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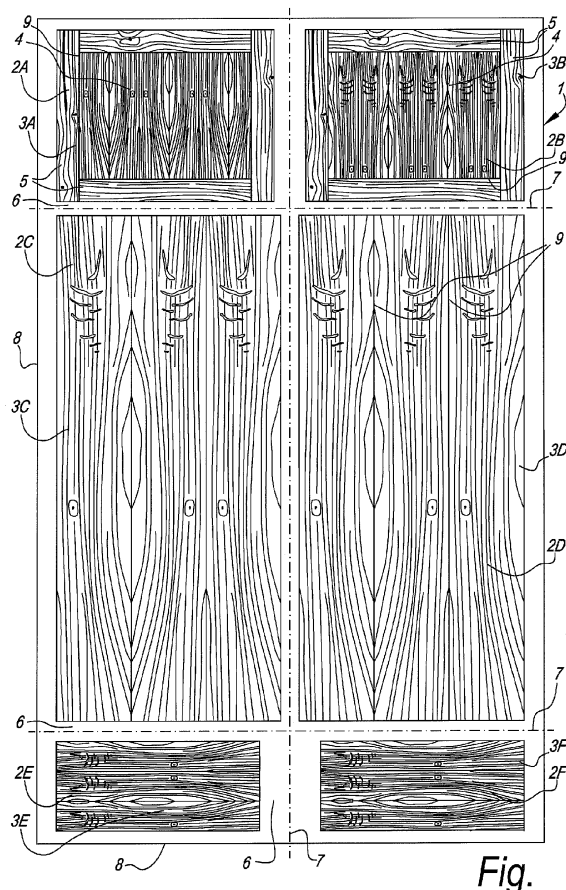
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(54) **Printed paper sheet, decorative panel, item of furniture and method for manufacturing an item of furniture.**

(57) Printed paper sheet for manufacturing decorative panels, wherein said paper sheet (1) carries the digitally printed pattern (2A-2C) for a plurality of said decorative panels, characterized in that said plurality of said

decorative panels comprises at least two panels of different size and in that predetermined portions (3A-3C) of the paper sheet (1) comprise the digitally printed pattern for said two decorative panels.



## Description

**[0001]** The present invention relates to a printed paper sheet for manufacturing decorative panels, as well as to such decorative panels and items of furniture comprising such decorative panels. The invention also relates to a method for manufacturing such items of furniture.

**[0002]** More particularly the invention is related to a printed paper sheet that carries the digitally printed pattern for a plurality of such decorative panels.

**[0003]** Traditionally, printed paper sheets for the manufacturing of decorative panels are produced by rotogravure or offset printing. Such sheets comprise a continuous pattern with a repeat in the length direction of the paper sheet about every 1.3 to 1.5 meters. When adhered to a substrate, such as to a chipboard or an MDF or HDF board, a large decorative laminate board is obtained that is cut up to a plurality of decorative panels. Each panel features a part of the printed pattern. The cutting process can be controlled so as to produce as few scrap as possible. Items of furniture manufactured from such decorative panels look quite fake and the design of the individual panels cannot be controlled. The printing of paper by means of an analog printing process, such as by rotogravure or offset printing, at affordable prices inevitably leads to large minimal order quantities of a particular decorative paper and restricts the attainable flexibility. A change of decor or pattern necessitates a standstill of the printing equipment of about 24 hours. This standstill time is needed for exchange of the printing rollers, the cleaning of the printing equipment and for adjusting the colors of the new decor or pattern to be printed.

**[0004]** Presently new printing techniques for producing such printed paper sheets are emerging, such as digital inkjet printing. Such printing techniques are also used to create continuous patterns and items of furniture manufactured from such decorative panels suffer from the same disadvantages. In this respect reference is made e.g. to the EP 2 293 946.

**[0005]** In the production of printed paper sheets for the manufacturing of flooring or wall panels it has been known for quite some time now to introduce a so-called plank effect, in an attempt to minimize the fake look of flooring panels. The printed pattern of some or all panels or planks are printed with a slightly different color or tint. Reference is in this respect made e.g. to US 3,810,774, WO 2009/087440 and EP 2 133 215, where available techniques are discussed. The possibilities of such techniques are rather limited.

**[0006]** From WO 02/00449 it is known to provide decorative panels for kitchens with predetermined digitally printed patterns, wherein these panels have different sizes and the print is provided directly on a substrate of such panel. Prior to printing, the substrate is cut to size and provided with a veneer or synthetic surface layer. Printing panel by panel places a high burden on the manufacturing. It is especially difficult to maintain color accuracy, panel after panel, while printing directly on a substrate.

Moreover a printing error results in a scrap panel.

**[0007]** A great need exist to enhance the look of flooring and items of furniture that are assembled from decorative panels which feature a printed pattern, while keeping the burden of manufacturing such furniture as low as possible.

**[0008]** With the aim of fulfilling this need, the present invention concerns a printed paper sheet for manufacturing decorative panels, wherein said paper sheet carries the digitally printed pattern for a plurality of said decorative panels, with as a characteristic that said plurality of said decorative panels comprises at least two panels of different size and in that predetermined, preferably distinct, portions of the paper sheet comprise the digitally printed pattern at least for said two decorative panels. The method of the present invention allows to custom design the printed pattern of each of the decorative panels, while keeping the burden of manufacturing low. Indeed such paper sheet can be processed in the traditional laminate board manufacture plant, and can be cut up much alike the traditional laminate board. The cutting scheme however needs to be adapted in accordance with the position of the predetermined portions of the printed pattern. Preferably the predetermined portions are positioned so as to minimize the creation of scrap portions while cutting up.

**[0009]** Preferably said predetermined portions can be cut from the sheet by means of cuts parallel to the edges of the paper sheet only and/or by means of continuous cuts only. Of course such cutting is normally carried out while the paper sheet is already adhered to a substrate to form a decorative laminate board. By a continuous cut it is meant a cut that completely separates a part from the board or from the remainder of the board, after other parts have already been cut off by way of continuous cuts only. Indeed, it should be noted that these cuts are not necessarily performed on the entirety of the laminate board, but possibly on already separated portions thereof. The present preferred embodiment allows cutting up of the laminate board comprising the printed paper sheet of the invention in a convenient way using standard machinery.

**[0010]** It is noted that a printing error in the method of the invention leads only to the loss of a printed paper sheet or part thereof.

**[0011]** Preferably said digitally printed pattern is a wood pattern. Of course, stone patterns or fantasy patterns can be used as well. Preferably the respective portions of the wood pattern are predetermined in that their size corresponds to the size of the respective decorative panel. Of course, preferably their size is somewhat larger to allow for tolerance while cutting up or further processing the decorative panels. According to a special embodiment, the respective portions of the wood pattern are predetermined in that the wood pattern depicts a central wood part bordered by several further wood parts such that the central wood part corresponds to the centre of the decorative panel and the several further wood parts

correspond to the border of the decorative panel.

**[0012]** It is clear that said predetermined portion preferably has a pattern adapted to the respective decorative panel. For example, when use is made of the above mentioned central wood parts, such wood parts will be larger for a larger decorative panel, than it is for a smaller decorative panel.

**[0013]** Preferably the digitally printed pattern of the respective panels is free from repetition, even if one or both decorative panels have a dimension larger than 1,5 meter.

**[0014]** Preferably said predetermined portions are bordered by unprinted areas of the paper sheet or by areas that comprise a distinctly different printed pattern, such as a uniformly colored line or area. Using such areas results in a cost saving, since the ink of digital inkjet printer are usually a lot more expensive than the inks of roto-gravure or offset printers. Such areas are also of interest to allow for an automatic detection of the position of the predetermined patterns, for example for cutting up the laminate board automatically. Such areas, especially when present as a stretched area extending over the entirety of the length or the width of the paper, enables to use several digital printers in the zones delimited by such areas, without having to worry about the seamless merging of patterns printed by several digital printers.

**[0015]** It is clear that the printed paper sheet of the invention is preferably used for the manufacture of furniture panels. Especially for furniture the need to custom design individual decorative panels is high.

**[0016]** It is clear that the invention also concerns a decorative panel, wherein said panel at least comprises a substrate and an attached thereto decor layer having a digitally printed pattern, with as a characteristic that said decor layer consists of a predetermined portion of a printed paper sheet carrying the digitally printed pattern of a plurality of such panels. Preferably the decor layer is attached to the substrate using the so-called DPL process, wherein the paper sheet is provided with a thermosetting resin, such as with melamine formaldehyde, and attached to the substrate by using a heated press treatment, resulting in said adherence, as well as in a hardening of the available resin.

**[0017]** It is further clear that the invention also concerns an item of furniture, with as a characteristic that said item of furniture comprises a plurality of such decorative panels, wherein the decor layer of each of said plurality of decorative panels consists of a predetermined portion of the same printed paper sheet. Clearly the ability to custom design the panels of an item of furniture individually is an important advantage. Having the predetermined portions on the same printed paper sheet enables several new possibilities, such as creating a relief adapted to each of the predetermined portions by means of a press treatment with a structured press element. Especially the possibility of creating impressions in between several depicted wood parts in such a predetermined portion of the printed pattern, or impressions on the edge of a depicted

wood part is interesting. With the continuous printed patterns of the prior art, this was simply impossible, as it was unclear where such impression or imitation edge would end up in the final decorative panel.

**[0018]** It is clear that the invention concerns also a method for manufacturing an item of furniture, wherein the item of furniture is assembled from a plurality of decorative panels, at least comprising a substrate and a decor layer with a digitally printed pattern, with as a characteristic that the pattern of said plurality of decorative panels is printed on the same paper sheet by means of one or more digital printers. Preferably use is made of one or more single pass or multi pass printers. In the case more than one printer is applied, preferably the abovementioned stretched unprinted areas are put into practice. Preferably use is made of pigment containing inks, such as a UV curable ink, since such inks can warrant a high color richness and color fastness.

**[0019]** It is important to note that the present invention completely reverses the design of decorative panels and items of furniture. Indeed, in accordance with the prior art, the design of furniture was independent from the decorative laminate board. Decorative panels were simply cut out of such laminate board and the item of furniture was assembled. The present invention links the design with the layout of the print on the decorative laminate board. Indeed before digitally printing the paper sheet of the invention the design of the item of furniture should already be known, since the print features predetermined portions for these panels.

**[0020]** It is clear that the decorative panels of the invention preferably comprise a wood based substrate, such as an MDF or HDF substrate (Medium of High Density Fiberboard) or a substrate consisting of or essentially made of wood particleboard.

**[0021]** With the intention of better showing the characteristics according to the invention, in the following, as an example without limitative character, an embodiment is described, with reference to the accompanying drawings, wherein the sole figure represents a printed paper sheet in accordance with the invention.

**[0022]** The figure represents a printed paper sheet 1 for manufacturing decorative panels. The paper sheet 1 carries the digitally printed pattern 2A-2B-2C-2D-2E-2F of a plurality of such panels, in this case of six panels, wherein the panels have at least two, in this case three different sizes. Predetermined portions 3A-3B-3C-3D-3E-3F, in this case distinct portions, of the paper sheet 1 comprise the digitally printed patterns 2A-2B-2C-2D-2E-2F of the six respective decorative panels, in this case furniture panels.

**[0023]** In the example the digitally printed patterns are wood patterns, wherein the upper depicted wood patterns 2A-2B are of the type having a central wood part 4 and several further wood parts 5 bordering the central wood part 4.

**[0024]** The predetermined portions 2A-2B-2C-2D-2E-2F of the print are in the example bordered by unprinted

areas 6. The unprinted areas 6 extend over the entirety of the length, respectively the width of the paper sheet 1.

[0025] The dash-dotted lines 7 make clear that said predetermined portions 2A-2B-2C-2D-2E-2F can be cut from the sheet by means of only cuts that are parallel to the edges 8 of the paper sheet 1 and are continuous.

[0026] As stated in the introduction the printed paper sheet 1 of the example may be further processed to a laminate board by attaching to a substrate, e.g. by impregnating it with a thermosetting resin before or after printing and sticking it to the substrate by means of a heated press treatment. During such press treatment a structured press element may provide suitable relief in the surface of the laminate board. Such relief may comprise indentations imitating wood pores. According to a special embodiment of the present invention, such relief comprises indentations or impressions on the edges 9 of one or more of the depicted wood parts 4-5 and/or in between such adjacent wood parts 4-5.

[0027] The present invention is in no way limited to the above described embodiments, but such method may be realized according to several variants without leaving the scope of the invention as defined by the appended claims.

## Claims

1. Printed paper sheet for manufacturing decorative panels, wherein said paper sheet (1) carries the digitally printed pattern (2A-2C) for a plurality of said decorative panels, **characterized in that** said plurality of said decorative panels comprises at least two panels of different size and **in that** predetermined portions (3A-3C) of the paper sheet (1) comprise the digitally printed pattern for said two decorative panels.

2. Printed paper sheet according to claim 1, **characterized in that** said digitally printed pattern is a wood pattern.

3. Printed paper sheet according to claim 1 or 2, **characterized in that** said predetermined portions (3A-3C) are bordered by unprinted areas (6) of the paper sheet (1).

4. Printed paper sheet according to any of the preceding claims, **characterized in that** said predetermined portion (3A-3C) has a pattern adapted to the respective decorative panels.

5. Printed paper sheet according to any of the preceding claims, **characterized in that** said decorative panels are furniture panels.

7. Printed paper sheet according to any of the preceding claims, **characterized in that** said predeter-

mined portions (3A-3C) can be cut from the sheet (1) by means of cuts parallel to the edges (8) of the paper sheet (1) only.

8. Printed paper sheet according to any of the preceding claims, **characterized in that** said predetermined portions (3A-3C) can be cut from the sheet (1) by means of continuous cuts only.

9. Decorative panel, wherein said panel at least comprises a substrate and an attached thereto decor layer having a digitally printed pattern, **characterized in that** said decor layer consists of a predetermined portion (3A) of a printed paper sheet carrying the digitally printed pattern (2A-2C) of a plurality of such panels.

10. Item of furniture, **characterized in that** it comprises a plurality of decorative panels in accordance with claim 9, wherein the decor layer of each of said plurality of decorative panels consists of a predetermined portion (3A-3C) of the same printed paper sheet (1).

11. Method for manufacturing an item of furniture, wherein the item of furniture is assembled from a plurality of decorative panels, at least comprising a substrate and a decor layer with a digitally printed pattern (2A-2C), **characterized in that** the pattern of said plurality of decorative panels is printed on the same paper sheet (1) by means of a digital printer.

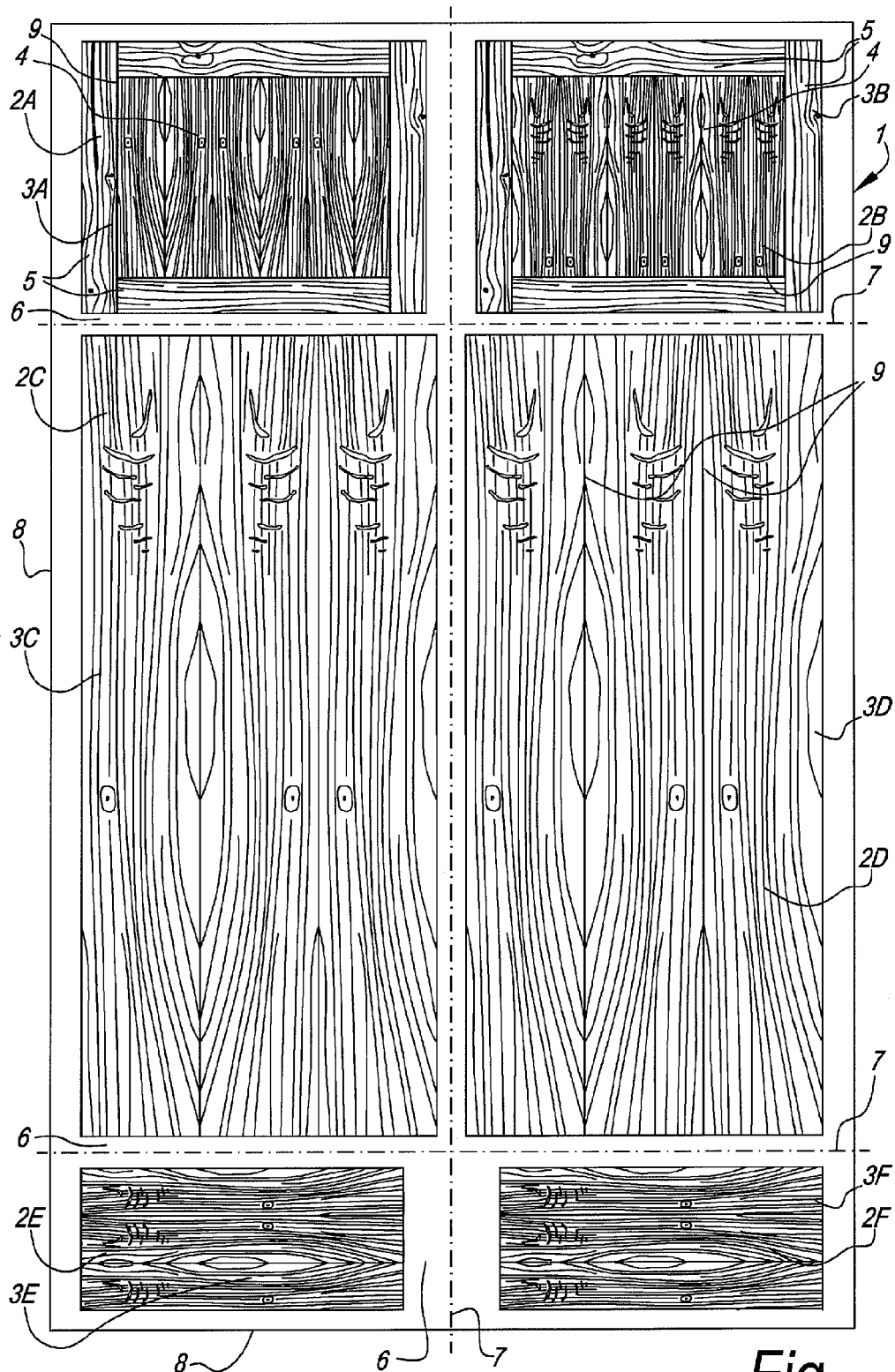


Fig.



## EUROPEAN SEARCH REPORT

Application Number  
EP 12 17 9401

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 2 133 215 A2 (FLOORING IND LTD SARL [LU]) 16 December 2009 (2009-12-16) * paragraph [0015] - paragraph [0020]; figure 1 *	1-11	INV. B44C5/04 B44F9/02 D21H19/00
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X	EP 2 213 476 A1 (SPANOLUX N V DIV BALTERIO [BE]) 4 August 2010 (2010-08-04) * paragraphs [0008], [0009], [0029] *	1-11	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
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Place of search		Date of completion of the search	Examiner
Munich		7 March 2013	Sartor, Michele
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons &amp; : member of the same patent family, corresponding document</p>			

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**ANNEX TO THE EUROPEAN SEARCH REPORT  
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EP 12 17 9401

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
The members are as contained in the European Patent Office EDP file on  
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07-03-2013

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