



Industria y Comercio

S U P E R I N T E N D E N C I A

Delegatura de propiedad Industrial

División de Nuevas Creaciones

PCT

SOLICITUD

PATENTE DE INVENCION

21. EXPEDIENTE No.

06-59313

54. TÍTULO

UN MATERIAL BOMPUESTO NO TEJIDO QUE CONTIENE

FILAMENTOS CONTINUOS Y FIBRAS CORTAS

51. CLASIFICACIÓN INTERNACIONAL

71. SOLICITANTE

SCA HYGIENE PRODUCTS AB

DOMICILIO

GOTEBORG, SUECIA

74. APODERADO

EMILIO FERRERO

C.C. 438.019 de Usaquén

22. BOGOTÁ, D. C.,

Publicado
F.N. 18-07-2006


Industria y Comercio

SUPERINTENDENCIA

PETITORIO

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO
 Rad: 06-059313- -00000-0000
 F&C 2005-06-16 17:55:42 Dep. 2020 NUEGRACIONES
 Tra. 11 PATENTE IYI
 Ene. 379 FASE NACIONAL IYI
 Act 411 PRESENTACION Folios: 85

FORMULARIO UNICO DE SOLICITUD DE PATENTE
PCT
ENTRADA EN FASE NACIONAL

SOLICITUD DE:

- 1 ☒ Patente de Invención. ☐ Patente de Modelo de Utilidad.
☐ Capítulo I. ☒ Capítulo II.

2 SOLICITANTE (71)	Nombre: SCA HYGIENE PRODUCTS AB sociedad constituida y existente bajo las leyes de: Suecia. Dirección: 405 03 Göteborg Suecia Domicilio: Göteborg, Suecia.	IDENTIFICACIÓN C.C. ☐ NIT ☐ C.E. ☐ Otro ☐ Cual _____ Número _____				
3 REPRESENTANTE O APODERADO	Nombre: EMILIO FERRERO Dirección: Carrera 4ª. No. 72-35 Teléfono: 347 36 11 Fax: 211 86 50 E-mail: <u>clientes@camyp.com.</u> Domicilio: Bogotá, Colombia.	IDENTIFICACIÓN C.C. ☒ NIT ☐ C.E. ☐ Otro ☐ Cual _____ Número <u>438.019</u> T.P <u>31.929</u>				
4 INVENTOR (ES) (72)	<table border="0"> <tr> <td> 1. Lars FINGAL Uddevallaplatsen 12, 416 70 Göteborg Suecia </td> <td> 2. Anders STRALIN Andalen 95, 423 38 Torslanda Suecia </td> </tr> <tr> <td> 3. Hannu AHONIEMI Prästgardsvägen 16, 438 36 Landvetter Suecia </td> <td> 4. Mikael STRANDQVIST Dälavägen 87, 437 36 Lindome Suecia </td> </tr> </table>		1. Lars FINGAL Uddevallaplatsen 12, 416 70 Göteborg Suecia	2. Anders STRALIN Andalen 95, 423 38 Torslanda Suecia	3. Hannu AHONIEMI Prästgardsvägen 16, 438 36 Landvetter Suecia	4. Mikael STRANDQVIST Dälavägen 87, 437 36 Lindome Suecia
1. Lars FINGAL Uddevallaplatsen 12, 416 70 Göteborg Suecia	2. Anders STRALIN Andalen 95, 423 38 Torslanda Suecia					
3. Hannu AHONIEMI Prästgardsvägen 16, 438 36 Landvetter Suecia	4. Mikael STRANDQVIST Dälavägen 87, 437 36 Lindome Suecia					
5 PCT (86) Solicitud Internacional No. <u>PCT/SE2004/001698</u> Fecha: <u>19 de noviembre de 2004</u> Publicación Internacional No. <u>WO 2005/059218 A1</u> Fecha: <u>30 de junio de 2005</u>						
6 TÍTULO (54) <u>UN MATERIAL COMPUESTO NO TEJIDO QUE CONTIENE FILAMENTOS</u> <u>CONTINUOS Y FIBRAS CORTAS</u>						
7 Clasificación Internacional (51) D04H 1/46						
8 Prioridad SI ☒ NO ☐	(33) País de Origen <u>SE</u>	(32) Fecha <u>18 de diciembre de 2003</u>				
(31) Número de Solicitud <u>0303413-9</u>						
9 Comprobante de pago No.: <u>06- 44.157</u> Fecha: <u>12 de junio de 2006</u>						

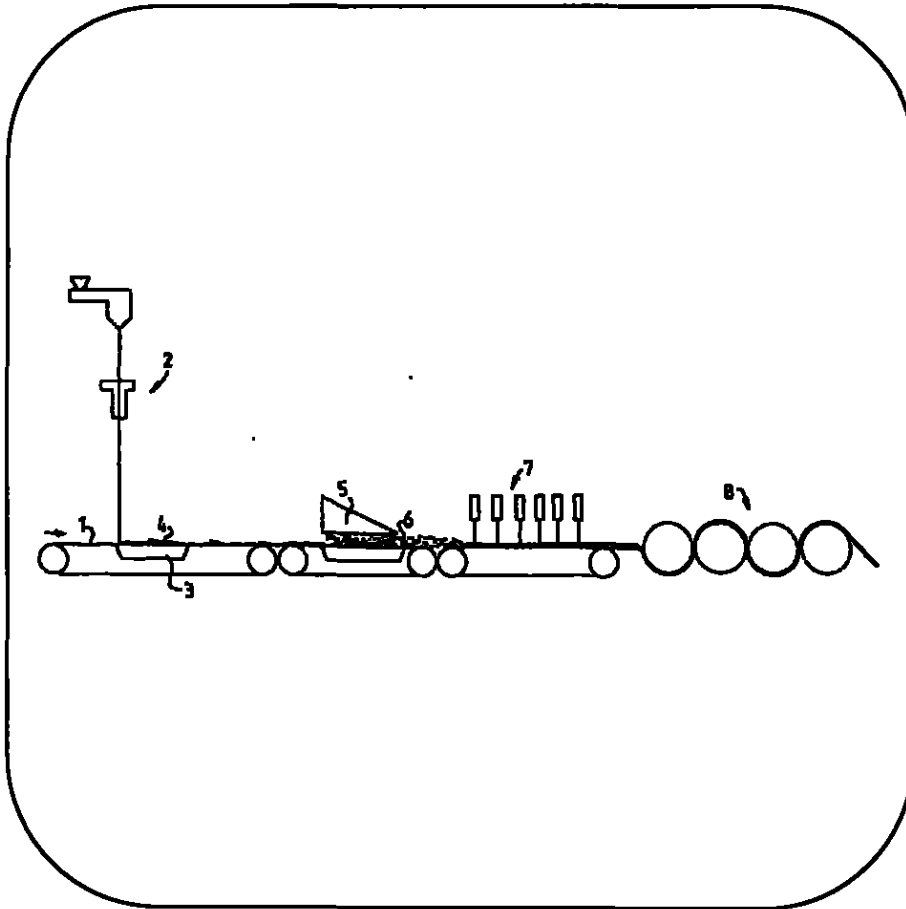
10

An x s:

- ☒ Comprobante de pago de la tasa de presentación de la solicitud por \$ 463.000.00.
- ☐ Comprobante de pago por reivindicación de prioridad.
- ☒ Documento que acredita la existencia y representación legal cuando el solicitante sea persona jurídica.
- ☒ Poderes, si fuere el caso.
- ☐ Documento de cesión del inventor al solicitante o a su causante.
- ☐ Declaraciones.
- ☒ Copia de la solicitud internacional. (Resumen, descripción, reivindicaciones, dibujos)
- ☒ Traducción de la solicitud internacional al castellano. (Resumen, descripción, reivindicaciones, dibujos)
- ☒ Copia del examen preliminar efectuado por la IPEA.
- ☐ Traducción del examen preliminar efectuado por la IPEA.
- ☐ De ser el caso, copia del contrato de acceso.
- ☐ De ser el caso, documento que acredite la licencia o autorización de uso de conocimientos tradicionales de las comunidades indígenas.
- ☐ De ser el caso, certificado de depósito del material biológico.
- ☒ Arte final 12x12
- ☐ De ser el caso, información sobre otras solicitudes de patente o títulos obtenidos en el extranjero por el mismo titular o su causante, relacionadas parcial o totalmente con la invención de esta solicitud.
- ☒ Otros: VER HOJA DE DOCUMENTOS ANEXOS

11

FIGURA CARACTERÍSTICA



12

Solicito la concesión de la patente,

NOMBRE:

EMILIO FERRERO

FIRMA:

Emilio Ferrero

C.C. 438.019 de Usaquén T.P. 31.929

DOCUMENTOS ANEXOS

1. ☒ **Publicación Internacional WO 2005/059218 A1**

Descripción:

Páginas 20 en el idioma original

Páginas 22 en español

Reivindicaciones: Número (s) 14

Figuras: Número (s) 1

2. ☒ **Forma PCT/ISA/210. Informe de Búsqueda Internacional.**
3. ☒ **Forma PCT/ISA/237. Opinión Escrita De La Administración Encargada De La Búsqueda Internacional.**
4. ☒ **Respuesta a la Opinión Escrita De La Administración Encargada De La Búsqueda**
5. ☒ **Forma PCT/IPEA/401. PCT Demand**
6. ☒ **Extracto de publicación.**

**NO SE REALIZARON MODIFICACIONES EN LA FASE
INTERNACIONAL**

CAVELIER

ABOGADOS

BOGOTÁ, COLOMBIA

REPRESENTACION Y PODER

For patents, utility models, industrial designs, trademarks, commercial names, trade emblems, slogans.

Para patentes, modelos de utilidad, diseños industriales, marcas de fábrica, nombres comerciales, enseñas, lemas comerciales.

REPRESENTATION AND POWER OF ATTORNEY

27256
0334

I (we), the undersigned / Yo (nosotros), abajo firmado (s)
SCA HYGIENE PRODUCTS AB

of / domiciliado (s) en 405 03 Goteborg,
SWEDEN

por el presente nombramos a EMILIO FERRERO, tpa. 31929; GONZALO PERDOMO, tpa. 831; LUZ CLEMENCIA DE PAEZ, tpa. 23555 y GERMAN CAVELIER, tpa. 832, domiciliados en la Carrera 4ª N° 72-35, Bogotá, Colombia, en obediencia a lo dispuesto en el parágrafo 1º del Artículo 543 del Código de Comercio, el primero como principal y los demás como suplentes, en su orden, como mis (nuestros) representantes en todos los asuntos de propiedad industrial, con facultad para recibir notificaciones y nombrar apoderados judiciales o extrajudiciales. El primer representante suplente reemplazará al principal en caso de ausencia o impedimento temporal o definitivo de aquél. La misma regla se aplicará cuando el segundo representante suplente haya de reemplazar al primero, o el tercero al segundo. En tales casos, el representante principal, o el primero, o segundo suplente, en su caso, o ambos, declararán su intención de no ejercer la representación mediante declaración autenticada por Notario Público en Colombia, o por Notario u otro Funcionario Público, o Cónsul de Colombia, en el extranjero; y si se tratare de impedimento, con el certificado respectivo. Si alguno de los nombrados faltare definitivamente, el siguiente tomará su lugar. Cuando cesare la ausencia o impedimento del representante principal, o de su primero o segundo suplentes, en su caso, podrán ejercer la representación, en su orden, uno u otros según el caso, asumiéndola por el solo hecho de ejercerla, cesando en ese momento el ejercicio de la representación por el primero, segundo o tercer suplente en su caso.

Además, confiero (conferimos) poder a los abogados arriba nombrados, para obtener la protección de mi (nuestra) propiedad industrial y contra la competencia desleal, a cuyo efecto autorizo (amos) a los dichos apoderados para que me (nos) representen ante cualesquiera entidades o personas, ejerzan o no jurisdicción, especialmente ante las del orden administrativo, contencioso-administrativo y judicial; así como los tribunales de arbitramento, en todo lo concerniente a los siguientes asuntos: a) Obtención de patentes de invención, modelos de utilidad, y diseños industriales; el registro de marcas de fábrica, colectivas, defensivas, de servicio, lemas comerciales, nombres comerciales, enseñas, variedades vegetales y denominaciones de origen; su renovación, traspaso, cambio de nombre o domicilio, cancelación voluntaria; y el registro de licencias de uso de esos derechos; b) Las acciones de competencia desleal, protección del consumidor, oposiciones u observaciones, cancelación administrativa y judicial, nulidad, medidas cautelares, concesión de licencias, la tutela, la protección de secretos industriales, y en general los juicios civiles, penales, administrativos o contencioso-administrativos relacionados con estos derechos; acciones y procesos que promovamos o se nos promuevan. Y para que en todos los asuntos arriba determinados, puedan sustituir este mandato, transigir, conciliar, admitir los hechos del proceso, desistír, cancelar, recibir, renunciar, y ratificar los actos de agentes oficiosos.

in due compliance with the terms of paragraph 1st. of article 543 of the Commercial Code, do hereby appoint EMILIO FERRERO, tpa. 31929; GONZALO PERDOMO, tpa. 831; LUZ CLEMENCIA DE PAEZ, tpa. 23555 and GERMAN CAVELIER, tpa. 832, domiciled at Carrera 4ª N° 72-35, Bogotá, Colombia, the first as principal and the others as alternates, in the order of their appointment, as our representatives for all industrial property matters with faculty to receive notifications and to appoint attorneys in and out of Court. The first alternate shall replace the principal in case of his absence or of temporal or definitive impediment. The same rule will apply when the second alternate representative is to replace the first one, or when the third is to replace the first or second alternates in their turn, or both of them, second. In such cases, the principal representative, or the first or second alternates in their turn, or both of them, shall state their intention not to act as representatives through a declaration given before a Notary Public in Colombia, or before a Notary or another Public Official or a Colombian Consul abroad; and in case of impediment, the appropriate certificate shall suffice. If any of the appointees were to be definitely absent, the following alternate shall take his place. When the absence or impediment of the principal representative, or of the first or second alternate in their turn ceases, the representation can be taken again in their sequence, by the principal, the first or second alternate depending on case, and the mere fact of its exercise will suffice. The exercise of the representation by the first, second or third alternates in their turn shall end.

In addition, we authorize the above-named attorneys, so that they may obtain the protection of my (our) industrial property, and against the unfair competition, for which purpose I (we) authorize the said attorneys to represent me (us) before any authorities or persons, with or without jurisdiction, especially those administrative, administrative-contentious and judicial, as well as before Arbitration Court. In all matters concerning the following: a) Obtainment of patents, utility models and industrial designs; the registration of trademarks, collective, defensive and service marks, slogans, commercial names, trade emblems, vegetal varieties and denominations of origin; its renewal, assignment, change of name or domicile, voluntary cancellation; and the registration of licenses of use of the above rights; b) Actions of unfair competition, protection to the consumer, oppositions or observations, administrative or Court cancellation, nullity, infringement, granting of licenses, the action for writ mandamus, the protection of trade secrets, and in general the civil, penal, and administrative suits relating to those rights; actions and suits instituted by me (us) or against me (us). And that in all the above matters they may substitute this Power of Attorney, compromise, conciliate, admit the facts of the case, desist, cancel, receive, resign, and ratify acts done by representatives without a power of attorney.

Given and signed this / Dado y firmado hoy
Gothenburg 19 February 1999

In/en

TRADUCCION No. 170719

MARIA ELVIRA MARTELO
Traductora e Interprete Oficial
Inglés - Español - Inglés
Res. No. 2879 Min. Justicia

Signature

Firma

Bengt Forshult
Head of Patent Department

SCA Hygiene Products AB

CAVELIER ABOGADOS

PODERE-12 (MINUTA 11.1.2.5)

9:15
11 FEB 1999

9:

11 FEB 1999

LEGALIZATION

The Colombia Consul must issue a consular certificate, on (1) the legal existence of the company, which grants the Power-of-Attorney, (2) that it is in actual exercise of its company purposes, and (3) that the persons who execute the Power of Attorney is authorized to do so. To this effect, please show the Consul the evidence to prove the above facts (1), (2) and (3).

MARIA ELVIRA MARTELO
Traductora e Interprete Oficial
Inglés - Español - Inglés
Res. No. 2879 Min. Justicia

**MINISTERIO DE RELACIONES
EXTERIORES**

that Bengt Forshult

has personally signed this document overleaf, and

according to a Power of Attorney, dated 1998-08-11, signed by GUNNAR ANDERSSON and SVEN-ERIK WINLÖF, who are duly authorized to sign jointly for and on behalf of

SCA HYGIENE PRODUCTS AKTIEBOLAG - Org.No. 556007-2356

According to a Swedish Certificate of Registration, dated

1998-07-20, Bengt Forslund is duly authorized

to sign such a document on behalf of the company.

CGotthard, this 25th day of February 1999

Exp. No.: 79234

Fee: SEK 350

COMO NOTAMOS EN EL
DE BOGOTA, EL DO CONSTA DE UN
FOTOCOPIA COINCIDE CON EL ORIGINAL
QUE HE TENIDO A LA VISTA

10 MAY 2008

NO. 3066
The Ministry for Foreign
Affairs in Stockholm hereby
certifies that NOTARIO (E)
Mr. [Signature]

MP ~~Signature~~
Nogary Public of
Gatchary
has issued and signed the
foregoing attestation In his
official capacity

Fee Stockholm this 24th day of March

Kr ~~120~~ PAID 1977

Ingvar Högborg

MARIA SMITH RUEDA
Encargada de las Funciones Coni

Ficha

1999-03-05

F-10: Doc

quien firma el documento que antecede
 ejerce para el efecto de
 Representante
 de la Sociedad SCA Agrícola Productora
 Agrícola
 que existe en conformidad con las leyes de
 Agrícola
 según se me quedó en los documentos que
 tuve a la vista.

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Quelle sei: Zhang Torsino!

NOTA PARA EL SEÑOR CONSUL DE COLOMBIA: Según los artículos 65 del C. de P.C. y 480 del C. de Co., si el poderdante es una sociedad, el Señor Cónsul debe certificar que tuvo a la vista las pruebas de su existencia, que ejerce su objeto social y que quien confiere el poder es su representante.



Rept Forshult
Signature Firma

Bengt Forshult
Head of Patent Department

SCA Hygiene Products AB

O. CAVELIER ABOGADOS

PODERE-17 (MINUTA 1.1.2.5)

9:

EL AGUJE
MANUEL TIA

2006
FAD 12

[Handwritten signature]

JEFE
SCA

TRADUCCION No: 1707/99

MARIA ELVIRA MARTELO

Traductora e Interprete Oficial

Inglés - Español - Inglés

Res. No. 2879 Min. Justicia

MINISTERIO DE RELACIONES
EXTERIORES

202032
Miguel Smith Rueda
CUYA FIRMA APARECE EN EL
DOCUMENTO DESEMPEÑA
LAS FUNCIONES INDICADAS

MINISTERIO DE RELACIONES
EXTERIORES
019530
ANULADO
JEFE DE ASISTENCIA
SANTA FE DE BOGOTÁ D.C.
NO SE ASUME
RESPONSABILIDAD DEL TEXTO

COMO NOTARIO SIENTO EN DEL CIRCULO
DE BOGOTÁ, HAGO CONSTAR QUE LA
FOTOCOPIA COINCIDE CON EL ORIGINAL
QUE HE TENIDO A LA VISTA
10 MAY 2006
PABLO MENDEZ BARAJAS
NOTARIO (F)

NOTA PARA EL SEÑOR CONSUL DE COLOMBIA: Según los artículos 65 del C. de P.C. y 480 del C. de Co. si el poderdante es una sociedad, el Señor Cónsul debe certificar que tuvo a la vista las pruebas de su existencia, que ejerce su objeto social y que quien confiere el poder es su representante:



EL CONSULADO DE COLOMBIA EN
ESTOCOLMO, SUECIA

Fecha.....1999-07-01..... No: 1329

Previa la confrontación correspondiente DA
FE de que la firma que aparece en este docu-
mento es similar a la REGISTRADA aquí por

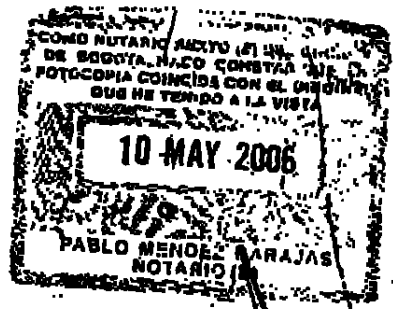
Ing. Höigberg, Mr. Telquinos
Subvires, Suecia

M. Smith
MARIA SMITH RUEDA
Encargada de las Funciones Consulares

PAGADO	
Impuesto de Timbre	
<u>Diez</u>	dólares US\$ <u>7</u>
Derechos Consulares	
<u>Quince</u>	dólares US\$ <u>15</u>



TRADUCCION No: 1709199
MARIA ELVIRA MARTELO
Traductora e Interprete Oficial
Inglés - Español - Inglés
Res. No. 2879 Min. Justicia



Bengt Forshult
Signature Firma

Bengt Forshult
Head of Patent Department

SCA Hygiene Products AB

CAVELIER ABOGADOS
PROPODERE-17 (MINUTA 121.1.25)

ASUME
IN EL TEX

9:

10:00
12:00

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JEFE
EPA

TRADUCCION No.: 707199

MARIA ELVIRA MARTELO
Traductora e Interprete Oficial
Inglés - Español - Inglés
Res. No. 2879 Min. Justicia

MINISTERIO DE RELACIONES
EXTERIORES

202032
Mglio Smith Rueda
CUYA FIRMA APARECE EN EL
DOCUMENTO DESEMPENA
LAS FUNCIONES INDICADAS

MINISTERIO DE RELACIONES EXTERIORES
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JEFE DE ASISTENCIA
SANTIA DE AGOTADO
LAS FUNCIONES INDICADAS
DOCUMENTO DESEMPENA
CUYA FIRMA APARECE EN EL
RESPONSABILIDAD DEL TEXTO
NO SE ASUME

COMO NOTARIO SECTO (E) DEL CIRCULO
DE BOGOTA, HAGO CONSTAR QUE LA
FOTOCOPIA CONCIERNE CON EL ORIGINAL
QUE HE TENIDO A LA VISTA
10 MAY 2006
PABLO MENDEZ BARAJAS
NOTARIO (E)

TRADUCCIÓN OFICIAL No. 17.07/99 preparada por **María Elvira Martelo**, Traductora Oficial aprobada por el Ministerio de Justicia por Resolución 2879 de 1995 y reconocida por el Ministerio de Relaciones Exteriores.

(A continuación se traducen los sellos y legalizaciones de un documento escrito en inglés y español, por el cual **SCA HYGIENE PRODUCTS AB** otorga poder a **EMILIO FERRERO, GONZALO PERDOMO, LUZ CLEMENCIA DE PAEZ Y GERMAN CAVELIER**). Dado y firmado el 19 de febrero de 1999 en Gothenburg. (Firma ilegible) **Bengt Forshult**, Jefe del Departamento de Patentes.

Yo, el abajo firmante **RICKARD STRÖM**, Notario Público de Gothenburg, Suecia, por el presente certifico

que **Bengt Forshult**

ha firmado personalmente el documento anterior

que de acuerdo con el poder de fecha 1998-08-11, firmado por

GUNNAR ANDERSSON y **SVEN-ERIK WINLÖF**, quienes están debidamente

autorizados para firmar conjuntamente por y a nombre de **SCA**

HYGIENE PRODUCTS AKTIEBOLAG - Org. No. 556007-2356; según

Certificado de Registro Sueco de fecha 1998-07-20, **Bengt Forshult** está

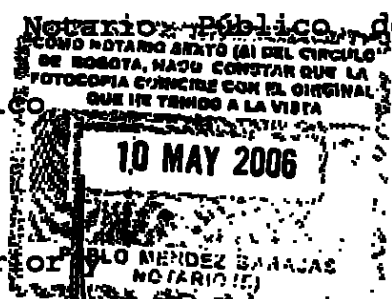
debidamente autorizado para firmar dicho documento a nombre de la compañía.

Gothenburg, 25 de febrero de 1999.

Ex officio: (Firma ilegible), **RICKARD STRÖM** (Sello notarial).

Exp. No.: 79234

Derechos: SEK 350:--



No. 3066

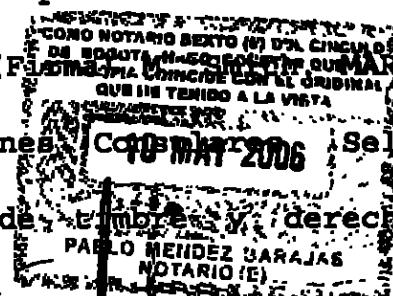
El Ministerio de Relaciones Exteriores en Estocolmo por el presente certifica que el Sr. Rickard Ström, Notario Público de Goteborg, ha expedido y firmado la declaración anterior en su capacidad oficial.

Derechos Estocolmo, 25 de marzo

Kr. 120 PAGADOS de 1999

(Firma ilegible) Inger Högberg. (Sello en tinta) Ministerio de Relaciones Exteriores.

(En español) Certificación de la capacidad legal de Bengt Forshult y de la existencia legal de SCA HYGIENE PRODUCTS AKTIEBOLAG expedida el 5 de marzo 1999 por el Consulado de Colombia en Estocolmo bajo el No. 022. (Firma) MARÍA SMITH RUEDA, Encargada de las Funciones Consulares. Sello consular en tinta. Pagados impuesto de timbre y derechos consulares.



(En español) Certificación de la firma de Inger Högberg, Ministerio de Relaciones Exteriores, Suecia, expedida el 01 de julio de 1999 por el Consulado de Colombia en Estocolmo bajo el No. 001329. (Firma) M. Smith. MARÍA SMITH RUEDA, Encargada de las Funciones Consulares. Sello consular en tinta. Pagados impuesto de timbre y derechos consulares.

(Al anverso) Legalización de la firma que antecede expedida por

el MINISTERI DE RELACIONES EXTERIORES bajo el No. 119916 del 14
de febrero del 2000, firmado por el Jefe de Legalizaciones.

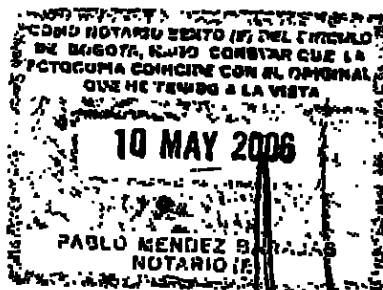
Es traducción fiel y completa de la cual se deja copia en esta
oficina para su confrontación.

COLO 11256-801-014-7

Id. 108

Feb. 15/00

Maria Elvira Martelo
TRADUCCION No. 170799
MARIA ELVIRA MARTELO
Traductora e Interprete Oficial
Ingles - Español - Ingles
Res. No. 2879 Min. Justicia



MINISTERIO DE RELACIONES EXTERIORES
220552
CIJRA 608720
CUYA FIRMA APARECE EN EL DOCUMENTO SE EMPEÑA
A LAS FUNCIONES INDICADAS
RESPONSABLE DEL CENTRO
Jefe de LEGALIZACIONES
SANTAFÉ DE BOGOTÁ
2000 FEB 15/00 12:02
A. SE ASUME

COMO NOTARIO SEXTO DEL CIRCULO DE SANTAGO DE BOBOTA, HAGO CONSTAR QUE LAS FIRMAS DE

[Firma]

[Firma]

COINCIDEN CON LA FIRMA REGISTRADA POR EL (ELLOS) EN ESTA NOTARIA

SANTAGO DE BOBOTA

16 FEB 2006



COMO NOTARIO SEXTO (O DEL CIRCULO) DE BOBOTA, HAGO CONSTAR QUE LA FOTOCOPIA COINCIDE CON EL ORIGINAL QUE HE TENIDO A LA VISTA

10 MAY 2006

PAULO MENDEZ BARAJAS
NOTARIO(E)

10 MAY 2006

0225

05 05 05

05 05 05

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
30 June 2005 (30.06.2005)

PCT

(10) International Publication Number
WO 2005/059218 A1

(51) International Patent Classification⁷: D04H 1/46, 5/02

(21) International Application Number:
PCT/SE2004/001698

(22) International Filing Date:
19 November 2004 (19.11.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
0303413-9 18 December 2003 (18.12.2003) SE

(71) Applicant (for all designated States except US): SCA HY-
GIENE PRODUCTS AB (SE/SE); S-405 03 Göteborg
(SE).

(72) Inventors: FINGAL, Lars; Uddevallaplatsen 12, S-416
70 Göteborg (SE). STRÅLIN, Anders; Andalen 95, S-423
38 Torslanda (SE). AHONIEMI, Hannu; Prästgårdsvägen
16, S-438 36 Landvetter (SE). STRANDQVIST, Mikael;
Dålavägen 87, S-437 36 Lindome (SE).

(74) Agent: ALBIHNS STOCKHOLM AB; P.O. Box 5581,
Linnégatan 2, S-114 85 Stockholm (SE).

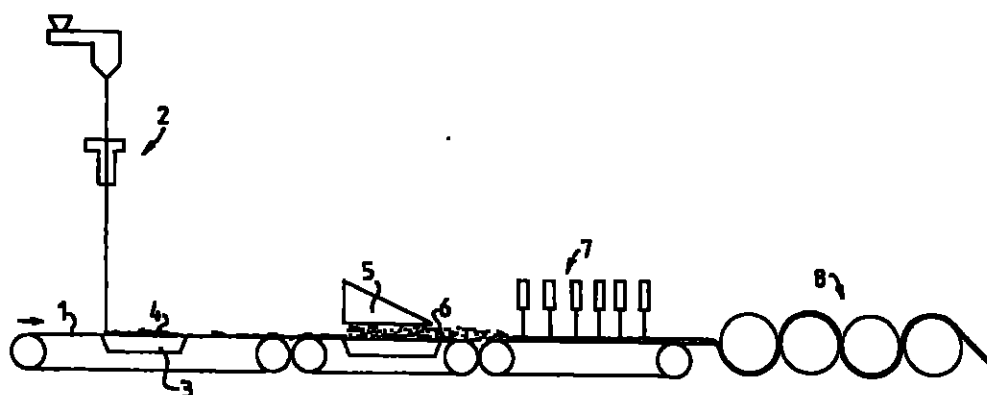
(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,
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(54) Title: A COMPOSITE NONWOVEN MATERIAL CONTAINING CONTINUOUS FILAMENTS AND SHORT FIBRES



(57) Abstract: The present invention relates to a nonwoven material consisting of a mixture containing continuous filaments and short fibres, the continuous filaments being substantially mechanically bonded to each other due to entangling of fibres and filaments. According to the invention the continuous filaments in the material have a projected coverage of at least 1.1 and not more than 1.7. The invention also relates to a method of manufacturing such a nonwoven material.

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A composite nonwoven material containing continuous filaments and short fibres

TECHNICAL FIELD

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The present invention relates to a composite nonwoven material containing continuous filaments and short fibres and a method of manufacturing a nonwoven material comprising the steps of laying a layer of fibres onto a web of unbonded continuous filaments, hydroentangling the layers consisting of continuous filaments and fibres to form a composite nonwoven material and thereafter drying the material.

10

BACKGROUND OF THE INVENTION

15 A nonwoven material for wiping applications should be strong, absorbent, abrasion resistant and exhibit low linting, i.e. fibres should not loosen from the material during normal use.

One way of manufacturing nonwoven materials is to use hydroentangling or spunlacing to mix and bond the constituents in the material. Hydroentangling is e.g. described in CA patent No. 841 938. It is known to produce composite nonwoven materials comprising continuous filaments and short fibres by hydroentangling, see for example EP-B1-0 333228, EP-B1- 0 938 601 and WO 99/20821.

20

25

A problem encountered in the manufacture of such composite materials is that it is difficult to obtain a good integration of the continuous filaments and short fibres only by hydroentangling which results in that the composite materials produced often have a more or less pronounced two-sidedness, i.e. one side

predominately containing short fibres and the other predominately containing continuous filaments. Such two-sidedness have several drawbacks. Firstly, the bonding of the filaments and short fibres will be weaker than in a composite material in which the short fibres and continuous filaments are well integrated, i.e. homogeneously mixed, the strength in the direction of thickness will be low and there is a risk that the composite delaminate if the two-sidedness is pronounced. Moreover, the "short fibre side" of such a material will be sensitive to linting, i.e. that fibres loosen from the surface, and the "filament side" will be sensitive to "pilling" when abraded, i.e. that parts of the filaments will be protruding from the surface of this side.

In WO 99/20821 the problem associated with poor mixing of the materials is solved by applying a bonding material to at least one side of a hydraulically entangled web comprising a fibrous component and a nonwoven layer of substantially continuous filaments. Also in US-A-5,389,202 a bonded web of continuous filaments is used. In EP-B1- 0 333 228 this problem is solved by co-deposition of an admixture of non-elastic meltblown filaments and fibre material on a conveyer surface. The fibrous material is intermingled with the meltblown fibres just after extruding of the material of the meltblown fibres through the meltblowing die so that the materials are thoroughly mixed before the entangling.

From EP-B1-0 938 601 it is known to manufacture a nonwoven material by foam forming a fibrous web of natural and/or synthetic staple fibres directly on a layer of unbonded continuous filaments and hydroentangling together the foamed fibre dispersion with the continuous filaments for forming a composite material. Through the foamforming there is achieved an improved mixing of the natural and/or synthetic fibres with synthetic filaments before the entangling. A drawback of this method is the necessity of equipment for

foamforming and for taking care of the surfactants used for the foamforming, which circulates in the water circuit.

By the use of a layer of unbonded continuous filaments it is easier to obtain a well integrated material than with a layer of bonded continuous filaments, whereby the energy consumption in the entangling step will be less than is needed to integrate fibres with a layer of bonded continuous filaments. However, it has been showed that the properties of the material obtained by such a manufacturing method is very sensitive to the amount and size of the continuous filaments in the web of continuous filaments with which the layer of short fibres should be integrated. If the web of continuous filaments is too open, it is a risk that short fibres are flushed out of the material in the entangling step. This can lead to holes in the material and an uneven basis weight distribution in the material obtained. If the web of continuous filaments is too dense, it is difficult to get a good integration of the short fibres in the material. The material will then be more like a laminate than a composite having one side predominately containing short fibres and the other side predominately containing continuous filaments. In such a material the bonding of the continuous filaments will be poor and the side predominately containing short fibres will be sensitive to abrasion and linting.

The objective of the present invention is to provide a composite nonwoven material containing continuous filaments and short fibres in which the continuous filaments and short fibres are well integrated in the material and which can be produced by a method of manufacturing which is cost effective and by which it is ensured that the integration of the filaments and fibres can be performed by entangling without the need of a premixing step of filaments and fibres.

SUMMARY OF THE INVENTION

This objective is according to the invention accomplished by a nonwoven composite material consisting of a mixture containing continuous filaments and short fibres, the continuous filaments being substantially mechanically bonded to each other due to entangling of fibres and filaments, characterised in that the continuous filaments in the material have a projected coverage of at least 1.1 and not more than 1.7. By ensuring that the web of continuous filaments used in the manufacture of such a material be neither too open or too dense a nonwoven composite material composed of continuous filaments and short fibres in which the filaments and fibres are well integrated can be obtained by entangling without a pre-mixing step and with a low consumption of energy. Such a composite will have similar properties on both sides thereof.

In a preferred embodiment the continuous filaments in the material have a projected coverage between 1.2-1.6, preferably 1.3-1.6. The short fibres comprises natural fibres and/or synthetic staple fibres. Preferably, the short fibres comprise at least 60 weight% of cellulose fibres, preferably at least 70 weight%, more preferably at least 75 weight% and most preferably at least 85 weight%. Advantageously, the short fibres comprise 85-95 weight% of cellulose fibres, preferably about 90 weight%. The content of continuous filaments in the material is about 15-40 weight%, preferably 25-40 weight%. The basis weight of the material is preferably 40-100 g/m², more preferably 50-80 g/m² and the short fibres are preferably wetlaid fibres.

The invention also relates to a method of manufacturing a nonwoven material comprising the steps of laying a layer of short fibres onto a web of unbonded continuous filaments, hydroentangling the layers consisting of continuous filaments and short fibres to form a composite nonwoven material and

thereafter drying the material, characterised by providing the web of continuous filaments with a projected coverage of at least 1.1 and not more than 1.7.

- 5 In a preferred embodiment the web of continuous filaments is provided with a projected coverage between 1.2-1.6, preferably 1.3-1.6, and the continuous filaments are spunlaid spunbond filaments. The short fibres can be wetlaid or airlaid onto the web of continuous filaments. The energy supply at the hydroentangling is at the most about 500 kWh/ton, preferably about 300-400
- 10 kWh/ton and most preferably about 350 kWh/ton.

BRIEF DESCRIPTION OF THE DRAWING

- 15 The invention will now be described with reference to the enclosed Figure 1, which schematically illustrates a process line for manufacturing a nonwoven material according to a preferred embodiment of the method according to the invention.

20 DESCRIPTION OF EMBODIMENTS

- In the process line schematically illustrated in Figure 1, a web of unbonded continuous filaments is laid on a transport belt 1. The transport belt 1 is air-permeable and can for example consist of a woven forming fabric or a wire.
- 25 The continuous filaments laid onto the transport web are delivered by a conventional device 2 for producing spunbond filaments.

Spunbond filaments are produced by extruding a molten polymer through a spinneret which can have 3000-5000 holes/m width with a typical diameter of

0.5 mm. The extruded polymer is then accelerated by high speed air either by a slot drawing attenuator or by quench air. The slot drawing attenuator works as a wide ejector and is fed with compressed air that is released in a narrow gap resulting in a very high air velocity (10000-20000 m/min). Very high
5 filaments velocities up to 6000 m/min can be obtained. As the filaments are drawn by quench air in a closed system, the velocity of the air is increased by narrowing the width of the attenuation chamber. By this process filament velocities up to 4000 m/min can be obtained. After filaments have left the slot
10 drawing attenuator or the narrowest passage in the quench chamber, the velocity of the filaments decrease and they are sucked and laid down onto the transport web 1. The production of spunbonded nonwoven webs is described in patents, such as US-A-5,389,202, US-A-4,340,563 and US-A-3,692,618.

When the continuous filaments are delivered to the transport web 1 they
15 normally have a diameter of 10-50 μm . The continuous filaments are delivered to the transport web with a much higher velocity than the velocity of the transport web, for example the velocity of the filaments is 2000-4000 m/min and the velocity of the transport web is 100-300 m/min. This means that the filaments will form irregular loops and bends on the transport web so that a
20 randomised web 4 of continuous filaments is obtained.

A suction box 3 is disposed under the air permeable transport web 1, whereby the filaments will be drawn against the transport web by the suction provided and the web of continuous filaments will assume a more or less two-
25 dimensional appearance, i.e. that loops or bends of filaments upstanding from transport web at the deliverance thereto will be drawn by the suction to a horizontal or near horizontal position.

It is essential for the present invention that the filaments that are spunlaid on the transport web are unbonded and free to move relative to each other.

5 The filaments consist of preferably of polypropylene or polyesters but can also consist of other polymers, such as polyethylene, or polyamides and polyactides. Copolymers of these polymers may also be used, as well as natural polymers with thermoplastic properties. All thermoplastic polymers are in principle possible to use.

10 The web 4 of continuous filaments is then advanced to a device 5 for wetlaying a layer 6 of short fibres onto the web 4 of filaments. This device is also of conventional construction.

15 The layer 6 of short fibres consists preferably of natural fibres, preferably cellulose fibres, or a mixture of natural fibres and staple fibres. The cellulose fibres are preferably wood pulp fibres but any type of cellulose fibres is possible to use, such as grass or straw. Both softwood fibres and hardwood fibres are suitable. The staple fibres can be synthetic fibres made from the same materials as the continuous filaments and copolymers of these materials
20 can of course also be used. It is also possible to use regenerated cellulose fibres, such as rayon, lyocell.

The short fibres should comprise at least 60 weight% of cellulose fibres, preferably at least 70 weight%, more preferably at least 75 weight% and most
25 preferably at least 85 weight%. Advantageously, the short fibres comprise 85-95 weight% of cellulose fibres, preferably about 90 weight%.

The web 4 of continuous filaments and the layer 6 of fibres laid thereon are then advanced to a hydroentangling device 7. In such a device, several

manifolds of water jets under high pressure, such as 50-120 bars, are directed against the fibre layer 6 and web 4 of filaments. During this step the fibres and filaments will mix and entangle with each other, with other fibres and with filaments.

5

Finally, the mixed nonwoven material obtained in the entangling step is advanced to a drying device 8. This device can be of conventional construction, such as a through-air drier.

10

As stated before it is essential for the present invention that the continuous filaments in the web 4 are unbonded to each other. By unbonded means that the continuous filaments in the web 4 are free to move relative to each other, i.e. the possible attachments of filaments to each other due to possible remaining stickiness when the filaments are laid onto the transport web 1 are

15

so weak that such possible attachments will be broken when the filaments are hit by the water jets. A great advantage by the use of a layer of unbonded continuous filaments is that the entangling can be performed with a low energy consumption in the hydroentangling step compared to the energy consumption of a layer of continuous filaments thermobonded to each other.

20

This is due to the fact that unbonded filaments are easy to move by the water jets compared to bonded filaments, the movements of which usually will involve movements of other filaments bonded thereto. The energy supply at the entangling is in the present invention at the most about 500 kWh/ton, preferably about 300-400 kWh/ton and most preferably about 350 kWh/ton.

25

The energy supply at the hydroentangling is calculated as the product of water flow (l/min) and pressure during entangling (bar) divided by the amount of produced material per hour (kg/h).

Another reason for the use of a layer of unbonded continuous filaments in the present invention is that it has been proven very difficult to obtain a good enough integration of short fibres and continuous filaments with a layer of bonded continuous filaments even if several entangling steps are used. This is probably caused by the passages between bonded portions of adjacent filaments very quickly gets occupied by short fibres which prevent penetration of short fibres through the filament layer later during the entangling process. The known use of a layer of bonded continuous filaments therefore has a tendency to produce nonwoven composites with a more or less pronounced two-sidedness.

The bonds between the fibres and filaments in a nonwoven material manufactured by the process described above will thus mainly be mechanical bonds due to entangling of fibres and filaments. However, hydrogen bonds between cellulosic fibres will be present in the material.

When using a web of unbonded filaments as a base for a nonwoven material, the integration of the two layers, i.e. the web of continuous filaments 1 and the fibre layer 6, is however very critical. If the two layers are not integrated well, also this material will have a pronounced two-sided appearance and the bonding of the continuous filaments will be poor. Such a material will have a reduced strength, especially in the direction of thickness. The short fibre side of such a two-sided material will have a high linting, i.e. a tendency for the short fibres to loosen from material. The bonds on the short fibre side will predominately consist of bonds between short fibres and the strength of the material on the short fibre side will be poor. The filament side of such a material will be sensitive to "pilling" while abraded, i.e. portions and ends of filaments will have a tendency to be projecting out from the surface of the filament side of the material. A composite nonwoven material containing short

fibres and continuous filaments only bonded by entangling, in which the integration of short fibres and continuous filaments have failed to some extent, will thus have worse properties than a similar material containing short fibres and continuous filaments prebonded to each other before the entangling step.

5

When the entangling step starts the structure of layer 4 of continuous filaments is relatively open and it is easy for the water jets to move the short fibres in the layer 6 overlaying the filaments into the filament layer through the width thereof. The more short fibres that are moved into the filament layer, the less space is available for easy transport of short fibres remaining on top of the filament layer. However, due to the low resistance to movement of the filaments caused by the absence of bond between them when entering the entangling station, the period during entangling in which short fibres can be moved into the filament layer is prolonged compared to the period for a prebonded filament layer. The mixing of short fibres and continuous filament thus mainly occurs in the beginning of the entangling step. During the rest of the entangling step, portions of the filaments and portions of short fibres will entangle, entwine and entwist with each other and with filaments and/or other fibres. The entangling can thus be said to contain a mixing step followed by a bonding step. Of course some bonding will occur during the mixing step but most of the bonds will be obtained after the short fibres have been mixed with the continuous filaments.

Even if the use of a layer 4 of unbonded continuous filaments facilitates the integration between short fibres and continuous filaments, a two-sided material can be obtained if the layer of continuous filaments is overly dense.

25

On the other hand, if the structure of the layer 4 of continuous filaments is overly open, there is a risk that the fibres will be flushed out of the material by

the water jets during entangling. This could create holes in the material and an uneven basis weight distribution.

5 The inventors have found that to obtain a composite nonwoven material in which the two layers 4 and 6 are well integrated and which have high strength and an even basis weight distribution, the web of continuous filaments should have a projected coverage of at least 1.1 and not more than 1.7, preferably between 1.2 – 1.6, more preferably 1.3-1.6.

10 The projected coverage is the sum of projected surface area of all filaments in one unit area and is obtained by multiplying the sum of lengths of filaments in one unit area with the average diameter of the filaments. The filaments in a web of continuous filaments having a projected coverage of 1.0 would thus cover the whole unit area if they were placed in one layer in straight lines
15 adjacent to each other and in one layer.

In Table 1 is shown the Taber abrasion resistance as a function of projected coverage for nonwoven material produced as described above with reference to Figure 1. The nonwoven materials are 80 gsm spunlaid composites
20 comprising 25% (20gsm) continuous spunlaid filaments of polypropylene and pulp fibres with or without 10% of 19 mm long, 1.7 dtex staple fibres of polyester mixed therein. The nonwoven materials were manufactured in the following way. A 0.4 m wide web of spunlaid filaments was laid down onto a forming fabric at 20m/min such that the filaments were not bonded to each
25 other. By a 0.4 m wide head box a fibre dispersion containing pulp fibres and staple fibres or alternatively without staple fibres was laid onto the unbonded web of spunlaid filaments and the excess water was drained and sucked off. The unbonded spunlaid filaments and wetlaid short fibres were then mixed and bonded together by hydroentanglement with three manifolds at a

hydroentangling energy of about 300-350 kWh/ton. The hydroentanglement was done from the wetlaid side and the pulp and staple fibres were thus moved into and mixed intensively with the spunlaid filament web. Finally, the hydroentangled nonwoven composite material was dewatered and then dried using a through-air drum drier.

The Taber resistance values refer to the pulp side of the composite nonwoven material.

10

Table 1

Projected coverage	Filament titre dtex	Taber value (with staple fibres)	Taber value (without staple fibres)
0.9	6.9	3	2
1.1	4.7	4	4
1.33	3.2	5	4
1.5	2.5	5	4
1.7	1.9	1	1
2.1	1.3	1	1

As is evident from Table 1, the strength of the pulp side is optimised at a projected coverage between 1.3 and 1.5 corresponding to filament titre of 3.2 and 2.5 dtex (g/10 000 m), respectively. At higher projected coverage of 1.7 or more represented by projected coverages 1.7 and 2.1 corresponding to filament titres of 1.9 and 1.3 dtex, respectively, the integration or mixing of fibres and filaments in the material was not good, resulting in very poor surface strength on the pulp side of the material. At the lower projected coverage of 0.9 corresponding to a filament titre of 6.9 dtex, the structure of

the filament web became too open to hold the pulp and the surface strength of the pulp side became poor.

5 The Taber abrasion resistance is measured by Taber test equipment 5151 with two rubber wheel CS-10. Such equipment is well known to the skilled man and need not be described in detail. The testing is performed by mounting a circular test sample of the nonwoven material on a rotatable disk on the Taber test equipment. In the test, the test sample is subjected to the pressure of the two rubber wheel running on the top surface of the test sample. Depending on
10 the basis weight of the test sample the disk is rotated with a different number of revolutions, the number of revolutions increasing with increased basis weight of the test sample. The Taber value of a tested sample is determined by visual comparison with a scale, i.e. five reference samples having Taber values 1-5, where 1 defines a very poor abrasion resistance and 3 defines an
15 acceptable abrasion resistance.

In Table 2 there is shown Taber values for three nonwoven materials, manufactured as described above, having different basis weight and content of continuous filaments. The continuous filaments are spunbond filaments of
20 polypropylene and the short fibres are pulp fibres. The Taber value in the table represents the average of two identical test samples.

Table 2

Sample Grammage/spunlaid content (g/m²)/ %	Projected coverage	Taber revolutions	Taber value
50/40%	0.85	30	1
" "	1.13	" "	2
" "	1.34	" "	3
" "	1.47	" "	3.5
" "	1.5	" "	3.5
" "	1.54	" "	3.5
" "	1.8	" "	2
65/25%	0.76	100	1.5
" "	1	" "	2.5
" "	1.18	" "	3
" "	1.3	" "	4
" "	1.4	" "	4.5
" "	1.8	" "	4
" "	2.16	" "	2
80/25%	0.9	200	1.5
" "	1.13	" "	3
" "	1.25	" "	4
" "	1.47	" "	5
" "	1.55	" "	5
" "	1.63	" "	4
" "	1.9	" "	2

From Table 2 one can conclude that if the projected coverage lies between 1.1 and 1.6 well integrated composite nonwovens can be provided for nonwovens with a basis weight of 80 g/m² or more. For nonwovens having a lower basis weight the projected coverage shall be at least 1.2 in order for an acceptable material to be provided. In the interval of 1.3-1.6 acceptable nonwovens are provided even for nonwovens with a low basis weight and high content of continuous filaments. Thus, when constructing nonwoven materials according to the invention the ideal projected coverage should preferably lie between 1.3-1.6

10

The examples below shows how important it is to select the correct filament titre to obtain the ideal projected coverage as basis weight and/or spunlaid content is varied in a wetlaid-spunlaid composite.

15 For three different basis weights, 50, 80 and 100 gsm, filament titre is shown as function of spunlaid content and coverage in Tables 3-5.

Calculation is made as follows:

20 The projected coverage (COV) is obtained by dividing the projected surface area ($A_{\text{projected}}$) of all spunlaid filaments within one unit area with the corresponding unit area (A) according to the equation below.

$$\text{COV} = \frac{A_{\text{projected}}}{A} \quad (1)$$

25

The projected surface area is obtained by multiplying the total length (L) of all spunlaid filaments with the average diameter (d) in m of all spunlaid filaments within the unit area.

$$A_{\text{projected}} = L \cdot d \quad (2)$$

The total length of the filaments within the unit area is obtained by dividing the total weight of spunlaid filaments with the average filament titre (Titre) in dtex as shown in equation (3) below. The weight of the spunlaid filament web is obtained by multiplying the basis weight of the spunlaid filament (BW_s) web in g/m^2 with the unit area (A). The filament titre in dtex is the weight of the filaments corresponding 10 000 m, i.e. $\text{g}/10\,000\text{m}$.

$$L = \frac{BW_s \cdot A}{\text{Titre}} \cdot 10000 \quad (3)$$

For a wetlaid composite material, the basis weight of the spunlaid filaments is calculated by

$$BW_s = BW \cdot X / 100 \quad (4)$$

where $[BW]$ is the basis weight of the wetlaid-spunlaid composite in g/m^2 and (X) is the content of spunlaid filaments in %.

L is thus:

$$L = \frac{BW \cdot X \cdot A}{100 \cdot \text{Titre}} \cdot 10000 \quad (5)$$

The relation between Titre in dtex and diameter in m of the filaments is given below where (ρ) is the specific gravity of the filaments in kg/m^3 .

$$\text{Titre} = \frac{\pi \cdot d^2}{4} \cdot 10000 \cdot \rho \cdot 1000 \quad (6)$$

As (d) is solved from equation (6) above the relation to the titre is:

$$d = \sqrt{\frac{4 * Titre}{\pi * 10000 * \rho * 1000}} \quad (7)$$

5

If equations (2),(5) and (7) are used in (1) projected coverage is given by:

$$COV = \frac{BW * X * A}{100 * Titre} * 10000 * \sqrt{\frac{4 * Titre}{\pi * 10000 * \rho * 1000}} * \frac{1}{A} \quad (8)$$

10

When equation (8) is simplified projected coverage is given by:

$$COV = \frac{2 * BW * X}{\sqrt{Titre * \pi * \rho * 1000}} \quad (9)$$

15 If titre is solved out of equation (9) above the relation between titre, projected coverage, basis weight and spunlaid content is obtained.

$$Titre = 4 * \left(\frac{BW * X}{COV} \right)^2 * \frac{1}{\pi * \rho * 1000} \quad (10)$$

20 The specific gravity for polypropylene is around 900 kg/m³ for polyester around 1350 kg/m³.

In Tables 2-4 below the filament titre for the ideal projected coverage range i.e. between 1.3 and 1.5 for wetlaid-spunlaid composite materials is shown. The
25 filament titre of the outer range when the spunlaid web will become to open or to

dense for making an acceptable spunlaid-wetlaid composite material is also shown for spunlaid projected coverages corresponding to 1.1 and 1.7.

5 **Table 3. Filament titre in dtex as function of spunlaid content and coverage for a 50 g/m² wetlaid-spunlaid composite material.**

SL Content [%]	Spunlaid Coverage			
	1.1	1.3	1.6	1.7
40	4.68dtex	3.35dtex	2.21dtex	1.96dtex
30	2.63dtex	1.88dtex	1.24dtex	1.10dtex
20	1.17dtex	0.84dtex	0.55dtex	0.49dtex

10 **Table 4. Filament titre in dtex as function of spunlaid content and coverage for a 80 g/m² wetlaid-spunlaid composite material.**

SL Content [%]	Spunlaid Coverage			
	1.1	1.3	1.6	1.7
30	6.73dtex	4.82dtex	3.18dtex	2.82dtex
25	4.68dtex	3.35dtex	2.21dtex	1.96dtex
20	2.99dtex	2.14dtex	1.41dtex	1.25dtex
15	1.68dtex	1.21dtex	0.80dtex	0.70dtex

15 **Table 4. Filament titre in dtex as function of spunlaid content and coverage for a 100 g/m² wetlaid-spunlaid composite material**

SL Content [%]	Spunlaid Coverage			
	1.1	1.3	1.6	1.7
30	10.52dtex	7.53dtex	4.97dtex	4.41dtex
25	7.31dtex	5.23dtex	3.45dtex	3.06dtex
20	4.68dtex	3.35dtex	2.21dtex	1.96dtex
15	2.63dtex	1.88dtex	1.24dtex	1.10dtex

28

As the filament titre in the Tables are compared it is clear that for spunlaid-wetlaid composites with high basis weights and/or high spunlaid contents a coarser titre of the spunlaid filaments has to be used to obtain the ideal spunlaid projected coverage. When spunlaid-wetlaid composites with low basis weight and/or low spunlaid contents are made a lower titre of the spunlaid filaments has to be used to obtain the ideal spunlaid projected coverage.

The results in the Tables also show that as spunlaid content in the materials is changed with a relatively small percentage, a major adjustment of the filament titre has to be made to keep the spunlaid projected coverage at the same level. In a similar manner a relatively small change of the total basis weight of the material require a relatively large adjustment of the filament titre to be able to hit the ideal spunlaid projected coverage.

Since the projected coverage is the product of filament length and average diameter of the filaments, the ideal projected coverage can be obtained by varying the filament length/m², i.e. the velocity by which the filaments are laid on the transport web 1, or the diameter of the filaments. It is thus relatively easy for a skilled man to adapt the process parameters within the given limits.

The described embodiment can of course be modified in several ways. For example, the continuous filaments could be meltblown instead of spunbond. Furthermore, the fibres can be air-laid instead of wet-laid and more than one hydroentangling steps can be performed. Instead of air- or wet-laying, the fibres can be delivered in form of a carded web. In the shown embodiment there are several transport conveyers having different fabrics or wires adapted to take care of air and water penetrating the fabric or wires in the different process steps but it possible to combine one of more of these conveyers into

one conveyer and one wire. The scope of invention should therefore only be restricted by the contents of the enclosed patent claims.

Claims

1. A nonwoven composite material consisting of a mixture containing continuous filaments and short fibres, the continuous filaments being substantially mechanically bonded to each other due to entangling of fibres and filaments, characterised in that the continuous filaments in the material have a projected coverage of at least 1.1 and not more than 1.7.
2. The nonwoven composite material according to Claim 1, characterised in that the continuous filaments in the material have a projected coverage between 1.2-1.6, preferably 1.3-1.6.
3. The nonwoven composite material according to Claim 1 or 2, characterised in that the short fibres comprises natural fibres and/or synthetic staple fibres.
4. The nonwoven composite material according to Claim 3, characterised in that the short fibres comprise at least 60 weight% of cellulose fibres, preferably at least 70 weight%, more preferably at least 75 weight% and most preferably at least 85 weight%.
5. The nonwoven composite material according to Claim 4, characterised in that the short fibres comprise 85-95 weight% of cellulose fibres, preferably about 90 weight%.
6. The nonwoven composite material according to any one of Claims 1-5, characterised in the content of continuous filaments in the material is about 15-40 weight%, preferably 25-40 weight%.

7. The nonwoven composite material according to any one of Claims 1-6, characterised in that the basis weight of the material is preferably 40-100 g/m², more preferably 50-80 g/m².
- 5 8. The nonwoven composite according to any one of Claims 1-7, characterised in that the short fibres are wetlaid fibres.
9. A method of manufacturing a nonwoven material comprising the steps of laying a layer of short fibres (6) onto a web of unbonded continuous
10 filaments (4), hydroentangling the layers consisting of continuous filaments and short fibres to form a composite nonwoven material and thereafter drying the material, characterised by providing the web of continuous filaments (4) with a projected coverage of at least 1.1 and not more than 1.7.
- 15 10. The method according to Claim 9, characterised by providing the web of continuous filaments (4) with a projected coverage between 1.2-1.6, preferably 1.3-1.6.
- 20 11. The method according to Claim 9 or 10, characterised in that the continuous filaments are spunlaid spunbond filaments.
12. The method according to Claim 9,10 or 11, characterised in that the short fibres are wetlaid onto the web of continuous filaments (4).
- 25 13. The method according to Claim 9,10 or 11, characterised in that the short fibres are airlaid onto the web of continuous filaments (4).

14. The method according to any one of Claims 9-14, characterised in that the energy supply at the hydroentangling is at the most about 500 kWh/ton, preferably about 300-400 kWh/ton and most preferably about 350 kWh/ton.

1/1

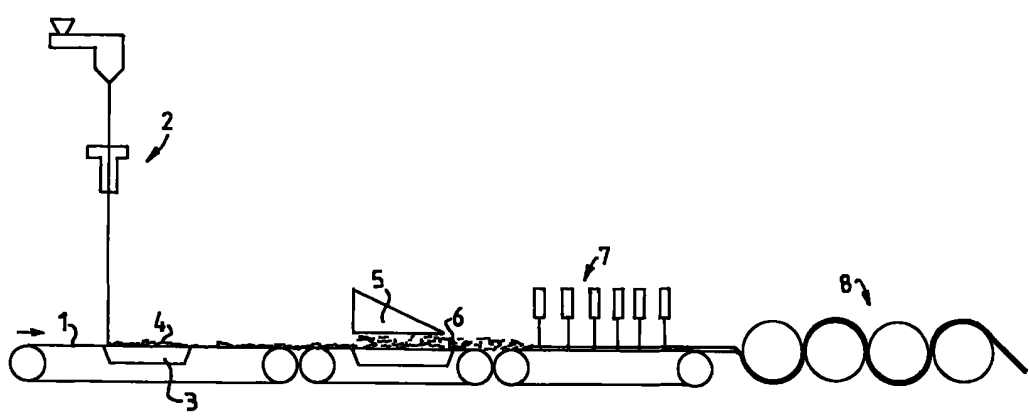


FIG 1

**UN MATERIAL DE COMPUESTO NO TEJIDO QUE CONTIENE FILAMENTOS
CONTINUOS Y FIBRAS CORTAS**

CAMPO TÉCNICO

La presente invención se relaciona con un material de compuesto no tejido que contiene filamentos continuos y fibras cortas, y un método para elaborar un material no tejido que comprende las etapas de poner una capa de fibras sobre una red de filamentos continuos no unidos, hidroentramar las capas que consisten de filamentos continuos y fibras para formar un material compuesto no tejido y posteriormente secar el material.

ANTECEDENTES DE LA INVENCION

Un material no tejido para aplicaciones de limpieza debe ser fuerte, absorbente, resistente a la abrasión y exhibir bajo deshilachamiento, es decir, las fibras no se deben aflojar del material durante el uso normal.

Una manera de elaborar materiales no tejidos es utilizar el hidroentramamiento o proceso "spunlacing" para mezclar y unir los constituyentes en el material. El hidroentramamiento es por ejemplo descrito en la patente CA No. 841 938. Es conocido producir materiales compuestos no tejidos que comprenden filamentos continuos y fibras cortas mediante hidroentramamiento, ver por ejemplo EP-B1- 0 333228, EP-B1-0 938601 y WO 99/20821.

Un problema encontrado en la elaboración de tales materiales compuestos es que es difícil obtener una buena integración en los filamentos continuos y las fibras cortas solamente mediante hidroentramamiento lo que da como resultado que los materiales compuestos producidos a menudo tengan un acabado diferente por ambas caras más o menos pronunciado, es decir, un lado que contiene predominantemente fibras cortas y el otro que contiene predominantemente filamentos continuos. Tal acabado diferente por ambas caras tiene varios inconvenientes. Primeramente, la unión de los filamentos y las fibras cortas será más débil que un material compuesto en el cual las fibras cortas y los filamentos continuos están bien integrados, es decir, homogéneamente mezclados, la resistencia en la dirección del grosor se da baja y existirá el riesgo de que el compuesto se deslamine si el acabado diferente por las dos caras es pronunciado. Más aún, el "lado de fibra corta" de tal material será sensible al deshilachamiento, es decir, que las fibras se aflojen de la superficie y el "lado del filamento" será, sensible al "frisado" cuando sufra abrasión, es decir, aquellas partes de los filamentos sobresaldrán de la superficie de éste lado.

En la WO 99/20821 el problema asociado con la mezcla pobre de los materiales se resuelve al aplicar un material de unión o al menos un lado de una red hidráulicamente entramada que comprende un compuesto fibroso y una capa no tejida de filamentos sustancialmente continuos. También en el US-A-5, 389,202 se utiliza una red unida de filamentos continuos. En la EP-B1-0 333 228 éste problema se resuelve mediante la co-deposición de una mezcla de filamentos soplados por fusión no elásticos y material de fibra sobre una superficie transportadora. El material fibroso es entremezclado con las fibras fundidas por soplado justo después de extruir el material de las fibras fundidas por soplado a

través de la boquilla de fundido por soplado de tal forma que los materiales son mezclados completamente antes del entramamiento.

De la EP-B1-0 938 601 es conocido elaborar un material no tejido al formar con espuma una red fibrosa de fibras de filamentos sintéticos directamente sobre una capa de filamentos continuos no unidos e hidroentramar juntas la dispersión de fibra espumada con los filamentos continuos para formar un material compuesto. A través de la formación de espuma se logra una mezcla mejorada de las fibras naturales y/o sintéticas con los filamentos sintéticos antes del entramamiento. Un inconveniente de éste método es la necesidad de equipo para la formación de espuma y tener cuidado de los tensoactivos utilizados para la formación de espuma, que circula en el circuito de agua.

Mediante el uso de una capa de filamentos continuos no unidos es más fácil obtener un material bien integrado que con una capa de filamentos continuos no unidos por medio de la cual el consumo de energía en la etapa de entramamiento será menor de lo necesario para integrar las fibras con una capa de filamentos continuos unido. Sin embargo, se ha mostrado que las propiedades del material obtenido mediante tal método de elaboración son muy sensibles a la cantidad y tamaño de los filamentos continuos en la red de filamentos continuos con la cual la capa de fibras cortas se debe integrar. Si la red de filamentos continuos es demasiado abierta, existe el riesgo de que las fibras cortas fluyan hacia fuera del material en la etapa de entramamiento. Esto puede conducir a huecos en el material y a una distribución de peso básico no homogénea en el material obtenido. Si la red de filamentos continuos es demasiado densa, es difícil conseguir una buena integración de las fibras cortas en el material. El material será entonces más similar a una lámina que un compuesto que contenga un lado

que contiene predominantemente fibras cortas y otro lado que contiene predominantemente filamentos continuos. En tal material la unión de los filamentos continuos será pobre y el lado que contiene predominantemente fibras cortas será sensible a la abrasión y al deshilachado.

El objetivo de la presente invención es suministrar un material compuesto no tejido que contiene filamentos continuos y fibras cortas en el cual los filamentos continuos y las fibras cortas estarán bien integrados en el material y podrán ser producidos mediante un método de elaboración que es efectivo en costos y mediante el cual se asegura la integración de los filamentos y las fibras se pueda desarrollar mediante entramamientos sin la necesidad de una etapa de premezclado de filamentos y fibras.

RESUMEN DE LA INVENCION

Ese objetivo se logra de acuerdo con la invención mediante un material compuesto no tejido que consiste de una mezcla que contiene filamentos continuos y fibras cortas, los filamentos continuos son sustancialmente unidos mecánicamente uno al otro debido al entramamiento de las fibras y filamentos, caracterizado porque los filamentos continuos en el material tienen un cubrimiento proyectado de al menos 1.1 y no más de 1.7. Al asegurar que la red de filamentos continuos utilizada en la elaboración de tal material no sea demasiado abierta o demasiado densa un material compuesto no tejido compuesto de filamentos continuos y fibras cortas en el cual los filamentos y las fibras están bien integrados se puede obtener mediante entramado sin la etapa de premezcla y con un bajo consumo de energía. Tal compuesto tendrá propiedades similares en ambos lados de éste.

En una modalidad preferida los filamentos continuos en el material tienen un cubrimiento proyectado entre 1.2-1.6, preferiblemente 1.3-1.6. Las fibras cortas comprenden fibras naturales y/o fibras de filamento sintético. Preferiblemente, las fibras cortas comprenden al menos 60% en peso de fibras de celulosa, preferiblemente al menos 70% en peso, más preferiblemente al menos 75% en peso y más preferiblemente al menos 85% en peso. Ventajosamente, las fibras cortas comprenden 85-95% en peso de fibras de celulosa, preferiblemente aproximadamente 90% en peso. El contenido de los filamentos continuos en el material es aproximadamente 15-40% en peso, preferiblemente 25-40% en peso. El peso base del material es preferiblemente 40-100 g/m², mas preferiblemente 50-80 g/m² y las fibras cortas son preferiblemente fibras "wetlaid".

La invención también se relaciona con un método para la elaboración de un material no tejido que comprende las etapas de poner una capa de fibras cortas sobre una red de filamentos continuos no unidos, hidroentramar las capas que consisten de filamento continuos y fibras cortas para formar un material compuesto no tejido y posteriormente secar el material, caracterizado por suministrarle a la red filamentos continuos con un cubrimiento proyectado de al menos 1.1 y más de 1.7.

En una modalidad preferida la red de filamentos continuos se suministra con un cubrimiento proyectado de entre 1.2-1.6, preferiblemente 1.3-1.6, y los filamentos continuos son filamentos "spunlaid spunbond". Las fibras cortas pueden ser "wetlaid" o "airlaid" sobre la red de filamentos continuos. El suministro de energía en el hidroentramamiento es cuando más aproximadamente 500 kWh/ton, preferiblemente aproximadamente 300-400 kWh/ton y más preferiblemente aproximadamente 350 kWh/ton.

BREVE DESCRIPCIÓN DE LOS DIBUJOS

La invención será descrita ahora con referencia a la figura 1 incluida que ilustra esquemáticamente un proceso en línea para la elaboración de un material no tejido de acuerdo con una modalidad preferida del método de acuerdo con la invención.

DESCRIPCIÓN DE LAS MODALIDADES

En el proceso en línea esquemáticamente ilustrado en la figura 1, una red de filamentos continuos no unidos es puesta sobre una correa transportadora 1. La correa transportadora 1 es permeable al aire y puede, por ejemplo, consistir de una tela formadora tejida o un alambre. Los filamentos continuos puestos sobre la red de transporte son suministrados por un dispositivo convencional 2 para producir filamentos "spunbond".

Los filamentos "spunbond" son producidos al extruir un polímero fundido a través de un "spinneret" que puede tener 3000-5000 huecos/m de ancho con un diámetro típico de 0.5 mm. El polímero extruido es luego acelerado con aire a alta velocidad mediante un atenuador "slot drawing" o mediante aire apagado. El atenuador "slot drawing" trabaja como un eyector amplio y es alimentado con aire comprimido que es liberado en un espacio estrecho que resulta en una velocidad de aire muy alta (10000-20000 m/min). Se pueden obtener velocidades de filamentos muy altas hasta de 6000 m/min. Como los filamentos son extraídos por aire apagado en un sistema cerrado, la velocidad del aire se incrementa al estrechar el ancho de la cámara de atenuación. Mediante este proceso se pueden obtener velocidades de

hasta 4000 m/min. Después de que los filamentos han dejado el atenuador "slot drawing" o el pasaje más estrecho en la cámara de apagado, la velocidad de los filamentos disminuye y ellos son succionados y puestos sobre la red de transporte 1. La producción de redes no tejidas unidas por hilado se describe en las patentes tales como la US-A-5, 389,202, US-A-4, 340,563 y US-A-3, 692,618.

Cuando los filamentos continuos se suministran a la red de transporte 1 ellos tienen normalmente un diámetro de 10-50 μm . Los filamentos continuos son suministrados a la red de transporte con una velocidad mucho mayor que la velocidad de la red de transporte, por ejemplo la velocidad de los filamentos es de 2000-4000 m/min y la velocidad de la red de transporte es 100-300 m/min. Esto significa que los filamentos formaran aros irregulares y se doblaran sobre la red de transporte de tal forma que se obtiene una red aleatorizada 4 de filamentos continuos.

La caja de succión 13 está dispuesta bajo una red de transporte permeable 1, por medio de la cual los filamentos serán arrastrados contra la red de transporte por la succión y la red de filamentos continuos asumirá una apariencia mas o menos bidimensional, es decir, que los aros o dobleces de los filamentos que permanezcan erguidos de la red de transporte al suministro de estos serán arrastrados por la succión a una posición horizontal o aproximadamente horizontal.

Es esencial para la presente invención que los filamentos que son puestos por proceso "spunlaid" sobre la red de transporte estén unidos y libres de moverse en relación uno con el otro.

Los filamentos consisten de preferiblemente de polipropileno o poliéster pero también pueden consistir de otros polímeros tales como polietileno, o poliamidas y polilactidas. Los copolímeros de éstos polímeros también se pueden utilizar, así como también como los polímeros naturales con propiedades termoplásticas. Todos los polímeros termoplásticos son en principio posibles de usar.

La red 4 de filamentos continuos se avanza luego a un dispositivo 5 para el proceso "wetlaying" de una capa 6 de fibras cortas sobre la red cuatro de filamentos. Este dispositivo también es de construcción convencional.

La capa 6 de fibras cortas consiste preferiblemente de fibras naturales, preferiblemente fibras de celulosa o una mezcla de fibras naturales y fibras de filamento. Las fibras de celulosa son preferiblemente fibras de pulpa de madera pero cualquier tipo de fibras de celulosa es posible de utilizar tal como de pasto o paja. Tanto las fibras de madera suave como las fibras de madera dura son adecuadas. Las fibras de filamento pueden ser fibras sintéticas hechas de los mismos materiales que los filamentos continuos y los copolímeros de estos materiales pueden por supuesto ser también utilizados. También es posible utilizar fibras de celulosa regeneradas, tales como rayón, lyocel.

Las fibras cortas deben comprender al menos 60% en peso de fibras de celulosa, preferiblemente al menos 70% en peso, más preferiblemente al menos 75% en peso y más preferiblemente al menos 85% en peso. Ventajosamente, las fibras cortas comprenden 85-95% en peso de fibras de celulosa, preferiblemente aproximadamente 90% en peso.

La red 4 de filamentos continuos y la capa 6 de fibras puestas sobre esta son luego avanzadas a un dispositivo de hidroentramamiento 7. En tal dispositivo, varios múltiples de chorros de agua bajo alta presión, tal como 50-120 bares, están dirigidos contra la capa de fibra 6 y la red 4 de filamentos. Durante ésta etapa las fibras y los filamentos se mezclaran y entramaran una con la otra, con otras fibras y con los filamentos.

Finalmente, el material no tejido mezclado obtenido en la etapa de entramado es avanzada a un dispositivo de secado 8. El dispositivo puede ser de construcción convencional, tal como secado a través de aire.

Como se estableció antes es esencial para la presente invención que los filamentos continuos en la red 4 estén desunidos uno con el otro. Por desunido se entiende que los filamentos continuos en la red 4 estén libre de moverse en relación uno con el otro, es decir, las posibles uniones de los filamentos de uno con el otro debido a posible pegajosidad restante cuando los filamentos son puestos sobre la red de transporte 1 son tan débiles que tales posibles uniones se romperán cuando los filamentos sean golpeados por los chorros de agua. Una gran ventaja del uso de una capa de filamentos continuos no unidos es que el entramamiento se puede desarrollar con un consumo bajo de energía en la etapa de hidroentramamiento comparado con el consumo de energía de una capa filamentos continuos termounidos uno con el otro. Esto es debido al hecho de que los filamentos no unidos son fáciles de moverse por los chorros de agua comparados con los filamentos unidos, los movimientos de los cuales usualmente involucraran los movimientos de otros filamentos unidos a estos. El suministro de energía en el entramamiento es en la presente invención como máximo aproximadamente 500 kWh/ton, preferiblemente aproximadamente 300-400

kWh/ton y más preferidamente 350 kWh/ton. El suministro de energía en el hidroentramamiento se calcula como el producto del flujo de agua (l/min) y la presión durante el entramamiento (bar) dividido por la cantidad de material producido por hora (kg/h).

Otra razón para el uso de una capa de filamentos continuos no unidos en la presente invención es que han sido probados muy difíciles para obtener una suficientemente buena integración de fibras cortas y filamentos continuos con una capa de filamentos continuos unidos aun si se utilizan varias etapas de entramamiento. Esto es probablemente causado por el paso entre porciones unidas de filamentos adyacentes que consigan ser ocupados muy rápidamente por fibras cortas que eviten la penetración de fibras cortas a través de la capa de filamento finalmente durante el proceso de entramamiento. El uso conocido de una capa de filamentos continuos unidos tiene por lo tanto una tendencia a producir compuestos no unidos con un acabado diferente por ambas caras pronunciado.

Las uniones entre las fibras y los filamentos en un material no unido y elaborado mediante el proceso descrito anteriormente serán principalmente unidas mecánicamente debido al entramamiento de las fibras y los filamentos. Sin embargo, los enlaces de hidrogeno entre las fibras celulósicas estarán presentes en el material.

Cuando se utiliza una red de filamentos no unidos como una base para un material no tejido, la integración de las dos capas, es decir, la red de los filamentos continuos 1 y la capa de fibra 6, es sin embargo muy crítica. Si las dos capas no están bien integradas, también ese material tendrá una apariencia de acabado por las dos caras diferentes pronunciada y la unión de los filamentos continuos será

pobre. Tal material tendrá una resistencia reducida, especialmente en la dirección de grosor. El lado de fibra corta de tal material con acabado diferente por dos lados tendrá un alto deshilachamiento, es decir, una tendencia de las fibras cortas a soltarse del material. Las uniones sobre el lado de fibra corta consistirá predominantemente de uniones entre las fibras cortas y la resistencia del material sobre el lado de fibra corta será pobre. El lado del filamento de tal material será sensible al "frisado" cuando se somete a abrasión, es decir, las porciones y los extremos de los filamentos tendrán una tendencia a ser proyectados hacia fuera de la superficie del lado del filamento del material. Un material de compuesto no tejido que contienen fibras cortas y filamentos continuos sólo unidos por entramamiento, en el cual la integración de las fibras cortas y los filamentos continuos ha fallado en alguna proporción, tendrá peores propiedades que un material similar que contiene fibras cortas y filamentos continuos reunidos uno con el otro antes de la etapa de entramamiento.

Cuando la etapa de entramamiento inicia, la estructura de la capa 4 de filamentos continuos es relativamente abierta y es fácil para los chorros de agua mover las fibras cortas en la capa 6 sobreponiendo los filamentos en la capa de filamento a través del ancho de ésta. Entre más fibras cortas sean movidas en la capa de filamento, menos espacio disponible subsistirá para el transporte fácil de las fibras cortas en la parte superior de la capa de filamento. Sin embargo, debido a la baja resistencia del movimiento de los filamentos originada por la ausencia de unión entre ellos cuando entran a la estación de entramamiento, el periodo durante el entramamiento en el cual las fibras cortas se pueden mover en la capa de filamento es prolongado comparado con el periodo para una preunión de la capa de filamento. La mezcla de fibras cortas y filamento continuo ocurrirá principalmente así en el inicio de la etapa de entramamiento. Durante el resto de la

etapa de entramamiento, las porciones de los filamentos y las porciones de las fibras cortas se entramaran, entrelazaran y retorcerán una con la otra y con los filamentos y/o otras fibras. El entrenamiento se puede decir que contiene así una etapa de mezclado seguida por una etapa de unión. Por su puesto que ocurrirá alguna unión durante la etapa de mezclado pero la mayoría de la mayoría de las uniones se obtendrá después de que las fibras cortas se hayan mezclado con los filamentos continuos.

Aun si el uso de la capa 3 de filamentos continuos no unidos facilita la integración entre las fibras cortas y los filamentos continuos, se puede obtener un material con acabado diferente por ambos lados si la capa de filamentos continuos es excesivamente densa.

De otra parte, si la estructura de la capa 4 de filamentos continuos es excesivamente abierta, existe el riesgo de que las fibras fluyan hacia fuera del material por los chorros de agua durante el entramamiento. Esto podría crear huecos en el material y una distribución de peso básico no homogéneo.

Los inventores han encontrado que para obtener un material no tejido compuesto en el cual las dos capas 4 y 6 estén bien integradas y que tengan alta resistencia y una distribución de peso base homogénea, la red de filamentos continuo deberá tener un cubrimiento proyectado de 1.1 y no más de 1.7, preferiblemente entre 1.2-1.6, más preferiblemente 1.3-1.6.

El cubrimiento proyectado es la suma del área de superficie proyectada de todos los filamentos en un área unitaria y se obtiene al multiplicar la suma de las longitudes de los filamentos en un área unitaria con el diámetro promedio de los

filamentos. Los filamentos en una red continua de filamentos que tenga una cubrimiento proyectado de 1.0 cubriría así el área unitaria completa si ellos se ubicaran en una capa en líneas rectas adyacentes una a la otra y en una capa.

En la tabla 1 se muestra la resistencia a la abrasión Taber como una función del cubrimiento proyectado del material no tejido producido como se describió anteriormente con referencia a la figura 1. Los materiales no tejidos son compuestos unidos por hilado de 80 gsm que comprende 25% (20gsm) de filamentos unidos por hilados continuos de polipropileno y fibras de pulpa con y sin 10% de 19 mm de largo, 1.7 dtex de fibras de filamento de poliéster mezcladas allí. Los materiales no tejidos fueron elaborados de la siguiente manera. Una red ancha de 0.4 m de filamentos unidos por hilado fue dejada sobre la tela formadora a 20 m/min de tal forma que los filamentos no se unieran uno con el otro. Mediante una caja de cabeza ancha de 0.4 m una dispersión de fibra que contiene fibras de pulpa y fibras de filamentos o alternativamente sin fibras de filamento fue puesta sobre la red no unida de filamentos unidos por hilado y el exceso de agua se drenó y succionó. Los red no unida de filamentos "spunlaid" no unidos y las fibras cortas "wetlaid" fueron entonces mezcladas y unidas juntas mediante hidroentramamiento con tres múltiples con una energía de hidroentramamiento de aproximadamente 300-350 kWh/ton. El hidroentramamiento fue hecho desde el lado "wetlaid" y la pulpa y las fibras de filamento fueron así removidas y mezcladas intensivamente con la red de filamento "spunlaid". Finalmente, el material compuesto no tejido hidroentramado fue desaguado y luego secado utilizando un secador de tambor con paso de aire.

Los valores de resistencia Taber se refieren al lado de la pulpa de material compuesto no tejido.

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Tabla 1

Cubrimiento Proyectado	Título de filamento dtex	Valor Taber (con fibras de filamento)	Valor Taber (sin fibras de filamento)
0.9	6.9	3	2
1.1	4.7	4	4
1.33	3.2	5	4
1.5	2.5	5	4
.17	1.9	1	1
2.1	1.3	1	1

Como es evidente de la Tabla 1, la resistencia del lado de la pulpa se optimiza en un cubrimiento proyectado entre 1.3 y 1.5 que corresponde al título de filamento de 3.2 y 2.5 dtex (g/10 000), respectivamente. Aun cubrimiento proyectado mayor de 1.7 o más representado por los cubrimientos proyectados 1.7 y 2.1 que corresponden a los títulos de filamento de 1.9 y 1.3 dtex, respectivamente, la integración o mezcla de las fibras y filamentos en el material no fue buena, dando como resultado una resistencia de superficie muy pobre sobre el lado de pulpa del material. Con un cubrimiento proyectado más bajo de 0.9 que corresponde al título de filamento de 6.9 dtex, la estructura de la red de filamentos se volvió demasiado abierta para mantener la pulpa y la resistencia de la superficie del lado de la pulpa se volvió pobre.

La resistencia a la abrasión Taber se mide con el equipo de prueba Taber 51 51 con dos ruedas de caucho CS-10. Tal equipo es bien conocido por los expertos y no necesita ser descrito en detalle. La prueba se desarrolla al montar una muestra

de ensayo circular de material no tejido sobre un disco rotatable sobre el equipo de prueba Taber. En el ensayo, la muestra de ensayo se somete a la presión de la rueda de caucho que corre sobre la superficie superior de la muestra de ensayo. Dependiendo del peso base de la muestra de ensayo el disco es rotado con un número diferente de revoluciones, el número de revoluciones se incrementa con el peso base incrementado de la muestra de ensayo. El valor Taber de la muestra ensayada se determina mediante comparación visual con una escala, es decir, cinco muestras de referencia que tienen valores Taber 1-5, donde 1 define una resistencia a la abrasión muy pobre y 3 define una resistencia a la abrasión aceptable.

En la Tabla 2 se muestran valores Taber para tres materiales no tejidos, elaborados como se describió anteriormente, que tienen diferente peso base y contenido de filamentos continuos. Los filamentos continuos son filamentos unidos por hilado de polipropileno y las fibras cortas son fibras de pulpa. El valor Taber en la tabla representa el promedio de dos muestras de ensayo idénticas.

Tabla 2

Muestra Gramaje/Contenido "spunlaid" (g/m²)/%	Cubrimiento Proyectado	Revoluciones Taber	Valor Taber
50/40%	0.85	30	1
"-"	1.13	"-"	2
"-"	1.34	"-"	3
"-"	1.47	"-"	3.5
"-"	1.5	"-"	3.5

"-"	1.54	"-"	3.5
"-"	1.8	"-"	2
65/25%	0.76	100	1.5
"-"	1	"-"	2.5
"-"	1.18	"-"	3
"-"	1.3	"-"	4
"-"	1.4	"-"	4.5
"-"	1.8	"-"	4
"-"	2.16	"-"	2
80/25%	0.9	200	1.5
"-"	1.13	"-"	3
"-"	1.25	"-"	4
"-"	1.47	"-"	5
"-"	1.55	"-"	5
"-"	1.63	"-"	4
"-"	1.9	"-"	2

De la Tabla 2 uno puede concluir que si el cubrimiento proyectado descansa entre 1.1 y 1.6 se pueden suministrar no tejidos compuestos bien integrados para los no tejidos con un peso base de 80 g/m² o más. Para los no tejidos que tienen un peso base inferior el cubrimiento proyectado será al menos 1.2 con el fin de que se suministre un material aceptable. En el intervalo 1.3-1.6 lo no tejidos aceptables son suministrados aun para no tejidos de una peso base bajo y un alto contenido de filamentos continuos. Así, cuando se construyen materiales con no tejidos de acuerdo con la invención el cubrimiento proyectado ideal debe estar preferiblemente entre 1.3 y 1.6.

Los ejemplos de adelante muestran qué tan importante es seleccionar el título de filamento correcto para obtener el cubrimiento proyectado ideal como peso base y/o el contenido de "spunlaid" varía en un compuesto "wetlaid-spunlaid".

Para tres diferentes pesos base 50, 80 y 100 gsm, el título de filamento se muestra como una función del contenido de "spunlaid" y el cubrimiento en las tablas 3-5.

Los cálculos son hechos como sigue:

El cubrimiento proyectado (COV) se obtiene al dividir el área de superficie proyectada ($A_{\text{proyectada}}$) de todos los filamentos "spunlaid" dentro de un área unitaria con el área unitaria correspondiente (A) de acuerdo con la ecuación de adelante.

$$\text{COV} = \frac{A_{\text{proyectada}}}{A} \quad (1)$$

El área de superficie proyectada se obtiene al multiplicar la longitud total (L) de todos los filamentos "spunlaid" con el diámetro promedio (d) en m de todos los filamentos "spunlaid" dentro del área unitaria.

$$A_{\text{proyectada}} = L \cdot d \quad (2)$$

La longitud total de los filamentos dentro del área unitaria se obtiene al dividir el peso total de los filamentos "spunlaid" con el título de filamento promedio (Título) en dtex como se muestra en la ecuación (3) de adelante. El peso de la red de filamento "spunlaid" se obtiene al multiplicar el peso base de la red de filamento

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"spunlaid" (BW_s) en g/m^2 con el área unitaria (A). El título de filamento en dtex es el peso de los filamentos que corresponden a 10 000 m, es decir, $g/10\ 000\ m$.

$$L = \frac{BW_s * A}{Título} * 10000 \quad (3)$$

Para un material compuesto "wetlaid", el peso base de los filamentos "spunlaid" se calcula mediante

$$BW_s = BW * X / 100 \quad (4)$$

Donde $[BW]$ es el peso base del compuesto "wetlaid-spunlaid" en g/m^2 y (X) es el contenido de los filamentos "spunlaid" en %.

L es así:

$$L = \frac{BW * X * A}{100 * Título} * 10000 \quad (5)$$

La relación entre el Título en dtex y el diámetro en m de los filamentos es dada adelante donde (ρ) es la gravedad específica de los filamentos en kg/m^3 .

$$Título = \frac{\pi * d^2}{4} * 10000 * \rho * 1000 \quad (6)$$

Cómo (d) es resuelto de la ecuación (6) adelante la relación al título es:

$$d = \sqrt{\frac{4 * \text{Título}}{\pi * 10000 * \rho * 1000}} \quad (7)$$

Si las ecuaciones (2), (5) y (7) son utilizadas en (1) el cubrimiento proyectado es dado por:

$$\text{COV} = \frac{BW * X * A}{100 * \text{Título}} * 10000 * \sqrt{\frac{4 * \text{Título}}{\pi * 10000 * \rho * 1000}} * \frac{1}{A} \quad (8)$$

Cuando la ecuación (8) es simplificada el cubrimiento proyectado es dado por:

$$\text{COV} = \frac{2 * BW * X}{\sqrt{\text{Título} * \pi * \rho * 1000}} \quad (9)$$

Si el título es resuelto de la ecuación (9) anterior se obtiene la relación entre el título, el cubrimiento proyectado, el peso base y el contenido de "spunlaid".

$$\text{Título} = 4 * \left(\frac{BW * X}{\text{COV}} \right)^2 * \frac{1}{\pi * \rho * 1000} \quad (10)$$

La gravedad específica para el polipropileno es aproximadamente 900 kg/m³ para poliéster alrededor de 1350 kg/m³.

En las tablas 2-4 de adelante se muestra el título del filamento para el rango de cubrimiento proyectado ideal, es decir, entre 1.3 y 1.5 para los materiales compuestos "wetlaid-spunlaid". El título de filamento del rango más exterior cuando la red "spunlaid" se vuelva abierta o se densifique para elaborar un

material compuesto "spunlaid-wetlaid" aceptable también se muestra para los cubrimientos proyectados "spunlaid" correspondientes a 1.1 y 1.7.

Tabla 3. Título de filamento en dtex como función del contenido "spunlaid" y el cubrimiento para un material compuesto "wetlaid-spunlaid" de 50 g/m².

Contenido SL [%]	Cubrimiento "spunlaid"			
	1.1	1.3	1.6	1.7
40	4.68dtex	3.35 dtex	2.21 dtex	1.96 dtex
30	2.63dtex	1.88 dtex	1.24 dtex	1.10 dtex
20	1.17dtex	0.84 dtex	0.55 dtex	0.49

Tabla 4. Título de filamento en dtex como una función del contenido "spunlaid" y el cubrimiento para un material compuesto "wetlaid-spunlaid" de 80 g/m².

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Contenido SL [%]	Cubrimiento "spunlaid"			
	1.1	1.3	1.6	1.7
30	6.73 dtex	4.82 dtex	3.18 dtex	2.82 dtex
25	4.68 dtex	3.35	2.21 dtex	1.96
20	2.99 dtex	2.14 dtex	1.41 dtex	1.25 dtex
15	1.68 dtex	1.21 dtex	0.80 dtex	0.70 dtex

Tabla 4. Título de filamento dtex como una función del contenido "spunlaid" y el cubrimiento para un material compuesto "wetlaid-spunlaid" de 100g/m².

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Contenido SL [%]	Cubrimiento "spunlaid"			
	1.1	1.3	1.6	1.7
30	10.52 dtex	7.53 dtex	4.97 dtex	4.41 dtex
25	7.31 dtex	5.23 dtex	3.45 dtex	3.06 dtex
20	4.68 dtex	3.35 dtex	2.21 dtex	1.96 dtex
15	2.63	1.88 dtex	1.24 dtex	1.10 dtex

Como el título del filamento en las tablas que está siendo comparadas es claro que para los compuestos "spunlaid-wetlaid" con un peso base y/o los contenidos "spunlaid" altos un título más burdo de los filamentos "spunlaid" tiene que ser utilizado para obtener el cubrimiento proyectado "spunlaid". Cuando son hechos compuestos "spunlaid-wetlaid" con un peso base bajo y/o los contenidos "spunlaid" un título más bajo de filamentos "spunlaid" tiene que ser utilizado para obtener el cubrimiento proyectado "spunlaid" ideal.

Los resultados en las tablas también muestran que el contenido de "spunlaid" en los materiales es cambiado con un porcentaje relativamente pequeño, una ajuste mayor del título de filamento tiene que ser hecho para mantener el cubrimiento proyectado "spunlaid" al mismo nivel, De la misma manera un cambio relativamente pequeño del peso base total del material requiere una ajuste relativamente grande del título de filamento para ser capaz de golpear el cubrimiento proyectado "spunlaid" ideal.

En razón a que el cubrimiento proyectado es el producto de la longitud del filamento y el diámetro promedio de los filamentos, el cubrimiento proyectado ideal se puede obtener al variar el filamento longitud/m², es decir, la velocidad por medio de la cual los filamentos son puestos sobre la red de transporte 1, o el

diámetro de los filamentos. Es así relativamente fácil para el experto adaptar los parámetros del proceso dentro de los límites dados.

La modalidad descrita puede por supuesto ser modificada de varias maneras, por ejemplo, los filamentos continuos pueden ser "meltblown" en lugar de "spunbond". Adicionalmente, las fibras pueden ser "airlaid" en lugar de "wetlaid" y se puede desarrollar más de una etapa de hidroentramamiento. En lugar de "airlaying" o "wetlaying", las fibras se pueden suministrar en la forma de una red cardada. En la modalidad mostrada existen varias conductoras de transporte que tienen diferentes telas o alambres adaptados para tener cuidado del aire y agua que penetra la tela o alambres en las diferentes etapas del proceso pero es posible combinar una o más éstas conductoras en una conductora y un alambre. El alcance de la invención sólo debe ser restringido por los contenidos de reivindicaciones de patente incluidas.

REIVINDICACIONES

1. Un material de compuesto no tejido que consiste de una mezcla que contiene filamentos continuos y fibras cortas, los filamentos continuos están sustancialmente unidos mecánicamente uno al otro debido a entramamiento de las fibras y filamentos caracterizado porque los filamentos continuos en el material tienen un cubrimiento proyectado de más de 1.1 y no más de 1.7.
2. El material de compuesto no tejido de acuerdo a la reivindicación 1, caracterizado porque los filamentos continuos en el material tienen un cubrimiento proyectado entre 1.2-1.6, preferiblemente 1.3-1.6.
3. El material de compuesto no tejido de acuerdo a la reivindicación 1 o 2, caracterizado porque las fibras cortas comprenden fibras naturales y/o fibras de filamento sintético.
4. El material de compuesto no tejido de acuerdo a la reivindicación 3, caracterizado porque las fibras cortas comprenden al menos 60% en peso de fibras de celulosa, preferiblemente al menos 70% en peso, más preferiblemente al menos 75% en peso y más preferiblemente al menos 85% en peso.
5. El material de compuesto no tejido de acuerdo a la reivindicación 4, caracterizado porque las fibras cortas comprenden 85-95% en peso de fibras de celulosa, preferiblemente aproximadamente 90% en peso.

6. El material de compuesto no tejido de acuerdo a una cualquiera de las reivindicaciones 1-5, caracterizado porque el contenido de filamentos continuos en el material es aproximadamente 15-40% en peso, preferiblemente 25-40% en peso.
7. El material de compuesto no tejido de acuerdo a una cualquiera de las reivindicaciones 1-6, caracterizado porque el peso base del material es preferiblemente 40-100 g/m², más preferiblemente 50-80 g/m².
8. El material de compuesto no tejido de acuerdo a una cualquiera de las reivindicaciones 1-7, caracterizado porque las fibras cortas son fibras "wetlaid".
9. Un método para elaborar un material no tejido que comprende las etapas de poner la capa de fibras cortas (6) sobre una red de filamentos continuos no tejidos (4), hidroentramar las capas que consisten de filamentos continuos y fibras cortas para formar un compuesto de material no tejido y posteriormente secar el material, caracterizado por suministrarle a la red de filamentos continuos (4) un cubrimiento proyectado de al menos 1.1 y no más de 1.7.
10. El método de acuerdo a la reivindicación 9, caracterizado por suministrarle a la red de filamentos continuos (4) un cubrimiento proyectado entre 1.2-1.6, preferiblemente 1.3-1.6.
11. El método de acuerdo a la reivindicación 9 o 10, caracterizado porque los filamentos continuos son filamentos "spunlaid spunbond".

12. El método de acuerdo a la reivindicación 9, 10 u 11, caracterizado porque las fibras cortas son "wetlaid" sobre la red de filamentos continuos (4).
13. El método de acuerdo a la reivindicación 9, 10 u 11, caracterizado porque las fibras cortas son "airlaid" sobre la red de filamentos continuos (4).
14. El método de acuerdo a una cualquiera de las reivindicaciones 9-14, caracterizado porque el suministro de energía en el hidroentramamiento es como máximo de aproximadamente 500 kWh/ton, preferiblemente aproximadamente 300-400 kWh/ton y más preferiblemente aproximadamente 350 kWh/ton.

1/1

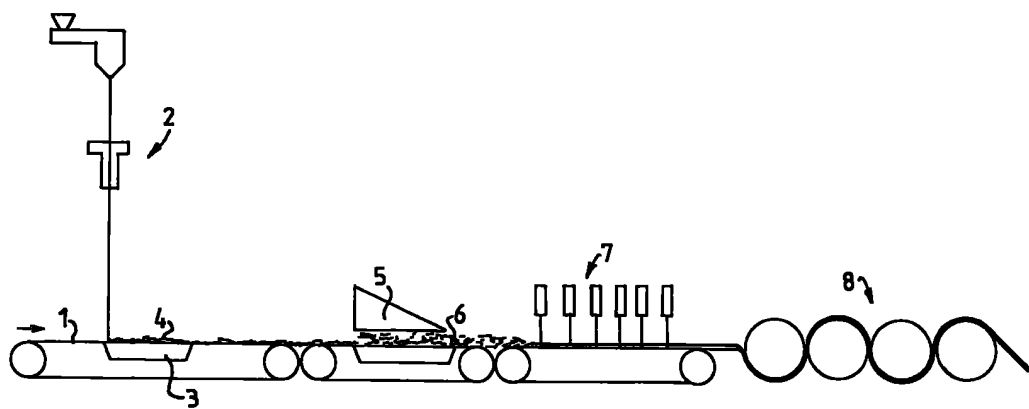


FIG 1

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 73186-77626		FOR FURTHER ACTION		See Form PCT/PEA/16
International application No. PCT/SE2004/001698		International filing date (day/month/year) 19.11.2004	Priority date (day/month/year) 18.12.2003	
International Patent Classification (IPC) or national classification and IPC D04H1/46				
Applicant SCA HYGIENE PRODUCTS AB et al.				
1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 38. 2. This REPORT consists of a total of 5 sheets, including this cover sheet. 3. This report is also accompanied by ANNEXES, comprising: a. ☐ sent to the applicant and to the International Bureau a total of sheets, as follows: ☐ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 807 of the Administrative Instructions). ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box. b. ☐ (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).				
4. This report contains indications relating to the following items: ☒ Box No. I Basis of the opinion ☐ Box No. II Priority ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability ☐ Box No. IV Lack of unity of invention ☒ Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement ☐ Box No. VI Certain documents cited ☒ Box No. VII Certain defects in the international application ☒ Box No. VIII Certain observations on the international application				
Date of submission of the demand 17.10.2005		Date of completion of this report 07.02.2006		
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80289 Munich Tel. +49 89 23699 - 0 Tlx 523656 epmu d Fax: +49 89 2399 - 4485		Authorized Officer Boccignone, M Telephone No. +49 89 2369-2843 		

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/SE2004/001698

Box No. I Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
 - ☐ This report is based on translations from the original language into the following language, which is the language of a translation furnished for the purposes of:
 - ☐ international search (under Rules 12.3 and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4)
 - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the elements* of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, Pages

1-20 as published

Claims, Numbers

1-14 as published

Drawings, Sheets

1/1 as published

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing
3. ☐ The amendments have resulted in the cancellation of:
 - ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing *(specify)*:
 - ☐ any table(s) related to sequence listing *(specify)*:
 4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
 - ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing *(specify)*:
 - ☐ any table(s) related to sequence listing *(specify)*:

* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/SE2004/001698

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	12,13
	No: Claims	1-11,14
Inventive step (IS)	Yes: Claims	
	No: Claims	1-14
Industrial applicability (IA)	Yes: Claims	1-14
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

**INTERNATIONAL PRELIMINARY
REPORT ON PATENTABILITY
(SEPARATE SHEET)**

International application No.

PCT/SE2004/001698

Reference is made to the following documents:

- D1: WO-A-99/22059
- D2: EP-A1-0 423 619
- D3: EP-A2-0 308 320
- D4: US-A-4 442 161
- D5: EP-A1-0 492 554
- D6: US 2002 157 766 A1
- D7: EP-A1-1 215 325

1. The following remarks on the subject-matter of claim 1 are raised:
 - a. Claim 1 is not supported by the description as required by Article 6 PCT, as its scope is broader than justified by the description and drawings. It appears in fact from the wording of claim 1 that only the continuous filaments are bonded to each other, whereas the short fibres do not become entangled. It is however clear from claim 19 and the whole description that the continuous filaments and the short fibres are entangled.
 - b. It is not possible to recognize in the finished product whether the continuous filaments were originally bonded or not before the entanglement with the short fibres takes place.
 - c. The definition of "projected coverage" given at page 11 should have been introduced therein.
2. It appears from the wording of claim 9 that method steps are missing. All the pure method steps are known from the prior art (preamble of the claim). The only not known characteristic, in the Applicant's view, is not a method step, but a product feature. However, it is not clear from the claim why the known method steps lead to a novel method (Article 6 PCT).
3. Document D1 (see from page 4, line 5 to page 11, line 26 and the claims) discloses a nonwoven composite material consisting of a mixture containing continuous filaments and short fibres, the continuous filaments being mechanically bonded to each other to entangling of fibres and filaments; wherein the continuous filaments in the material have a projected coverage of at least 1.1 and not more than 1.7.

It is pointed out that in the way the web of continuous filaments is produced (i.e. by foamforming or by other means) cannot be recognized in the finished product.

Thus, the subject-matter of claim 1 is not novel (Article 33(1) and (2) PCT).

Additionally, documents D2 to D7 (see the claims) also disclose the subject-matter of claim 1.

4. Document D1 (see from page 4, line 5 to page 11, line 26 and the claims) further discloses a method of manufacturing a nonwoven material comprising the steps of laying a layer of short fibres onto a web of unbonded continuous filaments, hydroentangling the layers consisting of continuous filaments and short fibres to form a composite nonwoven material and thereafter drying the material; wherein the web of continuous filaments is provided with a projected coverage of at least 1.1 and not more than 1.7.
5. Furthermore, document D1 also discloses the subject-matter of claims 2 to 7; 10, 11 and 14.

Document D7 (see the claims) also discloses the subject-matter of claim 8.

Thus, the subject-matter of claims 2 to 8; 10, 11 and 14 is not novel (Article 33(1) and (2) PCT).

6. Document D7 (see the claims) also suggests the subject-matter of claims 12 and 13.

Thus, the subject-matter of claims 12 and 13 is not inventive (Article 33(3) PCT).

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 73186-77626	FOR FURTHER ACTION see Form PCT/ISA/220 as well as, where applicable, item 5 below.	
International application No. PCT/SE 2004/001698	International filing date (day/month/year) 19 November 2004	(Earliest) Priority Date (day/month/year) 18 December 2003
Applicant SCA HYGIENE PRODUCTS AB		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 3 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ The international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. ☐ With regard to any nucleotide and/or amino acid sequence disclosed in the international application, see Box No. I.

2. ☐ Certain claims were found unsearchable (see Box No. II)

3. ☐ Unity of invention is lacking (see Box No. III)

4. With regard to the title,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the abstract,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the drawings,

a. the figure of the drawings to be published with the abstract is Figure No. 1

☒ as suggested by the applicant.

☐ as selected by this Authority, because the applicant failed to suggest a figure.

☐ as selected by this Authority, because this figure better characterizes the invention.

b. ☐ none of the figures is to be published with the abstract.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 2004/001698

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: D04H 1/46, D04H 5/02

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)

IPC7: D04H

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, WPI DATA, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0560556 A1 (IKEZAWA, HIDEO ET AL), 15 Sept 1993 (15.09.1993), page 3, line 9 - line 50; page 4, line 4 - line 26; page 4, line 55 - page 5, line 42, examples, claims, abstract --	1-14
X	EP 0492554 A1 (KIMBERLY-CLARK CORPORATION), 1 July 1992 (01.07.1992), page 3, line 43 - line 56; page 5, line 42 - line 54; page 7, line 10 - line 22, figure 1, examples, claims, abstract --	1-14
X	EP 1215325 A1 (SCA HYGIENE PRODUCTS AB), 19 June 2002 (19.06.2002), page 2, column 2, line 39 - line 45; page 3, column 3, line 18 - line 44, claims, abstract --	1-14

☒ Further documents are listed in the continuation of Box C.
 ☒ See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier application or patent but published on or after the international filing date	"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&" document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search 30 March 2005	Date of mailing of the international search report 06-04-2005
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM	Authorized officer Monika Bohlin/MP

INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 2004/001698

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2002157766 A1 (ANDRE VUILLAUME ET AL), 31 October 2002 (31.10.2002), page 1, paragraph 19-20; page 2, paragraph 22-27; page 2, paragraph 43-44; page 3, paragraph 51-52; page 4, paragraph 73; examples, figures, claims, abstract --	1-14
X	US 3493462 A (W.W.BUNTING, JR. ET AL), 3 February 1970 (03.02.1970), column 30, example 13; claims, abstract --	1-14
X	EP 0308320 A2 (JAMES RIVER CORPORATION OF VIRGINIA), 22 March 1989 (22.03.1989), column 1, line 48 - column 2, line 46; column 3, line 14 - column 4, line 6; column 4, line 42 - column 5, line 36, figure, claims, abstract --	1-14
X	US 4442161 A (BIROL KIRAYOGLU ET AL), 10 April 1984 (10.04.1984), column 1, line 44 - column 2, line 29; column 3, line 14 - line 29; column 5, line 24 - line 42, claims, abstract --	1-14
X	EP 0423619 A1 (FIBERWEB NORTH AMERICA, INC.), 24 April 1991 (24.04.1991), page 5, line 54 - page 6, line 54, claims, abstract --	1-14
X	WO 9922059 A1 (SCA HYGIENE PRODUCTS AB), 6 May 1999 (06.05.1999), page 4, line 1 - line 13, claims, abstract --	1-14
X	WO 0238846 A2 (KIMBERLY-CLARK WORLDWIDE INC.), 16 May 2002 (16.05.2002), claims, abstract -- -----	1-14

INTERNATIONAL SEARCH REPORT
Information on patent family members

01/03/2005

International application No.

PCT/SE 2004/001698

EP	0560556	A1	15/09/1993	DE	69314202 D,T	14/05/1998
				JP	2826586 B	18/11/1998
				JP	5253160 A	05/10/1993
				JP	6041583 U	03/06/1994
				JP	3289309 B	04/06/2002
				JP	5277053 A	26/10/1993
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INTERNATIONAL SEARCH REPORT
Information on patent family members

01/03/2005

International application No.

PCT/SE 2004/001698

69

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INTERNATIONAL SEARCH REPORT
Information on patent family members

01/03/2005

International application No.

PCT/SE 2004/001698

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PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

Albihts Stockholm AB
P.O. Box 5581
114 85 Stockholm

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing
(day/month/year)

06-04-2005

Applicant's or agent's file reference

73186-77626

FOR FURTHER ACTION

See paragraph 2 below

International application No.

PCT/SE 2004/001698

International filing date (day/month/year)

19.11.2004

Priority date (day/month/year)

18.12.2003

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

D04H 1/46, D04H 5/02

Applicant

SCA Hygiene Products AB

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further opinions, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/SE

Patent- och registreringsverket

Box 5055

S-102 42 STOCKHOLM

Facsimile No. +46 8 667 72 88

Authorized officer

Monika Bohlin/MP

Telephone No. +46 8 782 25 00

Form PCT/ISA/237 (cover sheet) (January 2004)

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/SE 2004/001698

Box No. I Basis of this opinion

1. With regard to the language, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This opinion has been established on the basis of a translation from the original language into the following language, _____, which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).

2. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

a. type of material

- ☐ a sequence listing
☐ table(s) related to the sequence listing

b. format of material

- ☐ in written format
☐ in computer readable form

c. time of filing/furnishing

- ☐ contained in the international application as filed.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/SE 2004/001698

Box No. V Reasoned statement under Rule 43bix.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	8, 12-14	YES
	Claims	1-7, 9-11	NO
Inventive step (IS)	Claims		YES
	Claims	1-14	NO
Industrial applicability (IA)	Claims	1-14	YES
	Claims		NO

2. Citations and explanations:

The following documents were cited in the international search report:

D1 EP 0560556 A1
D2 EP 0492554 A1
D3 EP 1215325 A1
D4 US 2002157766 A1
D5 US 3493462 A
D6 EP 0308320 A2
D7 US 4442161 A
D8 EP 0423619 A1
D9 WO 9922059 A1
D10 WO 0238846 A2

The claimed invention relates to a composite non-woven material comprising continuous filaments and short fibres, as well as a method of manufacturing the material. The method comprises the steps of laying short natural or synthetic fibres onto a web of unbonded continuous fibres and hydroentangling the two fibre layers. The object of the claimed invention is to provide a non-woven material that is strong, absorbent, abrasion resistant and that exhibits low linting, i.e. fibres should not loosen from the material during normal use. This object is accomplished by choosing the dimension of continuous fibres as a function of the basis weight of the continuous layer and its weight percentage of the total basis weight so that the projected coverage (COV) of the continuous fibres relative to the material surface area is between 1.1 and 1.7.

.../...

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of BOX V

D1 discloses a composite non-woven material that is manufactured by laminating a paper web onto a web of continuous fibres and then hydroentangling to bond the layers together. The dimensions and basis weight of the continuous fibres required in order to obtain a satisfactory result while at the same time minimising the amount of fibres that are lost in the water jet streams are discussed on page 4, lines 4-23. A suitable basis weight ratio of the paper web and the filament web is suggested on page 5 lines 20-28. The continuous filaments may be bonded or unbonded (see page 4 lines 23-25). When the figures supplied in example 1 of D1 are used to calculate COV according to this application, a COV of 1.4 is obtained.

The subject matter of current claims 1-7 and 9-11 is thus disclosed in D1. These claims are accordingly considered to lack novelty.

Current claims 8, 12 and 13 differ from the disclosure of D1 in that the short fibres are air- or wet-laid on the continuous web. It is however considered obvious to the skilled person that the short fibres can be supplied in different, well known ways. These claims are therefore not considered to involve an inventive step.

The energy consumption defined in claim 14 is considered normal to the claimed manufacturing method. This claim is thus not considered to involve an inventive step.

D2 discloses a material comprising 10-25% (by weight) continuous fibres and 75-90% pulp fibres (page 3 lines 43-48). The pulp fibres can be wet-, air- or dry-laid on the continuous web (page 6 lines 37-39). The continuous web may have a basis weight of 3.5 to 70 g/m² (page 5 line 50-53). It is further important that the bonded area of the continuous web is less than 30% (page 5 lines 55-58 and page 7 lines 10-22). It is impossible to calculate any COV since the dimensions of the continuous fibres are not specified in D2. The manufacturing method of D2 is the same as the claimed one. There is no evidence on file that the claimed

.../...

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/SE 2004/001698

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of Box V

material and manufacturing method differs from what is
disclosed in D2 or D3-D10.

ALBIHNS

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European Patent Office
Directorate General 2
D-80298 MÜNCHEN
TYSKLAND

Via facsimile

Our ref.
73186-77626-JOH/JOH

Your ref.

Stockholm
17 October 2005

International Patent Application No. PCT/SE2004/001698
SCA HYGIENE PRODUCTS AB

Dear Sirs,

I have the following comments to the written opinion attached to the search report.

Although D1 mentions the possibility of using unbonded continuous filaments, example 1 is directed to a bonded continuous filaments and this example is not relevant to the teaching of the present invention. In fact all examples are directed to fuse-bonded continuous filaments. Since the filaments are fuse-bonded to each other they are not "substantially mechanically bonded to each other due to entangling of fibres and filaments" as demanded by the claim language so it is quite clear that these examples can not teach a skilled man anything about the magnitude of a projected coverage of a web of unbonded continuous filaments. Nor is anything said in D1 about the special problems of obtaining a good integration of continuous filaments and short fibres only by hydroentangling, which is solved by the present invention, see for example the paragraph bridging pages 1 and 2 and page 3 of the present description. The teaching of D1 is therefore not relevant to the present invention.

Regarding the examiners comments that there is no evidence on file that the claimed material and manufacturing methods differs from what is disclosed in D2-D10 I find this comment to be rather peculiar. There is not possible to in a patent application mention all

ALBIHNS STOCKHOLM AB

Box 5581 • Linnégatan 2 • SE-114 85 Stockholm • Sweden • Org.No. 556015-0046

prior art that might be considered relevant by an Examiner, especially before such prior art has been cited.

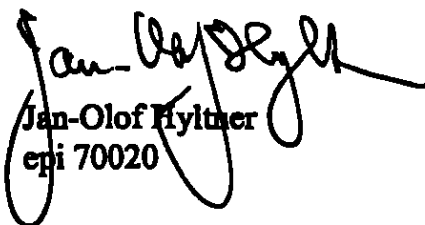
However, also D3, D6, D7, D8 and D10 teaches the use of bonded webs of continuous filaments and are already for this reason not relevant to the present invention. D9 comprises the use of foam when forming the material.

D4 and D5 (example XIII) discloses the use of unbonded webs of continuous filaments together with mixing these web with webs of staple fibres by hydroentangling. However, nothing is said about COV in these publications, so the content thereof cannot lead a skilled man in a direction towards the present invention. Furthermore, in D4 there are two examples enabling COV to be calculated, namely example 1 in which COV is 3.6 and example 2 in which COV is 2.1, and in D5 the COV:s in examples XII and XIII are 2.35 and 7.2 respectively. None of these documents can therefore lead a skilled man in a direction towards the present invention.

The claimed invention is thus novel and involves an inventive step and a favourable IPER is therefore respectfully requested.

Yours faithfully,

ALBIHNS INTERNATIONAL IP & LAW OFFICES


Jan-Olof Hyltner
epi 70020

The demand must be filed directly with the competent International Preliminary Examining Authority or, if two or more Authorities are competent, with the one chosen by the applicant. The full name or two-letter code of that Authority may be indicated by the applicant on the line below:

IPEA/EPO

PCT

CHAPTER II

DEMAND

under Article 31 of the Patent Cooperation Treaty:
The undersigned requests that the international application specified below be the subject of international preliminary examination according to the Patent Cooperation Treaty.

For International Preliminary Examining Authority use only	
Identification of IPEA	Date of receipt of DEMAND
Box No. I IDENTIFICATION OF THE INTERNATIONAL APPLICATION	
International application No. PCT/SE2004/001698	Applicant's or agent's file reference 73186-77626
International filing date (day/month/year) 19 November 2004 (19-11-2004)	(Earliest) Priority date (day/month/year) 18 December 2003 (18-12-2003)
Title of invention A COMPOSITE NONWOVEN MATERIAL CONTAINING CONTINUOUS FILAMENTS AND SHORT FIBRES	
Box No. II APPLICANT(S)	
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.) SCA HYGIENE PRODUCTS AB SE-405 03 GÖTEBORG Sweden	Telephone No. Facsimile No. Teleprinter No. Applicant's registration No. with the Office
State (that is, country) of nationality: SE	State (that is, country) of residence: SE
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.) 	
State (that is, country) of nationality:	State (that is, country) of residence:
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.) 	
State (that is, country) of nationality:	State (that is, country) of residence:
☐ Further applicants are indicated on a continuation sheet.	

Box No. III AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE

The following person is ☒ agent ☐ common representative

and ☒ has been appointed earlier and represents the applicant(s) also for international preliminary examination.

☐ is hereby appointed and any earlier appointment of (an) agent(s)/common representative is hereby revoked.

☐ is hereby appointed, specifically for the procedure before the International Preliminary Examining Authority, in addition to the agent(s)/common representative appointed earlier.

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)*

HYLTNER, Jan-Olof
ALBIHNS STOCKHOLM AB
P.O.Box 5581
SE-114 85 STOCKHOLM
Sweden

Telephone No.

+46 8 59 88 72 00

Facsimile No.

+46 59 88 73 00

Teleprinter No.

Agent's registration No. with the Office
epi No. 70021

☐ Address for correspondence: Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

Box No. IV BASIS FOR INTERNATIONAL PRELIMINARY EXAMINATION

Statement concerning amendments:*

1. The applicant wishes the international preliminary examination to start on the basis of:

☒ the international application as originally filed

the description ☐ as originally filed

☐ as amended under Article 34

the claims ☐ as originally filed

☐ as amended under Article 19 (together with any accompanying statement)

☐ as amended under Article 34

the drawings ☐ as originally filed

☐ as amended under Article 34

2. ☐ The applicant wishes any amendment to the claims under Article 19 to be considered as reversed.

3. ☐ Where the IPEA wishes to start the international preliminary examination at the same time as the international search in accordance with Rule 69.1(b), the applicant requests the IPEA to postpone the start of the international preliminary examination until the expiration of the applicable time limit under Rule 69.1(d).

4. ☐ The applicant expressly wishes the international preliminary examination to start earlier than at the expiration of the applicable time limit under Rule 54bis.1(a).

* Where no check-box is marked, international preliminary examination will start on the basis of the international application as originally filed or, where a copy of amendments to the claims under Article 19 and/or amendments of the international application under Article 34 are received by the International Preliminary Examining Authority before it has begun to draw up a written opinion or the international preliminary examination report, as so amended.

Language for the purposes of international preliminary examination: ... English

☒ which is the language in which the international application was filed.

☐ which is the language of a translation furnished for the purposes of international search.

☐ which is the language of publication of the international application.

☐ which is the language of the translation (to be) furnished for the purposes of international preliminary examination.

Box No. V ELECTION OF STATES

The filing of this demand constitutes the election of all Contracting States which are designated and are bound by Chapter II of the PCT.

Box No. VI CHECK LIST

The demand is accompanied by the following elements, in the language referred to in Box No. IV, for the purposes of international preliminary examination:

- | | | |
|--|---|--------|
| 1. translation of international application | : | sheets |
| 2. amendments under Article 34 | : | sheets |
| 3. copy (or, where required, translation) of amendments under Article 19 | : | sheets |
| 4. copy (or, where required, translation) of statement under Article 19 | : | sheets |
| 5. letter | : | sheets |
| 6. other (specify) | : | sheets |

For International Preliminary Examining Authority use only

received	not received
☐	☐
☐	☐
☐	☐
☐	☐
☐	☐
☐	☐

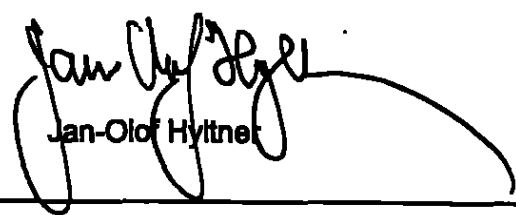
The demand is also accompanied by the item(s) marked below:

- | | |
|--|---|
| 1. ☒ fee calculation sheet | 5. ☐ statement explaining lack of signature |
| 2. ☐ original separate power of attorney | 6. ☐ sequence listing in electronic form |
| 3. ☐ original general power of attorney | 7. ☐ tables in electronic form related to a sequence listing |
| 4. ☐ copy of general power of attorney; reference number, if any: | 8. ☒ other (specify): Letter with comments to the Written Opinion |

Box No. VII SIGNATURE OF APPLICANT, AGENT OR COMMON REPRESENTATIVE

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the demand).

17 October 2005


Jan-Olof Hyttner

For International Preliminary Examining Authority use only

1. Date of actual receipt of DEMAND:	
2. Adjusted date of receipt of demand due to CORRECTIONS under Rule 60.1(b):	
3. ☐ The date of receipt of the demand is AFTER the expiration of 19 months from the priority date and item 4 or 5, below, does not apply. ☐ The applicant has been informed accordingly.	6. ☐ The date of receipt of the demand is AFTER the expiration of the time limit under Rule 54bis.1(a) and item 7 or 8, below, does not apply.
4. ☐ The date of receipt of the demand is WITHIN the time limit of 19 months from the priority date as extended by virtue of Rule 80.5.	7. ☐ The date of receipt of the demand is WITHIN the time limit under Rule 54bis.1(a) as extended by virtue of Rule 80.5.
5. ☐ Although the date of receipt of the demand is after the expiration of 19 months from the priority date, the delay in arrival is EXCUSED pursuant to Rule 82.	8. ☐ Although the date of receipt of the demand is after the expiration of the time limit under Rule 54bis.1(a), the delay in arrival is EXCUSED pursuant to Rule 82.

For International Bureau use only

Demand received from IPEA on:



FORMATO DE DIGITALIZACION
RELACION DE ANEXOS



Royal
Technologies S.A.
Calle 10 No. 10-10, San José, Costa Rica

81

Expediente No		06-059313	No de Folio
Item		No de unidades	
1	CD		
2	DVD		
3	REVISTA		
4	LIBRO		
5	PERIODICO		
6	DISQUETES		
7	SOBRE DE MANILA		
8	SOBRE BLANCO TAMAÑO CARTA X	1	✓
9	SOBRE BLANCO TAMAÑO OFICIO		
10	OTROS:		
Observaciones: Contiene Site Final			

83
82

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

NIT : 900176089-2

RECIBO OFICIAL DE CAJA : 06 - 44,157
FECHA : JUNIO 12 DE 2006

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO
Rad: 06-059313-00000-0000
Fec: 2006-06-15 17:36:42 Dep. 2020 NUECREACIONES
Trib. 11 PATENTEYII
Eve: 379 FASENACIONALII
Act 411 PRESENTACION Folios: 83

***** CONSIGNACION *****

DEPOSITANTE	TIPO PAGO	BANCO	CUENTA	No. PAGO	FECHA PAGO	Vr. PAGO
CAVELIER ABOGADOS	CONSIGNACION	BANCO POPULAR	050-00110-6	55274900	12/06/2006	26,485,000.00

***** CONCEPTO *****

CANT. RENTISTICO	CONCEPTO	TOTAL CONCEPTO
1 50005-01-01 SOLICITUDES	1 TRAMITES DE SOL. DE PATENTE DE IN	463,000.00
	TOTAL :	\$ 463,000.00

SON: CUATROCIENTOS SESENTA Y TRES MIL PESOS

RESPONSABLE : 

RECIBO DE CAJA APLICADO AL EXPEDIENTE No. _____

010 11256-841-091-7

**REQUISITOS MINIMOS PARA ADMISION A TRAMITE
PCT**

PATENTE DE INVENCION



MODELO DE UTILIDAD []

- ◆ Indicación de que se solicita la concesión de una patente []
- ◆ Datos de identificación del solicitante o de la persona que presenta la solicitud []
- ◆ Descripción de la invención []
- ◆ Dibujos de ser estos pertinentes []
- ◆ Comprobante de pago de las tasas establecidas []

COMPLETA []

INCOMPLETA []

DISEÑO INDUSTRIAL []

- ◆ Indicación de que se solicita el registro de Diseño Industrial []
- ◆ Datos de identificación del solicitante o de la persona que presenta la solicitud []
- ◆ Representación gráfica y fotográfica del Diseño Industrial o muestra del material que incorpora el diseño []
- ◆ Comprobante de pago de las tasas establecidas []

COMPLETA []

INCOMPLETA []

ESQUEMA DE TRAZADO []

- ◆ Indicación de que se solicita el registro de un Esquema de Trazado []
- ◆ Datos de identificación del solicitante o de la persona que presenta la solicitud []
- ◆ Representación gráfica del esquema trazado []
- ◆ Comprobante de pago de las tasas establecidas []

COMPLETA []

INCOMPLETA []

Firma Responsable

Fecha 16 JUN 2006

Carrera 13 No. 27-00 Piso 5, 7 y 10
Conmutador: 3 82 08 40
Fax: 350 52 20
E-mail: info@sic.gov.co
www.sic.gov.co
Bogotá, D.C., Colombia