(19) DANMARK

(10) DK/EP 2132043 T4

Patent- og Varemærkestyrelsen

(12) Oversættelse af ændret europæisk patentskrift

(51) Int.Cl.: *B 41 M 5/50 (2006.01)* *B 32 B 29/06 (2006.01)* *D 21 H 17/20 (2006.01)* *D 21 H 17/33 (2006.01)* *D 21 H 19/76 (2006.01)* *D 21 H 19/84 (2006.01)*

(45) Oversættelsen bekendtgjort den: **2023-11-13**

(80) Dato for Den Europæiske Patentmyndigheds bekendtgørelse om opretholdelse af patentet i ændret form: **2023-08-09**

(86) Europæisk ansøgning nr.: **08716179.0**

(86) Europæisk indleveringsdag: **2008-03-03**

(87) Den europæiske ansøgnings publiceringsdag: **2009-12-16**

(86) International ansøgning nr.: **EP2008001658**

(87) Internationalt publikationsnr.: **WO2008110276**

(30) Prioritet: **2007-03-15 DE 102007013133**

(84) Designerede stater: **AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MT NL NO PL PT RO SE SI SK TR**

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(54) Benævnelse: **FREMGANGSMÅDE TIL FREMSTILLING AF EN FLADEFORMET, BETRYKT KOMPONENT**

(56) Fremdragne publikationer:
EP-A- 1 108 529
EP-A- 1 749 676
WO-A-2006/130708
EP-A2- 1 580 010
DE-T2- 69 304 774
DE-Z Das Papier 3/2006, S. 38-45
Deppe Hans-Joachim, Kurt Ernst: "Taschenbuch der Spanplattentechnik" In: "Taschenbuch der Spanplattentechnik", 2000 pages 320-335,

Description

The invention concerns a method for manufacturing a planar, printed component, in particular for floor, wall, ceiling and/or furniture applications wherein, on a planar base body of the component, a resin-impregnated paper layer which is printed with an ink layer, is applied under the influence of pressure and heat, wherein the paper layer is not completely resin-impregnated and wherein the surface of the paper layer is at least partially, preferably at least essentially, free of resin.

A method for the manufacture of a planar, printed component of the type described above, a paper roll or layer which may be used in that method, as well as an printed, planar component of the aforementioned type are known from EP 1 749 676 A1. EP 1 749 676 A1 specifically concerns a method and a device for the manufacture of a paper roll capable of being printed by the inkjet method, as well as an object printed by means of this method. The object can be panels or sheets.

The purpose of EP 1 749 676 A1 is to make available an inkjet printing process in which the printing result on the surface of the objects to be printed meets the highest quality requirements in terms of appearance. To this end, the state of the art requires that a paper roll capable of absorbing liquid artificial resin along its entire thickness is impregnated with liquid artificial resin from one side to such an extent that the artificial resin does not entirely permeate the paper roll, such that the other side of the roll is at least essentially free of artificial resin. Lastly, the paper roll known from EP 1 749 676 A1 has an area on the top side that is essentially free of resin, making up approximately 50% of the thickness of the paper roll.

With the known method, surfaces should be created which are equivalent to conventional paper surfaces in terms of the properties required for printing, and are optimally adjusted to the desired printing result by the selection of the paper and the inking fluid.

However, it has been found in connection with the semi-resin-impregnated paper roll known from EP 1 749 676 A1 that, depending on the paper material and ink used, the ink that comes into contact with the paper roll enters the upper, non-resin-impregnated or only slightly resin-impregnated area, resulting in the so-called "blotter effect", particularly at high ink densities and/or high water content. The result is a relatively unsatisfactory print.

The object of this invention is to find a remedy for this issue.

In order to achieve the aforementioned object, it is provided in a method of the type as described above, according to the invention, that the applied ink layer, during printing, is dried using at least a heating device, that the heating temperature is between 30 °C and 150 °C, resulting in immediate drying of applied ink, the ink being water-containing and the heating device being an infrared, particularly NIR-, and/or microwave device, and that the paper layer is pressed, in a short- cycle pressing method, with the base body and a protection layer, which is also resin-impregnated and applied to the ink layer, the temperature during pressing being between 140 °C and 200 °C. According to a preferred embodiment, it is further provided that the paper layer is not completely resin-impregnated, wherein the surface of the paper layer is at least partially, preferably essentially, free of resin, and wherein onto the top side of the paper layer, a separate, ink-absorption layer is applied, which is intended for the application of the ink. In connection with the present invention, it has been found that excellent print results can be obtained in particular when, on the one hand, paper that has not been completely resin-impregnated, and, on the other hand, a preferably relatively thin ink-absorption layer are provided. The ink-absorption layer, which lies on the paper layer and/or is at least provided on the top of the paper layer, initially absorbs the ink layer during printing, such that the ink does not come into direct contact with the fibres of the paper layer. Preferably, the thickness of the ink-absorption layer is coordinated with the ink density and/or water content of the ink layer such that the printing ink is able to penetrate the ink-absorption layer and reach the top side of the paper layer, but does not run there. Unlike the method known from EP 1 749 676 A1, therefore, in the invention, the ink layer is applied directly to the ink-absorption layer and not directly to the paper of the paper layer.

In order for the advantage according to the invention to be obtained on every portion of the paper layer, the ink-absorption layer covers the entire top surface of the paper layer, whereby the top side of the paper layer is completely covered by the ink-absorption layer.

Although it is basically possible to place the separate ink-absorption layer directly on such a partially resin-impregnated paper roll in accordance with the invention, as is known from EP 1 749 676 A1, it is particularly useful for the paper layer to be impregnated with resin from beneath in such a manner that the upper paper layer area facing the print side, with little or no resin, extends over no more than 30% of

the thickness of the paper layer. Preferably, the upper paper layer area with little or no resin extends over no more than 20% of the thickness of the paper layer, and more preferably, over no more than 10% of the thickness of the paper layer, whereby any individual value between 0.1% of the thickness of the paper layer and 30% of the thickness of the paper layer is possible, and is expressly deemed essential to the invention.

In this regard, it should be noted that, in practice, there is no exact separation line between the upper paper layer area with little or no resin and the lower paper layer area with high resin content, because, when the paper layer is impregnated with resin from below, the resin concentration decreases from bottom side to top side, such that the greatest concentration is located on the bottom side. The transition from the upper area of the paper layer to the lower area of the paper layer, is however, characterized by a sudden change in the rate of decrease, while the rate of decrease from the bottom side of the lower paper layer area to its top side, on the one hand, and from the bottom side of the upper paper layer area to its top side is essentially constant or continuously decreasing. Incidentally, the aforementioned values for the thickness of the upper paper layer area refer to the paper layer before it is pressed, i.e., when the paper layer has not yet been applied to the base body of the component under the influence of pressure and heat.

Furthermore, in the case of the aforementioned defined partial impregnation, there is another advantage worthy of note. Conventionally, an upper protective layer, also impregnated with resin, is applied under the influence of pressure and heat to a printed component, in any case if it is used in flooring. In the case of the component known from EP 1 749 676 A1, after the pressing of the protective layer, a layer generally remains between the resin of the protective layer and that of the paper layer that is essentially free of resin. Because the resin of the protective layer does not (sufficiently) bind to that of the paper layer, this may lead to the detachment of the protective layer in some cases. In connection with the present invention, it has been recognized that sufficient binding of the resin of the paper layer with that of the protective layer is, in any case, ensured if the upper area of the paper layer with little or no resin extends over no more than 30% of the thickness of the paper layer.

In order to obtain a defined resin layer thickness in the paper layer, the amount of resin applied to the bottom side is procedurally controlled based on the porosity, and

thus absorbency, of the paper layer and the viscosity of the resin. For example, if the impregnation is applied via a roller that passes through an immersion bath, and the paper layer is moved with the bottom side to the roller, additional procedural parameters - the immersion depth of the roller, the composition of the surface of the roller, the diameter of the roller, the contact pressure between the paper layer and the roller, and the transportation speed of the paper layer - become factors. Of course, resin can be applied to the paper layer by other means, for example by jet spraying.

In order to obtain a specified thickness of the upper paper layer area, it is incidentally useful for the paper layer to be impregnated from the top side with a liquid that does not mix with the resin in such a manner that a barrier layer for the resin is formed over no more than 30% of the thickness of the paper layer. The application of the barrier liquid can be carried out in the same manner as the application of the resin, or, generally, by other means. After the impregnation of the paper layer with resin, the barrier liquid is vaporized. The space originally occupied by the barrier liquid then forms the upper area of the paper layer. However, because the invention is not limited to a specified layer thickness of the resin layer, it is, of course, generally possible to add the barrier fluid in such a manner that no defined barrier layer is ultimately created.

In this regard, it is preferable for solids, in particular pigments and/or binding agents, to remain in the barrier liquid in the upper area of the paper layer after vaporization. The pigments may be white pigments, such as kaolin, calcium carbonate, aluminium hydroxide, talcum, or titanium dioxide, or coloured pigments, such as iron oxide pigments, carbon black, copper, aluminium, or other metallic pigments, or organic coloured pigments. Moreover, liquid colouring agents and/or orthosilicic acids and/or kiesel sols may be used. Furthermore, natural or synthetic binding agents, such as starch, polyvinyl alcohol, carboxymethylcellulose, acrylic acid-, acrylester-, styrene-, butadiene-, vinyl acetate-, or acrylonitrile-based polymer dispersions may be used. Such solids assist with the fixation of the ink in the upper paper layer area, should the applied ink penetrate through the ink-absorption layer. It should incidentally be noted that the ink-absorption layer, in any case if it is a pigment coating, may contain all of the aforementioned solids or any combination thereof.

It is incidentally worthwhile for the ink-absorption layer to be applied in connection to or following the impregnation with the barrier liquid. The ink-absorption layer may

be applied separately or together with the barrier liquid by rolling, spraying, doctor blade application, blade coating, airbrushing, pouring, film pressing, size pressing, curtain coating, and/or by application with slotted nozzles. Generally, the barrier layer may also be made up exclusively of particles of the ink-absorption layer.

The invention incidentally makes it possible for the paper layer with the ink-absorption layer to be printed before the application to the base body. Thus, it is possible on the one hand to imprint the paper, whether or not it is partially impregnated with resin to a specified degree, and to store it, e.g., on rolls or in sheets. Subsequently, the printed paper layer may be pressed onto the base body of the component under the influence of pressure and heat, whereby the resin initially melts, and hardens immediately thereafter.

The method according to the invention is suited for use in "direct coating" by short-cycle pressing. In this case, the partially resin-impregnated paper layer melts, and then hardens, directly on the base panel under heat and pressure. Essential to the short-cycle pressing method is for the base body, as the carrier panel, to yield only negligibly to the pressure of the press, which will generally be between 200 and 650 N/cm. Additionally, the base body and the paper layers to be applied may not touch the hot press plates during insertion and removal. The pressing temperature is between 140°C and 200°C. The respective temperature depends on the reactivation temperature of the resin. Finally, the "critical idle period", i.e., the time from the first contact of the resin-impregnated paper layer with the press plate to the moment at which the necessary pressure is reached, must be taken into account. This critical idle period should be extremely brief.

Although it is generally possible to apply the method disclosed by the invention in connection with all known art printing processes, in particular intaglio printing, the paper layer is preferably printed by means of a digital printing process, in particular inkjet printing. In this case, it is preferable to use digital inkjet printers, with which excellent print results may be obtained. Furthermore, unlike the intaglio process, ornamentation may be simply designed on computers and printed in short notice. Incidentally, unlike intaglio, it is also possible for the paper layer to be printed only after it is impregnated with resin.

Inks containing solvents and/or water are preferred for use in printing. Generally, UV-based ink systems may also be used. However, these have the disadvantage of

developing an odour. Furthermore, problems may arise during pressing. According to the invention, water-containing inks are used.

In order to prevent any running of the ink when high amounts are used, it is useful for the printed side, i.e., the top side, of the ink-absorption layer to be smoothed out, abraded, and/or in particular finely roughened after the manufacture of the paper and the resin-impregnation, but in any case before imprinting. The smoothing out, abrading, and/or roughening may take place, e.g., using special squeegees or rollers.

Independently of the application of the ink-absorption layer and/or the smoothing out or roughening of the paper layer, it is provided according to the invention that the ink layer applied to the paper or ink-absorption layer is heated or dried with a corresponding heating device. For example, this can be done using a suitable fan. According to the invention, infrared, and in particular NIR heating devices, and/or microwave heating devices are used that act directly on the water content of the ink layer. The heating or drying may occur before, during, and/or after the printing. According to the invention, drying is achieved during printing. To this end, one or more heating devices may be used, whereby the drying line can not only be located at a single point, but also extend over a larger area, e.g., between 0 and 5 m, and in particular between 0 and 2 m. The heating or drying temperature depends on the reactivation temperature of the resin and is between 30°C and 150°C. The aforementioned heating causes immediate drying of the ink, and, in the best case, immediate drying of the ink on the ink-absorption layer, as soon as the ink is released from the print head. Although the heating or drying has independent inventive significance, is the partial resin impregnation with the separate ink-absorption layer a preferred embodiment.

In connection with the manufacturing of the paper layer, it should be noted that the resin impregnation occurs after the actual manufacturing of the paper. The paper layer can be impregnated with a single resin, or in several steps with various resins, in order to give the paper layer specific properties. After the resin impregnation, the paper layer may be dried, followed by the application of the ink-absorption layer. In an alternative embodiment, a "wet/wet treatment" is used. In this case, before the resin has fully dried, and is thus still liquid or (partially) gelatinous, the ink-absorption layer is applied. This may be done simultaneously or consecutively. The resin-impregnated paper layer, to which the ink-absorption layer has been applied, is then

dried together.

After drying, the paper layer is either cut into sheets or rolled together as a continuous roll. In the method disclosed by the invention, it is generally also possible for the imprinting to occur before cutting/rolling.

The paper layer can itself be partially resin-impregnated with resin through its thickness, such that the top side of the paper layer is free of resin at least in some areas, and preferably at least essentially free of resin, whereby a separate ink-absorption layer is applied to the top side of the paper layer that lies on top side of the paper layer and/or has penetrated at least the top side of the paper layer and is applied to the ink layer during imprinting. The ink-absorption layer has relatively good barrier properties for aqueous or solvent-containing substances such as lacquers and/or printing ink, and thus retains much of the ink from the paper material of the paper layer even at high ink density and/or high water content. For relatively thin ink-absorption layers, therefore, a predefined penetration of printing ink onto or in the paper layer may occur. Additionally, the ink-absorption layer generally causes homogenization of the printed side, which, in turn, aids in obtaining a favourable printing result. The ink-absorption layer is also configured such that the resin may pass through the ink-absorption layer from below in particular during pressing.

The ink-absorption layer preferably covers the full surface and is configured as a layer that completely covers the top side of the paper layer. It preferably has a basis weight between 0.5 g/m^2 and 20 g/m^2.

In a preferred embodiment of the invention, the ink-absorption layer is a pigment coating, and contains organic and/or inorganic pigments and/or binding agents. Preferably, the pigment coating contains white pigments such as kaolin, calcium carbonate, aluminium hydroxide, talcum, titanium dioxide, or coloured pigments such as iron oxide pigments, carbon black, copper, aluminium, other metallic pigments, or organic coloured pigments. The pigment coating can also contain liquid colouring agents and/or orthosilicic acid and/or kiesel sols. Furthermore, the pigment coating can contain natural or synthetic binding agents such as starch, polyvinyl alcohol, carboxymethylcellulose, acrylic acid-, acrylester-, styrene-, butadiene-, vinyl acetate-, or acrylonitrile-based polymer dispersions. The ratio of pigment to binding agent in the pigment coating is preferably between 1:0.05 to 1:1; and in particular 1:0.08 to 1:0.35 in relation to the solids content.

In a preferred embodiment, the ink-absorption layer is formed from an ink-absorption mass containing particles with an average diameter < 1,000 nm. Average diameters are between 50 and 400 nm, in particular between 100 nm and 300 nm, and preferably between 150 nm and 250 nm. Such small particles at least essentially encase the fibres of the fibre structure of the paper layer in the upper area of the fibre structure or paper layer, whereby open intermediate spaces in the encased fibre structure remain on top side of the paper layer. Lastly, on top side of the paper layer, a number of open intermediate spaces having a length > 20 µm, preferably > 30 µm, and in particular > 40 µm and/or an open surface > 200 μm^2, preferably > 500 μm^2 and in particular > 750 μm^2. The top side contains on average at least one intermediate space per unit surface area [mm^2], preferably more than three, and in particular more than ten intermediate spaces. In this embodiment, the particles of the ink-absorption layer/mass may consist not only of the aforementioned substances, but, in particular, contain titanium dioxide, barium sulphate, and silicates as main components.

As already noted initially, the upper area of the paper layer has little or no resin content. Although the upper area of the paper layer may have any thickness, it is useful in order to avoid the "blotter effect" for this area to extend over no more than 30% of the thickness of the paper layer, whereby any value between 0.01% and 30% is possible and essential to the invention. Of course, the material and the porosity of the paper layer must be selected to ensure that partial penetration of the paper layer with resin, and, if applicable, the aforementioned barrier liquid, is possible.

In particular if the aforementioned barrier liquid is applied together with the ink-absorption layer, solids, such as pigments and/or binding agents may be located in the upper area of the paper layer that are enclosed there. In this case, these solids may correspond to the materials contained in the ink-absorption layer.

Depending on the application, the basis weight of the paper layer without the resin content should be between 30 and 300 g/m^2, preferably between 50 and 120 g/m^2. The basis weight of the resin content should preferably be between 5 and 300 g/m^2 and, in particular, between 20 and 100 g/m^2.

The resin itself is a reactivatable resin, in particular an aminoplast, such as a melamine resin. Resins from the groups of diallyl phthalates, epoxy resins, urea-formaldehyde resins, uric acid-acetyl acid ester copolyesters, melamine-formaldehyde resins, melamine-phenol-formaldehyde resins, phenol-formaldehyde resins,

poly(meth)acrylates, or unsaturated polyester resins are preferably used.

The top side of the ink-absorption layer is preferably smoothed out, abraded, and/or finely roughened either before or after resin impregnation by means of additional mechanical processing, e.g., by means of squeegees or rollers, in order to prevent any unintended running of the printing ink.

It is expressly noted that the information as to ranges and intervals provided above and below encompasses all individual values located within the stated ranges and intervals, and include intermediate ranges or intervals, without a need for specification of individual values or intermediate ranges or intervals.

Embodiments of the invention are described below based on the figures, which show:

Fig. 1 a schematic cross-section of a partially resin-impregnated paper layer having an ink-absorption layer,

Fig. 2 a qualitative representation of the concentration curve of the resin amount over the thickness of the paper layer,

Fig. 3 a representation corresponding to Fig. 2 with further concentration curves,

Fig.4 a schematic cross-section of a partially resin-impregnated paper layer with an ink-absorption layer that is already printed,

Fig. 5 a schematic cross-section of a planar component, to the base body of which the paper layer has been applied, and

Fig. 6 a process schematic of the method according to the invention and

Fig. 7 an alternative process schematic of a method not according to the invention.

Fig. 1 shows a paper layer 1. The paper layer 1 consists of a conventional absorbent or liquid-absorbing paper or fibrous material. The paper layer 1 as such may be part of a roll or a sheet. Fig. 1 shows schematically that the paper layer 1 is only impregnated with resin over part of its thickness d. This creates an upper paper layer area 3 facing the top side 2 with little or no resin content and a lower paper layer area 4 originating from the bottom side 5 and having a very high resin content.

In the state shown in Fig. 1, ideal conditions are shown, in which the upper paper layer area 3 is free of resin, while the lower paper layer area 4 is totally resin-impregnated. The transition between the areas 3, 4 at point x is illustrated by a dotted line. The

state shown in Fig. 1, i.e., the clear separation between the areas 3 and 4, is such that no resin is present in the upper paper layer area 3, while the lower paper layer area 4 is totally impregnated, but is extremely difficult to achieve. Fig. 2 shows a state more closely approximating actual conditions in a diagram. Here, on the Y axis, the concentration c is shown in percent, and the X-axis shows the layer thickness of the paper layer 1 in percent, whereby the thickness d begins at the bottom side 5 and ends at the top side 2. It can be seen that there is a decrease in concentration with a relatively small gradient in the lower paper layer area 4 from the bottom side to the top side 2. It is generally also possible for the area adjacent to the bottom side 5 to be heavily impregnated with resin, and for there to be no decrease in concentration at all there, with the decrease in concentration in area 4 occurring only later. At point x, representing the transition from the lower paper layer area 4 to the upper paper layer area 3, a decrease in concentration with a much greater gradient occurs. Here, the concentration decreases much more rapidly, and decreases here ultimately down to approximately 0% at the top side 2.

Fig. 3 shows two additional alternative curves. The upper curve shows the ideal distribution of the resin concentration, whereby the resin concentration is constant at 100% in the lower paper layer area 4 and abruptly decreases to 0% at point x, i.e., the transition to the upper paper layer area 3. The lower curve shows a more rapid decrease in concentration from the bottom side 5 to the transition to the upper paper layer area 3, i.e., to point x, compared to the ideal curve, whereby the rate of decrease in concentration decreases much more rapidly, with the rate of decrease in concentration still at least more than twice as large as in the lower paper layer area 4. The respective course of the decrease in concentration depends on the respective individual parameters, in particular the porosity or absorbency of the paper layer 1 and the viscosity of the resin, as well as the procedural parameters in the application of the resin to the bottom side 5.

Lastly, however, the upper paper layer area 3 and the lower paper layer area 4 are characterized in that the decrease in the concentration of the resin content in the upper paper layer area 3 is greater than in the lower paper layer area 4 by at least a factor of 2. Here, of course, the decrease in concentration may be much greater than a factor of 2, as shown in particular by the ideal curve in Fig. 3. Lastly, any individual value starting from a factor of 2 and above a factor of 2 is possible.

In the embodiment shown, the upper paper layer area 3 extends over no more than 30% of the thickness d of the paper layer 1. In the applications shown in Figs. 2 and 3, the upper paper layer area 3 constitutes approximately 10% - 20% of the thickness d of the paper layer 1. In all applications, there is very little or no resin on the print side 2. The optimum extent of the upper paper layer area 3 is between 3% and 20% of the thickness d of the paper layer 1. Depending on the composition of the paper and the printing ink used, then, an optimal print result will be obtained, as the printing ink ultimately may be absorbed only over a very small area of the paper layer 1, and cannot run,

However, it should be noted that the present invention is not limited to the decrease in concentration shown in Figs. 2 and 3. It is generally also possible for the upper paper layer area 3 to be greater than 30% and/or have a constant decrease in concentration from the bottom side 5 to the top side 2 of the paper layer 1. It is, however, essential for a separate ink-absorption layer 6, lying on the paper layer 1 to be present, as shown in Fig. 1, on the top side 7 of which, as shown in Fig. 4, an ink layer 8 is applied. The top side 7 of the ink-absorption layer 6 is thus the printed side. The ink-absorption layer 6 ultimately avoids direct or immediate contact of the ink layer 8 with the top side 2 of the paper layer 1. The ink-absorption layer 6 is located over the entire surface of the top side 2 of the paper layer 1, and completely covers it. The basis weight of the ink-absorption layer 6 is conventionally between 0.5 g/m^2 and 20 g/m^2.

Here, the ink layer 8 has been applied by a digital inkjet printer not according to the invention, i.e., by means of the inkjet method, although other printing processes, in particular intaglio, are also possible. In that case water-containing inks may be used as printing inks.

Fig. 5 shows a section of a printed, planar component 9. The component 9 can, in particular, be a plate or a panel. Preferably, it is a floor, wall, and/or ceiling covering, or a plate-shaped piece of furniture. The component 9 has a planar base body 10, which is only shown partially, and which may have one or more layers, and consists in particular of wood and/or polymers. In particular, the component 9 can be a wooden material panel, such as MDF, HDF, or DKS panels, or an HPL (high-pressure laminate) panel. However, component 9 can also be a thicker foil, cardboard, or plasterboard.

The printed paper layer 1 with the ink-absorption layer 6 is applied to the top side 11 of the base body of the component 9 shown in Fig. 5, and in close contact with it.

Furthermore, a protective layer 12 is applied to the ink layer 8. The protective layer 12, which is also impregnated with resin, serves to protect the ink layer 8 from UV radiation, and, in particular, from mechanical damage. In order that the ink layer 8 remains recognizable, the protective layer 12 is transparent. The protective layer 12 may contain very hard particles, such as corundum. It should be noted that the protective layer 12 is generally included in components that are used in flooring. However, the protective layer 12 may also be dispensed with. This applies in particular for wall and ceiling applications, as well as furniture. According to the invention, a protection layer is provided.

Fig. 6 schematically illustrates the method disclosed by the invention in the case of a short-cycle pressing process, The process begins with the known art manufacturing of paper in a paper-making machine, which is shown in step 11. The paper layer 1 is still part of an essentially infinite paper roll. After the manufacturing of the paper in step 13, the (specified) partial impregnation of the paper layer 1 with resin from the bottom side 5 occurs in step 14, such that the lower paper layer area here accounts for approximately 85% of the thickness d of the paper layer 1, while the upper paper layer area 3 then accounts for 15%-20% of the thickness. Generally, the specified partial resin impregnation can be carried out in step 14 by running the rolled paper layer 1 after manufacture through a rotary roller with its bottom side 5 over or on the roller, which immerses it in liquid resin. By the contact of the bottom side 5 of the paper layer 1 with the roller, resin is absorbed by the paper layer. The amount of resin applied to the bottom side of the paper layer 1 depends on various procedural parameters, which may be adjusted as needed. Of course, instead of using a roller to impregnate the paper layer with resin, other impregnation means are also available, e.g., by jet spray.

While the aforementioned partial resin impregnation from the bottom side 5 is generally sufficient in order to obtain a relatively thin upper paper layer area 3 as compared with the lower paper layer area 4, it may generally also be useful for a specified amount of a barrier liquid to be applied to the print side 2 of the paper layer 1 immediately before partial resin impregnation, which barrier liquid penetrates the paper layer 1 and thus forms a barrier layer for the resin. The thickness of the barrier layer essentially corresponds to the thickness of the subsequent upper paper layer area3. It is important for the barrier liquid not to mix with the resin. After partial resin

impregnation, the paper layer 1 is then heated, such that the barrier liquid evaporates. In this regard, it can be useful for solids to be included in the barrier liquid that remain in the upper paper layer area 3 after evaporation.

The ink-absorption layer 6 can be applied with the desired thickness or the desired basis weight in step 13 before partial resin impregnation, in step 4 during the partial resin impregnation, or after the partial resin impregnation. Thus, for example, the ink-absorption layer may be applied directly after manufacturing the paper, i.e., the manufacturing of a paper roll, and then impregnated with resin in the next step. However, the ink-absorption layer 6 may also be applied together with the barrier liquid to the top side 2 of the paper layer 1, whereby the barrier liquid is then vaporized and the ink-absorption layer 6 remains. Generally, the ink-absorption layer 6 can also be applied after partial resin impregnation t.

In any case, the imprinting, and thus the application of the ink layer 8, occurs only after partial resin impregnation in step 14 and application of the ink-absorption layer 6 in step 15. The imprinting is done with a digital inkjet printer using the inkjet printing process. During imprinting, the paper layer 1 can still be part of a paper roll or already have become part of a sheet cut off from the paper roll. It can, however, also be cut into sheets later.

Parallel to process step 15, step 16, i.e., the heating of the printed side and thus the drying of the ink layer 6 is carried out directly after application of the ink-absorption layer 6. It should be noted that the paper layer 1 with the ink-absorption layer 6 may generally also have been heated or warmed before imprinting, with the ink being applied to a preheated paper layer 1, which assists with drying. According to the invention, drying is necessary during printing.

In step 17, the paper layer 1 is pressed together with the base body 10 in an appropriate press. Simultaneously, the protective layer 12 is also pressed. Under the pressure and heat of the press plates of the press, the resin in the paper layer 1 and the protective layer 12 melts, and immediately hardens during pressing, such that the paper layer 1 is tightly bonded to the base body 10, and the protective layer 12 to the paper layer 1. This leads to such a close bond between the protective layer 12 and the paper layer 1 that unintentional separation of the protective layer 12 is not a concern. Fig. 7 schematically illustrates a short-cycle pressing process of direct coating not according to the invention. Steps 18 and 19 correspond to the aforementioned steps

13 and 14 of manufacturing the paper and partial resin impregnation. However, this is followed by step 20, in which the paper layer 1 with ink-absorption layer 6, already cut into sheets, is applied to the base body 10, but without the protective layer 12, by pressing in the aforementioned press.

After pressing the as-yet unprinted paper layer 1 onto the base body 12, the unprinted component 9 is then also printed using the inkjet process in step 21. Simultaneously or immediately thereafter, the ink layer 8 is dried in step 22. Here, too, of course, the paper layer 1 or the ink-absorption layer 6 may have been preheated. This is followed by the pressing of the protective layer 12 in the press in step 23, in order to bind the protective layer 12 with the paper layer 1 after melting and hardening the resin.

Although the procedure schematically illustrated in Fig. 7 is more complex, it has the benefit of allowing unprinted components 9 to be simply stored, to be printed on short notice according to customer requirements as needed.

List of reference numerals

1	Paper layer
2	Top side
3	Upper paper layer area
4	lower paper layer area
5	Bottom side
6	Ink-absorption layer
7	Top side
8	Ink layer
9	Component
10	Base body
11	Top side
12	Protective layer
13	Paper manufacturing
14	Partial resin impregnation
15	Printing
16	Drying

17 Pressing

18 Paper manufacturing

19 Partial resin impregnation

20 Pressing

21 Printing

22 Drying

23 Pressing

Patentkrav

1. Fremgangsmåde til fremstilling af en fladeformet, betrykt komponent (9), navnlig til gulv-, væg-, lofts- og/eller møbelanvendelser, hvor der på et fladeformet grundlegeme (10) i komponenten (9) påføres et harpiksbehandlet papirlag (1), betrykt med et farvelag (8) under indflydelse af tryk og varme, **kendetegnet ved,**
at det påførte farvelag (8) tørres under betrykningen ved hjælp af i det mindste en varmeindretning, og at opvarmningstemperaturen ligger mellem 30°C og 150°C, så at der fås en umiddelbar tørring af den påførte farve, idet farven er vandholdig, og varmeindretningen er en infrarød-, navnlig NIR-, og/eller en mikrobølgevarmeindretning, og at papirlaget (1) presses i en kortcyklusspressefremgangsmåde med grundlegemet (10) og et beskyttelseslag (12), som også er harpiksbehandlet og påført farvelaget (8), idet temperaturen ved presning ligger mellem 140°C og 200°C.

2. Fremgangsmåde ifølge krav 1, **kendetegnet ved, at** papirlaget (1) ikke er fuldstændigt harpiksbehandlet, idet overfladen af papirlaget (1) er i det mindste, fortrinsvis i det mindst i det væsentlige harpiksfri, og hvor der på oversiden (2) af papirlaget (1) påføres et separat farveoptagelag (6), der ligger på papirlaget (1), og som er bestemt til påføringen af farvelaget (8).

3. Fremgangsmåde ifølge krav 1 eller 2, **kendetegnet ved, at** farvelaget (8) påføres direkte på farveoptagelaget (6), og/eller at farveoptagelaget (6) påføres på hele oversiden (2) af papirlaget (1), og/eller at farveoptagelaget (6) fuldstændigt dækker oversiden (2) af papirlaget (1).

4. Fremgangsmåde ifølge et af de foregående krav, **kendetegnet ved,**
at papirlaget (1) harpiksbehandles på en sådan måde defineret fra undersiden (5), at det mod det betrykte side (2) vendende øvre papirlagsområde (3) med lille eller ingen harpiksandel strækker sig maksimalt 30% af tykkelsen (d) af papirlaget (1).

5. Fremgangsmåde ifølge et af de foregående krav, **kendetegnet ved,**
at mængden af den til undersiden (5) tilførte harpiksandel fremgangsmådeteknisk

styres defineret i afhængighed af viskositeten af harpiksen og adsorptionsevnen af papirlaget (1).

6. Fremgangsmåde ifølge et af de foregående krav, **kendetegnet ved, at** papirlaget (1) før harpiksbehandlingen fra oversiden (2) imprægneres med en tætningsvæske, der ikke blander sig med harpiksen, og/eller en væske, der omfatter partikler af farveoptagelaget.

7. Fremgangsmåde ifølge et af de foregående krav, **kendetegnet ved, at** papirlaget (1) imprægneres fra oversiden (2) defineret på en sådan måde med tætningsvæsken og/eller med væsken, der omfatter partikler af farveoptagelaget, at der danner sig et spærrelag for harpiksen, som strækker sig over maksimalt 30% af tykkelsen (d) af papirlaget (1).

8. Fremgangsmåde ifølge et af de foregående krav, **kendetegnet ved, at** tætningsvæsken og/eller væsken, der omfatter partikler af farveoptagelaget, fordampes efter harpiksbehandlinge af papirlaget (1).

9. Fremgangsmåde ifølge et af de foregående krav, **kendetegnet ved, at** harpiksbehandlingen sker før, under eller efter påføringen af farveoptagelaget (6).

10. Fremgangsmåde ifølge et af de foregående krav, **kendetegnet ved, at** papirlaget (1) betrykkes før eller efter påføringen af grundlegemet (10).

11. Fremgangsmåde ifølge et af de foregående krav, **kendetegnet ved, at** papirlaget (1) første betrykkes efter påføringen af farveoptagelaget (6) og efter harpiksbehandlingen.

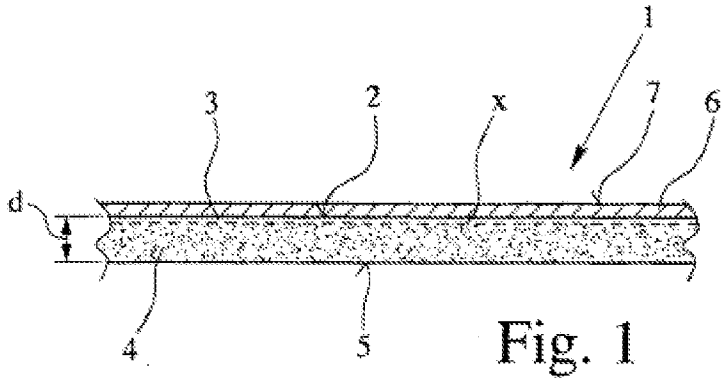

Fig. 1

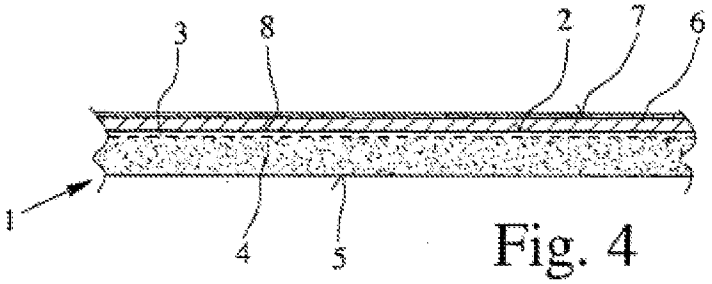

Fig. 4

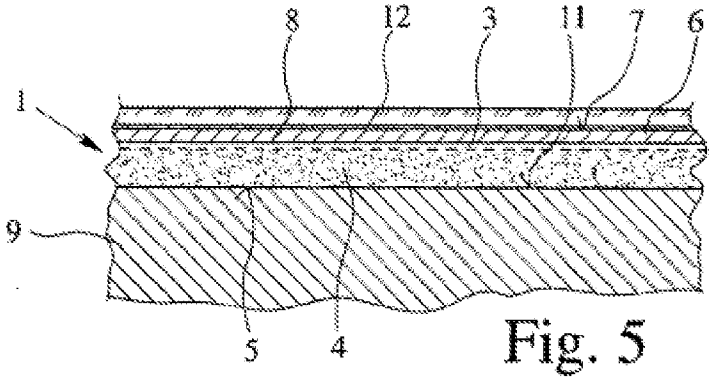

Fig. 5

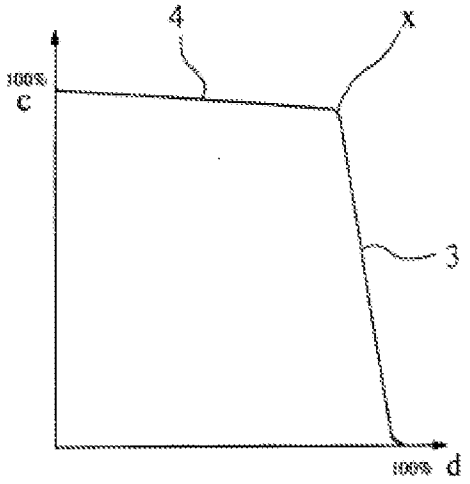

Fig. 2

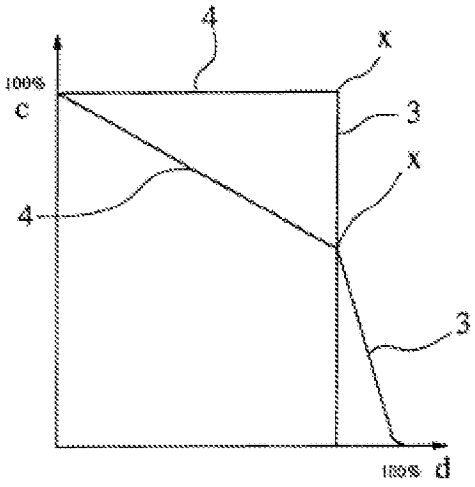

Fig. 3

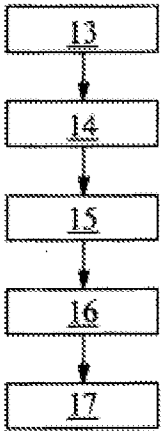

Fig. 6

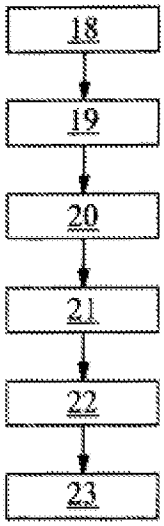

Fig. 7