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(54) **Lithographic dummy plate and method for its production**

Lithographische Blindplatte und Verfahren zu ihrer Herstellung

Faux-cliché lithographique et procédé pour sa production

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Description

[0001] This invention relates to coated lithographic dummy plates comprising a non-photosensitive coating, and a method for producing such dummy plates. In particular, the invention relates to dummy plates wherein the non-photosensitive coating composition comprises a thickening agent.

[0002] In news printing, non-printing plates are mounted at those parts of the cylinder where no ink should be transferred to the web to be printed. These non-printing plates are called "dummy plates". Such dummy plates are also used in the case of multicolor printing. Dummy plates are printing plates without ink-accepting areas. The dummy plates transfer the fountain solution applied over the entire width of the cylinder to the web and at the same time must not take up the ink.

[0003] Roughened and anodically oxidized aluminum plates are commonly used as dummy plates. However, such plates are very sensitive to fingerprints and other external influences like dust; fingerprints result in ink-accepting areas and thus smearing in the printing machine. Furthermore, the hydrophilicity of such dummy plates decreases during use which again results in ink-accepting areas and thus smearing. It is therefore preferred that dummy plates be treated with a protective gum solution.

[0004] Coated dummy plates are for instance disclosed in EP-A-0 894 642 where the non-photosensitive water-soluble protective layer contains a water-soluble organic compound which contains at least one OH- or NH-acidic group having a pKa value of £ 8, and has a layer thickness which is smaller than the average roughness of the support material.

[0005] Another coated dummy plate is described in EP-A-0 790 530 where the water-soluble non-photosensitive layer contains at least one organic polymer with a water solubility of at least 2 g/l at room temperature and at least one inorganic compound reacting as an acid.

[0006] However, the coating compositions described in these documents cannot be applied to the substrate with a slot coater but only with coaters which suffer from the disadvantage that there is a direct contact between coater and substrate so that the substrate may be damaged mechanically during coating.

[0007] In DE-C-42 01 660 granulates useful as gumming agent for offset printing plates are disclosed. A solution of said granulates could be applied to the substrate by a slot coater, however, the properties of the obtained coating are insufficient.

[0008] It is desirable that a coating composition can be applied by a slot coater since the slot coater technology has some advantages compared with for instance roll coaters. For example, since there is no direct contact between substrate and coater, the substrate cannot be damaged by the slot coater. Furthermore, in slot coater technology a greater web speed can be used compared to roll coaters and the parameters of the coating like coating thickness can be adjusted more easily with a slot coater.

[0009] Therefore, there is a need for a non-photosensitive coating composition which results in coatings with excellent properties, i.e. no longitudinal coating strips and no non-uniform coating thickness, and which on the other hand results in a fast roll-up and no toning when used as a coating for dummy plates. Furthermore, it should be possible to apply the coating composition by a slot coater in order to avoid mechanical damage of the substrate during coating.

[0010] In one aspect, the invention relates to a coated lithographic dummy plate comprising on a substrate a non-photosensitive coating obtainable from a non-photosensitive coating composition comprising (a) at least one water-soluble film-forming polymer and (b) at least one high molecular thickening agent which shows thixotropic behavior.

[0011] In another aspect, the invention relates to a process for the production of a dummy plate comprising applying the coating composition of the invention by means of a slot coater.

[0012] Figure 1 is a graph showing the relationship between viscosity and rpm of coating composition 1 in comparison to coating composition A.

[0013] The non-photosensitive coating compositions used for producing dummy plates according to the present invention comprise at least one water-soluble film-forming polymer and at least one high molecular thixotropic thickener.

[0014] The water-soluble film-forming polymer can be any polymer which is usually used as water-soluble low viscous binder in the field of overcoats on the photosensitive layer of printing plate precursors, as disclosed for instance in DE 197 32 902 which is incorporated herein by reference, or water-soluble film-forming binders in the field of gums as disclosed for instance in EP-A-0 790 530 which is incorporated herein by reference.

[0015] Suitable examples of such polymers are for instance polyvinyl alcohols (PVA), polyamides such as polyvinylpyrrolidone (PVP), low viscous water-soluble cellulose and derivatives thereof, partially saponified polyvinyl acetates, water-soluble dextrines and mixtures thereof. For dummy plates dextrines are especially preferred, while PVA and PVP are most preferred for overcoats. The amount of the water-soluble film-forming polymer in the coating composition is not particularly limited and depends on the molecular weight of the polymer and the coating method to be used. In most cases, the amount is within the range of about 0.2 to about 20 wt% based on the total coating composition, more preferably about 0.2 to about 15 wt%; for slot coater application it is most preferably from about 0.2 to about 1 wt%, while for application with a roll coater the amount is most preferably from about 5 to about 15 wt%.

[0016] The thixotropic thickener can be any highly viscous polymer which shows thixotropy. Examples are for instance xanthan gum, high viscous cellulose and cellulose derivatives like hydroxyethyl cellulose, carboxymethyl cellulose and

methyl cellulose, high viscous sodium alginate, guar gum, locust bean gum, gum karaya, gum tragacanth, high viscous starch, carrageenan, casein, hectorit, high viscous polyvinylpyrrolidone, high viscous polyvinyl alcohol and mixtures thereof. Preferred are such thickeners which show thixotropic as well as pseudoplastic behavior. Preferred thickeners are xanthan gum and high viscous hydroxy ethyl cellulose; xanthan gum is the most preferred one. The amount of the thickener in the coating composition is not particularly limited, however, the amount of the thickener is preferably such that the viscosity of the coating composition at medium shear stress is within the range of about 2.5 to about 60 mPa·s, preferably about 5 to about 50 mPa·s when measured according to Brookfield, DV-II-LV at 20°C with a UL adapter; in most cases the amount of the thickener is from about 0.02 to about 0.2 wt% based on the total composition.

[0017] According to the present invention it is possible to use a certain kind of polymer (for instance PVA) with high molecular weight as thickener and with low molecular weight as binder. For instance PVAs having a molecular weight of about 15000 to 30000 and a viscosity (measured in a 4 % solution at 20°C according to Höppler) of about 3 to about 8 mPa·s are useful as binder; PVAs having a molecular weight of about 70000 to 100000 and a viscosity (measured in a 4 % solution at 20°C according to Höppler) of about 30 to about 55 mPa·s are useful as thickeners.

[0018] The coating solutions contain water (preferably demineralized water), an organic solvent miscible with water (for example lower alcohols and glycols) or mixtures thereof as the solvent. Preferred solvents are water and a mixture of water and a lower alcohol (for example isopropanol). The amount of the solvent is not limited, however. Suitably the amount of the solvent is about 80 to about 99,6 wt% based on the total composition, more preferably about 94 to about 99.5 wt%.

[0019] The coating composition may further contain at least one of preservatives, surfactants, dyes, biocides, sequestering agents, antifoaming agents and corrosion inhibitors which are usually used in gum solutions. Suitable surfactants are anionic surfactants such as sodium dodecyl sulphate, sodium dodecyl sulphonate, alkylamino carboxylates and dicarboxylates, cationic surfactants such as tetraalkyl ammonium salts, and non-ionic surfactants such as polyethylene glycols. Examples of suitable preservatives are for instance p-hydroxybenzoic acid ester and 1,2-benzisothiazolin-3-on. Useful sequestering agents are for instance polyphosphates, Trilon® (available from BASF; Germany) and Sequion from Polygon. Sodium nitrate, ammonium nitrate and ammonium carbamate are suitable corrosion inhibitors. Suitable antifoaming agents are for instance Agitan® 290 (available from Münzing, Germany), Silikon-Ailtischaum-Emulsion SE57 (available from Wacker Chemie, Germany) and Antimussol WLN (available from Sandoz, Switzerland).

[0020] The amount of the above listed additives is not particularly limited as long as they do not deteriorate the effect of the present invention obtained by the mixture of the film-forming polymer and the thickener. The amount of the preservatives is about 0 to about 10 wt% based on the total amount of binder, preferably about 0.1 to 2 wt%, that of the surfactants is about 0 to 10 wt%, preferably about 0.05 to 0.5 wt%, that of the sequestering agents is about 0 to 5 wt%, preferably about 0.005 to 0.1 wt%, that of the antifoaming agents is about 0 to 1 wt%, preferably about 0.001 to 0.05 wt%, and that of the corrosion inhibitors is about 0 to 5 wt%, preferably about 0.1 to 1 wt% and the dyes are present in an amount of about 0 to 1 wt%, preferably about 0.005 to 0.05 wt%.

[0021] Dummy plates according to the present invention comprise a substrate conventionally used for printing plates. Preferably the substrate is selected from the group consisting of mechanically and/or electrochemically grained aluminum foil or plate, grained aluminum which was subjected to an anodizing treatment and plastic foils which may optionally be laminated to an aluminum foil. Most preferably the substrate for the dummy plates is the same as the substrate of the printing plate used in a certain printing process so that both plates show the same ink-water balance.

[0022] The coating composition is applied to said substrate by usual means known to those of ordinary skill in the art. The dry coating weight is preferably about 0.10 to about 0.25 g/m^2, more preferably about 0.10 to about 0.15 g/m^2. Although any conventional coater like roll coater, bar coater, wire wound rod coater and air knife coater can be used, it is preferred to use a slot coater for applying the coating composition to the substrate. When a slot coater is used, the solid content of the coating composition to be applied is preferably about 0.2 to about 2 wt% of the total composition, more preferably about 0.3 to about 1.0wt%. For coaters using squeeguee rollers it is preferred that the solid content of the coating composition be about 5 to about 20 wt% based on the total composition, more preferably about 8 to about 12 wt%.

[0023] When applying the coating composition to the substrate by means of a slot coater, the gap between the coating head and the substrate to be coated is held constant and is preferably about 100 to about 250 μm. The substrate speed is preferably between about 20 and 80 m/min, more preferably about 30 to about 60 m/min. The coating weight can be varied by varying the gap and the speed.

[0024] The dummy plates produced according to the procedure described above neither show longitudinal coating stripes or wind pattern nor an inconsistent coating thickness which appears with dummy plates produced according to previous methods with coating solutions having low thixotropy. Without being bound to any theory, the inventor believes that the coating composition can be applied evenly due to the thixotropic properties of the used thickener since the viscosity of the composition is reduced during coating by the shear stress. Due to the thixotropic behavior, the obtained dummy plates show excellent "coating cosmetics" without any defects such as bubbles and mottles. Apart from these advantages, the dummy plates according to the present invention can be economically produced by an automized

production line, they are not sensitive to fingerprints and dust, do not tend to stick, are stable over a long storage time, show excellent hydrophilic properties and are therefore not sensitive to toning. After restart of the press, the dummy plates according to the invention show immediate roll-up.

[0025] All references cited herein are incorporated by reference herein in their entirety.

[0026] The following examples describe the invention in more detail without limiting the invention.

EXAMPLE 1

1. Coating Compositions

Gum solution (stock solution):

[0027] Granules according to Example 1 of DE-C-42 01 660 were prepared by the use of the following components:

529.0 g	dextrine (potato starch)
105.8 g	sorbitol
2.5 g	Marlophen® 1028 N (a surfactant available from Hüls AG, Germany)
0.6 g	Trilon® B (tetrasodium salt of EDTA; available from BASF, Germany)
19.8 g	urea
0.1 g	Agitan® 290 (antifoaming agent available from Münzing Chemie, Germany)
7.9 g	Parmetol® B70 (preservative available from Schülke & Mayer GmbH, Germany)
0.7 g	NaOH

The obtained granules were dissolved in demineralized water to obtain a 20 % solution thereof.

Coating composition 1:

[0028] A coating composition was prepared by mixing 94.9 wt% demineralized water, 5.0 wt% gum solution obtained as described above and 0.1 wt% Kelzan® D (a xanthan gum, available from Langer & Co., Ritterhude/Germany) under stirring. The viscosity of the composition at medium shear rate was determined to be 49.4 mPa·s (at 20°C) by using the Brookfield method (DV-II-LV with UL adapter). The viscosity of the composition versus rpm is shown in Fig. 1.

Coating composition 2:

[0029] A coating composition was prepared by mixing 94.87 wt% demineralized water, 5.00 wt% gum solution obtained as described above, 0.1 wt% Kelzan® D and 0.03 wt% 1,2-benzisothiazolin-3-on under stirring. The viscosity was determined to be 49.5 mPa·s (at 20°C).

Coating composition 3:

[0030] A coating composition was prepared by mixing 99.3 wt% demineralized water, 0.6 wt% Emdex® 30 AN45 (dextrine available from Emsland-Stärke GmbH, Emlichheim/Germany) and 0.1 wt% Kelzan® D under stirring. The viscosity was determined to be 48 mPa·s (at 20°C).

Coating composition 4:

[0031] A coating composition was prepared by mixing 95.9 wt% demineralized water, 4.0 wt% gum solution obtained as described above and 0.1 wt% Rhodopol® 23 (xanthan gum available from Rhône-Poulenc Industries, Paris/France) under stirring.

Coating composition 5:

[0032] This composition was prepared by mixing the following components:

84.9 wt%	demineralized water
10.0 wt%	isopropyl alcohol

Table continued

5.0 wt%	gum solution obtained as described above
0.1 wt%	Kelzan® D

Comparative coating compositions A and B:

[0033] Coating composition A differed from composition 1 in that no thickener was present (95.0 wt% water + 5.0 wt% gum solution as described above). Viscosity: 2 mPa·s (at 20°C).

[0034] Coating composition B differed from composition 2 in that no thickener was present (94.97 % water + 5.0 % gum solution as described above + 0.03 % 1,2-benzisothiazolin-3-on). Viscosity: 2 mPa·s (at 20°C).

2. Preparation of Dummy Plates

[0035] A lithographic aluminum substrate (electrochemically grained and anodized aluminum substrate) was coated with any of the coating compositions above by means of a commercially available slot coater at a web speed of 32 m/min and a gap of 150 μm. The obtained dry coating weight was 0.15 g/m^2.

[0036] The coating properties and the behavior on press are summarized in the following Table 1.

Table 1

Coating composition	Coating application	Behavior on press
1	Very good, faultless coating	Excellent
2	Very good, faultless coating	Excellent
A	Poor coating, stripes, bubbles, mottles	Defective areas pick up ink
B	Poor coating, stripes, bubbles, mottles	Defective areas pick up ink
3	Very good, faultless coating	Excellent
4	Very good, faultless coating	Excellent
5	Very good, faultless coating	Excellent

[0037] As is apparent from Table 1, the coating compositions according to the present invention showed excellent coating behavior. The dummy plates obtained with coating compositions 1 to 5 showed immediate roll-up.

[0038] The printing characteristics after different storage times are shown in the following Table 2.

Table 2

	Storage time until printing	Coating Composition 1	Coating Composition 2	Coating Composition 4	Substrate without coating
Printing Characteristics	Fresh plate	No toning Fast roll-up	No toning Fast roll-up	No toning Fast roll-up	Toning
Printing Characteristics	1 week	No toning Fast roll-up	No toning Fast roll-up	No toning Fast roll-up	Strong toning
Printing Characteristics	1 month	No toning Fast roll-up	No toning Fast roll-up	No toning Fast roll-up	Strong toning
Printing Characteristics	3 months	No toning Fast roll-up	No toning Fast roll-up	No toning Fast roll-up	Strong toning

As is apparent from Table 2, dummy plates according to the invention show a fast roll-up and no toning problems.

Claims

1. A coated lithographic dummy data comprising on a substrate a non-photosensitive coating obtainable from a non-

photosensitive coating composition comprising

(a) at least one water-soluble film-forming polymer; and
(b) at least one high molecular thickening agent which shows thixotropic behavior.

2. The dummy plate according to claim 1 wherein the coating composition further comprises at least one additive selected from the group consisting of preservatives, surfactants, sequestering agents, antifoaming agents, corrosion inhibitors, dyes and biocides.

3. The dummy plate according to claim 1 or 2, wherein the coating composition further comprises a solvent selected from water and water-miscible organic solvents.

4. The dummy plate according to any one of claims 1 to 3, wherein the film-forming polymer is selected from the group consisting of water-soluble dextrines, celluloses, polyvinyl alcohols and polypyrrolidones.

5. The dummy plate according to any one of claims 1 to 4, wherein the thickener also shows pseudoplastic behavior.

6. The dummmy plate according to claim 5, wherein the thickener is selected from the group consisting of xanthan gum and high viscous hydroxyethyl cellulose.

7. The dummy plate according to claim 3, wherein the amount of the solvent is 80 to 99.6 wt% based on the total coating composition.

8. The dummy plate according to any one of claims 1 to 7, wherein the amount of the film forming polymer is 0.2 to 20 wt% based on the total coating composition.

9. The dummy plate according to any one of claims 1 to 8, wherein the amount of the thickener is from 0.02 to 0.2 wt% based on the total composition.

10. The dummy plate according to any one of claims 1 to 9, wherein the solid content of the coating composition is 0.2 to 2 wt% of the total composition.

11. The dummy plate according to any one of claims 1 to 10 wherein the dry coating weight is 0.10 to 0.25 g/m^2.

12. A method for producing a coated lithographic dummy plate comprising the steps:

(a) providing a substrate
(b) applying a coating composition to the substrate, the composition being defined as in any one of claims 1 to 10.

13. The method of claim 12 wherein the coating composition is applied by means of a slot coater.

14. The method of claim 13 wherein the web speed is 20 to 80m/min.

15. The method of claim 12 wherein the substrate is a mechanically and/or electrochemically grained aluminum foil.

16. The method of claim 15 wherein the grained aluminum foil was subjected to an anodizing treatment before coating it.

Patentansprüche

1. Beschichtete lithographische Blindplatte umfassend auf einem Substrat eine nichtlichtempfindliche Beschichtung, erhältlich aus einer nicht-lichtempfindlichen Beschichtungszusammensetzung, welche

(a) mindestens ein wasserlösliches filmbildendes Polymer; und
(b) mindestens ein hochmolekulares Verdickungsmittel, das thixotropes Verhalten zeigt,

umfasst.

2. Blindplatte nach Anspruch 1, wobei die Beschichtungszusammensetzung weiter mindestens ein Additiv, ausgewählt aus Konservierungsmitteln, grenzflächenaktiven Mitteln, Maskierungsmitteln, Schaumverhütungsmitteln, Korrosionshemmern, Farbstoffen und Bioziden, umfasst.

3. Blindplatte nach Anspruch 1 oder 2, wobei die Beschichtungszusammensetzung weiter ein Lösungsmittel, ausgewählt aus Wasser und mit Wasser mischbaren organischen Lösungsmitteln, umfasst.

4. Blindplatte nach einem der Ansprüche 1 bis 3, wobei das filmbildende Polymer aus wasserlöslichen Dextrinen, Cellulosen, Polyvinylalkoholen und Polypyrrolidonen ausgewählt ist.

5. Blindplatte nach einem der Ansprüche 1 bis 4, wobei das Verdickungsmittel auch pseudoplastisches Verhalten zeigt.

6. Blindplatte nach Anspruch 5, wobei das Verdickungsmittel aus Xanthangummi und hochviskoser Hydroxyethylcellulose ausgewählt ist.

7. Blindplatte nach Anspruch 3, wobei die Menge des Lösungsmittels 80 bis 99,6 Gew.-%, bezogen auf die gesamte Beschichtungszusammensetzung, beträgt.

8. Blindplatte nach einem der Ansprüche 1 bis 7, wobei die Menge des filmbildenden Polymers 0,2 bis 20 Gew.-%, bezogen auf die gesamte Beschichtungszusammensetzung, beträgt.

9. Blindplatte nach einem der Ansprüche 1 bis 8, wobei die Menge des Verdickungsmittels 0,02 bis 0,2 Gew.-%, bezogen auf die gesamte Zusammensetzung, beträgt.

10. Blindplatte nach einem der Ansprüche 1 bis 9, wobei der Feststoffgehalt der Beschichtungszusammensetzung 0,2 bis 2 Gew.-% der gesamten Zusammensetzung beträgt.

11. Blindplatte nach einem der Ansprüche 1 bis 10, wobei das Trockenschichtgewicht 0,10 bis 0,25 g/m^2 beträgt.

12. Verfahren zur Herstellung einer beschichteten lithographischen Blindplatte, umfassend die Schritte:

    (a) Bereitstellen eines Substrats;
    (b) Aufbringen einer Beschichtungszusammensetzung auf das Substrat, wobei die Zusammensetzung wie in einem der Ansprüche 1 bis 10 definiert ist.

13. Verfahren nach Anspruch 12, wobei die Beschichtungszusammensetzung mit Hilfe eines Schlitzdüsenbeschichters aufgebracht wird.

14. Verfahren nach Anspruch 13, wobei die Bahngeschwindigkeit 20 bis 80 m/min beträgt.

15. Verfahren nach Anspruch 12, wobei das Substrat mechanisch und/oder elektrochemisch aufgerauhte Aluminiumfolie ist.

16. Verfahren nach Anspruch 15, wobei die aufgerauhte Aluminiumfolie vor der Beschichtung einer Anodisierungsbehandlung unterzogen wurde.

Revendications

1. Faux-cliché lithographique enduit comprenant, sur un substrat, un revêtement non photosensible pouvant être obtenu à partir d'une composition de revêtement non photosensible comprenant :

    (a) au moins un polymère filmogène soluble dans l'eau ; et
    (b) au moins un agent épaississant de haut poids moléculaire présentant un comportement thixotrope.

2. Faux-cliché selon la revendication 1, dans lequel la composition de revêtement comprend aussi au moins un additif choisi dans le groupe comprenant des conservateurs, des agents tensioactifs, des agents séquestrants, des agents antimousse, des inhibiteurs de corrosion, des colorants et des biocides.

3. Faux-cliché selon la revendication 1 ou 2, dans lequel la composition de revêtement comprend aussi un solvant choisi parmi l'eau et les solvants organiques miscibles à l'eau.

4. Faux-cliché selon l'une quelconque des revendications 1 à 3, dans lequel le polymère filmogène est choisi dans le groupe comprenant des dextrines, celluloses, alcools polyvinyliques et polypyrrolidones, solubles dans l'eau.

5. Faux-cliché selon l'une quelconque des revendications 1 à 4, dans lequel l'agent épaississant présente aussi un comportement pseudo-plastique.

6. Faux-cliché selon la revendication 5, dans lequel l'agent épaississant est choisi dans le groupe comprenant la gomme de xanthane et une hydroxyéthylcellulose ayant une viscosité élevée.

7. Faux-cliché selon la revendication 3, dans lequel la quantité de solvant est de 80 à 99,6 % en poids, par rapport à la composition totale du revêtement.

8. Faux-cliché selon l'une quelconque des revendications 1 à 7, dans lequel la quantité de polymère filmogène est de 0,2 à 20 % en poids, par rapport à la composition totale du revêtement.

9. Faux-cliché selon l'une quelconque des revendications 1 à 8, dans lequel la quantité d'agent épaississant est de 0,02 à 0,2 % en poids, par rapport à la composition totale.

10. Faux-cliché selon l'une quelconque des revendications 1 à 9, dans lequel la teneur en solides de la composition de revêtement est de 0,2 à 2 % en poids, par rapport à la composition totale.

11. Faux-cliché selon l'une quelconque des revendications 1 à 10, dans lequel le titre en poids à sec est de 0,10 à 0,25 g/m^2.

12. Procédé permettant de produire un faux-cliché lithographique enduit, comprenant les étapes de :

    (a) préparation d'un substrat ;
    (a) application d'une composition de revêtement sur le substrat, la composition étant telle que définie dans l'une quelconque des revendications 1 à 10.

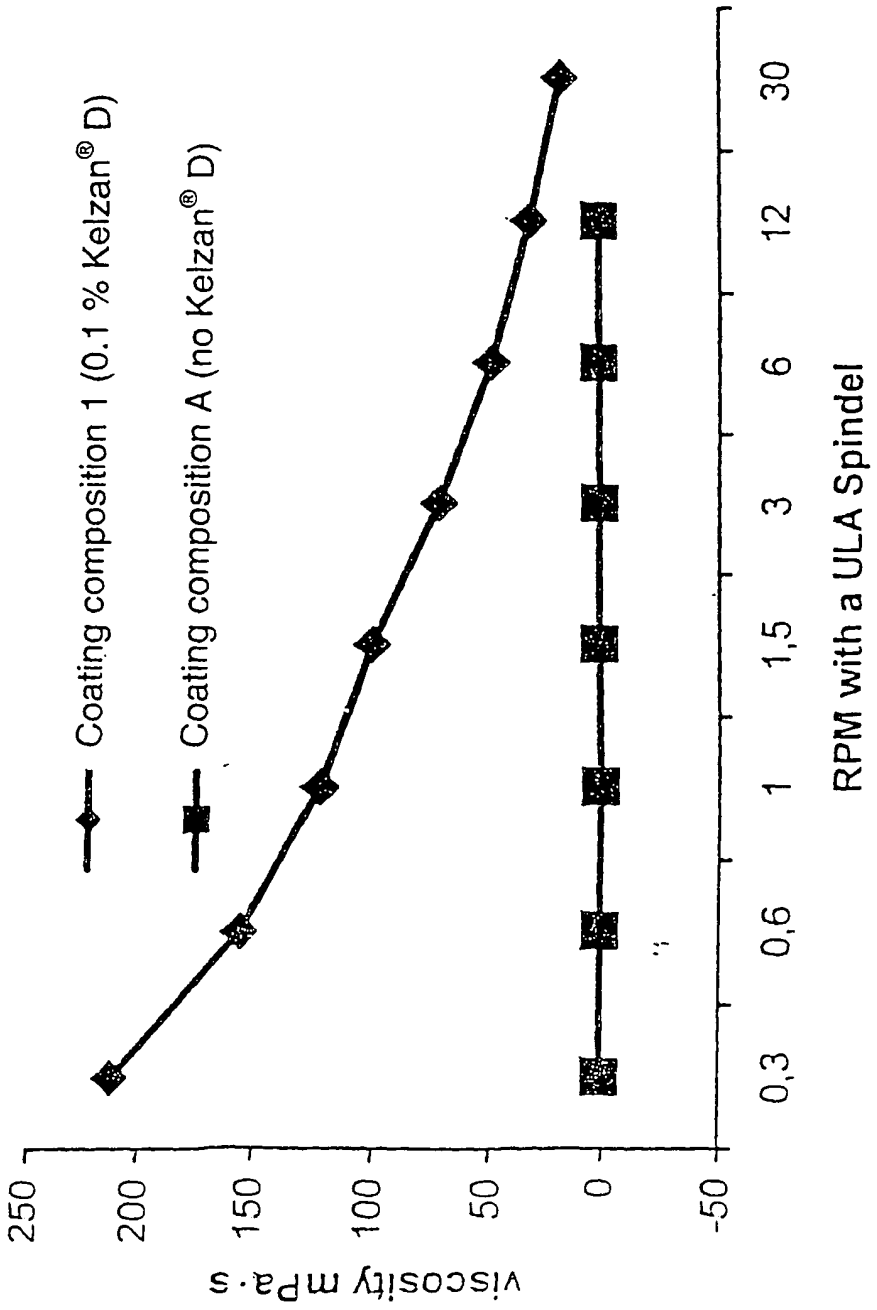
13. Procédé selon la revendication 12, dans lequel la composition de revêtement est appliquée au moyen d'une coucheuse à fente.

14. Procédé selon la revendication 13, dans lequel la vitesse de la bande varie de 20 à 80 m/min.

15. Procédé selon la revendication 12, dans lequel le substrat est une feuille d'aluminium grainé par un procédé mécanique et/ou électrochimique.

16. Procédé selon la revendication 15, dans lequel la feuille d'aluminium grainé était soumise à un traitement d'anodisation avant d'être enduite.

Figure 1


Coating composition 1 (0.1 % Kelzan® D)
Coating composition A (no Kelzan® D)
viscosity mPa·s
250
200
150
100
50
0
-50
0,3
0,6
1
1,5
3
6
12
30
RPM with a ULA Spindel