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(71) Applicant: **SCA Hygiene Products GmbH**
68264 Mannheim (DE)

(72) Inventors:
- **Eichhorn, Stephan**
  64579 Gernsheim (DE)
- **Urban, Andrea**
  67069 Ludwigshafen (DE)

(74) Representative: **Harrison, Michael Charles et al**
Albihns GmbH,
Grasserstrasse 10
80339 München (DE)

(54) Composition for treating an absorbent paper product and an absorbent paper product treated with said composition

(57) A composition for treating absorbent paper products is disclosed. The composition is a solid or semi-solid at ambient temperature with a creamy, high viscosity consistency. The composition comprises between about 30 and 90 weight percent of an oil, between about 1 and 40 weight percent of a wax, between about 1 and 30 weight percent of an emulsifying agent and between about 5 and 35 weight percent of water. The lotion composition is applied to the outer surfaces of a tissue paper web in melted form. The composition substantially improves both the smoothness of the treated product and the bulk softness, while leaving the surface of the product substantially non-greasy to the touch but with a perceivable lotion-like feel.

EP 1 029 977 A1

Description

1. Field of invention

[0001] The invention is directed to a composition for treating absorbent paper products, in particular for tissue paper products destined to come into prolonged or repeated contact with the skin, and for imparting a soft and smooth tactile character to the product. The invention further relates to absorbent paper products treated with such composition.

2. Background art

[0002] Absorbent paper products, such as paper handkerchiefs, toilet tissue, disposable paper towels etc., are generally used to cleanse and dry the skin by absorbing body fluids. However, frequent use of such products, for example as through nose blowing by persons suffering a cold or an allergy, can abrade the skin, leading to heightened sensitivity, redness, irritation and, in some cases inflammation and soreness. To alleviate the abrasive effects of such products, additives in the form of solids, semi-solids or lotions, can been applied to the tissue paper. These additives may serve to impart a smoothness to the surface of the product, allowing the tissue paper to glide more easily across the skin. Some of the additives may additionally be transferred to the skin to perform some other function, such as to provide a cooling or soothing effect.

[0003] Examples of such additives adapted to be applied to tissue paper are described in WO 95/356412, US 5,525,345 and WO 96/24723. WO 95/356412 describes a lotion that contains a substantially water-free plastic or fluid emollient such as petrolatum and an immobilising agent such as a fatty acid or fatty alcohol. The formulation described in US 5,525,345 also comprises an emollient and an immobilising agent. In this latter case the emollient includes one of a petroleum-based emollient, a fatty acid ester emollient, an alkyl ethoxylate emollient, or a mixture of these. The immobilising agent contains a polyhydroxy fatty ester, a polyhydroxy fatty acid amide, such as sorbitan stearate or a mixture of these. The lotion may optionally include a hydrophilic surfactant. The formulation for treating tissue paper described in WO 96/24723 is a composition containing an oil and a wax.

[0004] All the compositions described in these references are based on waxy materials. As a result, the paper products treated with these compositions tend to be rather stiff and unpleasantly greasy or oily to the touch.

[0005] WO 97/30217 describes a further formulation for the treatment of absorbent paper products that is designed to improve the feel of the paper. The described formulation is a liquid at ambient temperature to permit its application to the paper carrier without the need for heating. The formulation includes an aqueous emollient, a quaternary ammonium compound and a solvent, which is a polyol, a mineral oil or a mixture of the two. The aqueous emollient is an oil in water emulsion comprising fatty alcohols with C16 or higher, waxy esters with at least C24, a non-ionic or amphoteric emulsifier, oil and water. The quantity of water utilised in the composition as a whole may vary between about 3 weight percent to 85 weight percent; however, a mineral oil or wax may be substituted for part of the water. Quaternary ammonium compounds have long been known for their softening properties in the treatment of absorbent paper products. Thus, tissue paper treated with this prior art lotion may well be softer than untreated products. However, the composition as a whole also renders the surface of the tissue paper substantially dry to the touch. Accordingly, treated tissue paper will not produce a lotion-like sensation in use and for this reason may abrade the skin more than is pleasant.

[0006] Other formulations that are liquid at ambient temperature generally penetrate below the surface fibres of a tissue paper carrier long after their application to the paper. In fact, such lotions will tend to migrate into a tissue paper carrier until equilibrium is reached, i.e. until all the layers constituting the tissue paper contain the same quantity of lotion. This may be arrested to a degree by reducing the amount of lotion applied to the paper, however, the proportion of lotion present on the surface will always be small compared to the amount absorbed into the tissue paper bulk. Thus, while these compositions may improve the softness of the paper product, the surface will not have a lotion-like feel.

[0007] It is an object of the present invention to provide a composition for treating a paper product, preferably an absorbent paper product, that alleviates the disadvantages of prior art formulations.

[0008] In particular, it is an object of the present invention to provide a composition for treating a paper product that both renders the surface of the paper smooth and silky to the touch with a perceptible lotion-like feel and additionally substantially improves the softness and bulk softness of the product, while leaving the tensile strength and calliper of the treated paper product essentially unaffected.

[0009] Preferably, the composition should be suitable as a carrier for diverse skin care additives, such as moisturisers, anti-inflammatories, astringents, cleansing agents and the like, which may be deposited in a film on the skin as the treated product is used. The composition should also be stable.

SUMMARY OF THE INVENTION

[0010] The present invention relates to a cream lotion composition suitable for treating absorbent paper products that is solid or semi-solid at 30 °C and comprises between about 30 and 90 weight percent of an oil, between about 1 and 40 weight percent of a wax, between about 1 and 30 weight percent of an emulsifying agent and between about 5 and 35 weight percent of water.

[0011] The composition is essentially a water in oil emulsion, which when deposited on the skin is generally perceived to produce a more comfortable sensation when compared with waxy lotions. It has also been discovered that tissue paper treated with such a cream lotion is more pleasant to the touch than tissue paper treated with a waxy lotion. The lotion composition is a solid or semi-solid at ambient temperature and is applied to a paper carrier in melted form. When the lotion composition is applied in molten form to an absorbent paper web, a small but important share of the emulsion will penetrate into the paper. The remaining portion of the lotion will "freeze" on the outside layers of the paper providing the desired increased smoothness and lotion-like feel to the treated product. The share of the lotion composition that penetrates into the paper bulk contributes to a significant increase in the softness and bulk softness of the final product.

[0012] The composition has the further advantage that both hydrophobic and hydrophilic skin care additives, such as plant extracts or the like, may be incorporated in the composition. A further benefit is that the effect of the lotion composition applied to tissue paper or other absorbent paper products is perceived in smaller application quantities than a waxy lotion. The composition is thus very economical since the same perceived improvement in smoothness and bulk softness can be obtained using smaller amounts of the composition according to the invention when compared to prior art formulations. In addition, paper products treated with the composition according to the invention have a perceivable lotion-like feel in use.

[0013] The amount of water in the composition is low, 35 weight % or less, to prevent the treated absorbent paper product from having a wet appearance and also to prevent or minimise loss of tensile strength of the treated paper product. Preferably the composition comprises between 10 and 30 weight percent of water, and most preferably between about 15 and 25 weight percent of water. This quantity of water has been found to provide a significant improved perceived softness while substantially safeguarding the structural integrity and absorption capacity of the treated paper product.

[0014] In a preferred embodiment of the invention the proportion of oil components is between about 40 and about 80 percent, and most preferably between about 50 and about 70 percent of the weight of the composition as a whole.

[0015] In a further embodiment of the invention, the percentage weight of wax components in the composition is between about 1 and about 30 weight percent, and most preferably between about 5 and about 20 weight percent.

[0016] The proportion of emulsifying agents present in the composition is preferably between about 1 to about 30 weight percent, and most preferably between about 5 and about 20 weigh percent. The emulsifying agent or agents may be dissolved either in the oil phase or the water phase of the composition. These agents are important for providing the treated absorbent paper product with a heightened bulk softness.

[0017] The oil components are preferably selected from one of naturally occurring oils, such as vegetable oils, mineral or synthetic oils, or a combination of these. Examples of synthetic oils are the liquid wax esters, such as oleyl erucate, available under the name Cetiol J600 from Henkel. Suitable naturally occurring oils include Jojoba oil, olive oil and macadamia nut oil.

[0018] Suitable wax components may be selected from naturally occurring waxes, such as vegetable waxes, synthetic waxes or mineral waxes, or comprise a mixture of these. Preferably the wax component includes beeswax and/or candelilla wax.

[0019] The emulsifying agent may be an ionic or nonionic emulsifier, preferably nonionic, more preferably a nonionic water in oil (W/O) emulsifier, or a mixture of these. Examples of these include sorbitan stearate (sorbitan monostearate) and polyglyceryl-2 dipolyhydroxystearate. These two compounds are available from Henkel KgaA under the name Dehymuls SMS and Dehymuls PGPH, respectively.

[0020] The composition may also comprise further additives. In particular a surfactant may be incorporated in the composition to improve the stability of the emulsion. An example of a suitable surfactant is sodium lauryl sulfoacetate, available under the name Lathanol LAL from the firm Stepan.

[0021] According to a further embodiment of the invention the composition may further include active skin care ingredients having skin soothing and/or anti-inflammatory properties, or the like. These include, but are not limited to, the following naturally occurring and synthetic active ingredients: skin care formulations based on vitamins or plant extracts, such as horse chestnut extract, birch extract, calendula, arnica extract, camomile or bisabolol, azulen, extract of rose of Sharon or St. John's wort, teatree oil, cucumber, aloe vera, hops, allantoin or hamamelis and lime tree, which is known for its astringent and healing action. Pro-vitamin B5 (D-panthenol) is also particularly well suited as an additive since it serves as a moisturising agent. Bisabolol and azulen provide a perceptible effect in amounts from 0.5 weight percent to 1 weight percent of the total composition. Other active agents that can be incorporated in the composition include glycyrrhetinic acid, the active agent from liquorice, which has bacteriostatic and anti-inflammatory (antalgic) properties, as well as its salts and phytosterol (including ethoxylated) available under the name of Generol from Henkel KGaA, that is fabricated from soya oil and also has anti-inflammatory action (see Parfümerie und Kosmethik 75 (1994) 775, R. Wachter, B. Salka and A. Magnet, "Phytosterole - pflanzliche Wirkstoffe in der Kosmetik"). These additional substances are preferably present in the composition in amounts between about 1 weight percent and about 20 weight percent of the total composition.

[0022] The invention further resides in the use of this composition in treating absorbent paper wherein the composition is applied to at least one surface of the paper in an amount from about 0.1 to about 30 percent by weight of the dry paper product. Preferably the composition is applied in an amount from about 0.5 to about 25 percent by weight of the dry paper, and most preferably from about 1 to about 20 percent by weight of the dry paper.

[0023] An absorbent paper product, such as tissue paper, for example, that is treated with the lotion composition according to the present invention will carry most of the composition on its outer surface or surfaces in the form of a frozen film. However the composition has a melting point between about 30 and about 80 °C, preferably between about 35 and about 75 °C, and most preferably between about 40 and about 70 °C, so the molten lotion composition will not be immobilised immediately on the surface of the paper. Rather a significant proportion of the lotion will penetrate into the inner layers of the paper product and so substantially increase the softness of the tissue paper.

[0024] In a still further aspect of the invention the above objects are attained in an absorbent paper product with an amount of the composition deposited on at least one surface thereof from about 0.1 to about 30 percent by weight of the dry paper product. Preferably, the treated absorbent paper product has between about 0.5 and about 25 weight percent of the composition present relative to the dry weight of paper product, and most preferably from about 1 to about 20 weight percent of the composition.

[0025] Suitable absorbent paper materials include tissue paper in general. Tissue paper may comprise one, two or more plies. The plies may be layered or homogenous, creped or uncreped, wet-pressed or blow-dried. Tissue paper types useful for the present invention include, but are not limited to, felt-pressed tissue paper, pattern densified tissue paper, uncompacted tissue paper and compacted tissue paper. The various characteristics of these tissue papers and their manufacturing processes are described in more detail in WO 95/35412, which is included herein by reference.

[0026] The paper furnish used to make tissue paper may include both natural cellulose fibres, such as wood pulp fibres, and synthetic fibres. Additives may also be included in the paper furnish to improve the wet strength and dry strength or other properties of the finished tissue paper.

[0027] The composition may be applied to one, preferably both surfaces of a tissue paper web. Application typically takes place after the paper web has been dried and may be applied at any subsequent stage, for example, directly after drying the web, shortly before combining webs to form multiple plies, or before forming the multi-ply web into the final absorbent paper product. For tissue paper having two or more plies, the composition may be applied to each ply or only to one or both outer plies. The individual plies or multi-ply structure may be patterned either before or after application of the lotion composition according to the invention. Suitable application techniques include spraying, rotogravure printing, flexographic printing, extrusion or any process capable of applying a film of lotion to a paper web.

DETAILED DESCRIPTION OF THE INVENTION

[0028] The absorbent paper products suitable for this invention can be in a variety of forms but preferably take the form of tissue paper. In this regard, the desired use of the final product determines the particular type of absorbent paper product employed. The basis weight of tissue paper varies from between about 10g/m^2 and about 65g/m^2, with facial tissue paper generally being at the lower end and paper handkerchiefs at the upper end of this range.

[0029] In the foregoing description, reference will be made only to the treatment of tissue paper, which may be used for a variety of products including disposable paper towels, paper handkerchiefs, facial tissues and toilet tissue.

[0030] The lotion for treating the absorbent paper includes an oil phase including an oil component and a wax component, an emulsifying agent and water. Further additives, including a surfactant and active skincare ingredients may also be incorporated in the composition.

[0031] The lotion is prepared by heating together the liquid oils and the wax of the oil phase with the emulsifying agent or agents and any optional active substances miscible in the oil phase until all components are melted and a homogenous liquid obtained. The water phase, which includes the water and, optionally, one or more additional surfactants and any further hydrophilic active substances, is heated to the same temperature as the oil phase. In order to obtain a stable emulsion, the heated oil phase must be stirred or agitated at high speed with a disperser or emulsifier while the heated water phase is added slowly. A suitable disperser is the Ultra Thurrax™. After combining the two phases, the mixture is stirred until a stable emulsion is formed. The mixture is stirred continuously at a slower speed until it has cooled to a temperature of less than 30 °C. At this temperature the emulsion will be solid or semi-solid with a creamy viscous consistency.

[0032] The thus obtained composition can be applied to tissue paper using any application method capable of distributing the melted composition evenly on at least one surface of a tissue paper web. Suitable techniques include spraying, printing, such as flexographic printing or rotogravure printing, extrusion, or combinations of these. Examples of rotogravure printing and extrusion methods are described in WO 95/35412 and WO 96/24723, both of which are included herein by reference.

[0033] The lotion composition according to the inven-

tion should not be applied to the tissue paper web in quantities that saturate the tissue paper. Saturation of the paper web will lead to an extreme reduction in the tensile strength of the finished product and may also engender a negative perception of the product by consumers. Furthermore, the benefits of the lotion composition in terms of softness, smoothness and a lotion-like feel can be felt at application quantities well below saturation. It is thus preferred that application techniques are used that apply the composition to the surface or surfaces of the paper web only. The increase in bulk softness will be obtained as a portion of the emulsion penetrates into the web prior to cooling to its solid or semi-solid state.

[0034] The composition may be applied to only one side of a tissue paper web, but is preferably applied to both sides. In the later case, the lotion composition may be applied to one side before being applied to the other; alternatively both sides may be treated simultaneously. The composition is applied to a tissue paper web in liquid form. Since the composition is a solid or semi-solid at ambient temperature with a melting point between about 30 and about 80 °C, preferably between about 35 and about 75 °C and most preferably between about 40 and about 70 °C, it must be heated before application to the tissue paper web. Alternatively, the composition may be applied to tissue paper in its molten state directly after preparation without the intermediate cooling stage. It will be appreciated that the various components of the composition may melt at different temperatures. Thus the term melting point is used broadly to mean the temperature at which all, or substantially all, components of the composition are liquid.

[0035] The lotion is typically applied to the tissue paper web after the web has been dried. The composition is applied to the web in quantities of from about 0.1 to about 30 percent by weight of the dry paper, preferably between about 0.5 and about 25 weight percent, and most preferably from about 1 to about 20 percent relative to the dry weight of the paper.

[0036] A perceptible improvement in the softness and smoothness of the tissue paper and a lotion-like feel can be attained with these low quantities of applied composition because it is a water-containing emulsion with a special water content of between about 5 and 35 weight %, preferably between about 10 and 30 weight %, and most preferably between about 15 and 25 weight %. In addition, it is believed that the water component of the lotion composition helps the emulsion to penetrate into the bulk of the tissue paper on application, resulting in a significant improved bulk softness at quantities of applied lotion that do not adversely affect the wet or dry strength of the finished product.

EXAMPLES OF THE INVENTION

Example 1 - Lotion A

[0037]

COMPONENT	WEIGHT PERCENT
Cetiol J600	60% (oil phase)
Dehymuls SMS	8% (oil phase)
Candelilla wax	7% (oil phase)
Distilled water	25% (water phase)

[0038] The synthetic oil Cetiol J600 (oleyl erucate) is a liquid wax ester for cosmetic use that is available from Henkel.
Dehymuls SMS (sorbitan stearate) is available from Henkel.

[0039] The oil phase consisting of the oleyl erucate, sorbitan stearate and candelilla wax is heated to a temperature of about 80 °C until all the components are melted homogenously. The water is heated separately to the same temperature. When both phases have the same temperature, the water is slowly poured into the oil phase while the oil phase is stirred rapidly using a disperser, e.g. Ultra Thurrax™. Once all the water has been added, the emulsion is stirred for a further 2 minutes. The lotion composition is then ready to be applied to tissue paper. Alternatively, if the lotion is not to be used immediately it should be cooled to room temperature while being constantly and slowly stirred. Lotion A is creamy and of a high viscosity at room temperature and has a melting range of between 55 °C and 70 °.

[0040] Lotion A was applied in the melted state to tissue paper by spraying in amounts by weight ranging from 2 % to 20 % relative to the tissue paper dry weight.

Example 2 - Lotion B

[0041]

COMPONENT	WEIGHT PERCENT
Macadamia nut oil	60% (oil phase)
Dehymuls SMS	8% (oil phase)
Candelilla wax	7% (oil phase)
Distilled water	25% (water phase)

[0042] Lotion B was prepared in the same way as for example 1. It has a melting range of between 75°C and 90°C.

[0043] Macadamia nut oil was used as a less expensive and more easily available substitute for jojoba oil. Both macadamia nut oil and jojoba oil are plant oils. While the consistency of the lotion is expected to be the

same for both types of oil, Jojoba oil is resistant to oxidation and therefore has a longer storage life. Jojoba oil would thus be the preferred choice.

[0044] Lotion B was applied in the melted state to tissue paper in amounts by weight ranging from 2% to 20% relative to the tissue paper dry weight.

Example 3 - Lotion C

[0045]

COMPONENT	WEIGHT PERCENT
Oryza oil	29.4% (oil phase)
Jojoba oil	29.4% (oil phase)
Candelilla wax	6.9% (oil phase)
Dehymuls SMS	7.8% (oil phase)
Generol 122 E25	1% (oil phase)
Ammonium glycyrrhetinate	1%
Distilled water	24.5% (water phase)

[0046] Generol 122 E25 (phytosterol) is available from Henkel KGaA.

[0047] Lotion C was prepared in the same was as for example 1. It has a melting range of between 65°C and 85°C.

[0048] Lotion C was applied in the melted state to tissue paper in amounts by weight ranging from 2% to 20% relative to the tissue paper dry weight.

Example 4 - Lotion D

[0049]

COMPONENT	WEIGHT PERCENT
Cetiol OE	68% (oil phase)
Dehymuls SMS	8% (oil phase)
Candelilla wax	7% (oil phase)
Lathanol LAL	2%
Distilled water	15% (water phase)

[0050] Lathanol LAL (sodium lauryl sulfoacetate) is a surfactant available from Stepan. It was used in this example to improve the stability of the water in oil emulsion.

Cetiol OE (dicaprylyl ether) is a synthetic oil available from Henkel.

[0051] Lotion D was prepared in the same was as for example 1. It has a melting range of between 65°C and 80°C.

[0052] Lotion D was applied by spraying to tissue paper in the melted state in amounts by weight of between 2 % to 20 % relative to the tissue paper dry weight.

Example 5 - Lotion E

[0053]

COMPONENT	WEIGHT PERCENT
Cetiol J600	55% (oil phase)
Dehymuls SMS	12% (oil phase)
Candelilla wax	15% (oil phase)
Lathanol LAL	3%
Distilled water	15% (water phase)

[0054] Lotion E was prepared in the same way as for example 1. The lotion has a melting range of between 65°C and 80°C.

[0055] Lotion E was applied to tissue paper in the melted state by spraying in amounts by weight of between 2 % to 20 % relative to the tissue paper dry weight.

Example 6 - Lotion F

[0056]

COMPONENT	WEIGHT PERCENT
Cetiol J600	60% (oil phase)
Dehymuls PGPH	8% (oil phase)
Candelilla wax	7% (oil phase)
Distilled water	25% (water phase)

[0057] Dehymuls PGPH (polyglyceryl-2 dipolyhydroxystearate) is a nonionic emulsifier available from Henkel.

[0058] Lotion F was prepared in the same way as for example 1. The lotion was applied to tissue paper in the melted state by spraying in amounts by weight of between 2 % to 20 % relative to the tissue paper dry weight.

[0059] In preliminary trials tissue paper treated with the compositions A and F (examples 1 and 6) were preferred over the others for the perceivable lotion-like feel and improved smoothness and softness. The emulsion composition of lotion F (example 6) was also found to have the best stability.

Claims

1. A composition for treating paper products that is a solid or semi-solid at 30°C comprising between about 30 and 90 weight percent of oil, between about 1 and 40 weight percent of a wax, between about 1 and 30 weight percent of an emulsifying agent and between about 5 and 35 weight percent of water.

2. A composition as claimed in claim 1, comprising between about 10 and 30 weight percent of water.

3. A composition as claimed in claim 1, comprising between about 15 and 25 weight percent of water.

4. A composition as claimed in any preceding claim, comprising between about 40 and 80 weight percent of oil.

5. A composition as claimed in any one of claims 1 to 3, comprising from about 50 and 70 weight percent of oil.

6. A composition as claimed in any preceding claim, comprising between about 1 and 30 weight percent of wax.

7. A composition as claimed in any one of claims 1 to 5, comprising between about 5 and 20 weight percent of wax.

8. A composition as claimed in any preceding claim, comprising between about 2 and 20 weight percent of an emulsifying agent.

9. A composition as claimed in any one of claims 1 to 7, comprising between about 4 and 15 weight percent of an emulsifying agent.

10. A composition as claimed in any preceding claim, further comprising a surfactant for stabilising the composition.

11. A composition as claimed in any preceding claim, further comprising at least one of skin soothing, skin moisturising and anti-inflammatory agents in amounts between about 1 weight percent and 20 weight percent of the total composition.

12. A composition as claimed in any preceding claim, wherein said oil includes a synthetic oil, a natural oil, a mineral oil or a mixture thereof.

13. A composition as claimed in any preceding claim, wherein said wax includes a natural wax, a synthetic wax, a mineral wax or a mixture thereof.

14. A composition as claimed in any preceding claim, wherein said emulsifying agent includes nonionic emulsifiers.

15. A composition as claimed in any one of claims 1 to 13, wherein said emulsifying agent comprises nonionic water in oil (W/O) emulsifiers.

16. A composition as claimed in any preceding claim, wherein said emulsifying agent comprises sorbitan stearate.

17. A composition as claimed in any one of claims 1 to 15, wherein said

17. A composition as claimed in any one of claims 1 to 15, wherein said emulsifying agent comprises polyglyceryl-2 dipolyhydroxystearate.

18. A composition as claimed in any preceding claim, wherein said composition has a melting point between about 30 and about 80 °C.

19. A composition as claimed in any one of claims 1 to 17, wherein said composition has a melting point between about 35 and about 75 °C.

20. A composition as claimed in any one of claims 1 to 17, wherein said composition has a melting point between about 40 and about 70 °C.

21. The use of the composition as claimed in any one of claims 1 to 20 in treating absorbent paper, wherein said composition is applied to at least one surface of said absorbent paper in an amount from about 0.1 to about 30 percent by weight of the dry paper.

22. The use of the composition as claimed in claim 21, wherein said composition is applied to said at least one surface of the paper in an amount from about 0.5 to about 25 percent by weight of the dry paper.

23. The use of the composition as claimed in claim 21, wherein said composition is applied to said at least one paper surface in an amount from about 1 to about 20 percent by weight of the dry paper.

24. An absorbent paper product having deposited on at least one surface thereof in an amount from about 0.1 to about 30 percent by weight of the dry paper a composition as claimed in any one of claims 1 to 20.

25. An absorbent paper product as claimed in claim 24, wherein said composition is present on said at least one surface of said absorbent paper in an amount from about 0.5 to about 25 percent by weight of the dry paper.

26. An absorbent paper product as claimed in claim 24, wherein said composition is present on said at least one surface of said absorbent paper in an amount from about 1 to about 20 percent by weight of the dry paper.

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 99 10 3169

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
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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
THE HAGUE	2 July 1999	Songy, O

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
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EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 99 10 3169

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