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(54) Title: HYGIENE PRODUCT

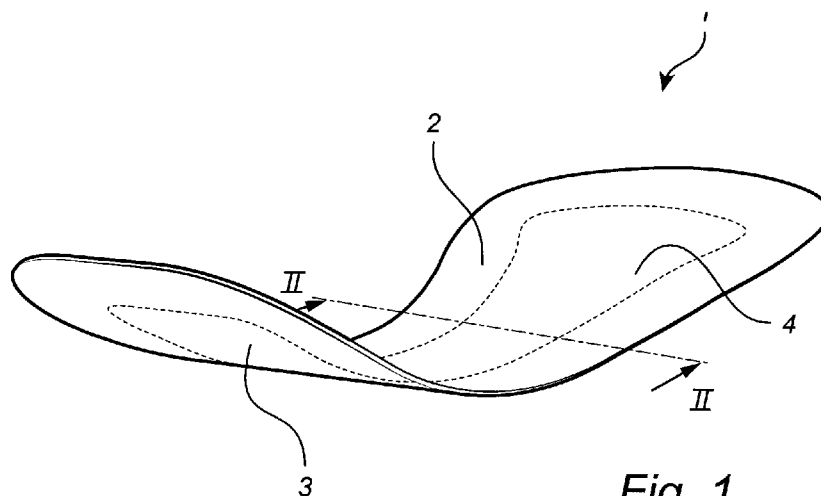


Fig. 1

(57) Abstract: The invention relates to a hygiene product such as an incontinence pad, a sanitary towel or a panty liner, wherein the hygiene product comprises a liquid-permeable surface material of nonwoven and a backing material, wherein at least one side of the liquid-permeable surface material of nonwoven is coated with wetting agent to increase its hydrophilicity. Furthermore, the liquid-permeable surface material of nonwoven is also coated, at least on the side that is coated with wetting agent, with allantoin and/or D-panthenol.



HYGIENE PRODUCT

5 TECHNICAL FIELD

The invention relates to a hygiene product such as an incontinence pad, a sanitary towel or a panty liner, the hygiene product comprising a liquid-permeable surface material of nonwoven, and a backing material.

10 BACKGROUND

For hygiene products such as incontinence pads, sanitary towels and panty liners, which are intended to lie in direct contact with the user's skin during use, high demands are made in respect of them being soft and comfortable to wear. Users who have trouble with discharges, for example, or problems with small quantities
15 of menstrual liquid that are secreted at irregular intervals, or for users that have milder incontinence problems with small quantities of urine that are secreted, it is often normal to use such a hygiene product on a daily basis. It is important, therefore, that such a product is discreet and flexible, so that it is as comfortable as possible to wear. Thin panty liners are flexible and can lie adjacent to the mucous
20 membrane/skin.

Due to the fact that more and more women are shaving off the hair in the genital area, this means that the skin sensitivity in the genital area is increasing. The hair acts as a shield against external mechanical stress, and creates an air gap be-
25 tween the skin/mucous membrane and the panty liner that contributes to a certain airiness. In those cases where the majority or all of the hair has been shaved off, the panty liner lies more closely against the skin and there is a greater risk that the area becomes moist. Such a moist environment carries an increased risk of bacterial growth. Skin that has been shaved can also be negatively affected by the
30 shaving itself due to mechanical irritation of the hair follicles, which means an increased risk of infections in the hair follicles. The risk of the user's skin becoming moist due to sealing around the user's genital area during use is a problem that can be experienced as uncomfortable for the user, since excess moisture in itself can produce skin irritation. Furthermore, the excess moisture can give rise to in-

creased penetration of other irritants and also increase the risk of bacterial growth with accompanying skin and odour problems.

Some people also have a more sensitive skin and suffer problems to a greater extent with skin irritations when using panty liners, sanitary towels and incontinence pads, while other users do not experience problems with skin irritations. There are several reasons why the skin becomes red and irritated. One reason for the skin becoming red and irritated is that the product can chafe against the user's skin, for example due to mechanical stress on the skin when the user is moving. Another reason for the skin becoming red and irritated is bacterial growth.

DESCRIPTION OF THE INVENTION

The problem of achieving a panty liner, incontinence pad or a sanitary towel that is experienced as soft and comfortable to wear directly adjacent to the skin has been substantially avoided with the present invention.

People have skin types of varying sensitivity and so the tendency to get skin irritation when using hygiene products is not the same for all users. Persons with a sensitive skin type can react negatively to certain substances that persons with a less sensitive skin type can use without any problem. A panty liner, incontinence pad or towel that lies directly adjacent to the user's delicate skin in the genital area needs to have a surface material that is kind to the skin/mucous membrane. This is important especially for users who wear such a product in close proximity to the skin continuously, i.e. every day. A panty liner that does not generally affect the microclimate, i.e. the humidity conditions in the space between the skin and the panty liner, more than normal cotton briefs is desirable.

A hygiene product according to the invention, such as a panty liner, towel or incontinence pad is distinguished primarily by the fact that at least one side of the liquid-permeable surface material of nonwoven is coated with a wetting agent to increase its hydrophilicity, and that the liquid-permeable surface material of nonwoven is also coated with allantoin and/or D-panthenol. Allantoin is a chemical compound with the formula $C_4H_6N_4O_3$. It is also called 5-

ureidohydantoin or glyoxyldiureide. It is a diureide of glyoxylic acid. D-panthenol is a chemical compound with the formula $C_9H_{19}NO_4$. It is also called dexpanthenol and provitamin B₅. The chemical name is 2,4-Dihydroxy-*N*-(3-hydroxypropyl)-3,3-dimethylbutanamide. The active component, allantoin or D-panthenol, reduces the risk of any skin irritations. Allantoin is good for dry and sensitive skin and also helps to reduce the sensitivity to other substances, such as the wetting agent.

The hygiene product can be an absorbent product such as a panty liner, sanitary towel or incontinence pad. Furthermore, the hygiene product can also be a substantially non-absorbent hygiene product such as a thin panty liner.

The wetting agent can be anionic, cationic, nonionic or zwitterionic. Treating surface materials with wetting agents has long been a conventionally common way of treating surface material to increase the hydrophilicity. There are therefore several different types of wetting agents today that are conventional and are also kind to the skin. All the same, however, it has proved to be the case that such wetting agents can give rise to skin irritations among a certain group of users who have a particularly sensitive skin type. It is very valuable, therefore, that it has now turned out that an addition of allantoin and/or D-panthenol can reduce the skin irritant effect that the wetting agent causes in this group of users.

According to one embodiment, the quantity of allantoin and/or D-panthenol in relation to wetting agent is at least 1:20.

According to another embodiment, the quantity of wetting agent in relation to allantoin and/or D-panthenol is at most 20:1.

According to yet another embodiment, the wetting agent has a molecular weight that is lower than 1000 daltons.

According to one embodiment, the surface weight of the material is 10-150 g/m². According to yet another embodiment, the surface weight is 20-120 g/m², 30-120 g/m² or 30-90 g/m². For a nonwoven material that is dense and has a high surface weight, a greater quantity of tenside can be required to obtain a material that is

liquid-permeable. It is especially important, therefore, with an addition of allantoin and or D-panthenol for surface material that has a surface weight of over 20 g/m².

For a panty liner that does not comprise a separate intermediate absorbent structure, a suitable surface weight of the surface material is 20-120 g/m², 30-120 g/m² or 30-90 g/m².

The fibre thickness of the fibres in the nonwoven material can be 1.5 – 3.5 dtex or 2.5 – 3.0 dtex.

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According to one embodiment, the backing material is liquid-tight. Liquid-tight means that the material can resist the flow of liquid. It is advantageous, on the other hand, if the material is vapour-permeable, i.e. the backing material is liquid-tight but vapour-permeable. Vapour-permeable backing materials can consist, for example, of perforated films, microporous films, macroporous films, nanoporous films, monolithic films, polyethylene-filled films or nonwovens and laminates thereof. Examples of nonwoven laminates are laminates of spunbond and meltblown, for example SMMS laminate (spunbond-meltblown-meltblown-spunbond-laminate) or SMS-laminate (spunbond-meltblown-spunbond-laminate). The liquid-tight backing material can also include renewable material in the form of PLA, starch or the like. For users who use panty liners on a daily basis and are aiming for freshness, but do not need the panty liner to absorb any great quantity of liquid, on the other hand, a liner that has a high airiness and/or high water vapour permeability is desirable. A panty liner that does not substantially affect the humidity conditions that prevail in the intermediate space between skin and panty liner more than normal cotton briefs is desirable. A breathable backing material contributes to the fact that perspiration generated by the skin will be able to leave the surface of the skin, which produces a less moist skin surface, which in turn reduces the risk of undesirable bacterial growth and reduces the risk of irritants penetrating the skin.

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For a thin panty liner that is substantially non-absorbent, the backing can be a more open structure with a higher breathability/vapour permeability than for an absorbent panty liner or incontinence pad that should be able to receive and absorb more liquid.

The vapour permeability of the backing material is preferably greater than 3000 g/m²/24h, measured according to a standard method from EDANA, WSP 70.6(09) part 2 – “Standard Test Method for Measuring the Moisture Vapor Transmission
5 Rate by the Principle of Measuring the Time to Increase Humidity”. The apparatus is available from Lyssy Instruments.

According to one embodiment, the panty liner comprises a surface material and a backing material, but no separate absorbent structure in between. For a panty liner
10 that is primarily intended to protect the underlying briefs from becoming soiled due to the secretion of very small quantities of bodily fluid, for example discharges, a panty liner without any separate absorbent structure placed between the surface material and the backing material can function satisfactorily. One advantage of a panty liner of this kind is that it is very thin, flexible, pliable and discreet to wear.
15 For such a panty liner the surface material of nonwoven can have a surface weight that is 20-120 g/m². According to one embodiment, the surface weight is 30 – 120 g/m², or 30-90 g/m². An example of nonwoven material is spunlace material, but it is also possible, of course, to use other types of nonwoven material such as spun-bond, meltblown, carded or a laminate of several nonwoven layers of the same
20 type or different types. For a panty liner that does not contain a separate absorbent structure, the backing material according to one embodiment is thinner than the surface material.

According to another embodiment, the hygiene product includes an absorbent
25 structure placed between the surface material and the backing material. The absorbent structure can consist of one or more layers, which can be fibre-based or foam-based. The absorbent structure can be constructed of an upper liquid-receiving layer placed next to the surface material, and one or more underlying liquid-storing layers. The liquid-receiving layer has the purpose of being able to re-
30 ceive a large quantity of liquid quickly, the liquid then being stored in the liquid-storing layer/layers. The absorbent structure can also include superabsorbent particles, for example a mixed structure of cellulose fibres and superabsorbent particles, or a laminate comprising superabsorbent particles enclosed between a nonwoven placed on either side. The absorbent structure is preferably thin and

has a thickness that is less than 1.5 mm, more preferably less than 1.0 mm. The surface weight of the absorbent structure can be 30-300 g/m², or 30-200 g/m². Furthermore, the absorbent structure can be acidified, either the liquid-receiving layer or the liquid-storing layer/layers or the whole absorbent structure can be acidified. An acidified absorbent structure is advantageous since the relatively low pH inhibits bacterial growth. It is also possible to have superabsorbent material with a low pH in order to inhibit bacterial growth in such a way.

According to one embodiment, the hygiene product has a thickness that is less than 2.0 mm, or less than 1.5 mm. For a very discreet and flexible panty liner, the thickness can be 0.5-1.0 mm. The thickness of the panty liner is measured at a pressure of 0.5 kPa, using a measuring foot that has the dimensions 45 x 45 mm. The measurement is performed on the central part of the panty liner, starting out from the centre point of the panty liner, the centre point being the point of intersection between the longitudinal centre line in the plane of the panty liner and the transverse centre line in the plane of the panty liner.

According to one embodiment, the absorbent structure includes particulate material. Examples of particulate material are superabsorbent particles, active carbon, zeolites, citric acid, silica and "clays". Particulate material can be added to improve a function, for example the absorbent capacity and/or the odour-/bacteria-inhibiting function. In cases where the absorbent product includes particulate material, it is often desirable to have a relatively tight surface material, since it is essential that the particles/powder do not trickle out of the product.

The nonwoven material includes preferably fibres and/or filaments of a hydrophobic polymer. Polyolefins are an example of hydrophobic polymers. The nonwoven material can also include renewable material, for example PLA or starch. The nonwoven material can also include absorbent fibres.

According to yet another embodiment, the wetting agent also includes a further one or more active substances apart from allantoin and/or D-panthenol, such as aloe vera, camomile, vitamin E or silk amino acids, for example.

According to one embodiment, the total quantity of allantoin and/or D-panthenol is at least 50 ppm and a maximum of 5.0 per cent by weight, calculated on the weight of the wetting agent.

- 5 To produce a liquid-permeable surface material of nonwoven according to the invention, allantoin and/or D-panthenol can be added to a wetting agent solution, following which the wetting agent solution containing allantoin and/or D-panthenol is applied to at least one of the two sides of the nonwoven material. The wetting agent solution that contains allantoin and/or D-panthenol is applied preferably by
10 spraying technology, for example it can be added to the nonwoven material through kiss roll foam spray.

It is also possible to manufacture a liquid-permeable surface material according to the invention by first applying the wetting agent to at least one of the two sides of
15 the nonwoven material, following which a solution containing allantoin and/or D-panthenol is applied to at least one of the two sides of the nonwoven material. The solution containing allantoin and/or D-panthenol is applied preferably to the same side of the nonwoven material as the wetting agent was applied to.

20 BRIEF DESCRIPTION OF FIGURES

Fig. 1 shows a panty liner according to the invention, seen from the side that is intended to lie closest to the user during use.

- 25 Fig. 2A shows a cross section of the panty liner according to fig. 1.

Fig. 2B shows a cross section of an alternative embodiment of a panty liner according to the invention.

30 DESCRIPTION OF FIGURES

Fig. 1 shows a panty liner 1 according to the invention, seen from the side that is intended to lie closest to the user during use. The panty liner 1 has a liquid-permeable surface material 2 of nonwoven material, a backing material 3, and an

absorbent structure 4 enclosed between the surface material 2 and backing material 3. Examples of backing material are a vapour-permeable polyethylene film with CaCo_3 , or nonwoven laminate such as SMS or SMMS, for example. The surface material of nonwoven material is coated with wetting agent. Furthermore, the surface material of nonwoven material is also coated with allantoin and/or D-panthenol. The absorbent structure 4 in fig. 1 consists of one layer, which is fibre-based or foam-based.

Fig. 2A shows a cross section of the panty liner in fig. 1, with an absorbent structure 4 enclosed between the surface material 2 and the backing material 3.

Fig. 2B shows a cross section of an alternative construction of a panty liner, the panty liner being constructed only from a surface material 2 and a backing material 3, it being visible that the thickness of the surface material 2 is greater than the thickness of the backing material 3. The surface weight of the surface material can be 20-120 g/m², 30-120 g/m², or 30-90 g/m². Examples of nonwoven material are spunlace material, but it is also possible, of course, to use other types of nonwoven material such as spunbond, meltblown, carded or a laminate of several nonwoven layers of the same type or different types. The backing material is preferably vapour-permeable with a vapour permeability greater than 3000 g/m²/24h.

EXAMPLE

Method of determining anti-irritation in-vitro

Skin irritation causes the release of the substance IL-1alpha from the skin tissue. This means that the higher the amount of IL-1alpha that is released, the greater the skin irritation that the substance being tested gives rise to.

Execution

EpiDermTM tissue from Mattek Corp, Ashland, was used. The tissue consists of normal human epidermal keratinocytes that were cultivated to form a differentiated model, with several different layers, of human epidermis. After the tissue was supplied, it was incubated overnight in an incubator at a temperature of 37°C and with a carbon dioxide content of 5%. 100 µl of a phosphate buffer solution (PBS, phos-

phate buffered saline) containing 5.0% of the test substance was dosed topically to the EpiDermTM tissue. Apart from the test substance, the phosphate buffer contained 5.0% wetting agent. The wetting agent we used has the brand name NUWET 237 and is a non-ionic wetting agent. All test solutions were tested on two or three skin tissues. One test solution contained only wetting agent and was used as a positive control, which other test solutions were compared with. The solution with only phosphate buffer, without the addition of either wetting agent or test substance, acted as a negative control. Following the addition of the respective test solution, the tissues were stored in the incubator.

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The content of liberated IL-1 α in the tissues' medium was measured after 2 hours, 5 hours and 24 hours, or alternatively after 2 hours and 24 hours.

The quantity of IL-1 α was then determined with an "Immunoassay kit", Quantikine, R&D Systems. A microplate coated with a monoclonal antibody that is specific for IL-1 α was used. The test solutions were added to the plate and the IL-1 α that was present in the solution bound itself to the antibody on the microplate. The unbound material was washed off and a solution with the detection antibody was added (enzyme-linked polyclonal antibody) that is specific for IL-1 α . Then a substrate solution was added that becomes coloured in contact with the detection antibody. The intensity of the colour formed is proportional to the quantity of IL-1 α . The intensity of the colour was then measured spectrophotometrically.

Two experiments were conducted. In experiment 1, the following substances were tested: D-panthenol, betain, bisabolol, glycerol, niacinamide, phosphate-buffered saline solution and wetting solution only without the added substance. The IL-1 α response was measured after 2 hours, 5 hours and 24 hours.

Results of experiment 1

	Material	IL-1alpha response (n=2 for all)		
		2 hrs	5 hrs	24 hrs
5				
	1. D-panthenol and wetting agent	3.8	5.41	6.6
	2. Betain and wetting agent	3.7	7.6	32.5
	3. Bisabolol and wetting agent	4.5	8.6	422.4
	4. Glycerol and wetting agent	3.4	2.3	38
10	5. Niacinamide and wetting agent	4.2	4.7	35.3
	6. Phosphate buffered saline	2.6	2.0	3.5
	7. Wetting agent	2.6	2.2	27.8

The results of experiment 1 show that only D-panthenol reduces the skin irritant effect that is caused by the wetting agent.

In experiment 2, D-panthenol, allantoin, phosphate buffered saline solution and purely a wetting agent solution without the added substance were tested. The IL-1alpha response was measured after 2 hours and after 24 hours.

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Results of experiment 2

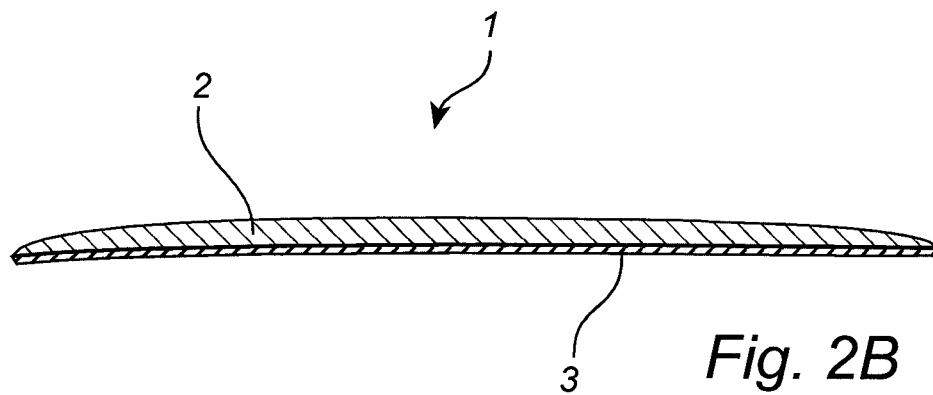
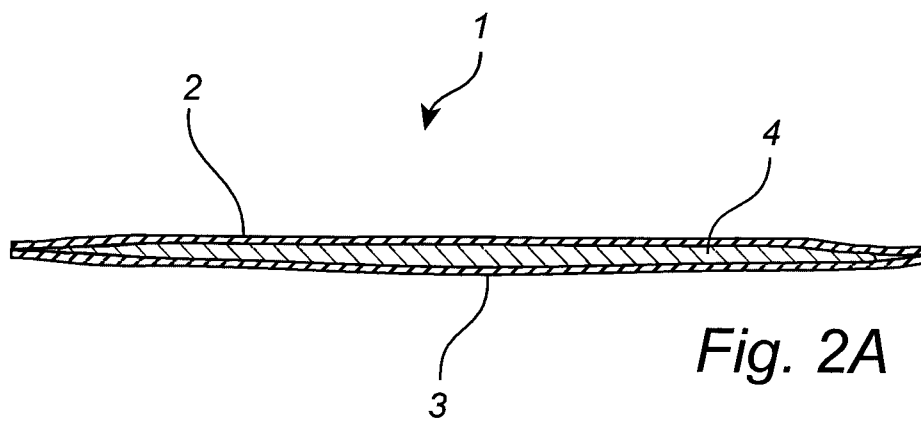
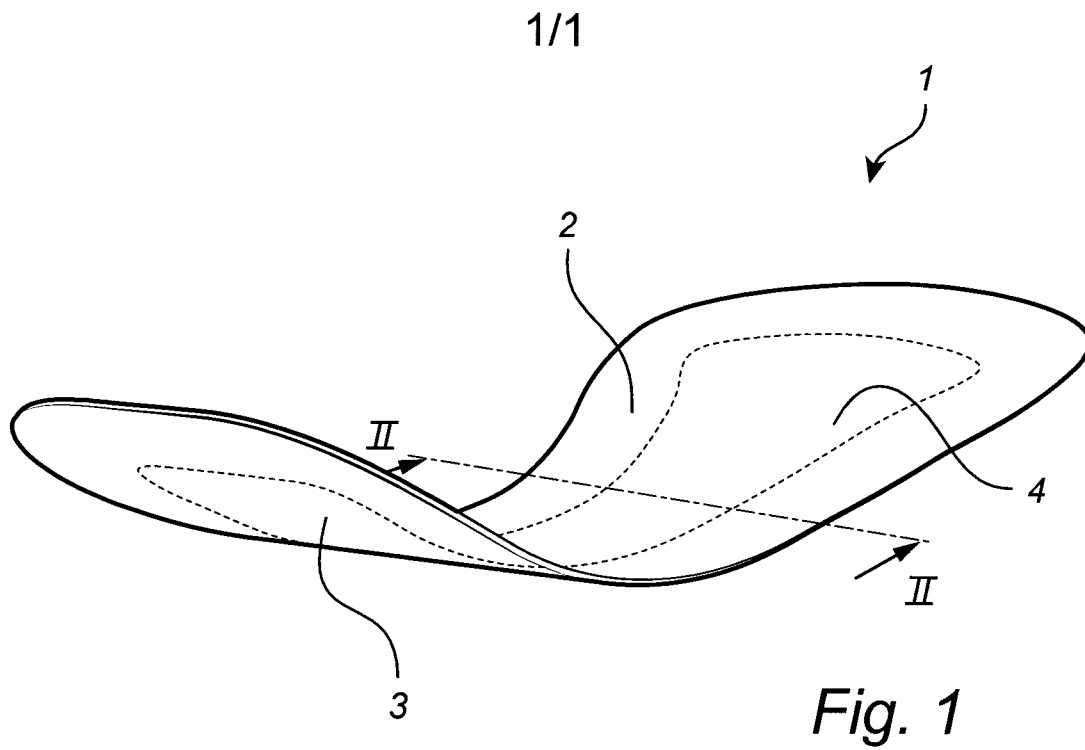
	Material	IL-1alpha response (n=2 for all)	
		2 hrs	24 hrs
25			
	1. Allantoin and wetting agent	6.2	68.5
	2. D-panthenol and wetting agent	7.0	71.6
	3. Phosphate buffered saline	4.9	10.1
	4. Wetting agent	1.7	106.9

The results of experiment 2 show that both D-panthenol and allantoin reduce the skin irritant effect caused by the wetting agent.

CLAIMS

1. Hygiene product such as a panty liner, sanitary towel or an incontinence pad, wherein the hygiene product comprises a liquid-permeable surface material
5 of nonwoven and a backing material, wherein at least one side of the liquid-permeable surface material of nonwoven is coated with wetting agent to increase its hydrophilicity, **characterised by** that the liquid-permeable surface material of nonwoven is also coated, at least on the side that is coated with wetting agent, with allantoin and/or D-panthenol.
10
2. Hygiene product according to claim 1, wherein the quantity of allantoin and/or D-panthenol in relation to the wetting agent is at least 1:20.
3. Hygiene product according to claim 2, wherein the quantity of wetting
15 agent in relation to allantoin and/or D-panthenol is at most 20:1.
4. Hygiene product according to one of the preceding claims, wherein the liquid-permeable surface material of nonwoven is also coated with a further one or more active substances, such as aloe vera, camomile, vitamin E or silk amino acids, for example.
20
5. Hygiene product according to any of the preceding claims, wherein the total quantity of allantoin and or D-panthenol is at least 50 ppm and a maximum of 5.0 per cent by weight calculated on the weight of the wetting agent.
25
6. Hygiene product according to any of the preceding claims, wherein the absorbent structure includes particulate material.
7. Hygiene product according to any of the preceding claims, wherein the
30 wetting agent has a molecular weight that is lower than 1000 daltons.

8. Hygiene product according to any of the preceding claims, **characterised by** that the backing material is vapour-permeable and has a vapour permeability that is greater than $3000 \text{ g/m}^2/24\text{h}$.
9. Hygiene product according to the preceding claims, **characterised by** that
5 the backing material is a nonwoven laminate, for example spunbond-meltblown-spunbond (SMS) or spunbond-meltblown-meltblown-spunbond.
10. Hygiene product according to any of claims 1-9, **characterised by** that the surface weight of the surface material is between 20 g/m^2 and 120 g/m^2 .
- 10 11. Hygiene product according to any of claims 1-10, **characterised by** that the surface weight of the surface material is between 30 g/m^2 and 90 g/m^2 .
12. Hygiene product according to any of the preceding claims, **characterised**
15 **by** that the hygiene product is a panty liner and that one side of the surface material is in direct contact with the underlying backing material.
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INTERNATIONAL SEARCH REPORT

International application No.
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A. CLASSIFICATION OF SUBJECT MATTER

IPC: see extra sheet

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: A61F, A61L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE, DK, FI, NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, PAJ, WPI data, CHEM ABS Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 2103315 A2 (PROCTER & GAMBLE), 23 September 2009 (2009-09-23); abstract; claims 1, 4-11; paragraphs [0037]-[0038], [0051]-[0053] --	1-12
X	US 6559353 B (SHERIDAN CHRISTOPHER H), 6 May 2003 (2003-05-06); abstract; column 5, line 46 - line 56; column 6, line 5 - line 38; column 9, line 62 - column 10, line 25 --	1-12
A	US 6570054 B (GATTO JOSEPH ANTHONY ET AL), 27 May 2003 (2003-05-27); column 10, line 7 - line 28; column 16, line 24 - line 32; column 28, line 50 - column 29, line 6; claims 1, 11-12 --	1-12

☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:

“A” document defining the general state of the art which is not considered to be of particular relevance

“E” earlier application or patent but published on or after the international filing date

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Date of the actual completion of the international search

05-03-2014

Date of mailing of the international search report

05-03-2014

Name and mailing address of the ISA/SE

Patent- och registreringsverket

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INTERNATIONAL SEARCH REPORT

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6087551 A (PEREIRA JOSE ANTONIO), 11 July 2000 (2000-07-11); abstract --	1-12
A	WO 2005035013 A1 (KIMBERLY CLARK CO ET AL), 21 April 2005 (2005-04-21); abstract; claim 10; paragraphs [0039]- [0041] --	1-12
A	WO 9705909 A2 (PROCTER & GAMBLE), 20 February 1997 (1997-02-20); abstract; page 36, line 24 - page 37, line 12 --	1-12
A	WO 9824391 A2 (PROCTER & GAMBLE), 11 June 1998 (1998-06-11); abstract; claims 15-18; page 36 fifth paragraph --	1-12
A	US 4668566 A (BRAUN RALPH V), 26 May 1987 (1987-05- 26); abstract; column 2, line 10 - line 26 -- -----	1-12

Continuation of: second sheet**International Patent Classification (IPC)****A61F 13/511** (2006.01)**A61L 15/44** (2006.01)**A61F 13/84** (2006.01)**A61L 15/48** (2006.01)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

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