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(54) **Sand-effect paper material and corresponding manufacturing method**

(57) A sand-effect paper material comprises a substrate, formed by a mixture of cellulose fibres and containing at least one polymeric substance (comprising, for example, one or more colophony-based and/or alkyl-ketene-dimer-based and/or epichlorohydrin-based resins, and/or modified starches, etc.), apt to bestow strength on the mixture of fibres, and an inorganic filler (for example, a mineral filler of a carbonate type, kaolin, talc, etc.); the paper material has at least one surface treated with at least one surface adhesive and provided with a glossy coating formed by one or more binding polymers and/or waxes, mixed with pigments, so that the paper material has a sand-like feel.

EP 2 520 709 A1

Description

[0001] The present invention relates to a sand-rough-effect paper material (paper/cardboard) and to the corresponding manufacturing method. More precisely, the paper material of the invention, thanks to an appropriately devised pulp and to a specific surface treatment, loses the typical feel of paper materials and is characterized by a feel similar to that of sand.

[0002] In the paper-making sector there is a constant search for new types of papers having particular appearances and/or finishes, above all designed for wrapping, packaging, production of illustrative material, quality printing, etc.

[0003] Not infrequently, however, these particular effects are achieved at the expense of other characteristics of the paper, for example, printability.

[0004] An aim of the present invention is to provide a paper material that presents a feel different from that of traditional paper materials and at the same time enables a high printing quality.

[0005] The present invention hence regards a paper material and the corresponding manufacturing method as defined in the annexed Claims 1 and 8, respectively.

[0006] Preferred embodiments of the paper material and of the corresponding manufacturing method are defined in the dependent Claims 2 to 7 and 9 to 18, respectively.

[0007] The invention hence provides a sand-effect paper material (paper/cardboard), which, thanks to an appropriately devised pulp and to a specific surface treatment, loses the typical feel of paper materials and is characterized by a feel similar to that of sand, having a rough surface finish typical of a surface covered with fine sand.

[0008] The paper material of the invention moreover ensures a high printing quality and enables particular graphic effects to be achieved, which are difficult to obtain with traditional coated papers.

[0009] In detail, the paper material of the invention comprises a substrate that is formed by a mixture of cellulose fibres and contains at least one polymeric substance, capable of bestowing (dry and wet) strength on the mixture of fibres, and an inorganic filler, capable of bestowing on the material good characteristics of machinability.

[0010] The substrate has at least one surface (face) treated with at least one surface adhesive and a glossy coating having particular components so that the paper material, owing to the combined effect of the composition of the substrate and of the surface treatment, presents a feel similar to that of sand. Clearly, both of the faces of the substrate can be treated in the same way.

[0011] Preferably, the polymeric substance included in the substrate comprises one or more colophony-based and/or alkyl-ketene-dimer-based and/or acetyl-succinic-acid-based and/or epichlorohydrin-based resins, and/or modified starches, and the inorganic filler is a mineral filler comprising one or more substances selected in the group consisting of carbonates, kaolins, talc, and mixtures thereof.

[0012] The surface adhesive is, for example, an adhesive with a base of starch and/or polyvinyl alcohol and/or acrylic, polyurethane and/or styrene-butadiene polymers.

[0013] Moreover, the paper material of the invention is provided with a glossy coating, applied on the treated surface (clearly, the paper material can have both of the surfaces treated and provided with a glossy coating).

[0014] In particular, the glossy coating is formed by one or more binding polymers (for example, polyurethane-based and/or silicone-based polymers, and/or acrylic polymers, styrene-butadiene polymers, polyvinyl-acetate polymers, polyvinyl-alcohol polymers, and the like) and/or waxes, mixed with pigments, for example, pigments with a lamellar or flat structure, such as, for example, precipitated calcium carbonate (PCC), kaolins for coating, calcined and/or lamellar kaolins, in combination with pigments with a base of calcium silicates having different grain sizes and degree of whiteness higher than approximately 85 (according to the DIN 5033 standard).

[0015] These calcium-silicate-based pigments, preferably having particles of variable grain size and a particular degree of whiteness are especially important for achieving the desired effect.

[0016] In particular, the pigments comprise wallastonite (calcium silicate of formula $CaSiO_3$).

[0017] The amount of polymer per face is preferably comprised between 5% and 100% with respect to the pigments; the substance of the paper material is comprised between approximately 90 g/m^2 and approximately 350 g/m^2; the amount of glossy coating spread on each face is comprised between approximately 5 g/m^2 and approximately 20 g/m^2.

[0018] The glossy coating may be coloured and/or spread on a coloured substrate; preferably, colours in paste form and organic or inorganic pigments are used.

[0019] The paper material just described is obtained, in accordance with a further aspect of the present invention, with the method described below.

[0020] First the substrate is provided with techniques of formation of paper that are substantially known, for example, on a paper machine.

[0021] Basically, an aqueous pulp is provided constituted by cellulose fibres, said pulp containing the polymeric substance (colophony-based and/or alkyl-ketene-dimer-based and/or acetyl-succinic-acid-based and/or epichlorohydrin-based resins, and/or modified starches) and the inorganic filler (carbonates, kaolins, talc, etc.).

[0022] Next, water is removed from the pulp to form the substrate of the paper material.

[0023] This is followed by a step of surface treatment of one or both of the faces of the substrate with an aqueous solution of surface adhesive, for example, made up of an aqueous solution of starch (10 wt%), and/or acrylic adhesive (5 wt%), or adhesives similar to the ones described previously (adhesives with a base of polyvinyl

alcohol and/or of acrylic, polyurethane and/or styrene-butadiene polymers).

[0024] The treatment with the surface adhesive has also the purpose of bestowing on the paper material a correct penetration of water, indispensable for the subsequent coating step.

[0025] The method then comprises, after the surface treatment with adhesive, a step of smoothing of the substrate, where the substrate is smoothed up to Bendsten ISO 2494 roughness values of less than approximately 50 ml/min and preferably of less than approximately 30 ml/min, and indicatively around 20 ml/min.

[0026] Next, the glossy coating described above is applied.

[0027] Preferably, application of the glossy coating is performed by spreading carried out with an air-blade or smoothing-blade coating machine, and is followed by a step of drying of the coating, conducted in an infrared oven and/or hot-air oven at a temperature of between approximately 100°C and approximately 180°C and with an oven time of between 0.5 and 4 minutes.

[0028] Finally, the method comprises a step of mechanical treatment of the surface provided with the coating, in particular a smoothing step and/or an embossing step.

[0029] It then remains understood that modifications and variations may be made to the paper material and to the corresponding manufacturing method described and illustrated herein, without thereby departing from the scope of the invention as defined in the annexed claims.

Claims

1. A sand-rough-effect paper material, comprising a substrate, formed by a mixture of cellulose fibres containing at least one polymeric substance, apt to bestow strength on the mixture of fibres, and an inorganic filler; and having at least one surface treated with at least one surface adhesive and provided with a glossy coating formed by one or more binding polymers and/or waxes, mixed with pigments; and wherein the pigments comprise pigments with a base of calcium silicate so that the paper material has a sand-like rough feel.

2. The paper material according to Claim 1, wherein the polymeric substance included in the substrate comprises one or more colophony-based and/or alkyl-ketene-dimer-based and/or acetyl-succinic-acid-based and/or epichlorohydrin-based resins, and/or modified starches.

3. The paper material according to Claim 1 or Claim 2, wherein the inorganic filler is a mineral filler and comprises one or more substances selected in the group consisting of carbonates, kaolins, talc, and mixtures thereof.

4. The paper material according to any one of the preceding claims, wherein the surface adhesive is an adhesive with a base of starch and/or polyvinyl alcohol and/or acrylic, polyurethane and/or styrene-butadiene polymers.

5. The paper material according to any one of the preceding claims, wherein the calcium-silicate-based pigments have variable grain size and degree of whiteness higher than approximately 85 according to the DIN 5033 standard.

6. The paper material according to any one of the preceding claims, wherein the glossy coating comprises pigments with a lamellar or flat structure, such as, for example, precipitated calcium carbonate (PCC), kaolins for coating, calcined and/or lamellar kaolins, in combination with the calcium-silicate-based pigments.

7. The paper material according to any one of the preceding claims, wherein the binding polymers comprise polyurethane-based, acrylic-based, polyvinyl-alcohol-based, styrene-butadiene-based and/or silicone-based polymers.

8. A method for manufacturing the paper material according to any one of the preceding claims, comprising the steps of:

   (d) preparing an aqueous pulp of cellulose fibres containing at least one polymeric substance, apt to bestow strength on the mixture of fibres, and an inorganic filler;
   (e) removing water from the pulp to form a substrate of the paper material;
   (f) treating at least one surface of the substrate with at least one surface adhesive in such a way as to bestow on the substrate characteristics of water penetration suitable for a subsequent coating step; and
   (g) applying to the surface treated a glossy coating formed by one or more binding polymers and/or waxes, mixed with pigments comprising calcium-silicate-based pigments so that the paper material has a sand-like feel.

9. The method according to Claim 8, wherein the polymeric substance included in the substrate comprises one or more colophony-based and/or alkyl-ketene-dimer-based and/or acetyl-succinic-acid-based and/or epichlorohydrin-based resins, and/or modified starches.

10. The method according to Claim 8 or Claim 9, wherein the inorganic filler is a mineral filler and comprises one or more substances selected in the group consisting of carbonates, kaolins, talc, and mixtures

thereof.

11. The method according to any one of Claims 8 to 10, wherein the surface adhesive is an adhesive with a base of starch and/or polyvinyl alcohol and/or acrylic, polyurethane and/or styrene-butadiene polymers.

12. The method according to any one of Claims 8 to 11, wherein the calcium-silicate-based pigments have variable grain size and degree of whiteness higher than 85 according to the DIN 5033 standard.

13. The method according to any one of Claims 8 to 12, wherein the glossy coating comprises pigments with a lamellar or flat structure, such as, for example, calcium carbonate, precipitated calcium carbonate (PCC), calcined and/or lamellar kaolins, kaolins for coating in combination with the calcium-silicate-based pigments.

14. The method according to any one of Claims 8 to 13, wherein the binding polymers comprise polyurethane-based, acrylic-based, polyvinyl-alcohol-based, styrene-butadiene-based and/or silicone-based polymers.

15. The method according to any one of Claims 8 to 14, comprising, after the surface treatment with adhesive, a step of smoothing of the substrate, wherein the substrate is smoothed up to Bendsten ISO 2494 roughness values of less than approximately 50 ml/min, preferably of less than approximately 30 ml/min, and indicatively around 20 ml/min.

16. The method according to any one of Claims 8 to 15, wherein the step of application of the glossy coating is performed with an air-blade or smoothing blade coating machine.

17. The method according to any one of Claims 8 to 16, comprising a step of drying of the glossy coating, conducted in an infrared oven and/or hot-air oven at a temperature of between approximately 100°C and approximately 180°C and with an oven time of between 0.5 and 4 minutes.

18. The method according to any one of Claims 8 to 17, comprising a step of mechanical treatment of the surface provided with the glossy coating, in particular a smoothing step and/or an embossing step.

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EUROPEAN SEARCH REPORT

Application Number
EP 12 16 7036

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Y	US 5 334 286 A (VAN PHAN DEAN [US] ET AL) 2 August 1994 (1994-08-02) * column 6, line 49 - column 7, line 7 * * column 7, line 14 - column 8, line 36; claims 1-19; figure 1; example 3 *	1-18	INV. D21H13/00 D21H19/40 D21H19/82
Y	WO 00/22231 A1 (PROCTER & GAMBLE [US]) 20 April 2000 (2000-04-20) * page 11, line 18 - line 22 * * page 12, line 21 - line 30 * * page 14, line 6 - line 22 * * page 40, line 1 - line 5; claims 1-10; example 1 *	1-18	
Y	EP 1 762 656 A2 (OJI PAPER CO [JP]) 14 March 2007 (2007-03-14) * paragraphs [0016] - [0040]; claims 1-9 *	1-18	
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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 September 2012	Chindia, Evangelia

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
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1

EPO FORM 1503 03.82 (P04C01)

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