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(54) **Improvements in papermaking fabrics**

Verbesserungen an Papiermaschinengeweben

Améliorations portant sur des toiles de machine à papier

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Description

[0001] This invention relates to improvements in papermaking fabrics.

[0002] WO 96/35018 (Kimberly-Clark Corp.) discloses a process of forming patterned or decorative markings on tissues including the use of a forming fabric with areas of relatively slow water drainage. Where a fibre slurry containing both relatively long and relatively short fibres is used, the provision of areas of different water drainage rates causes the markings to be delineated by areas of different fibre composition, or shorter fibre lengths, preferably avoiding areas of slower drainage. The areas of relatively slow water drainage are provided by providing additional filaments over or within the fabric weave pattern, or by a film or coating which blocks or fills void space within the fabric. The area does not necessarily protrude from the surface of the fabric.

[0003] This arrangement however is somewhat restrictive in the possible variety of markings which may be imparted to a tissue or other fibrous web, for example it may be useful to include areas of enhanced drainage in the fabric as well as or instead of areas of slower drainage, or areas of the same drainage rate as the rest of the fabric which are perhaps distinguished in a different manner, e.g. by standing proud of the fabric surface or being recessed below the fabric surface, to emboss the tissue web. Such a variety of possible effects cannot be achieved by the forming fabric described in WO 96/35018 noted above.

[0004] An object of this invention therefore is to provide a papermaking fabric which can enable such effects to be achieved.

[0005] According to the invention, a papermaking fabric comprises a paper-contacting surface layer of partially fused particles, the paper-contacting layer having a surface which comprises areas which are proud of or recessed relative to the main plane of the paper-contacting surface.

[0006] From another aspect, the invention provides a fabric comprising a base layer or substrate, having decoratively shaped areas on the web contacting surface, said areas comprising sintered particles which are fused or bonded to the substrate.

[0007] The surface layer is normally supported by a base layer which may be a woven or nonwoven fabric, or a membrane (which may be perforated or in the form of a grid) of nonwoven material such as a sheet of a synthetic plastics material.

[0008] The surface layer of partially fused particles may include a reinforcing textile structure which is fully or partially embedded in the layer of partially fused particles.

[0009] The partially fused particles may form a sintered matrix, and be composed of sintered polymer or metal particles or fibres, or a mix of particles and fibres.

[0010] The reinforcing textile structure may comprise a woven or nonwoven fabric, or a random but generally

uniform dispersion of chopped fibres. The fibres or yarns of the reinforcing structure may be bicomponent structures incorporating materials of different melting point. The fibres or yarns may preferably have a higher melting point than the reinforcing structure.

[0011] Both raised and recessed areas may be provided in the paper-contacting surface of the fabric. Raised areas may be provided by forming an additional thickness of the sintered matrix having the same density and thus the same drainage flow rate as the main body of the matrix. Similarly, recessed areas may be provided by omission of a thickness of the sintered matrix so that the matrix again has the same density and drainage flow rate as the main body of the matrix.

[0012] On the other hand, the raised and/or recessed areas may be provided by moulding of the paper-contacting surface of the sintered matrix, e.g. using a patterned platten or roller to impress the surface. In this case recessed areas will have a greater density and thus reduced drainage flow rate than the main body of the matrix, and raised areas will have a lesser density and thus increased drainage flow rate with respect to the main body of the matrix.

[0013] Where the fabric is to be used as a dryer fabric, for example in a through-air-dryer, it is to be noted that the air permeability is the relevant quality which is determined by the matrix density, rather than the drainage rate.

[0014] The invention will be further described by way of example with reference to preferred embodiments of the invention as illustrated in the accompanying drawings wherein:-

Figure 1 is a sectional view of a papermachine fabric according to the invention wherein raised and/or recessed areas of the paper-contacting surface have substantially the same density;

Figure 2 is a sectional view of a papermachine fabric according to the invention wherein raised and/or recessed areas of the paper-contacting surface have reduced or increased density; and

Figure 3 is a sectional view of a further embodiment of the invention.

[0015] In Fig. 1, 10 is a support or base fabric which can be a woven fabric, a nonwoven fabric, a membrane or perforated or reticulated membrane or a composite of one or more layers of any of the said materials.

[0016] A layer 11 is provided on at least the paper-contacting side of the base fabric 10 which is formed of a layer of sintered particles and/or fibres of a suitable plastics material such as polyethylene or polypropylene or other materials such as set out in EP-A-653512.

[0017] This layer of sintered material has the fabric 10 embedded wholly within it to form a textile reinforcement structure which is shown diagrammatically as a conven-

tional representation of a woven fabric. However, a non-woven scrim or a dispersion of chopped fibres may be used instead or additionally.

[0018] The paper-contacting surface 13 has a general or median level 14, to which most of the surface conforms. However, selected raised areas 15 stand proud of the surface level 14, whilst other areas 16 are recessed below the surface level 14. These proud and recessed areas preferably form a pattern which will have a decorative or a functional effect on a paper web formed or carried on the surface 13.

[0019] The proud and recessed areas are formed by moulding of the layer 11 during the process of forming the layer, so that extra material is provided in the raised areas 15, whilst less material is provided in the recessed areas 16. Consequently, the sintered material has essentially the same density in the raised areas 15 and in the recessed areas 16 as elsewhere in the layer 11.

[0020] The fabric according to Fig. 1 produces an embossing effect on any tissue or web formed or carried on the fabric due to the effect of the raised and/or lowered areas. Either the raised areas, or the recessed areas may be omitted.

[0021] In Fig. 2, a papermachine fabric comprises a base layer 20, which may be any one of the options suggested in the description of Fig. 1 above. The base layer 20 carries a layer 21 which consists of a layer of sintered particles and/or fibres of a suitable plastics material, or of a sintered metal, as discussed in EP-A-653512. The base layer 10 comprises a reinforcing fabric 22 which is wholly embedded within the sintered layer 21 and may be a woven or nonwoven fabric, or a dispersion of chopped fibres, but is shown as a conventional representation of a woven fabric. Layer 21 has a paper-contacting surface 23 which has a general or median plane 24. The surface 23 carries raised areas 25, and recessed areas 26, as in Fig. 1. However, these areas are formed by embossing the layer 21 after formation using a roller or platten press. Consequently the parts of layer 21 below raised areas 25 are less densely compressed than the main part of the layer 21, and the parts of layer 21 below recessed areas 26 are more densely compressed than the main part of the layer 21. This is symbolised by less dense hatching of the raised parts and more dense hatching of the recessed parts.

[0022] In this case, the air permeability and water drainage flow rate are differentially effected, so that the fabric not only embosses any tissue formed or carried thereon, but also introduces marking due to different fibre deposition patterns.

[0023] Instead of using relatively complicated techniques such as silk screen printing or jacquard weaving to overlay patterns, a simple single step process is made available, and the fabric is not susceptible to wear or delamination of such patterns from the fabric.

[0024] Fig. 3 illustrates a third embodiment, where discrete areas 30 of sintered particles and/or fibres of metal or plastics material are bonded direct to a base

layer 31. The base layer 31 may again be a substrate comprised of a woven or nonwoven fabric, or a membrane, or a composite of such layers. The general or median level 32 of the paper-contacting face of the fabric is provided by the substrate, and raised areas are provided by the discrete areas 30.

[0025] The present invention allows an embossing fabric to be made by a quick single step process and due to integral formation of the decoratively shaped areas from the material forming the web-contacting surface, the resistance of the areas to delamination is increased. The sintered areas offer greater resistance to wear than the materials used in the prior art referred to above, and thus the initial distinction of the embossed pattern is maintained over a much greater period.

[0026] Drainage or permeability is varied in the decoratively shaped areas in a highly controlled manner by varying the density of the sintered material.

Claims

1. A papermaking fabric comprising a paper-contacting surface layer (11; 21) at least areas of which are formed from a layer of partially fused particles, the paper-contacting surface layer having a surface which comprises areas (15, 16; 25, 26) which are proud of or are recessed relative to a main plane (14; 26) of the paper-contacting surface.
2. A papermaking fabric comprising a base layer (31) or substrate having discrete shaped areas (30) on the paper-contacting face of the fabric, said shaped areas comprising sintered particles which are joined to the substrate.
3. A fabric according to claim 1 wherein said surface layer (11; 21) is supported by a base layer (10; 20).
4. A fabric according to claim 3 wherein the base layer (10; 20) comprises a woven or nonwoven textile material.
5. A fabric according to claim 3 wherein the base layer (10; 20) comprises a membrane of nonwoven sheet material.
6. A fabric according to claim 5 wherein said membrane comprises a sheet of synthetic plastics material which is perforated or in the form of a grid.
7. A fabric according to claim 1 wherein the layer of partially fused particles includes a reinforcing textile structure (22) which is fully or partially embedded in the layer of partially fused particles.
8. A fabric according to claim 7 wherein the partially fused particles form a sintered matrix, and is com-

posed of sintered particles and/or fibres of one or more polymeric materials, or a mix of such particles and fibres.

9. A fabric according to claim 7 wherein the reinforcing textile structure comprises a woven or nonwoven fabric, or a random but generally uniform dispersion of chopped fibres.
10. A fabric according to claim 9 wherein the reinforcing textile structure comprises fibres or yarns which are bicomponent structures incorporating materials of different melting point.
11. A fabric according to any preceding claim wherein the reinforcing textile structure is provided by the base layer (10; 20; 31).
12. A fabric according to claim 1 wherein both raised and recessed areas (15, 16; 25, 26) are provided in said surface layer (11; 21).
13. A fabric according to claim 12 wherein said raised areas (15; 25) are provided by forming an additional thickness of a sintered matrix having the same density and drainage flow rate as the main body of said layer of partially fused particles, and said recessed areas (16; 26) are provided by omission of a thickness of the sintered matrix.
14. A fabric according to claim 12 wherein said raised and/or recessed areas (15, 16; 25, 26) are provided by moulding of said paper-contacting surface (13; 23) of the layer of partially fused particles.

Patentansprüche

1. Papiermachergewebe mit einer Papierseiten-Oberflächenschicht (11; 21), bei der zumindest Bereiche aus einer Schicht von teilweise angeschmolzenen Teilchen hergestellt sind, wobei die Papierseiten-Oberflächenschicht eine Oberfläche aufweist, die Bereiche (15, 16; 25, 26) umfaßt, welche relativ zu einer Hauptebene (14; 26) der Papierseiten-Oberfläche erhöht oder vertieft sind.
2. Papiermachergewebe mit einer Basisschicht (31) oder einem Substrat, das separat geformte Bereiche (30) auf der Papierseite des Gewebes aufweist, wobei die geformten Bereiche gesinterte Teilchen umfassen, die mit dem Substrat verbunden sind.
3. Gewebe nach Anspruch 1, wobei die Oberflächenschicht (11; 21) durch eine Basisschicht (10; 20) abgestützt ist.
4. Gewebe nach Anspruch 3,

wobei die Basisschicht (10; 20) ein gewebtes oder nichtgewebtes textiles Material umfaßt.

5. Gewebe nach Anspruch 3, wobei die Basisschicht (10; 20) eine Membrane aus nichtgewebtem Flachmaterial umfaßt.
6. Gewebe nach Anspruch 5, wobei die Membrane ein Flachmaterial aus Kunststoff umfaßt, das perforiert ist oder die Form eines Gitters hat.
7. Gewebe nach Anspruch 1, wobei die Schicht aus teilweise angeschmolzenen Teilchen eine textile Verstärkungsstruktur (22) enthält, die ganz oder teilweise in die Schicht aus teilweise angeschmolzenen Teilchen eingebettet ist.
8. Gewebe nach Anspruch 7, wobei die teilweise angeschmolzenen Teilchen eine gesinterte Matrix bilden, die aus gesinterten Teilchen und/oder Fasern aus einem oder mehreren polymeren Stoffen oder einer Mischung aus solchen Teilchen und Fasern zusammengesetzt ist.
9. Gewebe nach Anspruch 7, wobei die textile Verstärkungsstruktur ein gewebtes oder nichtgewebtes Gewebe oder eine wirre, aber im wesentlichen gleichmäßige Dispersion aus geschnitzelten Fasern umfaßt.
10. Gewebe nach Anspruch 9, wobei die textile Verstärkungsstruktur Fasern oder Fäden umfaßt, die durch Bikomponenten-Strukturen gebildet sind, welche Materialien mit unterschiedlichem Schmelzpunkt enthalten.
11. Gewebe nach einem vorhergehenden Anspruch, wobei die textile Verstärkungsstruktur durch die Basisschicht (10; 20; 31) gebildet ist.
12. Gewebe nach Anspruch 1, wobei sowohl erhöhte als auch vertiefte Bereiche (15, 16; 25, 26) in der Oberflächenschicht (11; 21) ausgebildet sind.
13. Gewebe nach Anspruch 12, wobei die erhöhten Bereiche (15; 25) dadurch hergestellt werden, daß eine zusätzliche Schicht einer gesinterten Matrix ausgebildet wird, die dieselbe Dichte und Entwässerungsgeschwindigkeit aufweist wie der Hauptkörper der Schicht aus teilweise angeschmolzenen Teilchen, und wobei die vertieften Bereiche (16; 26) durch Weglassung einer Schicht der gesinterten Matrix hergestellt werden.
14. Gewebe nach Anspruch 12, wobei die erhöhten und/oder vertieften Bereiche

(15, 16; 25, 26) durch Formen der Papierseiten-Oberfläche (13; 23) der Schicht aus teilweise angeschmolzenen Teilchen hergestellt werden.

fils constituant des structures à deux composantes et intégrant des matériaux de point de fusion différents.

Revendications

1. Toile de machine à papier comprenant une couche superficielle au contact du papier (11 ; 21) dont au moins certaines zones sont formées à partir d'une couche de particules partiellement fondues, la couche superficielle au contact du papier ayant une surface comprenant des zones (15, 16 ; 25, 26) en saillie ou en retrait par rapport à un plan principal (14 ; 26) de la surface au contact du papier.
2. Toile de machine à papier comprenant une couche de base (31) ou substrat ayant des zones (30) de forme discrète sur la face de la toile au contact avec le papier, lesdites zones formées comprenant des particules frittées qui sont solidarisées au substrat.
3. Toile selon la revendication 1, dans laquelle ladite couche superficielle (11 ; 21) est supportée par une couche de base (10 ; 20).
4. Toile selon la revendication 3, dans laquelle la couche de base (10 ; 20) comprend un matériau textile tissé ou non tissé.
5. Toile selon la revendication 3, dans laquelle la couche de base (10 ; 20) comprend une membrane de matériau en feuille non tissée.
6. Toile selon la revendication 5, dans laquelle ladite membrane comprend une feuille de matériau plastique synthétique qui est perforé ou sous forme de grille.
7. Toile selon la revendication 1, dans laquelle la couche de particules partiellement fondues englobe une structure textile de renfort (22) qui est complètement ou partiellement noyée dans la couche de particules partiellement fondues.
8. Toile selon la revendication 7, dans laquelle les particules partiellement fondues forment une matrice frittée, et se compose de particules frittées et/ou de fibres d'un ou de plusieurs matériaux polymères, ou un mélange desdites particules et fibres.
9. Toile selon la revendication 7, dans laquelle la structure de textile de renfort comprend une toile tissée ou non tissée, ou une dispersion aléatoire, mais généralement uniforme, de fibres hachées.
10. Toile selon la revendication 9, dans laquelle la structure textile de renfort comprend des fibres ou des
11. Toile selon l'une quelconque des revendications précédentes, dans laquelle la structure textile de renfort est constituée par la couche de base (10 ; 20 ; 31).
12. Toile selon la revendication 1, dans laquelle des zones en saillie et en retrait (15, 16 ; 25, 26) sont prévues dans ladite couche superficielle (11 ; 21).
13. Toile selon la revendication 12, dans laquelle lesdites zones en saillie (15 ; 25) sont prévues par formation d'une épaisseur supplémentaire d'une matrice frittée ayant la même densité et le même débit de drainage que le corps principal de laite couche de particules partiellement fondues, et lesdites zones en retrait (16 ; 26) sont constituées par omission d'une épaisseur de la matrice frittée.
14. Toile selon la revendication 12, dans laquelle lesdites zones en saillie et/ou en retrait (15, 16 ; 25, 26) sont constituées par moulage de ladite surface en contact avec le papier (13 ; 23) de la couche de particules partiellement fondues.

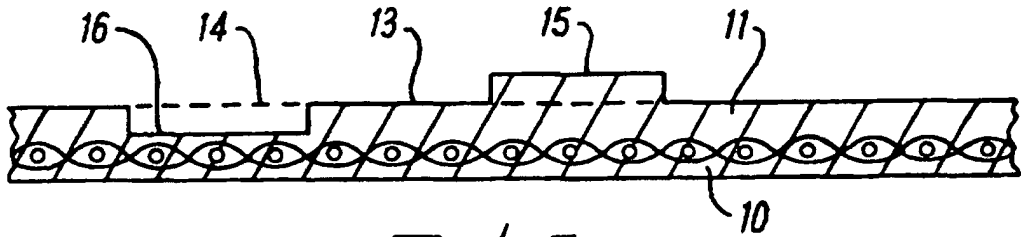


FIG. 1

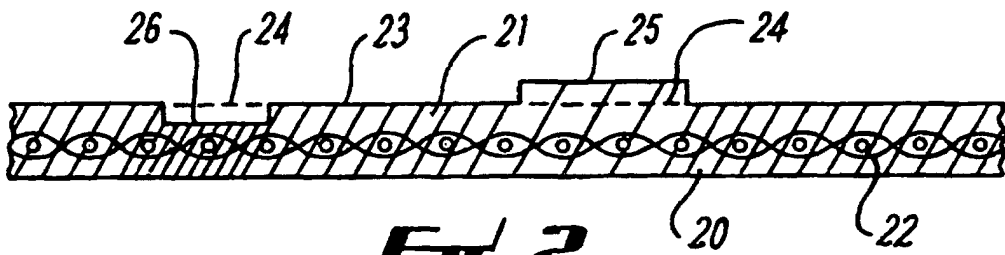


FIG. 2

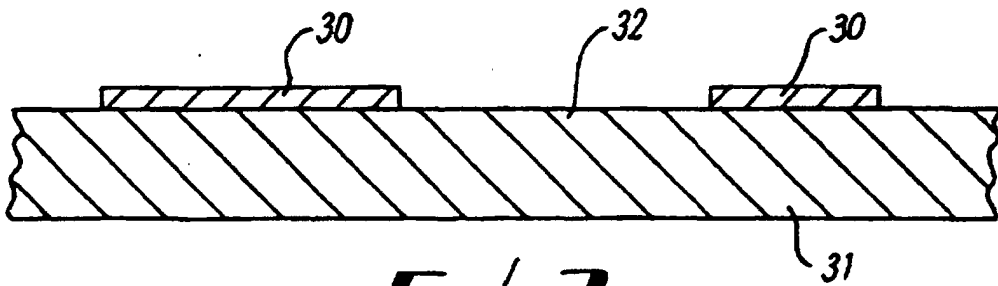


FIG. 3