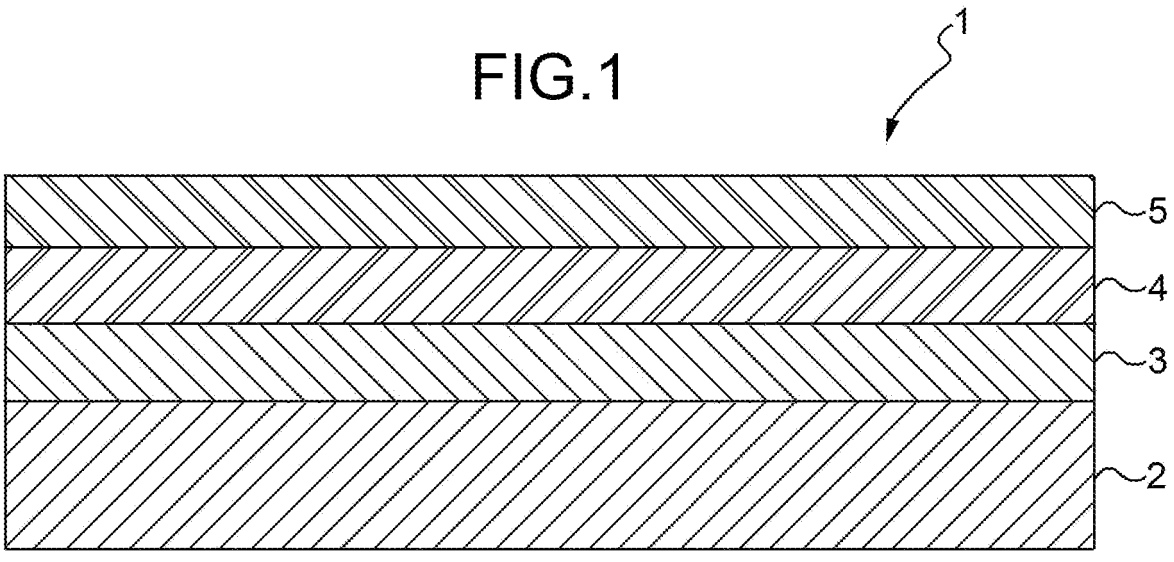
(54) A method of producing decorative panels or laminates with fabrics

(57) A method of producing a decorative panel or laminate, comprises the steps of:
piling up a plurality of layers of material, the layers of material comprising:
- a substrate (2),
- one or more paper sheets impregnated with thermosetting resin, the one or more paper sheets comprising a decorative paper sheet (3) and, optionally, an overlay (4) combined with the decorative paper sheet, and
- a layer of fabric (5) of natural, synthetic, or metallic fibres or a combination of such fibres, which is suitable for producing a decorative effect, and

applying pressure and heat to the pile of layers thus obtained in order to bond the paper sheet/s, the substrate and the fabric layer to one another intimately.

The fabric layer is intended to form a surface layer of the decorative panel or laminate; the thermosetting resin of the decorative sheet and/or of the overlay is prepared in a manner such that, during the application of pressure and heat, the resin penetrates through and incorporates the fabric layer, leaving the outer surface of the fabric layer exposed.

FIG.1



EP 2 189 298 A1

Description

[0001] The present invention relates to a method of producing a decorative panel or laminate, comprising the steps of:

piling up a plurality of layers of material, the layers of material comprising:

- a substrate,
- one or more paper sheets impregnated with thermosetting resin, the one or more paper sheets comprising a decorative paper sheet and, optionally, an overlay combined with the decorative paper sheet, and
- a layer of fabric of natural, synthetic, or metallic fibres or a combination of such fibres, which is suitable for producing a decorative effect, and

applying pressure and heat to the pile of layers thus obtained in order to bond the paper sheet/s, the substrate and the fabric layer to one another intimately.

[0002] It is known, particularly in the furnishing and architectural fields, to produce rigid decorative surfaces that are characterized by aesthetic "fabric" effects. Decorative panels with a "fabric" effect are currently produced by various techniques.

[0003] A first known technique provides for a printing process. According to this technique, the surface of the panel is printed directly by digital or silk-screen technology and then varnished. Alternatively, the paper is first of all decorated by digital or rotary printing and is then saturated with thermosetting resins (mainly ureic and melamine resins) and pressed to produce faced panels or laminates. However, the printed surfaces are simply imitations of the fabric; the synthetic surface does not have the same visual and tactile characteristics as the natural product.

[0004] Another known method provides for an interlamination process which constitutes the known technique that is closest to the invention. According to this process, which is known in the field of high-pressure laminates (HPL), real fabric is interposed between two melamine overlays and pressed. The advantage of the process is the production of a realistic decorative effect. However, even these products do not have the feel of fabric since the outer surface is synthetic, that is, the melamine resin protecting the HPL laminate.

[0005] The use of real fabric surfaces in furnishing is limited in practice to upholstery, within which there is a process for stretching fabric over a panel with the interposition of soft materials. However, this technology does not enable rigid surfaces to be obtained and is limited to a few applications such as, for example, the manufacture of bed heads.

[0006] Although fabrics potentially offer a vast range of decorative solutions which are attractive for the purposes of design furnishings (one need only think of combinations with curtains, bedspreads, sofa materials, etc.) there is, in the current state of the art, no solution which permits the production, by a repeatable industrial process, of rigid fabric surfaces having strength and cleanability performance that is adequate for the various requirements.

[0007] In the light of the foregoing, the present invention proposes a method of producing rigid surfaces which enables surfaces to be obtained with a rich aesthetic appearance, a high degree of decorative flexibility and good cleanability and surface strength.

[0008] The subject of the invention is therefore a method of the type defined above in which:

the fabric layer is intended to form a surface layer of the decorative panel or laminate, and
the thermosetting resin of the decorative sheet and/or of the overlay is prepared in a manner such that, during the application of pressure and heat, the resin penetrates through and incorporates the fabric layer, leaving the outer surface of the fabric layer exposed.

[0009] The method of the invention produces rigid, fabric-covered panels or laminates with which components of any shape and thickness can be made for a wide range of uses in furnishing. In contrast with other printing or incorporation techniques, the fabrics constitute the surface layer and therefore retain the aesthetic and tactile characteristics of the starting fabric.

[0010] These and other objects and advantages will become clearer from the following detailed description of some embodiments of the invention which is given with reference to the appended drawings, in which:

- Figure 1 shows a generic scheme for the piling-up of the layers in a method of producing a panel or laminate according to the invention,
- Figure 2 shows a scheme for the piling-up of the layers in a method of producing a faced panel according to the invention,
- Figure 3 shows a scheme for the piling-up of the layers in a method of producing a high-pressure laminate according to the invention, and
- Figure 4 shows a scheme for the piling-up of the layers in a method for the continuous production of a decorative laminate according to the invention.

[0011] A method of producing a decorative panel or laminate according to the invention is now described in general with reference to Figure 1. The panel or laminate is generally indicated 1 in Figure 1. The production method comprises, in conventional manner, a step of piling up layers of material and a step of applying pressure and heat to the pile of layers thus obtained in order to bond the layers of material to one another intimately.

[0012] The layers of material of the pile comprise a

substrate 2 of a material conventionally used in the field. The substrate may be constituted, for example, by a substrate panel, generally of medium density fibre (MDF) or chipboard, by a bundle of sheets of Kraft paper impregnated with thermosetting resin, by parchment paper, or by another substrate film, or even by a combination thereof.

[0013] The pile of layers further comprises one or more paper sheets impregnated with thermosetting resin. These paper sheets comprise a decorative paper sheet 3 and, optionally, an overlay 4 combined with the decorative sheet 3. The decorative sheet 3 may be, conventionally, coloured paper or colour-printed paper with designs, etc. "Overlay" means, conventionally, a thin paper sheet which is impregnated with thermosetting resin and which can be combined with a decorative sheet with a protection or finishing function. The overlay is substantially transparent or is formed so as to become transparent after the pressure and heat treatment so as to allow the decorative effect of the underlying decorative sheet 3 to be seen.

[0014] Finally, the pile of layers comprises a fabric layer 5 suitable for producing the decorative effect of the panel or laminate. The fabric layer 5 and the decorative sheet 3 may optionally be selected so as to cooperate to produce a decorative effect combining the decorative effect provided by each. For the purposes of the present invention, the term "fabric" means a flexible layer formed by one or more arrangements of threads which intersect and are interwoven in predetermined directions and at predetermined angles. In particular, all printed and non-printed fabrics both of natural fibres (jute, cotton, linen, silk, etc.) and of synthetic fibres (polyesters, nylon, lycra, etc.), and also metal mesh fabrics or mixed metal/fibre fabrics (aluminium, stainless steel, copper, silk/steel, etc.) are suitable for the method according to the invention. Fabrics which have a fairly large porosity or a fairly loose weave such as to permit partial saturation and incorporation of the fabric by the resin are preferable for the purposes of the invention. In any case, it is essential that the penetration of the resins be such as not to immerse the fabric layer in the resin completely but to leave the outer surface of the fabric layer 5 exposed.

[0015] The pile of layers thus obtained is subjected to a step of applying pressure and heat with the purpose of bonding the paper sheet/s, substrate and fabric layer to one another intimately. This step may take place conventionally in a static, single-compartment or multi-compartment press or in a continuous press.

[0016] According to the invention, the fabric layer 5 is intended to form a surface layer of the decorative panel or laminate. In other words, the fabric layer is not covered with further layers that are intended permanently to form an integral part of the panel or laminate. At most, the fabric layer 5 may be covered by a release film to protect the pressure plates.

[0017] The thermosetting resin of the decorative sheet 3 and/or of the overlay 4, in particular melamine resin, is prepared in a manner such that, during the application of pressure and heat, the resin penetrates through and incorporates the fabric layer 5. With the polymerization brought about by the pressure and temperature cycle, the resin that has penetrated the fabric cross-links, irreversibly locking the fibres or threads thereof. The reactivity and fluidity of the resin should therefore be such as to enable the resin to penetrate into the fabric and to cross-link, avoiding the formation of aesthetic defects. For this purpose, when the paper sheets of the panel or laminate are impregnated with melamine resin, a melamine resin which is modified to afford the required reactivity and fluidity may be used for the decorative sheet (in this case, the overlay may even be absent). However, it is preferred to use a standard melamine resin for the decorative sheet and a modified melamine resin for the overlay.

[0018] Three different processes for the production of panels or laminates according to the invention are now described by way of example.

Example 1 - Low-pressure facing_ process

[0019] This process is carried out by a static press, generally with a single compartment, to obtain a melamine faced panel. A preferred layering scheme for this process, which is illustrated in Figure 2, is as follows (the reference numerals with which the layers appear in the drawing are indicated in brackets):

(8) release paper
(5) fabric
(4) melamine overlay
(3) melamine decorative layer
(6) phenolic barrier (optional)
(2) substrate panel
(6) phenolic barrier (optional)
(7) melamine balancing layer

[0020] The layers indicated by reference numerals 2 to 5 are of the type described above. The substrate panel 2 is generally a medium-density fibre (MDF) or chipboard panel. The phenolic barriers 6 associated with the substrate panel 2 are advantageously constituted by sheets of paper impregnated with phenolic resin and have the function of permitting any subsequent operations for the post-forming of the edge of the panel. The melamine balancing layer 7 is constituted, conventionally, by one or more decorative paper sheets impregnated with melamine resin and has a balancing function to prevent excessive warping of the panel due to the polymerization shrinkage of the resins.

[0021] The pile of layers described above is inserted between opposed plates of the facing press. The press transmits the heat to the plates by means of surfaces that are heated with diathermic oil. The plates are thus heated to temperatures of between about 150 and 200°C and compress the pile of layers with pressures of between

20 and 50 kg/cm^2. During this process, the fabric 5, the melamine papers 3, 4, the barriers 6 and the balancing layer 7 are pressed onto the panel 2 with cycles, for example, of 20s - 80s duration. Under the effect of the heat and the pressure, the melamine resin of the overlay 4 is fluidized and infiltrates between the fibres/threads of the fabric and then cross-links and sets. Naturally, the resin of the other impregnated layers also cross-links and sets so that, upon completion of the pressure and heating cycle, the papers are welded firmly to the substrate panel and to the fabric, forming a single body. Upon setting, the resin of the balancing layer 7 keeps the panel flat. The removable protective film 8 is optionally provided to protect the plate that is in contact with the fabric 5, preventing contamination with any inks or additives contained therein. The plates may also be surface structured permitting further individualization by embossing of the surface.

Example 2 - High-pressure pressing_ process

[0022] This process is carried out with a static press, generally a multi-compartment press, to produce a high-pressure laminate (HPL). A preferred layering scheme for this process, illustrated in Figure 3, is as follows (the reference numerals with which the layers appear in the drawing are indicated in brackets; elements corresponding to those of the preceding example have been attributed the same reference numerals):

(8) release paper
(5) fabric
(4) melamine overlay
(3) melamine decorative layer
(2) bundle of phenolic Kraft paper sheets.

[0023] In contrast with the preceding example, the melamine papers 3, 4 and the fabric 5 are pressed onto a substrate 2 which is constituted by a series of Kraft paper layers impregnated with phenolic resins. The press for HPL laminates reaches higher pressures than the finish-treatment press and may even reach 100 kg/cm^2. The cycles are generally longer (about 30 minutes) and the temperatures lower (between 120°C and 140°C). Upon completion of the pressing cycle, a laminate is obtained with a thickness that depends on the number of Kraft paper sheets used as substrate (by way of indication from a minimum of 0.6 mm to a few centimetres thickness).

Example 3 - Continuous pressing process

[0024] This process is carried out by a continuous press to produce a laminate. A preferred layering scheme for this process, illustrated in Figure 4, is as follows (the reference numerals with which the layers appear in the drawing are indicated in brackets; elements corresponding to those of the preceding example have been attributed the same reference numerals):

(8) release paper
(5) fabric
(4) melamine overlay
(3) melamine decorative layer
(2) parchment paper or other substrate film

[0025] The melamine papers 3, 4, the fabric 5 and the substrate film 2 are on reels and are combined with one another in the press at a temperature of about 140-200°C, with pressures of 20-70 kg/cm^2 and times depending on the speed of the line. The laminate obtained has a thickness depending on the materials used and is generally variable from a minimum of 0.1 mm to about 1 mm.

[0026] The use of one of these production techniques produces fabric-covered rigid panels or laminates with which components of any shape and thickness can be produced for a wide range of uses in furnishing. The faced panels permit post-forming, bending, and edging processes, etc. The laminates, on the other hand, permit the production of profiles, rims or finished shapes.

[0027] In contrast with known printing or incorporation processes, the fabrics represent the surface layer and therefore retain the aesthetic and tactile characteristics of the starting fabric.

[0028] To improve resistance to the absorption of dirt, Teflon-treatments of the fabric may be used prior to the pressing process. The fabric is thus protected from most staining substances and is easier to wash.

[0029] The embodiments described herein should be considered as examples of the implementation of the invention; the invention may, however, undergo modifications relating to the shape and arrangement of parts, and to constructional and operational details in accordance with the numerous possible variants which will seem appropriate to persons skilled in the art.

Claims

1. A method of producing a decorative panel or laminate, comprising the steps of:

   piling up a plurality of layers of material, the layers of material comprising:

   - a substrate (2),
   - one or more paper sheets impregnated with thermosetting resin, the one or more paper sheets comprising a decorative paper sheet (3) and, optionally, an overlay (4) combined with the decorative paper sheet, and
   - a layer of fabric (5) of natural, synthetic, or metallic fibres or a combination of such fibres, which is suitable for producing a decorative effect, and

applying pressure and heat to the pile of layers thus obtained in order to bond the paper sheet/s, the substrate and the fabric layer to one another intimately,

characterized in that:

the fabric layer is intended to form a surface layer of the decorative panel or laminate, and the thermosetting resin of the decorative sheet and/or of the overlay is prepared in a manner such that, during the application of pressure and heat, the resin penetrates through and incorporates the fabric layer, leaving the outer surface of the fabric layer exposed.

2. A method according to Claim 1 in which the decorative paper sheet and the fabric layer are selected to produce a decorative effect in combination.

3. A method according to Claim 1 or Claim 2 in which the fabric layer is arranged in contact with the decorative paper sheet and the overlay is absent, the thermosetting resin of the decorative paper sheet being prepared in a manner such that, during the application of pressure and heat, the resin penetrates through and incorporates the fabric layer.

4. A method according to Claim 1 or Claim 2 in which the fabric layer is arranged in contact with the overlay and the overlay is interposed between the fabric layer and the decorative paper sheet, solely the thermosetting resin of the overlay being prepared in a manner such that, during the application of pressure and heat, the resin penetrates through and incorporates the fabric layer.

5. A method according to any one of the preceding claims, intended for the production of a faced panel in which the substrate comprises a rigid substrate panel.

6. A method according to any one of Claims 1 to 4, intended for the production of a high-pressure laminate, in which the substrate comprises a bundle of Kraft paper sheets impregnated with thermosetting resin.

7. A method according to any one of Claims 1 to 4, intended for the continuous production of a laminate, in which the substrate comprises one or more substrate films.

8. A method according to any one of the preceding claims in which the fibre fabric has undergone a stain-proofing treatment, for example, a Teflon treatment.

FIG.1

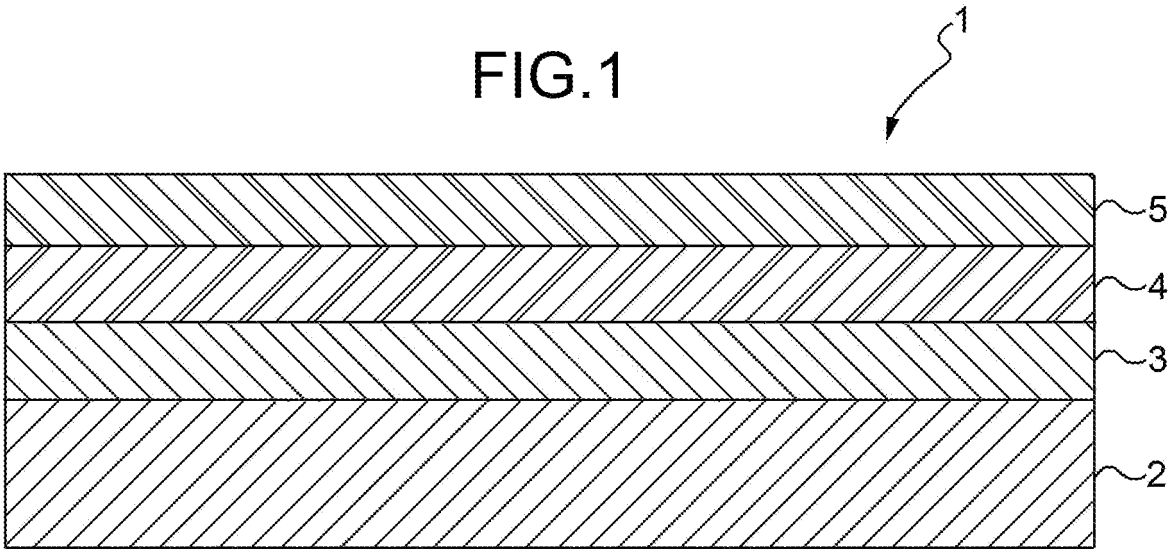
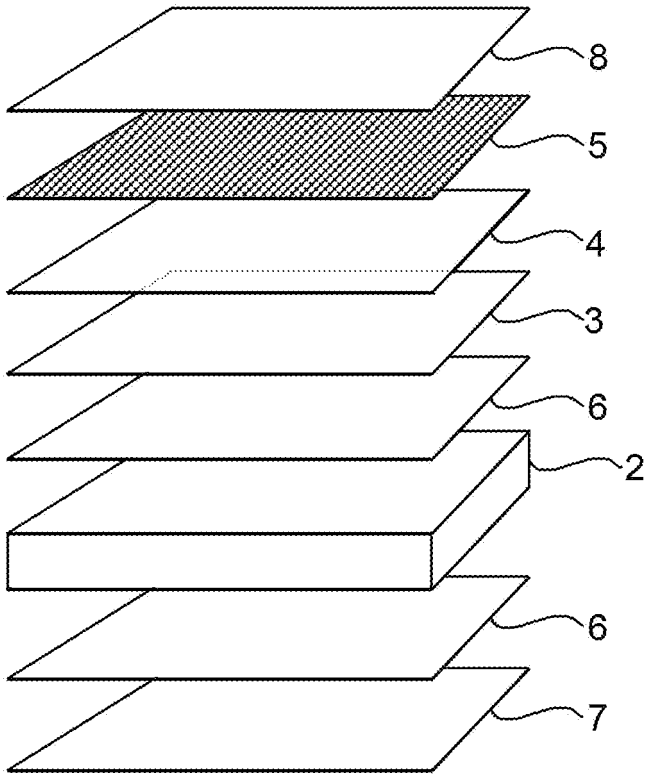


FIG.2



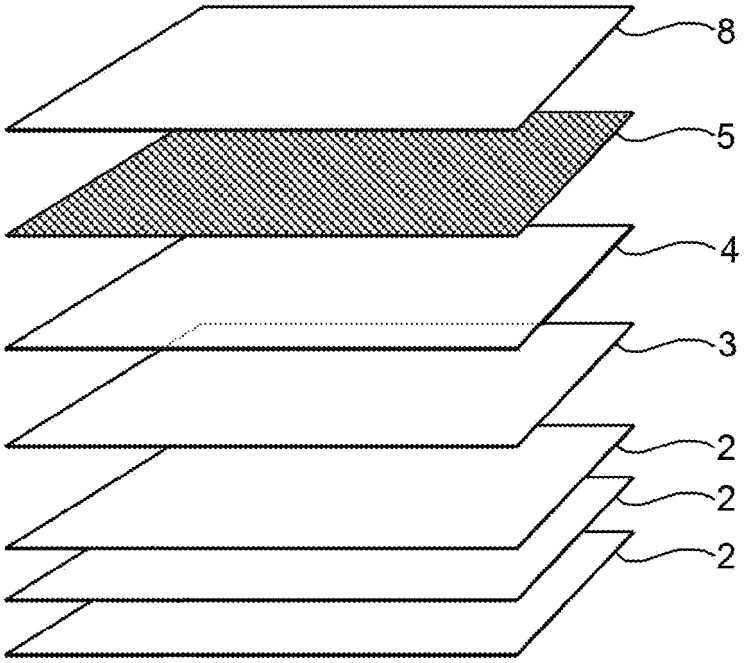


FIG.3

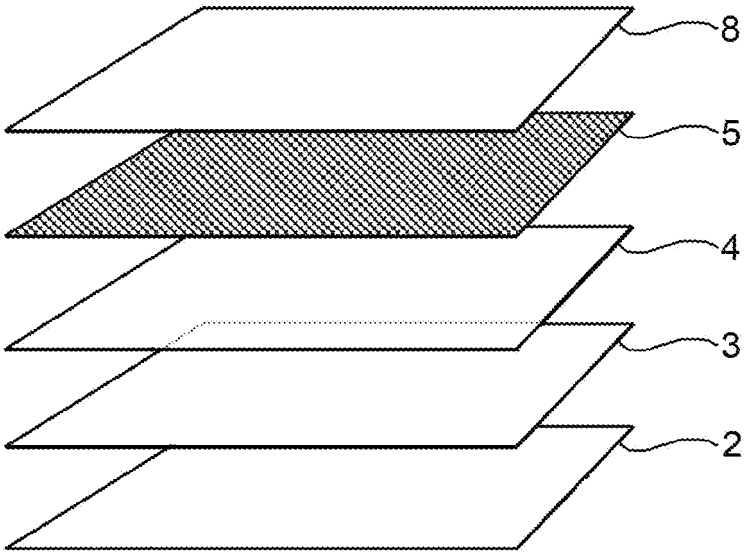


FIG.4

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EUROPEAN SEARCH REPORT

Application Number
EP 08 42 5752

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	7 April 2009	Sartor, Michele

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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