

Drigard & Castr
Abogados

Apartado 3892

Cra. 7 16-56
Bogotá - Colombia S.A.

Tel. Conm. 3802200
Tel./Fax: (57.1) 2827976
(57.1) 3802700

E.Mail:bricas@brigardycastro.com.co

SUPERINDUSTRIA Y COMERCIO

Radicacion : 04039436 00000001 Folios: 7

AS: 93.083

Fecha (AMB): 2004-12-17 13:07:21

Tramite : 011 PCT-PATENT 379 FASE NACI 530 PETICION

Dependencia: 2020 DIVISION DE NUEVAS CREACIONES

Señores
SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO
DIVISION DE NUEVAS CREACIONES
E. S. D.

REF.: Expediente No. 04 039.436 - solicitud de Patente FASE NACIONAL
Corresp. a la Solicitud Internacional PCT/US02/13530
a nombre de: **KIMBERLY – CLARK WORLDWIDE, INC.**
Titulada: **HOJA DE CUBIERTA PARA PRODUCTOS PARA EL CUIDADO PERSONAL**

JUAN PABLO CADENA SARMIENTO, vecino de Bogotá, portador de la tarjeta profesional No. 57492 del Consejo Superior de la Judicatura, obrando como apoderado sustituto de la Sociedad **KIMBERLY – CLARK WORLDWIDE, INC.**, según lo acredita el documento de poder anexo, de acuerdo con el Artículo 44 de la Decisión 486 de la Comisión de la Comunidad Andina, me permito solicitar que se examine si la invención contenida en la solicitud en referencia es patentable.

De acuerdo con lo anterior, me permito anexar el recibo oficial de caja No. 04-82,964 por valor de \$177.000.

De la Señora Jefe atentamente,


JUAN PABLO CADENA SARMIENTO
C.C. No. 80.410.337 de Usaquén
T.P. No.57492 del C.S.J.
Cra 7 No. 16-56 Piso 9

Diciembre 15, 2004
CHP/MEV/hsr

77-
76

SUPERINDUSTRIA Y COMERCIO
Radicacion : 04039436 00000001 Folios: 7
Fecha (AMD): 2004-12-17 14:07:21
Tramite : 011 PCT-PATENT 379 FASE NNCI 538 PETICION
Dependencia: 2020 DIVISION DE NUEVAS CREACIONES

NIT : 800176089-2

14

RECIBO OFICIAL DE CAJA : 04 - 92,964
FECHA : OCTUBRE 21 DE 2004

***** CONSIGNACION *****

DEPOSITANTE	TIPO PAGO	BANCO	CUENTA	No. PAGO	FECHA PGO	Vr. PAGO
BRIARD & CASTRO LTDA	CONSIGNACION	BANCO POPULAR	050-00110-6	21591355	20/10/2004	16,050,000.00

***** CONCEPTO *****

CANT. RENTISTICO	CONCEPTO	TOTAL CONCEPTO
1 50005-01-01 SOLICITUDES	114 PTC CAP-II EXAMEN DE PATENTIBILID	177,000.00
	TOTAL :	177,000.00

SOM: CIENTO SETENTA Y SIETE MIL PESOS

RESPONSABLE : 

RECIBO DE CAJA APLICADO AL EXPEDIENTE No. _____

THE STATE OF WISCONSIN

**Office of the
Secretary of State**

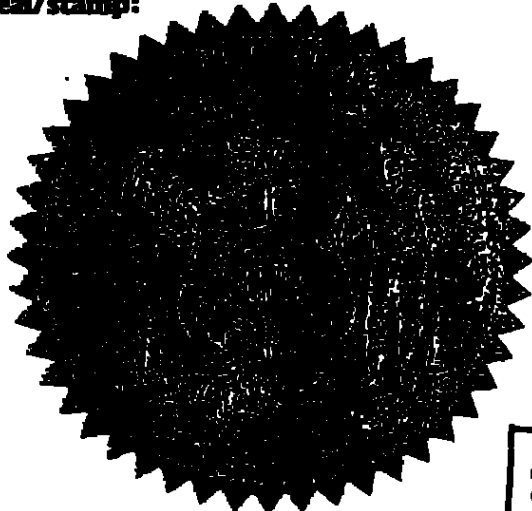
APOSTILLE

(Convention de La Haye du 5 octobre 1961)

1. **Country: United States of America**
2. **This public document has been signed by Cheryl R Gorges**
3. **acting in the capacity of Notary Public, State of Wisconsin**
4. **bears the seal/stamp of Notary Public, State of Wisconsin**

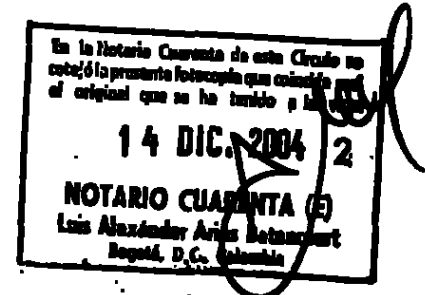
CERTIFIED

5. **at Madison, Wisconsin**
6. **August 16, 2002**
7. **by the Secretary of State of Wisconsin**
8. **No. 73756**
9. **Seal/stamp:**
10. **Signature:**



Douglas La Follette

**DOUGLAS LA FOLLETTE
Secretary of State**



Nombre

Cargo

Signature

Name

Title

Nancy Lee Carter

Nancy Lee Carter

Assistant Secretary

Kimberly-Clark Worldwide, Inc.

PODER

POWER OF ATTORNEY

29
78

Yo (nosotros)

I (We) Kimberly-Clark Worldwide, Inc.

domiciliado(s) en

domiciled in 401 N. Lake Street, Neenah, Wisconsin, 54956, USA.

Nombro(anos) a: RAMIRO CASTRO DUQUE y/o JUAN PABLO CADENA SARMIENTO y/o BEATRIZ JARAMILLO S. de Santafé de Bogotá, Colombia, apoderados verdaderos y legales con poder especial, amplio y suficiente, para recabar de las oficinas y autoridades colombianas administrativas, judiciales y de policía, en cualquier instancia o recurso, la obtención de patentes de invención, registros de marcas, diseños industriales, modelos de utilidad, depósitos de nombres comerciales y enseñas, registros de derechos de autor y contratos sobre los mismos, obtención de certificados de obtención de variedades vegetales, así como sus prórrogas, renovaciones, anotaciones de traspaso, cambios de nombre y/o domicilio; elaborar, tramitar y registrar contratos de licencia y licencias de cualesquiera clases; intervenir como demandante o como demandado en cualquier instancia y recurso ante cualquier juez, corporación, funcionario público o autoridad en acciones judiciales, administrativas y de policía tales como: oposiciones al registro de marcas; acciones de caducidad, cancelación y nulidad; acciones reivindicatorias, acciones derivadas de la obtención o explotación de licencias; acciones de competencia desleal; demandas penales; acciones de indemnización de perjuicios, reclamos y observaciones a solicitudes de patentes, diseños industriales, modelos de utilidad, en el ejercicio de medidas cautelares y en otras acciones o medidas similares.

Hereby appoint RAMIRO CASTRO DUQUE and/or JUAN PABLO CADENA SARMIENTO and/or BEATRIZ JARAMILLO S. of Santafé de Bogotá, Colombia, my (our) true and lawful attorneys with special, ample and sufficient power to obtain from the Colombian administrative, judicial and police offices and authorities, in any instance, privileges of patents of invention, registration of trademarks, industrial designs and utility models; registration of commercial names and emblems, registration of copyright and contracts related thereto, certificates of obtainment of vegetables varieties, as well as extensions, renewals and recordal of assignments and changes of name and domicile related to the above; to prepare, prosecute and register licenses of any kind; to act as plaintiff or defendant in any instance or recourse, and before any judge, corporation, public official or authority in judicial, administrative and police actions, such as: oppositions to the registration of trademarks; caducity, cancellation and nullity actions; claim actions derived from the obtaining or exploitation of licenses, action of unfair competition; penal demands, actions of indemnities for damages; claims or observations on patent applications, models, industrial designs and utility models; in the exercise of preventive measures; and in other actions or similar proceedings.

A este efecto, lo(s) faculto(anos) para elevar solicitudes, formular descripciones, enmiendas, protestas, declaraciones, oposiciones, cancelaciones, nulidades, apelaciones y reclamos; pagar impuestos, cuotas y gravámenes prescritos por la ley; renunciar o desistír a derechos concedidos o en curso de concesión; recibir toda clase de documentos y valores, dando el descargo respectivo, y, en general, para dar ante dichas autoridades todos los pasos necesarios al efecto indicado y tomar todas las medidas que creyeren conducentes al resguardo de mis (nuestros) intereses, con todas las demás facultades regales necesarias.

To that effect they are hereby empowered to file applications, formulate descriptions, amendments, protests, declarations, oppositions, cancellations, nullifies, appeals and claims; to pay taxes, quotas and assessments prescribed by law, renounce or waive the rights granted or in the process of granting; to receive all kind of documents and valuables, giving the respective release of receipt, and, in general, to take before said authorities the necessary steps to such effect, and any measures that they may deem pertinent to the safeguard of my (our) interests with all the other necessary legal powers.

Este poder comprende la facultad de ratificar o confirmar en mi (nuestro) nombre lo actuado así como la facultad de desistír, transigir, comprometer, y la de sustituirlo en todo o en parte y revocar sustituciones. Asimismo nombro(anos) a: RAMIRO CASTRO DUQUE y/o JUAN PABLO CADENA SARMIENTO y/o BEATRIZ JARAMILLO S. domiciliado(s) en la Carrera 7 No. 16-56 Piso 9, mis (nuestros) apoderados en Colombia, con facultades para recibir notificaciones y designar apoderados judiciales o extrajudiciales.

This power includes the faculty to ratify or confirm desist, settle and compromise on my (our) behalf, and to substitute this power in whole or in part and to revoke substitutions. At the same time I (We) hereby appoint RAMIRO CASTRO DUQUE and/or JUAN PABLO CADENA SARMIENTO and/or BEATRIZ JARAMILLO S. domiciled in Carrera 7 No. 16-56, Piso 9, my (our) attorneys in fact, with powers to receive notifications and to designate judicial and extrajudicial attorneys.

Otorgado y firmado en

Granted and signed in Neenah, Wisconsin

hoy de de 20

this 6th day of August, 2002

Firma

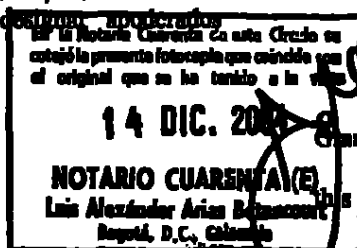
Signature

Nombre

Name

Cargo

Title



Nancy Lee Carter

Nancy Lee Carter

Assistant Secretary

Kimberly-Clark Worldwide, Inc.

**CERTIFICADO NOTARIAL
(SOCIEDAD)**

Hoy de de personalmente compareció ante mí

a quien conozco, y de quien me consta que firmó el anterior documents, debidamente juramentado declaró y dijo que él es

de

Sociedad legalmente constituida para un periodo de duración que aún no ha terminado; que el declarante está autorizado por dicha compañía para conferir este poder; que el sello estampado por él al pie de tal poder, en nombre y representación de la expresada compañía, es el sello oficial de ella; y que el objeto para el cual se confiere este instrumento está comprendido dentro del de la sociedad.

El suscrito Notario hace constar que tuvo a la vista las pruebas de la existencia de la sociedad.

Estado de
con fecha

y que quien confiere el presente poder es su representante.

Notario Público (sello)

**CERTIFICADO NOTARIAL
PERSONA NATURAL**

Hoy de de compareció(eron) ante mí

a quien (es) conozco y me consta que es(son) la(s) persona(s) firmante(s) del documento que precede y quien(es) declara(n) que otorgan el mismo para los fines y propósitos que en él se expresan.

Notario Público (sello)

LEGALIZACION POR APOSTILLA ES REQUERIDA

**NOTARIAL CERTIFICATE
(CORPORATION)**

On this day of of personally appeared before me Nancy Lee Carter

to me known, and known to me to be the person who signed the foregoing instrument who being by me duly sworn did depose and say that he (she) is the Assistant Secretary

of Kimberly-Clark Worldwide, Inc.

Which is legally constituted for a term not yet expired, that deponent is authorized by said Company to confer this Power of Attorney: that the seal affixed hereunto by the deponent in the name and on behalf of said Corporation is the corporate seal thereof; and that the purpose for which this instrument is granted is included within the corporate purpose of company.

The undersigned Notary Public attests that he has seen the documents that prove the existence of the company.

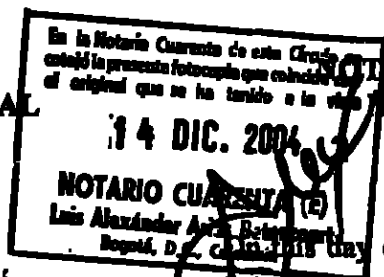
State of Wisconsin
under date of

and that he (she) who grants the power of attorney is its Representative.

Charles R. Gorge
Notary Public (Seal)

My commission expires September 11, 2005

**NOTARIAL CERTIFICATE
NATURAL PERSON**



On this day of of personally appeared before me

who is(are) known to me and who I attest executed the foregoing document and he (they) declared he (they) grant(s) the document for the uses and purposes therein expressed.

Notary Public (Seal)

LEGALIZATION BY APOSTILLE IS REQUIRED

81
80

TRADUCCIÓN SIMPLE AL ESPAÑOL de la apostilla que vienen junto con el poder dado por Kimberly-Clark Worldwide, Inc, domiciliada en 401 N. Lake Street, Neenah, Wisconsin, 54956 Estados Unidos de América a Ramiro Castro Duque y/o Juan Pablo Cadena Sammlento y/o Beatriz Jaramillo S. domiciliados en la Carrera 7 # 16-56 P. 9, Bogotá.

APOSTILLE

(Convención de La Haya del 5 de Octubre de 1961)

1. País: ESTADOS UNIDOS DE AMERICA
2. Este documento público ha sido firmado por Cheryl R. Gorges
3. actuando en capacidad de Notario Público, Estado de Wisconsin
4. lleva el sello/timbre del Notario Público, Estado de Wisconsin

CERTIFICADO

- | | |
|--|---------------------|
| 5. en Madison, Wisconsin | 6. Agosto 6 de 2002 |
| 7. por Secretario de Estado de Wisconsin | |
| 8. No. 73756 | |
| 9. Sello/Timbre | 10. Firma |

Douglas La Follette (Firma)
DOUGLAS LA FOLLETTE
Secretario de Estado



GAVIRI A

ORGANIZACION ELECTORAL
REGISTRADURIA NACIONAL DEL ESTADO CIVIL

REGISTRO CIVIL DE DEFUNCION

Indicativo
Serial

5562241

82
81



Detalles de la oficina de registro

Clase de oficina:	Registraduría	Notaría	☒	Consulado	Corregimiento	Insp. de Policía	Código	9995
País: Colombia - Departamento: Cundinamarca - Municipio: Bogotá D.C. - Corregimiento o Inspección de Policía: NOTARIA 32.								

Detalles del inscrito

Apellidos y nombres completos	
CASTRO DUQUE RAMIRO	
Documento de identificación (Clase y número)	Sexo (en Letras)
C.C. No. 170322 DE BOGOTA	MASCULINO

Detalles de la defunción

Lugar de la Defunción: País - Departamento - Municipio - Corregimiento o Inspección de Policía			
COLOMBIA CUNDINAMARCA BOGOTA D.C.			
Fecha de la defunción		Hora	Número de certificado de defunción
Año 2004 Mes 10 Día 30	04:10 PM	A- 2094375.	
Presunción de muerte		Fecha de la sentencia	
Jurado que profiere la sentencia		Año Mes Día	
Documento presentado		Nombre y cargo del funcionario	
Acreditación judicial	Certificado Médico	ANDRES DIAZ CAMPOS.- R. M. No. 79982662	

Detalles del denunciante

Apellidos y nombres completos	
EDGAR DAVID REGINO II.	
Documento de identificación (Clase y número)	Firma
C.C. No. 15.030.154 DE LORICA/ CORDOBA	

Primer testigo

Apellidos y nombres completos	
Documento de identificación (Clase y número)	
Firma	

Segundo testigo

Apellidos y nombres completos	
Documento de identificación (Clase y número)	
Firma	

Fecha de inscripción		Nombre y firma del funcionario que actúa	
Año 2004 Mes 10 Día 02	BLANCA LEOGIL GONZALEZ RESTREPO		NOTARIA

PARENTES: ALFONSO CASTRO		ESPACIO PARA NOTAS	
MERCEDES DUQUE			

ORIGINAL PARA LA OFICINA DE REGISTRO

COMO SECRETARIO DELEGADO DE LA NOTARIA TREINTA Y DOS (32) DEL
CIRCULO DE BOGOTA

CERTIFICO, QUE:

La presente acta es fiel copia del original tomada del registro
civil de defunciones serial indicativo número: **ST 6224**.....
que expido en la ciudad de Bogotá D.C. hoy: **11 de mayo 2004**.....

WILSON GONZALEZ
SECRETARIO DELEGADO

DIVISION DE NUEVAS CREACIONES

RADICACIÓN EXPEDIENTE No. 04-39436

**EL EXTRACTO DE LA PRESENTE SOLICITUD DE PATENTE DE INVENCION -
PCT FUE PUBLICADO EN LA GACETA DE PROPIEDAD INDUSTRIAL No 542,
DE FECHA 30 DE JULIO DE 2004, EL TERMINO HABIL SEÑALADO POR LA
LEY EXPIRA EL 26 DE OCTUBRE DE 2004.**

NOTA: Dentro del plazo de los seis (6) meses siguientes a partir de la fecha de publicación en la gaceta de Propiedad Industrial, deberá solicitar y cancelar el examen de patentabilidad so pena de que la solicitud caiga en abandono, de acuerdo con lo establecido en el Artículo 44 de la Decisión 486/2000.

SE PRESENTARON OPOSICIONES POR PARTE DE TERCEROS.

SI

NO **X**

-04.
F3

**SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO
DIVISION DE NUEVAS CREACIONES
SOLICITUD VIA PCT**

2020

Bogotá, D.C., 21 de diciembre de 2008

Doctor
JUAN PABLO CADENA SARMIENTO
Apoderado

Oficio-Nº 0014900

ASUNTO	Radicación	04-39436
	Trámite	002
	Evento	001
	Actuación	430
	Folios	031

Como resultado del examen de fondo, realizado con fundamento en el artículo 45 de la Decisión 486 de la Comisión de la Comunidad Andina, se le comunica:

1. Documentos estudiados

- Para el presente estudio se tuvo en cuenta el capítulo descriptivo que se encuentra en los folios 15 a 37 y el capítulo reivindicatorio que se encuentra en los folios 38 a 40 que comprende dieciséis (16) reivindicaciones.
- Se considerará la prioridad reivindicada sobre la solicitud de Estados Unidos No. 09/990,787 del 14 de noviembre de 2001.

2. Objeto de la Invención

- La invención propuesta se refiere a forros que conciernen a hojas de cubierta para productos para el cuidado personal, productos para la higiene de la mujer, pañales, calzoncillos de aprendizaje y otros similares.

En la reivindicación independiente 1 se define un forro para productos para el cuidado personal que comprende una primera capa no tejida perforada hidrofílica laminada con una segunda capa no tejida perforada hidrofóbica.

En la reivindicación independiente 7 se define un forro para productos para el cuidado personal que comprende una primera capa no tejida que comprende fibras naturalmente hidrofílicas y básicas hidroenredadas para formar un laminado con una segunda capa no tejida que comprende fibras hidrofóbicas en donde dicho laminado está perforado con un área de 10 a 50%.

En la reivindicación independiente 12 se define un producto para el cuidado personal que comprende el forro tal y como se reivindica en la cláusula 11.

En la reivindicación independiente 13 se define un forro para bragas que comprende un forro permeable al líquidos, un separador impermeable al líquido y un núcleo absorbente colocado entre los mismos, en donde dicho forro comprende una primera capa no tejida perforada hidrofílica laminada de

acuerdo a un proceso de atado con hilado con una segunda capa no tejida perforada hidrofóbica.

En la reivindicación Independiente 15 se define un proceso para hacer un forro para productos para cuidado personal que comprende el hidronear una primera capa no tejida hidrofílica con una segunda capa no tejida hidrofóbica y perforar dichas capas.

- Se afirma que los forros para artículos absorbentes han avanzado significativamente con los años, aún cuando el rehumedecimiento de la piel del usuario y el filtrado especialmente en el caso de los productos para la higiene de la mujer sigue siendo un asunto importante. Aún existe la necesidad, por tanto, de un forro el cual tomará rápidamente los fluidos como la orina los fluidos menstruales y retrasará o evitará que éstos se muevan hacia arriba hacia el usuario de nuevo.
- El objeto de la invención definido se catalogó como D04H 13/00, B32B 7/00 y A61F 13/512 según la Clasificación Internacional de Patentes (IPC⁷).

3. Claridad de la solicitud

El artículo 30 de la Decisión 486 de la Comisión de la Comunidad Andina establece que: "Las reivindicaciones definirán la materia que se desea proteger mediante la patente. Deben ser claras y concisas y estar enteramente sustentadas por la descripción.

Las reivindicaciones podrán ser independientes o dependientes. Una reivindicación será independiente cuando defina la materia que se desea proteger sin referencia a otra reivindicación anterior. Una reivindicación será dependiente cuando defina la materia que se desea proteger refiriéndose a una reivindicación anterior. Una reivindicación que se refiera a dos o más reivindicaciones anteriores se considerará una reivindicación dependiente múltiple".

- El capítulo reivindicatorio de la solicitud posee cuatro (4) reivindicaciones de producto y una (1) de proceso.

Después del estudio de la materia de la invención se puede afirmar que resulta innecesario emplear un número tan elevado de reivindicaciones para plantear un producto como el de la solicitud. Por el contrario, se presta para problemas de claridad dado que en unas reivindicaciones independientes se incluyen unas características y en otras reivindicaciones independientes se añaden otras lo cual incluso llevaría a pensar en problemas de unidad de invención.

Para evitar problemas de claridad y por ende de unidad de invención, es recomendable que el señor solicitante plantee una sola reivindicación independiente cuya parte caracterizante sea completa, es decir, posea todos y cada uno de los detalles técnicos novedosos según el criterio del señor solicitante.

- Dada la gran cantidad de forros que forman parte del estado de la técnica es recomendable que las reivindicaciones independientes de la solicitud en estudio presenten la formalidad de preámbulo y parte caracterizante diferenciados por la expresión "caracterizado por" (tal como se encuentran las reivindicaciones dependientes) de modo que el preámbulo permita situar el campo de la invención e incluir los detalles técnicos que ya forman parte del arte previo; además, la parte caracterizante debería estar conformada únicamente por las características técnicas novedosas que corresponden al aporte técnico sorprendente que realiza el señor solicitante.

- En la reivindicación dependiente 5 se intenta especificar el forro mediante detalles de proceso lo cual no es coherente pues un producto se debe definir por la estructura, composición y/o elementos que lo conforman, y un proceso por las etapas y/o condiciones de operación. Por lo tanto, si la especificación de la reivindicación 5 es importante para el señor solicitante se recomienda que sea eliminada como dependiente de la reivindicación 1 y se reorganice como reivindicación dependiente de la reivindicación 15.
- En la reivindicación independiente 13 se intenta definir un forro para bragas mediante detalles del proceso de atado de las capas, lo cual no es coherente tal como se explicó en el punto de arriba. Por lo tanto, si la especificación de proceso de la reivindicación 5 es importante para el señor solicitante, se recomienda que sea eliminada como reivindicación independiente y se incluya dicha información en las reivindicaciones correspondientes al proceso.
- En conclusión, el capítulo reivindicatorio no cumpliría con el requisito de claridad de acuerdo con el artículo 30 de la Decisión 486.

4. Reivindicaciones de uso

El artículo 14 de la Decisión 486 de la Comisión de la Comunidad Andina establece: "Los Países Miembros otorgarán patentes para las invenciones, sean de producto o procedimiento, en todos los campos de la tecnología, siempre que sean nuevas, tengan nivel inventivo y sean susceptibles de aplicación industrial."

- En la reivindicación Independiente 12 se intenta reclamar un producto para el cuidado personal. Si bien esta reivindicación se define como producto, la caracterización de la invención se realiza únicamente mencionando que 'comprende el forro tal y como se reivindica en la cláusula 11', lo que da a entender que se espera reclamar una aplicación o uso del forro.

Dado que la legislación colombiana no permite la protección de los usos, se recomienda que la reivindicación 12 sea eliminada.

- En conclusión, la reivindicación 12 no es patentable de acuerdo con el artículo 14 de la Decisión 486.

5. Evaluación de la unidad de invención

El artículo 25 de la Decisión 486 de la Comisión de la Comunidad Andina establece: "La solicitud de patente sólo podrá comprender una invención o un grupo de invenciones relacionadas entre sí, de manera que conformen un único concepto inventivo."

- **Unidad de invención a priori**

De la sola lectura del capítulo reivindicatorio de la solicitud se comprende que en la reivindicación Independiente 1 se define el forro mencionando que comprende una primera capa no tejida perforada hidrofílica y una segunda capa no tejida perforada hidrofóbica. Ahora bien, en la reivindicación independiente 7 se añade la característica de que las fibras hidrofílicas son hidroenredadas para formar el laminado con la segunda capa y además que el laminado está perforado con un área de 10 a 50%, características que no están en la reivindicación 1. Más aún, en la reivindicación independiente 13 se incluye la característica de la capa no tejida perforada hidrofílica de acuerdo a un proceso de atado hilado con la segunda capa y finalmente, la reivindicación independiente 15 relacionada con el proceso tan solo hace mención del hidroenredado de las capas.

84
63

Como puede notarse del contenido de las reivindicaciones independientes de la solicitud, tan solo la reivindicación 1 y la reivindicación 15 poseen unidad de invención. Las demás reivindicaciones independientes incluyen otros detalles técnicos diferentes a los de la reivindicación 1 y la 15, de modo que no es posible identificar la relación técnica.

Lo anterior obedece al elevado número de reivindicaciones independientes que posee el capítulo reivindicatorio tal como se hizo mención en el numeral 3 de la presente comunicación. Por lo tanto, para subsanar los problemas de unidad de invención se recomienda seguir las observaciones del numeral 3 de la presente comunicación.

- **Unidad de invención a posteriori**

Al realizar el estudio del estado de la técnica y de los requisitos de patentabilidad se pudo encontrar que las reivindicaciones independientes 1 y 15 se encontrarían afectadas por novedad, mientras que la reivindicación independiente 7 se encontraría afectada únicamente por nivel inventivo. Este resultado demuestra que las reivindicaciones no cumplirían con el requisito de unidad de invención.

- En conclusión, las reivindicaciones independientes 1, 7 y 15 no cumplirían con el requisito de unidad de invención de acuerdo con el artículo 25 de la Decisión 486.

6. Determinación del estado de la técnica

El artículo 16 de la Decisión 486 de la Comisión establece: "El estado de la técnica comprenderá todo lo que haya sido accesible al público por una descripción escrita u oral, utilización, comercialización o cualquier otro medio antes de la fecha de presentación de la solicitud de patente o, en su caso, de la prioridad reconocida.

Sólo para el efecto de la determinación de la novedad, también se considerará dentro del estado de la técnica, el contenido de una solicitud de patente en trámite ante la oficina nacional competente, cuya fecha de presentación o de prioridad fuese anterior a la fecha de presentación o de prioridad de la solicitud de patente que se estuviese examinando, siempre que dicho contenido esté incluido en la solicitud de fecha anterior cuando ella se publique o hubiese transcurrido el plazo previsto en el artículo 40."

- Se realizó el estudio de los documentos concernientes a la búsqueda preliminar Internacional y se consideró el 14 de Noviembre de 2001 como fecha para el análisis del estado de la técnica.
- De acuerdo con lo establecido en el artículo 16 se determinó el estado de la técnica y se encontraron los siguientes antecedentes:

No.	Documento No.	Título	Fecha de Publicación
1	ES2051908	"MATERIAL LAMINAR NO ELASTICO, NO TEJIDO, DE TIPO COMPUESTO, Y METODO PARA SU FABRICACION	20 de septiembre de 1989
2	US5990377	"DUAL-ZONED ABSORBENT WEBS"	23 de noviembre de 1999

Se anexan copias de los principales apartes en documento adjunto

Respecto al estado de la técnica:

- En el documento **ES2051908** (llamado D1 de aquí en adelante) se divulga la existencia de un material no elástico, no tejido y a métodos para la fabricación del mismo.

El material laminado no tejido comprende a) por lo menos una capa de fibras de soplado en fusión y b) por lo menos una capa de material no tejido, donde las fibras (a) de soplado en fusión están hidráulicamente entrelazadas e interconectadas con dicho material no tejido (b).

En D1 se enseña que las fibras de soplado en fusión son fibras sopladas en fusión que pueden ser de **polipropileno o poliéster**. De otro lado, se menciona que el material no tejido comprende fibras de pulpa de celulosa o fibras de pulpa de madera y que el soporte final está dotado de aberturas.

En cuanto al procedimiento para la fabricación se menciona que se caracteriza por la proyección de una serie de chorros líquidos a alta presión hacia una superficie de dicho laminado, entrelazando e interconectando de este modo hidráulicamente dichas fibras de soplado en fusión y dicho material no tejido para formar un material laminado no elástico y no tejido.

- En el documento **US5990377** (llamado D2 de aquí en adelante) se divulga la existencia de una red absorbente resistente tridimensional de doble zona, la cual es deseable para aplicaciones en artículos de protección femenina, pañales, etc.

En D1 se enseña que la red absorbente resistente a la humedad, comprende una red de hoja base hidrofílica con topografía tridimensional y cuyas partes más elevadas presentan fibras hidrofóbicas depositadas o impresas. En una modificación de la invención, el material hidrofóbico aplicado comprende fibras en una red no tejida contigua la cual ha sido perforada o provista con aberturas.

En D1 se explica que las regiones hidrofóbicas aumentan la sensación seca y promueve el flujo de fluidos a través de las regiones hidrofílicas más bajas. La hoja base está preferiblemente en comunicación líquida con el material absorbente subyacente.

En D1 se explica que las fibras hidrofóbicas sintéticas pueden ser de copolímeros de polipropileno/etileno, copolímeros de poliéster, polietileno de baja densidad, acrílicos, polipropileno, entre otros, y que las fibras hidrofílicas de la hoja base pueden ser de pulpa de madera.

7. Evaluación de los requisitos de patentabilidad

El artículo 14 de la Decisión 486 de la Comisión de la Comunidad Andina establece: "Los Países Miembros otorgarán patentes para las invenciones, sean de producto o de procedimiento, en todos los campos de la tecnología, siempre que sean nuevas, tengan nivel inventivo y sean susceptibles de aplicación industrial."

En cumplimiento con este artículo, se procedió a evaluar los requisitos de novedad, nivel inventivo y aplicación industrial con el fin de establecer la patentabilidad de la invención reivindicada en la solicitud en estudio.

BA
PE

Evaluación de la Novedad

El artículo 16 de la Decisión 486 de la Comisión de la Comunidad Andina establece:

"Una invención se considerará nueva cuando no está comprendida en el estado de la técnica." "El estado de la técnica comprenderá todo lo que haya sido accesible al público por una descripción escrita u oral, utilización, comercialización o cualquier otro medio antes de la fecha de presentación de la solicitud de patente o, en su caso, de la prioridad reconocida.

Sólo para el efecto de la determinación de la novedad, también se considerará dentro del estado de la técnica, el contenido de una solicitud de patente en trámite ante la oficina nacional competente, cuya fecha de presentación o de prioridad fuese anterior a la fecha de presentación o de prioridad de la solicitud de patente que se estuviese examinando, siempre que dicho contenido esté incluido en la solicitud de fecha anterior cuando ella se publique o hubiese transcurrido el plazo previsto en el artículo 40."

- **Para el presente estudio de novedad se realizó la comparación elemento por elemento de la invención de la presente solicitud con respecto al estado de la técnica.**
- **El forro para productos para el cuidado personal**

En la reivindicación Independiente 1 se plantea un forro para productos para el cuidado personal que comprende una primera capa no tejida perforada hidrofílica laminada con una segunda capa no tejida perforada hidrofóbica. No obstante, en D1 también se divulga un producto laminado con por lo menos una capa de fibras de soplado en fusión y por lo menos otra capa de material no tejido, donde la capa de fibras de soplado en fusión son sintéticas como en polipropileno, o poliéster (tal como ocurre en el producto de la solicitud en estudio), y la capa de material no tejido consiste en fibras de pulpa de celulosa o de madera (tal como ocurre también en el producto de la solicitud en estudio) (D1; Reivindicaciones 1, 2, 5 a 8, 11).

Dado que los materiales que conforman el laminado de D1 son los mismos de la solicitud en estudio, es una característica intrínseca del polipropileno o del poliéster que sean hidrofóbicos y es una característica intrínseca de la pulpa de celulosa o de madera, que sean hidrofílicas.

En D1 también se enseña que el material laminado está dotado de aberturas (D1; Reivindicación 31).

En la reivindicación 3 se menciona que la primera capa comprende fibras durablemente hidrofílicas tal como también sucede en D1. Aún cuando en D1 no se haga referencia a la hidrofiliidad, es intrínseco de la pulpa de madera o de celulosa que sea hidrofílica.

En la reivindicación 4 se menciona que la segunda capa comprende fibras no durablemente hidrofílicas tal como en D1 puesto que la segunda capa corresponde a fibras de naturaleza hidrofóbica como las de polipropileno y las de poliéster.

La única diferencia encontrada entre D1 y la solicitud en estudio consiste en la aplicación puesto que en D1 no se hace mención de usos para productos de cuidado personal y la invención de solicitud sí va encaminada particularmente a forros para productos para cuidado personal. No obstante, este uso no es

29

una diferencia importante teniendo en cuenta que en el artículo 21 de la Decisión 486 se señala:

"Los productos o procedimientos ya patentados, comprendidos en el estado de la técnica, de conformidad con el artículo 16 de la presente Decisión, no serán objeto de nueva patente, por el simple hecho de atribuirse un uso distinto al originalmente comprendido por la patente inicial".

- **El proceso para hacer un forro**

En la reivindicación Independiente 15 se define el proceso mencionando que comprende el hidrogenar una primera capa no tejida hidrofílica con una segunda capa no tejida hidrofóbica y perforar dichas capas. No obstante, en D1 se divulga el mismo proceso de hidrogenado de dos capas una de naturaleza sintética intrínsecamente hidrofóbica y otra de fibras de pulpa de celulosa o madera intrínsecamente hidrofílica cuyo producto finalmente queda perforado.

La única diferencia encontrada entre el proceso de la solicitud en estudio y el de D1 consiste en el uso del forro. No obstante, esta no es un criterio diferenciador de un proceso menos cuando en el artículo 21 de la Decisión 486 se menciona que:

"Los productos o procedimientos ya patentados, comprendidos en el estado de la técnica, de conformidad con el artículo 16 de la presente Decisión, no serán objeto de nueva patente, por el simple hecho de atribuirse un uso distinto al originalmente comprendido por la patente inicial".

- En conclusión, de acuerdo con la comparación elemento por elemento la invención definida en las reivindicaciones 1, 3, 4 y 15, se encontraría afectada en el requisito de novedad de acuerdo con el artículo 16 de la Decisión 486.

Evaluación del Nivel Inventivo:

El artículo 18 de la Decisión 486 de la Comisión de la Comunidad Andina establece: "Se considerará que una invención tiene nivel inventivo, si para una persona del oficio normalmente versada en la materia técnica correspondiente, esa invención no hubiese resultado obvia ni se hubiese derivado de manera evidente del estado de la técnica."

Respecto a la solicitud en estudio:

- **El técnico de nivel medio versado en la materia**

El técnico de nivel medio versado en la materia encargado de resolver el problema técnico puede ser un Ingeniero químico que labore en la industria de absorbentes y que atiende a planes de mejoramiento continuo normalmente formulados por las empresas.

- **Especificaciones del forro para productos para el cuidado personal comprendidas en las reivindicaciones 2 y 6**

En la reivindicación dependiente 2 se hace especificaciones sobre las aberturas en cuanto a que estas están alineadas. No obstante, estas características son evidentes para un técnico pues este tiene conocimientos básicos sobre la disposición de las aberturas en un laminado tal como se

puede demostrar con las enseñanzas básicas contenidas en D2 por ejemplo (Columna 40, líneas 45 – 48).

De igual manera, en la reivindicación dependiente 6 se especifica que la capa hidrofílica es tratada con aloe, vitamina E, aceite mineral, bicarbonato de sosa y combinaciones, lo cual también es ampliamente conocido y forma parte de los conocimientos básicos que tiene un técnico de nivel medio versado en la materia, de hecho eso puede comprobarse al analizar las enseñanzas básicas contenidas en D2 (Columna 3, línea 65 – Columna 4, línea 28).

En conclusión, las reivindicaciones 2 y 6 son obvias para un técnico de nivel medio versado en la materia que posee conocimientos básicos en su arte.

- **El forro para productos para el cuidado personal de la reivindicación Independiente 7**

En las reivindicaciones 7 a 11 se propone un forro para productos para el cuidado personal que se fundamenta en el principio técnico de estar conformada por dos capas donde la primera no tejida es de fibras hidrofílicas hidroenredadas para formar un laminado con una segunda capa no tejida de fibras hidrofóbicas en donde el laminado está perforado con un área de 10 a 50%. No obstante, en D2 también se enseña un laminado con estructura y naturaleza equivalente, con perforaciones que pueden lograrse en forma de patrón, además de enseñar que se hidroenredan para formar el laminado.

La diferencia entre la solicitud y D2 consiste en la mención explícita del porcentaje perforado de 10 a 50%, no obstante, dicha característica puede ser evidente para un técnico de nivel medio versado en la materia que realiza ensayos de rutina para saber el nivel de perforación requerido.

En conclusión, si un técnico de nivel medio versado en la materia tuviera acceso a las enseñanzas de D2 se vería motivado a desarrollar un forro equivalente en estructura y naturaleza química y física donde las capas fueran hidroenredadas para la formación del laminado perforado que permitiera la sensación seca del producto en el usuario y facilitara el transporte de los fluidos hacia el cuerpo absorbente. De tal manera que proponer un forro como el de las reivindicaciones 7 a 11 no generaría un efecto sorprendente que evidencie un salto tecnológico respecto al arte previo.

- **Especificaciones del proceso para hacer un forro**

En la reivindicación dependiente 16 se hace la especificación de que las capas son perforadas simultáneamente para producir perforaciones alineadas. No obstante, dicha especificación puede derivarse de D2 tal como se explicó en el punto anterior y por tanto resulta evidente para un técnico de nivel medio versado en la materia.

8. Conclusiones

- Por lo anteriormente expuesto, la invención definida por las reivindicaciones 2, 6 a 11 y 16 de la solicitud podrían verse afectadas en su nivel inventivo ya que se derivan de manera evidente del estado de la técnica y pueden ser obvias para un técnico de nivel medio versado en la materia. Por tanto, no cumplirían con las disposiciones del artículo 18 de la Decisión 486 de la Comisión de la Comunidad Andina.

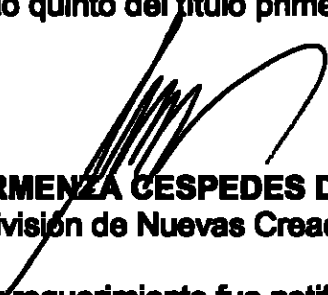
92
91

- En conclusión, los requisitos de patentabilidad de la presente solicitud se encuentran afectados así:

No.	Documento	Reivindicaciones Afectadas	Requisito que afecta
1.	ES2051908	1, 3, 4, 15	Novedad
2.	US5990377	2, 6 – 11, 16	Nivel Inventivo

En cumplimiento del artículo 45 de la Decisión 486 de la Comisión de la Comunidad Andina, se le indica que debe dar respuesta dentro del término de **sesenta** días contados a partir de la fecha de notificación de la presente comunicación. En caso de no dar respuesta al presente requerimiento, o si a pesar de la respuesta subsistieran los impedimentos para la concesión, se denegará la patente.

Notifíquese el presente oficio conforme a lo dispuesto en el numeral 5.2, literal e), del capítulo quinto del título primero de la circular única No. 10 de 2001.


ALIX CARMENZA CESPEDES DE VERGEL
Jefe de División de Nuevas Creaciones

29 DIC. 2006

El anterior requerimiento fue notificado por fijación en lista, de fecha _____

CONCEPTO TECNICO No. 1989	EXAMINADOR TECNICO Código No. 202042
-------------------------------------	--

95
92

①



OFICINA ESPAÑOLA DE
PATENTES Y MARCAS

ESPAÑA

⑪ N.º de publicación: ES 2 051 908

⑤① Int. Cl.⁵: D04H 1/44

D04H 1/56

⑫

TRADUCCION DE PATENTE EUROPEA

T3

⑤⑥ Número de solicitud europea: 89104801.9

⑤⑥ Fecha de presentación : 17.03.89

⑤⑦ Número de publicación de la solicitud: 0 333 211

⑤⑦ Fecha de publicación de la solicitud: 20.09.89

⑤④ Título: Material laminar no elástico, no tejido, de tipo compuesto, y método para su fabricación.-

③⑩ Prioridad: 18.03.88 US 170200

⑦③ Titular/es: Kimberly-Clark Corporation
401 North Lake Street
Neenah, Wisconsin 54956-0349, US

④⑤ Fecha de la publicación de la mención BOPI:
01.07.94

⑦② Inventor/es: Radwanaki, Fred R.;
Chambers, Leon E., Jr. y
Trimble, Lloyd E.

④⑤ Fecha de la publicación del folleto de patente:
01.07.94

⑦④ Agente: Durán Olivella, Alfonso

Aviso: En el plazo de nueve meses a contar desde la fecha de publicación en el Boletín europeo de patentes, de la mención de concesión de la patente europea, cualquier persona podrá oponerse ante la Oficina Europea de Patentes a la patente concedida. La oposición deberá formularse por escrito y estar motivada; sólo se considerará como formulada una vez que se haya realizado el pago de la tasa de oposición (artº 99.1 del Convenio sobre concesión de Patentes Europeas).

Venta de fascículos: Oficina Española de Patentes y Marcas. C/Panamá, 1 - 28008 Madrid

93

DESCRIPCION

La presente invención se refiere a un material no elástico, no tejido y a métodos para la fabricación del mismo.

5 Se ha sentido la necesidad de conseguir un material no tejido que tenga características mejoradas de tacto y caída sin sacrificar la resistencia e integridad.

10 La Patente U.S.A. N° 3.485.706 de Evans, cuyo contenido se incorpora a la actual haciendo de referencia, da a conocer un género no tejido de tipo textil y un procedimiento y aparato para su fabricación, de manera que el género tiene fibras entrelazadas al azar entre sí formando un dibujo repetitivo de zonas entrelazadas localizadas, interconectadas por fibras que se extienden entre dichas zonas entrelazadas. El procedimiento que se da a conocer en dicha patente comporta el soporte de una capa de material fibroso sobre un elemento que tiene un dibujo formado por aberturas a efectos de tratamiento, proyectando líquido a chorros con una presión mínima de 13,8 bar (200 libras por pulgada cuadrada (psi) para formar unos chorros que tienen una energía de caudal superior a 4,83 kJ/cm² (23.000 pie/libra /pulgada².segundo) a la distancia de tratamiento y atravesando la capa de soporte de material fibroso, con las corrientes para entrelazar las fibras en el dibujo determinado por el elemento de soporte, utilizando la suficiente cantidad o magnitud de tratamiento para producir un género con un dibujo uniforme. El material inicial se indica como un material laminar, esterilla, guata o similar a base de fibras libres dispuestas en relación al azar entre sí o con cualquier grado de alineación.

25 La Patente U.S.A. de nueva concesión N° 31.601 de Ikeda y otros da a conocer un género, útil como soporte para cuero artificial, que comprende un género tejido o género de punto constituyente y otro constituyente a base de género no tejido. El género no tejido constituyente consiste en numerosas fibras individuales extremadamente finas que tienen un diámetro promedio de 0,1 a 6,0 µm y que están distribuidas al azar y entrelazadas entre sí para formar un material de género no tejido. El constituyente de material no tejido y el constituyente de género tejido o de punto están superpuestos y unidos entre sí para formar un cuerpo de género compuesto de modo tal que una parte de las fibras individuales extremadamente finas y el componente de género no tejido penetran dentro del componente de género tejido o género de punto y se entremezclan con la parte de las fibras del mismo. Este género compuesto es fabricado, según se indica, al superponer dos componentes de género uno sobre otro y arrojando numerosos chorros de fluidos que salen a una presión comprendida entre 15 y 100 kg/cm² hacia la superficie del componente de género laminar fibroso. Esta patente da a conocer que las fibras extremadamente finas pueden ser producidas utilizando cualesquiera métodos convencionales de producción de fibras, preferentemente el método de soplado en fusión.

40 La Patente U.S.A. N° 4.190.695 de Niederhauser da a conocer géneros compuestos de peso ligero adecuados para aplicaciones generales en prendas de vestir, producidos por un proceso de enhebrado hidráulico de fibras cortas y un sustrato o soporte de filamentos continuos formando según una disposición ordenada transversalmente, interpretándose los filamentos continuos individuales por las fibras cortas y quedando retenidas en su lugar por la elevada frecuencia de inversiones de fibras largas. Los géneros compuestos conformados pueden retener las fibras largas durante el lavado, y tienen una estética comparable desde el punto de vista de cubrición y de género a los materiales tejidos con un peso base más elevado.

45 La Patente U.S.A. N° 4.426.421 de Nakamae y otros da a conocer una lámina compuesta de capas múltiples que es útil como sustrato para cuero artificial, que comprende por lo menos tres capas fibrosas, es decir, una capa superficial que comprende fibras extremadamente finas dispuestas por hilatura, entrelazadas entre sí, formando un cuerpo de una capa fibrosa de un material no tejido; una capa intermedia que comprende fibras sintéticas entrelazadas entre sí para formar un cuerpo de una capa de material fibroso no tejido y una capa base que consiste en un género tejido o de punto. La hoja o lámina de tipo compuesto se da a conocer por una preparación por superposición de las capas entre sí en el orden mencionado anteriormente y, a continuación, incorporándolas unas a otras para formar un cuerpo laminar compuesto por medio de punzonado de agujas o chorros de agua a elevada presión. Esta patente da a conocer que las fibras extremadamente finas dispuestas por hilatura pueden ser fabricadas por el método de soplado en fusión.

60 La Patente U.S.A. N° 4.442.161 de Kirayoglu y otros da a conocer un género no tejido hilado (entrelazado hidráulicamente) y un proceso para fabricación del género en el que un conjunto que comprende esencialmente pulpa de madera y fibras orgánicas sintéticas es sometido a tratamiento, dispuesto sobre un elemento de soporte, con finos chorros de agua en forma de columnas. Esta patente da a conocer que es preferible que las fibras orgánicas sintéticas adopten formas de láminas de género no tejido de filamentos

98
94

continuos y que las fibras de pulpa de madera adopten una forma de hojas de papel.

La Patente U.S.A. N° 4.476.186 de Kato y otros da a conocer un género no tejido, de tipo entrelazado, que comprende una parte (a) formada por haces de fibras ultrafinas que tienen un tamaño no superior a 0,055 TEX (0,5 denier) cuyos haces son entrelazados entre sí, y una parte (b) que comprenda desde fibras ultrafinas hasta haces de fibras ultrafinas que se ramifican de los haces ultrafinos, cuyos haces ultrafinos y haces finos de fibras ultrafinas se entrelazan entre sí y en el cual ambas partes (a) y (b) son distribuidas de forma no uniforme en la dirección del espesor del género.

La Patente U.S.A. 4.041.203 de Brock y otros da a conocer un material en forma de género no tejido que comprende una esterilla integrada de microfibras generalmente discontinuas polímeras y termoplásticas y un elemento laminar de filamentos molecularmente orientados substancialmente continuos y dispuestos al azar de un polímero termoplástico. Las microfibras de material polímero tienen un diámetro de fibras promedio que llega hasta las 10 μm mientras que el diámetro promedio de los filamentos en el género laminar de filamentos continuos supera las 12 μm . El acoplamiento entre la esterilla de microfibras y el elemento laminar de filamentos continuos se consigue en zonas discretas intermitentes de modo tal que se integra el género laminar de filamentos continuos en un componente del material eficaz para soportar cargas. Es preferible que las zonas de unión discreta queden formadas por la aplicación de calor y presión a las áreas intermitentes. Otros métodos de acoplamiento de capas tales como la utilización de adhesivos aplicados independientemente o el entrelazado mecánico de las fibras tales como por técnicas de agujas o similares, también pueden ser utilizados. Otros géneros que utilizan microfibras fabricadas por soplado en fusión se dan a conocer en las Patentes U.S.A. N°s. 3.916.447 de Thompson y 4.379.192 de Wahlquist y otros.

La Patente U.S.A. N° 4.514.455 de Hwang da a conocer un género compuesto no tejido que comprende una guata de fibras de poliéster rizadas y una hoja o lámina unida de filamentos de poliéster, substancialmente continuos. La guata y el género laminar se encuentran en contacto superficial entre sí y están fijados entre sí por una serie de costuras paralelas que tienen una separación mínima de 1,7 cm, y preferentemente no superior a 5 cm, entre costuras sucesivas. En una realización de Hwang, las costuras son resultado de chorros que constituyen un cosido hidráulico.

No obstante, es deseable dar a conocer un material laminar no tejido que tenga características mejoradas de tacto y caída y en el cual la resistencia del género laminar (húmedo y seco) permanezca elevada. Además, es deseable dar a conocer un género similar a un tejido que pueda tener propiedades barrera y elevada resistencia. Además, es deseable dar a conocer un procedimiento para producir dicho material que permite el control de otras características del producto tales como absorbencia, resistencia en húmedo, duración, baja formación de hebras, etc.

De acuerdo con ello, es un objetivo de la presente invención dar a conocer un material laminar no elástico no tejido que tiene buenas características de tacto y caída y métodos para la fabricación de dicho material.

Otro objetivo de la presente invención consiste en dar a conocer un material laminar no elástico no tejido, que tiene elevada resistencia del género laminar, integridad y baja formación de fibras o hilachas y métodos para la fabricación de dicho material.

Otro objetivo de la presente invención consiste en dar a conocer un material laminar no elástico no tejido, que tiene elevada resistencia del género laminar, integridad y baja formación de fibras o hilachas, y métodos para la fabricación de dicho material.

Otro objetivo adicional de la presente invención consiste en dar a conocer un material laminar no tejido y no elástico que tiene características similares a un tejido y propiedades barrera, dando asimismo a conocer métodos para la fabricación de dicho material. Estos objetivos se consiguen mediante material laminar no elástico y no tejido, de tipo compuesto, que se describe en la reivindicación 1 y por el procedimiento de su fabricación descrito en la reivindicación independiente 18. Otras características ventajosas del género laminar y del proceso quedan evidentes de las reivindicaciones dependientes.

La presente invención da a conocer un material laminar no tejido a base de fibras entrelazadas hidráulicamente, en el que el material entrelazado hidráulicamente, de tipo no tejido, es un género laminar no elástico entrelazado hidráulicamente compuesto de un mínimo de una capa de fibras fabricadas por soplado por fusión y un mínimo de una capa de un material de género no tejido, por ejemplo fibroso, tal como fibras de pulpa, fibras largas, fibras fabricadas por soplado en fusión, filamentos continuos, redes,

materiales esponjosos, etc. Este material tiene aplicaciones para trapos de fregado, toallitas, baberos, servilletas, manteles o géneros de protección, pañales, esterillas femeninas, géneros de aplicación médica y laminados, entre otras aplicaciones.

- 5 De acuerdo con la presente invención, se forma un material laminar no elástico, no tejido, de tipo compuesto, por entrelazado hidráulico de un laminado de (1) como mínimo una capa de fibras fabricadas por soplado en fusión y (2) como mínimo una capa de género no tejido por ejemplo material fibroso tal como una capa de como mínimo fibras de pulpa, fibras largas, fibras de soplado en fusión, filamentos continuos, rejillas, material esponjoso, etc. para proporcionar un material laminar no elástico y no tejido.
- 10 Preferentemente la capa de fibras fabricadas por soplado en fusión y la capa de material no tejido están realizadas cada una de ellas a base de un material no elástico.

- La utilización de fibras fabricadas por soplado en fusión como parte de la estructura (por ejemplo laminado), sometidas a entrelazado hidráulico, facilita el entrelazado de diferentes fibras y/o filamentos.
- 15 Esto resulta en un elevado grado de entrelazado y permite la utilización de una amplia variedad de otros materiales fibrosos en el laminado. Además, la utilización de fibras fabricadas por soplado en fusión puede disminuir la cantidad de energía necesaria para el entrelazado hidráulico del laminado. En tecnología de unión por entrelazado hidráulico, algunas veces indicado como "spunlace", se incorporan de manera típica un número suficiente de fibras con extremos libres (por ejemplo fibras largas y fibras de madera),
- 20 diámetros reducidos y alta movilidad de las fibras en los géneros laminares fibrosos para envolver y entrelazarse alrededor de los filamentos de fibras, material esponjoso, rejillas, etc., los llamados puntos de cruce, es decir, los "nudos de unión" ("tying knots"). Sin estas fibras, la unión del género laminar es muy pobre. Los filamentos de diámetro grande y de tipo continuo que no tienen extremos libres y que son menos móviles se han considerado normalmente fibras malas para el entrelazado. No obstante, las fibras
- 25 fabricadas por soplado en fusión se ha visto que son eficaces para la envoltura y entrelazado o interconexión. Esto es debido a que las fibras tienen pequeños diámetros y elevada área superficial y al hecho de que cuando se suministra una energía suficientemente elevada de flujo por parte de los chorros, las fibras se rompen, se movilizan y se entrelazan con otras fibras. Este fenómeno tiene lugar independientemente de si las fibras fabricadas por soplado en fusión se encuentran en las formas de disposición en capas que
- 30 antes se han mencionado o en formas de mezcla.

- La utilización de fibras fabricadas por soplado en fusión (por ejemplo microfibras), proporciona un producto mejorado en el que el anudado o fijación entre las fibras de soplado en fusión y otros materiales del laminado, por ejemplo fibrosos, queda mejorado. De este modo, debido a la longitud relativamente
- 35 grande y al espesor relativamente pequeño de las fibras sopladas en fusión, la envoltura de las fibras de soplado en fusión alrededor del otro material de laminado queda mejorado. Además las fibras de soplado en fusión tienen un área superficial relativamente grande, diámetros reducidos y están separadas entre sí suficientemente para permitir que otros materiales fibrosos del laminado se muevan de manera libre y envuelvan alrededor y en su interior las fibras fabricadas por soplado en fusión. Además, dado que las
- 40 fibras procedentes de soplado en fusión son numerosas y tienen un área superficial relativamente alta, pequeño diámetro y son casi continuas, estas fibras son excelentes para el anclaje (unión) de fibras sueltas (por ejemplo, fibras de madera y fibras largas) a las mismas. El anclaje o laminado de estas fibras a fibras procedentes de soplado en fusión requiere proporciones relativamente bajas de energía para producir el entrelazado.

- 45 La utilización de técnicas de entrelazado hidráulico para entrelazar mecánicamente (por ejemplo, una unión mecánica) el material fibroso, en vez de utilizar solamente otras técnicas de unión distintas, comprendiendo otras técnicas de entrelazado mecánico, proporciona un material laminar fibroso no tejido, de tipo compuesto, que tiene mayor resistencia, integridad y tacto y caída y permite un mejor control de
- 50 otras características del producto tales como absorbencia, resistencia en húmedo, etc.

La Figura 1 es una vista esquemática de un aparato para la conformación de un material laminar no elástico no tejido y de tipo compuesto según la presente invención.

- 55 Las Figuras 2A y 2B son micrografías (a 157 y 80 aumentos lineales, respectivamente) de respectivas caras de un ejemplo de un material compuesto no tejido no elástico según la presente invención.

- Las Figuras 3A y 3B son micrografías (a 82 y 89 aumentos, respectivamente) de respectivas caras de otro ejemplo de material no elástico no tejido, de tipo compuesto, según la presente invención; y

- 60 Las Figuras 4A y 4B son micrografías (a 85 y 85 aumentos lineales, respectivamente) de otro ejemplo de un material no elástico, no tejido, de tipo compuesto según la presente invención.

Si bien la presente invención se describirá en relación con las realizaciones específicas y preferentes, se comprenderá que no está destinado a limitar la invención a estas realizaciones.

5 La presente invención prevé un género laminar no elástico, de tipo no tejido, compuesto, a base de un laminado hidráulicamente entrelazado y un método para su fabricación, que comporta el proceso de un material laminado compuesto como mínimo a base de una capa de fibras de soplado en fusión y como mínimo una capa de material no tejido. El laminado es entrelazado hidráulicamente, es decir, se proyecta una serie de chorros de líquido a alta presión hacia la superficie del material laminado, entrelazando así
10 mecánicamente e interconectando las fibras de soplado en fusión y el material no tejido del laminado para proporcionar un material laminar no elástico, no tejido. Preferentemente cada una de las capas de fibras de soplado en fusión y capa de material no tejido quedan realizadas a base de material no elástico.

15 Por capa de material no tejido se indica en esta memoria una capa de material que no incorpora un dibujo regular de hebras interconectadas mecánicamente, partes de hebras o tiras en forma de hebras, es decir, no es género tejido ni género de punto.

Las fibras o filamentos pueden adoptar la forma de, por ejemplo géneros laminares, guatas, fibras sueltas, etc. El laminado puede comprender otras, por ejemplo, capas de fibras.

20 La Figura 1 muestra de manera esquemática un aparato para conseguir el material laminar no tejido y compuesto de la presente invención.

Un chorro de gas (2) de microfibras fabricadas por soplado en fusión preferentemente microfibras no
25 elásticas de soplado en fusión, es formado por técnicas conocidas de soplado en fusión con aparatos de soplado en fusión convencionales indicados de manera general por el numeral de referencia (4), por ejemplo, según la Patente U.S.A. N° 3.849.241 de Buntin y otros y la Patente U.S.A. N° 4.048.364 de Harding y otros, cuyos contenidos se incorporan a la actual a título de referencia. De manera básica, el método de formación comporta la extrusión de un material polímero fundido a través de una tobera o matriz de
30 extrusión que se indica de manera general con el numeral de referencia (6) formando finas corrientes y atenuando éstas mediante flujos convergentes a elevada velocidad de un fluido caliente (habitualmente aire) suministrado a partir de toberas (8) y (10) para romper las corrientes de polímero formando fibras de diámetro relativamente pequeño. La matriz de extrusión comprende preferentemente un mínimo de una alineación recta de aberturas de extrusión. Las fibras pueden ser microfibras o macrofibras dependiendo
35 del grado de atenuación. Las microfibras están sujetas a una atenuación relativamente grande y pueden tener un diámetro que llega hasta unas 20 μm , pero de manera general son aproximadamente de 2 a 12 μm de diámetro. Las macrofibras tienen generalmente un diámetro mayor, es decir, mayor de unas 20 μm , por ejemplo, 20 - 100 μm , habitualmente unas 50 μm . La corriente de gas (2) queda recogida, por ejemplo, sobre una cinta (12) para formar el género laminar (14) soplado en fusión.

40 En general, cualquiera material polímero termoconformable, especialmente material termoconformable no elástico, es útil para formar fibras de soplado en fusión tales como las que se han indicado en las Patentes anteriores Buntin y otros. Por ejemplo, poliolefinas tales como polipropileno y polietileno, poliamidas y poliésteres tales como polietileno tereftalato se pueden utilizar tal como se da a conocer en
45 la Patente U.S.A. N° 4.100.324, cuyo contenido queda incorporado a la actual a título de referencia. Son materiales no elásticos preferibles el polipropileno, polietileno, polietileno tereftalato, polibuteno tereftalato y cloruro de polivinilo. Un material polímero no elástico, por ejemplo, una poliolefina, es el más preferible para conformar las fibras de soplado en fusión de la presente invención. También se pueden utilizar copolímeros de los materiales anteriores.

50 La capa (14) de material soplado en fusión puede ser laminada por lo menos con una capa no tejida, preferentemente no elástica. Esta última capa o capas se pueden conformar previamente o se pueden formar de forma directa sobre la capa (14) de material soplado en fusión con intermedio de varios procedimientos, por ejemplo, conformación en seco o en húmedo, carga, etc.

55 La capa no tejida, preferentemente no elástica, puede quedar realizada a base de filamentos substancialmente continuos. Los filamentos substancialmente continuos son preferentemente filamentos continuos de gran diámetro tales como filamentos de hilatura en fusión sin unión ("spunbond") (por ejemplo, polipropileno o poliéster de hilatura en fusión), rejilla de nylon, cañamazo ligero e hilos. Un género laminar
60 de hilatura en fusión sin unión, tal como un género sin unión alguna, por ejemplo 16,9 g/m² (0,5 oz/yd²) de filamentos de polipropileno de hilatura en fusión, con un diámetro promedio aproximado de 20 μm , es particularmente preferible.

REIVINDICACIONES

1. Material laminado, no elástico, no tejido, de tipo compuesto, que comprende (a) por lo menos una capa de fibras de soplado en fusión y (b) por lo menos una capa de material no tejido caracterizado porque dichas fibras (a) de soplado en fusión están hidráulicamente entrelazadas e interconectadas con dicho material no tejido (b):
2. Material laminado, no elástico, no tejido, de tipo compuesto según la reivindicación 1, en el que dichas fibras de soplado en fusión son fibras sopladas en fusión de polipropileno.
3. Material laminado, no elástico, no tejido, de tipo compuesto según una de las reivindicaciones anteriores, en el que dicho material no tejido comprende filamentos no elásticos substancialmente continuos.
4. Material laminado, no elástico, no tejido, de tipo compuesto según la reivindicación 3, en el que dichos filamentos no elásticos substancialmente continuos son filamentos aglomerados por hilatura.
5. Material laminado, no elástico, no tejido, de tipo compuesto según la reivindicación 4, en el que dichos filamentos aglomerados por hilado están formados a base de un material seleccionado entre el grupo que comprende polipropileno y poliéster.
6. Material laminado, no elástico, no tejido, de tipo compuesto según una de las reivindicaciones 1 ó 2, en el que dicho material no tejido comprende fibras de pulpa no elásticas.
7. Material laminado, no elástico, no tejido, de tipo compuesto según la reivindicación 6, en el que dichas fibras de pulpa no elásticas son fibras de pulpa de celulosa.
8. Material laminado, no elástico, no tejido, de tipo compuesto según la reivindicación 6, en el que dichas fibras de pulpa no elásticas son fibras de pulpa de madera.
9. Material laminado, no elástico, no tejido, de tipo compuesto según una de las reivindicaciones 1 ó 2, en el que dicho material no tejido comprende fibras largas no elásticas.
10. Material laminado, no elástico, no tejido, de tipo compuesto según la reivindicación 9, en el que dichas fibras largas no elásticas son fibras largas sintéticas.
11. Material laminado, no elástico, no tejido, de tipo compuesto según la reivindicación 10, en el que dichas fibras largas sintéticas están realizadas a base del material seleccionado del grupo que comprende rayón y polipropileno.
12. Material laminado, no elástico, no tejido, de tipo compuesto según una de las reivindicaciones 1 ó 2, en el que dicho material no tejido comprende fibras de soplado en fusión no elásticas.
13. Material laminado, no elástico, no tejido, de tipo compuesto según la reivindicación 12, en el que dichas fibras de soplado en fusión no elásticas son microfibras de soplado en fusión que tienen un diámetro hasta 20 μm , y preferentemente un diámetro de 2 a 12 μm .
14. Material laminado, no elástico, no tejido, de tipo compuesto según la reivindicación 12, en el que dichas fibras de soplado en fusión no elásticas son microfibras de soplado en fusión poseyendo un diámetro mayor de 20 μm y de manera típica un diámetro aproximadamente de 50 μm .
15. Material laminado, no elástico, no tejido, de tipo compuesto según una de las reivindicaciones 1 ó 2, en el que dicho material no tejido comprende una red no elástica.
16. Material laminado, no elástico, no tejido, de tipo compuesto según una de las reivindicaciones 1 ó 2, en el que dicho material no tejido comprende un material esponjoso.
17. Material laminado, no elástico, no tejido, de tipo compuesto según una de las reivindicaciones anteriores, en el que cada uno de dichos materiales de fibras de soplado en fusión y de tipo no tejido consisten esencialmente en material no elástico.
18. Procedimiento para la fabricación de un material laminado no elástico no tejido, de tipo compuesto que comprende (a) como mínimo una capa de fibras de soplado en fusión y (b) como mínimo una capa de material no tejido sobre un soporte, y que se caracteriza en la proyección de una serie de

chorros de líquido a alta presión hacia una superficie de dicho laminado, entrelazando e interconectando de este modo hidráulicamente dichas fibras de soplado en fusión y dicho material no tejido para formar un material laminado no elástico y no tejido.

5 19. Procedimiento según la reivindicación 18, en el que dicho material no tejido es por lo menos un elemento seleccionado entre el grupo que comprende fibras de pulpa, fibras largas, fibras de soplado en fusión y filamentos continuos.

10 20. Procedimiento según las reivindicaciones 18 ó 19, en el que dichas fibras de soplado en fusión son fibras de polipropileno soplado en fusión.

21. Procedimiento según la reivindicación 19, en el que dichos filamentos substancialmente continuos son filamentos sintéticos no elásticos substancialmente continuos.

15 22. Procedimiento según la reivindicación 21, en el que dichos filamentos sintéticos no elásticos substancialmente continuos son filamentos aglomerados por hilado.

23. Procedimiento según la reivindicación 22, en el que dichos filamentos aglomerados por hilado están formados por un material seleccionado del grupo que consiste en polipropileno y poliéster.

20 24. Procedimiento según la reivindicación 19, en el que dichas fibras de pulpa son fibras de pulpa de celulosa.

25 25. Procedimiento según la reivindicación 24, en el que dichas fibras de pulpa de celulosa son fibras de pulpa de madera.

26. Procedimiento según la reivindicación 19, en el que dichas fibras de pulpa son fibras de pulpa sintéticas no elásticas.

30 27. Procedimiento según la reivindicación 26, en el que dichas fibras de pulpa sintéticas no elásticas tienen una longitud menor o igual a 0,623 cm (0,25 pulgadas) y un valor tex menor o igual a 0,143 (denier menor o igual a 1,3).

35 28. Procedimiento según la reivindicación 27, en el que dichas fibras de pulpa sintéticas no elásticas son fibras de pulpa de poliéster.

29. Procedimiento según la reivindicación 19, en el que dichas fibras largas son fibras largas no elásticas sintéticas.

40 30. Procedimiento según la reivindicación 29, en el que dichas fibras largas no elásticas sintéticas están realizadas a base de un material seleccionado del grupo que comprende rayón y polipropileno.

31. Procedimiento según una de las reivindicaciones 18 a 30, en el que dicho soporte es un soporte dotado de aberturas.

45 32. Procedimiento según una de las reivindicaciones 18 a 31, en el que dicho laminado sobre un soporte y la mencionada serie de chorros de líquido a alta presión son desplazados unos con respecto a otros de manera que dicha serie de chorros de líquido a alta presión atraviesa la longitud de dicho laminado sobre el mencionado soporte.

50 33. Procedimiento según la reivindicación 32, en el que dicha serie de chorros de líquido a elevada presión atraviesa el laminado sobre el soporte una serie de veces.

55 34. Procedimiento según una de las reivindicaciones 18 a 33, en el que dicho laminado tiene superficies principales opuestas, y la serie de chorros de líquido a alta presión son proyectados hacia cada una de las superficies principales de dicho laminado.

35. Procedimiento según la reivindicación 18, en el que dicho material no tejido es una red.

60 36. Procedimiento según la reivindicación 18, en el que dicho material no tejido es un género esponjoso.

128
99

37. Procedimiento según una de las reivindicaciones 18 a 36, en el que cada una de dichas fibras sopladas en fusión y material no tejido consiste esencialmente en un material no elástico.

5

10

15

20

25

30

35

40

45

50

NOTA INFORMATIVA: Conforme a la reserva del art. 167.2 del Convenio de Patentes Europeas (CPE) y a la Disposición Transitoria del RD 2424/1986, de 10 de octubre, relativo a la aplicación del Convenio de Patente Europea, las patentes europeas que designen a España y solicitadas antes del 7-10-1992, no producirán ningún efecto en España en la medida en que confieran protección a productos químicos y farmacéuticos como tales.

55

Esta información no prejuzga que la patente esté o no incluida en la mencionada reserva.

United States Patent [19]

Chen et al.

[11] Patent Number: 5,990,377
[45] Date of Patent: Nov. 23, 1999

[54] DUAL-ZONED ABSORBENT WEBS

[75] Inventors: Fung-jou Chen; Jeffrey Dean Lindsay, both of Appleton; Richard Joseph Kampa, Wrightstown; Andrew Michael Lake, Combined Locks; Mark Louis Robinson, Appleton, all of Wis.

[73] Assignee: Kimberly-Clark Worldwide, Inc., Neenah, Wis.

[21] Appl. No.: 08/997,287

[22] Filed: Dec. 23, 1997

Related U.S. Application Data

[63] Continuation-in-part of application No. 08/821,483, Mar. 21, 1997, abandoned.

[51] Int. Cl.⁶ A61F 13/15

[52] U.S. Cl. 604/381; 604/385.1; 442/79; 442/86

[58] Field of Search 604/381, 382, 604/385.1; 442/79, 85, 86, 90

[56] References Cited

U.S. PATENT DOCUMENTS

2,391,621 12/1945 Powell, III et al. .
2,576,914 12/1951 Barrett .
3,020,178 2/1962 Sweeney et al. .
3,165,485 1/1965 Illyckyj .
3,224,926 12/1965 Bernardin .
3,287,149 11/1966 Dooley et al. .
3,339,550 9/1967 Van Haaften .

(List continued on next page.)

FOREIGN PATENT DOCUMENTS

0 677 612 A2 10/1985 European Pat. Off. .
0 353 972 A1 2/1990 European Pat. Off. .
3-185197 8/1991 Japan .
WO 95/13773 A1 5/1995 WIPO .
WO 95/13774 A1 5/1995 WIPO .
WO 97/18784

A1 5/1997 WIPO .
WO97/18784 5/1997 WIPO 604/385.1

OTHER PUBLICATIONS

Derwent World Patent Database abstract of GB 1,593,331: Description of Kemi Oy, "Water Resistant Paper And Board."

AATCC Test Method 66-1990, Technical Manual of the American Association of Textile Chemists and Colorists, 1995, pp. 99-100.

(List continued on next page.)

Primary Examiner—John G. Weiss

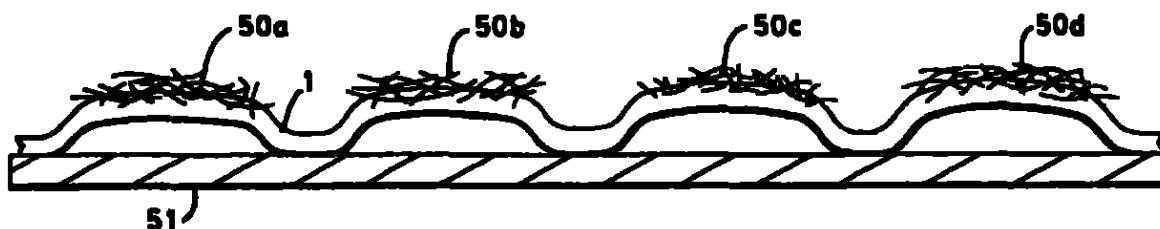
Assistant Examiner—Dennis Ruhl

Attorney, Agent, or Firm—Gregory E. Croft

[57] ABSTRACT

A dual-zoned, three-dimensional, resilient absorbent web is disclosed which is suitable as body-side liner for absorbent articles such as feminine pads, diapers and the like. When used as a liner in absorbent articles, the dual-zoned web combines the advantages of apertured films and soft, nonwoven cover layers in one structure while still being inherently hydrophilic. The liner comprises a web of wet-resilient, hydrophilic basesheet having a three-dimensional topography comprising elevated regions onto which hydrophobic matter is deposited or printed and a plurality of spaced apart depressed regions. In a preferred embodiment, the hydrophobic matter applied to the elevated regions of the basesheet comprises hydrophobic fibers in a contiguous nonwoven web which has been apertured or provided with slits or other openings, such that the apertures or openings overlay a portion of the depressed regions. The elevated hydrophobic regions enhance dry feel and promote fluid flow toward the lower hydrophilic regions, which comprise the exposed depressed regions of the basesheet. The basesheet is preferably in liquid communication with underlying absorbent material, most preferably a stabilized airlaid cellulosic material or compressed stabilized fluff such that the absorbent material can wick fluid out of the basesheet by capillary action. When soft, hydrophobic fibers are deposited on the elevated regions, the liner also has a soft, cloth-like feel in addition to a dry feel in use.

22 Claims, 11 Drawing Sheets



DUAL-BONDED ABSORBENT WEBS

This application is a continuation-in-part of U.S. application Ser. No. 0,952,493 filed on Mar. 21, 1977 now abandoned.

BACKGROUND OF THE INVENTION

Absorbent articles are typically used in contact with skin. These absorbent articles such as disposable diapers, facial tissue pads, sanitary liners, incontinence pads and the like are held in contact with skin to absorb body liquids or exudates, while other absorbent materials such as paper towels, hand towels, and wipes may be held in the hands to absorb liquid on the skin or other surfaces. In virtually every case, it is desired that the absorbent article or material keep liquids off the skin to provide a clean, dry feel and to reduce skin health problems that arise from excess hydration or from contact with harmful biological or chemical materials in the liquid being absorbed.

While paper towels and wipes are often composed of homogeneous material, such as an entirely cellulosic web, absorbent articles intended to absorb body fluids typically have at least three layers of different materials. What is, in the prior art, is a typical layer, a three-dimensional layer, is used as a liner, body-side liner or cover sheet. Beneath the top layer is the absorbent core that is designed to retain liquid, and beneath the absorbent core is a fluid-impermeable backsheet that prevents leakage and maintains the integrity of the product. The top layer should feel soft and should have high liquid permeability to allow body fluid such as urine, menses, or sweat to pass through to be absorbed and transported away from the skin to reach the absorbent core. Ideally, the top layer provides a "dry hand" or "dry feel" by preventing liquid from flowing back to the skin. It is also desirable that the top layer have high wet resistance to maintain their bulk and shape when wet.

Traditional hydrophobic cover materials or top layers in contact with the skin can serve effectively to transport body fluids into the absorbent core, but they cause a wet feel against the skin of the user and may adversely affect skin health. Further, they may wick liquid in the plane of the layer, allowing liquid to approach the edges of the absorbent article and possibly leak or seep out.

To address the goal of softness and a dry feel in top layers of absorbent articles, many manufacturers have turned to nonwoven fabrics made of hydrophobic fibers for the body-facing top layer. While the use of hydrophobic nonwoven fabrics may have resulted in improved dry feel, the hydrophobic material blocks wicking into the absorbent core, often this absorbent capacity and reduces liquid permeability. Further, the poor absorbency of most hydrophobic materials causes any liquid retained therein to be easily squeezed out by body motion of the wearer.

Others have sought to improve the poor wicking and absorbent properties of hydrophobic materials by applying a fluid absorbing mechanism on the surface of the hydrophobic fibers. This approach may offer some benefits when the article is first wetted, but the mechanisms tend to be washed away, resulting in poorer performance upon further wetting.

In the case of absorbent pads for females, two distinct approaches involving hydrophobic top layers or covers are common. One approach is to use a soft, cellulosic nonwoven hydrophobic material, which has some contact but has the drawback of poor intake of menses. Another approach is to use an apertured plastic film of hydrophobic

polymer or other material. The hydrophobic cover material keeps many body fluids, while the apertures allow wicking away from the cover into the absorbent material beneath.

In theory, the hydrophobic apertured material should allow the user's skin to remain relatively dry while allowing wicking in the z-direction (normal to the plane of the cover) into the underlying absorbent core. In practice, hydrophobic apertured films present a number of problems. Apertured films have the drawback of being difficult by many means for their plastic feel and for their poor absorbency. Their hydrophobic nature makes transport through the material, possibly delaying liquid into the absorbent core. Likewise, punctures or tears of liquid may form between the film and the user's skin. In the absence of hydrophobic pressure or physical compression, menses in particular may pool on the hydrophobic surface and not penetrate into the apertures, especially if there is a significant lateral gap between the cover and the underlying absorbent material.

Therefore there is a need for an improved apertured material which provides the clean feel said to be characteristic of hydrophobic apertured materials, while also providing for rapid z-direction (perpendicular) transport of liquid through the apertures into the underlying absorbent core, a characteristic of a hydrophobic apertured material. Preferably, these absorbent top layers also have wet resistance and absorbency properties which protect upon multiple bands of urine or other liquids.

SUMMARY OF THE INVENTION

The present invention pertains to composite, multi-layer materials that offer the one-dry feel and softness, wet resistance and a clean, dry feel when used as skin-contacting layers that absorb body fluids or other liquids.

In one aspect, U.S. application Ser. No. 0,951,428, "Web Resistant Wipes and Disposable Articles Made Thereof," by F. J. Chen et al., herein incorporated by reference, a novel wet-wet feel from web is taught having unusually high bulk, wet resistance, in-plane permeability, and absorbency. The material comprises of this material and a hydrophobic layer of high liquid flow, wet strength addition, and noncompressive drying of a coated, three-dimensional structure. The three-dimensional structure of this material does not collapse readily when wetted and thus retains the contact area with the skin when wet, contributing to a relatively dry feel. It has been found that the inherently hydrophobic material of this structure is resistant and related materials can be made substantially more useful in personal care articles by the selective addition of hydrophobic material which can impart increased dry feel and, in some embodiments, improved wet resistance. With hydrophobic material deposited on the top surface, body-contacting surface of the three-dimensional hydrophobic web, the highest body-facing wetting regions are made substantially hydrophobic to

resist the wetting of a clean, dry feel, while a plurality of hydrophobic regions in said web remain accessible to body fluids, allowing liquids to be wicked away from the body and into an absorbent material. Thus, dry feel and high absorbency are achieved in a single web layer or in a single composite structure which may be a laminate of hydrophobic and hydrophilic materials. The hydrophobic material is located or integrally attached to the top surface; improved disposable absorbent articles comprising such materials include feminine pads and panty liners, incontinence products such as diapers and liners, bed pads, disposable slippers, pull-ups or disposable training pants, disposable

able menstrual pads, sanitary pads, disposable toilet bands or pads, breast pads, other absorbing pads for shoes, towels, absorbent wipes, wipes, medical pads, bandages and sterile pads for wounds, disposable garments, liners for helmets or other protective or athletic gear, pads for use in wicking contaminants and other surfaces, and so forth. A simple example of an absorbent article containing a top layer, absorbent core and a backsheet is illustrated in U.S. Pat. No. 3,008,089 issued May 7, 1974 to Huthorn et al., which is hereby incorporated by reference.

In general, it has been discovered that the addition of hydrophobic agents or materials on relatively elevated portions of one surface of a three-dimensional, wet resistant fibrous web, said web predominantly comprising hydrophobic fibers, can enhance the wicking ability of such webs for use in absorbent articles by reducing the amount of liquid that can remain in contact with the skin or flow back to the skin during use as an absorbent article, thus resulting in a drier, dry feel. Certain hydrophobic materials such as olefin, dry feel, while others such as hydrophobic carbon, polyethylene, wax, or liquid can improve the wet resistance or leakability of the surface and improve the wicking properties.

Substrate laminates can be prepared from apertured sheets of permeable fibers with laminar permeability between the layers. The fibers may be derived from wool or other sources of cellulose and preferably containing a portion of high yield or other wet resistant pulp fibers and an effective amount of wet strength agents. The laminate can be formed by through-drying on a three-dimensional fabric or other woven layer in the art and preferably non-compressively dried to give a three-dimensional structure. The inherent stiffness of wet resistant pulp fibers may be reduced, if desired, by incorporation of a suitable plasticizer such as glycerol or by mechanical treatment such as microwaving, dry crimping or calendaring. Through-drying fibers will reduce the formation of three-dimensional webs as disclosed in U.S. Pat. No. 3,438,684, issued to Chis et al., "Apparatus for Making Soft Tissue Products," issued Jul. 4, 1969, herein incorporated by reference. Other articles such as wet molding, forming on three-dimensional forming fabric, drying on nonwoven substrates, rank transfer onto embossing fabrics, embossing, stamping, and so forth may be used to create useful three-dimensional structures. The laminate may be formed as a unitary multilayer structure in which various films are wet bonded and integrally connected to each other. Unitary multilayer laminates may be formed using layered or stratified laminates in which two or more laminates are provided into separate channels of a backsheet, or they may be formed using separate laminates by coating the wet webs together prior to drying in order to allow extensive hydrogen bonding to develop between the films during drying, or they may be formed during drying by varying the composition of the films and adhesion imparted to web.

Midlayer sheets allow better control of physical properties by tailoring the material composition of each layer. For example, a unitary multilayer laminate useful for the present invention would have an upper layer, corresponding to the upper surface of the backsheet, and at least one remaining layer below said upper layer and integrally attached thereto, preferably through hydrogen bonds formed between cellulose fibers during drying, wherein said upper layer differs from at least one remaining layer of the laminate in terms of material composition. The difference in material composition may be due to differences in fiber species (for example, percentages of hardwood versus softwood fibers), fiber length, fiber yield, fiber treatment with processes which change fiber morphology or chemistry such as mechanical refining, fiber fractionation, chemical treatment, chemical modification, bleaching, lignin treatment with alkali or other chemical agents, supercritical fluid treatment, including supercritical fluid extraction of lignin in the fiber or supercritical fluid deposition of solutes on and into the cell wall, and the like. The difference in material composition between the upper layer and at least one other layer in the laminate also may be due to differences in fiber characteristics, including the type, amount, or shape of added chemicals. The chemicals added differentially to at least one layer of the web may include debonding agents, cellulosic agents, wet strength agents, emulsions, plasticizers, superabsorbent particles, fiber plasticizers such as glycerol, carbonates, quaternary ammonium salts, alkali, bleaching agents, dyes, pigments, surfactants, carbon, activated carbon, and the like. In a preferred embodiment, the laminate structure has a wet resistant, noncompressively dried lower layer, preferably composed of cellulose fibers, probably including at least 10% of high yield fibers such as spruce DCTM, and a soft upper layer containing a portion of finer fibers such as chemically pulped hardwoods. The multilayer laminate structure is wetted in such a way that the two layers are integrally connected or bonded together. For example, a two-layer unitary laminate could be formed with a layered backsheet or by coating together two wet sheets prior to drying to form intimate contact and hydrogen bonding between the two layers.

The portion of the surface area treated with hydrophobic materials should be great enough to provide an effective improvement in wicking; which will in part depend on the specific product. Accordingly, the fraction of the laminate surface covered by hydrophobic material can be about 5% or greater, more specifically about 10% or greater, more specifically about 20% or greater, more specifically about 30% or greater, and still more specifically from about 40% to about 75%. The portion of the surface area of the laminate that remains essentially hydrophobic can be about 10% or greater, more specifically about 20% or greater, more specifically about 30% or greater, more specifically about 40% or greater, and still more specifically from about 50% to about 90%. For effective fluid removal, the lateral width of the deposited hydrophobic regions should be about 0.1 mm or greater, more specifically about 0.3 mm or greater, and still more specifically about 1 mm or greater. The spacing between deposited hydrophobic regions can be about 0.4 mm or greater, more specifically about 0.6 mm or greater, and still more specifically about 1.5 mm or greater. The minimum width of the elevated regions can be about 0.5 mm or greater, more specifically about 1 mm or greater, and still more specifically from about 1 to about 3 mm.

On one preferred embodiment, the hydrophobic material comprises a substantially continuous network of hydrophobic fibers having a plurality of macroscopic openings such that a portion of the deposited regions of the laminate are aligned with openings in the underlying network of hydrophobic fibers to allow body fluids to pass through the macroscopic openings into the backsheet. A macroscopic opening is defined as an opening that is large relative to the intrinsic pore size of the material. In a typical apertured or bonded coated web, for example, a macroscopic opening would appear to the eye to be a deliberately formed hole or void in the web rather than a characteristic pore between adjacent fibers, and specifically could have a characteristic

substantially flow length, fiber yield, fiber treatment with processes which change fiber morphology or chemistry such as mechanical refining, fiber fractionation, chemical treatment, chemical modification, bleaching, lignin treatment with alkali or other chemical agents, supercritical fluid treatment, including supercritical fluid extraction of lignin in the fiber or supercritical fluid deposition of solutes on and into the cell wall, and the like. The difference in material composition between the upper layer and at least one other layer in the laminate also may be due to differences in fiber characteristics, including the type, amount, or shape of added chemicals. The chemicals added differentially to at least one layer of the web may include debonding agents, cellulosic agents, wet strength agents, emulsions, plasticizers, superabsorbent particles, fiber plasticizers such as glycerol, carbonates, quaternary ammonium salts, alkali, bleaching agents, dyes, pigments, surfactants, carbon, activated carbon, and the like. In a preferred embodiment, the laminate structure has a wet resistant, noncompressively dried lower layer, preferably composed of cellulose fibers, probably including at least 10% of high yield fibers such as spruce DCTM, and a soft upper layer containing a portion of finer fibers such as chemically pulped hardwoods. The multilayer laminate structure is wetted in such a way that the two layers are integrally connected or bonded together. For example, a two-layer unitary laminate could be formed with a layered backsheet or by coating together two wet sheets prior to drying to form intimate contact and hydrogen bonding between the two layers.

The portion of the surface area treated with hydrophobic materials should be great enough to provide an effective improvement in wicking; which will in part depend on the specific product. Accordingly, the fraction of the laminate surface covered by hydrophobic material can be about 5% or greater, more specifically about 10% or greater, more specifically about 20% or greater, more specifically about 30% or greater, and still more specifically from about 40% to about 75%. The portion of the surface area of the laminate that remains essentially hydrophobic can be about 10% or greater, more specifically about 20% or greater, more specifically about 30% or greater, more specifically about 40% or greater, and still more specifically from about 50% to about 90%. For effective fluid removal, the lateral width of the deposited hydrophobic regions should be about 0.1 mm or greater, more specifically about 0.3 mm or greater, and still more specifically about 1 mm or greater. The spacing between deposited hydrophobic regions can be about 0.4 mm or greater, more specifically about 0.6 mm or greater, and still more specifically about 1.5 mm or greater. The minimum width of the elevated regions can be about 0.5 mm or greater, more specifically about 1 mm or greater, and still more specifically from about 1 to about 3 mm.

On one preferred embodiment, the hydrophobic material comprises a substantially continuous network of hydrophobic fibers having a plurality of macroscopic openings such that a portion of the deposited regions of the laminate are aligned with openings in the underlying network of hydrophobic fibers to allow body fluids to pass through the macroscopic openings into the backsheet. A macroscopic opening is defined as an opening that is large relative to the intrinsic pore size of the material. In a typical apertured or bonded coated web, for example, a macroscopic opening would appear to the eye to be a deliberately formed hole or void in the web rather than a characteristic pore between adjacent fibers, and specifically could have a characteristic

width of about 0.3 mm or greater, about 0.5 mm or greater, about 1 mm or greater, about 2 mm or greater, about 4 mm or greater, about 6 mm or greater, or more than 1 mm to about 5 mm. The characteristic width is defined as 4 times the area of the square divided by the perimeter.

[illegible]

For improved comfort, the network of hydrophilic filaments in the above-mentioned embodiment preferably is one that is perceived as soft and conformable when next to the skin.

For systems efficiency in the embodiment comprising a networked web, the systems or openings in the web should be arranged in a pattern corresponding to the array of demand points in the plane boundary, or should cover

[illegible][illegible]

It has also been discovered that highly enhanced versions of such vents are exhibited on lunar rocks. The hydrothermal, originally apparent regions are much relatively flat, although they are highly elevated. The rocks have the same chemical composition as the rocks from the lunar surface, but also have the ability to react after warming to provide improved dry fuel to the wet, hydrothermal steam source from the skin relative to the more hydrothermal, elevated regions. While as treated can achieve the same generally exclusive goals of having high density for economical dispensing and low density when used for high efficiency, while also having a dry fuel in use.

Thus, in one aspect, the invention resides in an absorbent web having a dry feel when wet, comprising: (a) an inherently hydrophilic bastment comprising papermaking fibres and having an upper surface and a lower surface, said upper surface having elevated and depressed regions; and (b), hydrophobic matter deposited preferentially on the elevated regions of the upper surface of said bastment.

In another aspect, the invention resides in an absorbent dual-zoned web providing a dry fluff in one, acid web having an upper surface comprising a plurality of hydrophobically treated regions surrounded by inherently hydrophilic cellulosic regions, wherein upon wetting said web expands such that the hydrophobically treated regions are preferentially elevated relative to said hydrophilic regions.

In another aspect, the invention resides in an element with having a thrust value of at least 1 g or less, comprising:

- (a) an inherently hydrophilic bioactive comprising pyramiding filon and having a top surface and a lower surface, said upper surface having elevated and depressed regions with an Overall Surface Depth of 0.3 mm or greater in the nonburied and uncovered state, said bioactive further having a Wet Compressive Bulk of at least 5 cc/g; and
- (b) hydrophobic matter deposited preferentially on the elevated regions of the upper surface of said bioactive.

In another aspect, the burrowing animals in an abundant way leaving a dry bed when wet, comprising: (a) an extremely hydrophilic basement comprising paraffinized fibers and having an upper surface and a lower surface, and upper surface having elevated and depressed regions with an Overall Surface Depth of about 0.2 mm or greater; and (b) a minutely continuous network of hydrophilic fibers having a plurality of macroscopic openings attached to the upper surface and the lower surface, and the upper and lower regions of the basement are slightly tilted with openings in the overlying network of hydrophilic fibers with openings in the overlying network of hydrophilic fibers to allow body exudates to pass through the macroscopic openings into the basement.

In another aspect, the levanan stains in an obvious web having a dry feel when wet, comprising: (a) an inherently hydrophilic basement comprising superabsorbent films and having an upper surface and a lower surface, said upper surface having elevated and depressed regions, said basement uniformly having a wettability ratio of at least 0.1; and (b) a continuous network of hydrophilic matter deposited preferentially on the elevated regions of the upper surface of said basement.

In another aspect, the formation involves an abundant, acidic comprising a liquid impermeable bacterium, a cellulose abundant core is superposed solution with acid bacterium, and a liquid permeable abundant web; acid abundant web comprising an inherently hydrophilic bacterium comprising permeable films and having a waxy lamella rate of at least 0.1; said bacterium having an upper surface and a lower surface, said upper surface having

coloured and depressed regions and hydrophobic matter deposited predominantly on the elevated regions, whence the haemolysate is removed on the absorbing curve with the lower surface of the haemolysate during the standard curve.

As another aspect, the lamellar system is an abundant article comprising a liquid impermeable laminae, a multicellular abundant one in compressed relation with said laminae, and a liquid permeable abundant one, said system comprising an entirely developed lamellar abundant covering growing from and covering the lower surface of the upper lamina, and a lower article, said upper lamina having abundant and depressed regions, further comprising an abundant continuous one of impermeable nature, whereas material attached to the upper surface of the laminae is the laminae, the laminae being the laminae of the abundant one of the laminae, whereas the laminae is supported on the abundant one with the lower surface of the laminae facing the abundant one.

In earlier papers, the literature studies in colloidless, low-density structures of positively three-dimensional polymers with having hydrophobic nature on the cross appearance of regions of core or bulk sides of the web. Without limitation, such articles may serve as suitable hand towels by providing high initial speeds of field by the plasticity of hydrophobic polymers in the plane of the film paper during initial wringing, followed by an enhanced dry fast on the dry-filling nature, since the most of the plane of the sheet dries by wringing. The hydrophobic nature in such articles may also be used to increase the apparent thickness or fabricity of the article and to increase the apparent surface area.

In another report, the boron solution is a saturated three percent aqueous solution. The boron solution is applied to the paper by (a) forming a saturated boron solution; (b) dipping the paper into a slurry of gypsum-boron slurry; (c) thoroughly drying the antiseptic paper with an air-dry-drum; (d) through-drying the paper having a pattern of elevated and depressed regions; (e) completing the drying of the web; (f) applying a continuous web by means of hydroentanglement, wherein the continuous web overlaps a carrier fabric having a pattern of elevated and depressed regions; (g) substantially the same pattern of elevated and depressed regions on the through-drying sheets of step (d); and (h) drying the resulting paper by means of the through-drying drum, thereby completing the treatment of the paper so that the pattern of the surface of the web is substantially aligned with the depressed regions of the through-dry paper web.

In stating that hydrophobic matter is predominantly deposited on elevated portions of the basement, the term "predominantly" implies that some hydrophobic matter is deposited on the elevated regions rather close to the depression. The elevated regions are not, however, as elevated as the depressed regions have a significantly lower amount of hydrophobic matter present than the elevated regions. It is further pointed out that the percentage of the hydrophobic material deposited on the elevated regions be at least about 50 percent of the total amount deposited. The hydrophobic matter can comprise, for example, carbon, graphite, mica, gels, and other materials, and is usually supplied with an average associated basic weight of about 1000. The hydrophobic matter is deposited in the form of gels. When used on the skin-sensitizing layer of fluorescent crystals, said fluorescent wax serves as an effective improvement over conventional, plastic appearance films or other nonfluorescent hydrophobic materials. The elevated regions are not elevated as much as the depressed regions, and the elevated regions contain about 300 percent more hydrophobic matter than the depressed regions. The elevated regions are, however, having a higher relative to the shape of the depression, as measured in the

uncombined state, of about 0.1 mm or greater, preferably about 0.2 mm or greater, more preferably about 0.3 mm or greater, and most preferably from about 0.25 to about 0.6 mm.

Definition of Terms and Test Procedures

In describing the value of this invention and their field-handling characteristics, a number of terms and tests are used which are described below.

As used herein, "high yield pulp fibers" are those paper-making fibers of pulp produced by pulping processes providing a yield of about 65 percent or greater, more specifically about 75 percent or greater, and still more specifically from about 75 to about 95 percent. Yield is the resulting amount of processed fiber expressed as a percentage of the initial wood mass. High yield pulps include bleached chemi-thermochemical pulp (BCTMP), chemi-thermochemical pulp (CTMP), thermochemical pulp (TMP), thermomechanical pulp (TMP), high yield sulfate pulps, and high yield Kraft pulps, all of which contain fibers having high levels of lignin. The preferred high yield pulp fibers can also be characterized by being composed of fibers of a certain length, such as fibers having a length of between 250 Canadian Standard Fibrans (CSF) or greater, more specifically 350 CSF or greater, and still more specifically 400 CSF or greater, and low fines content (less than 25 percent, more specifically less than 10 percent, still more specifically less than 5 percent, and still more specifically less than 10 percent by the fiber per unit). In addition to common paper-making fibers listed above, high yield pulp fibers also include other natural fibers such as cottonwood seed fibers, straw, hemp, flax, jute, bagasse, cotton and the like.

As used herein, "wet mill pulp fibers" are paper-making fibers selected from the group comprising high-yield fibers, chemically refined fibers and cross-linked fibers. Examples of chemically refined fibers or cross-linked fibers include uncombined fibers, HRA fibers produced by Weyerhaeuser Corp., and those such as described in U.S. Pat. No. 3,224,924, "Method of Forming Cross-Linked Cellulosic Fibers and Products Thereof," issued in 1965 to L. J. Bernfield, and U.S. Pat. No. 3,433,776, "Capped Fibers Formed From Soft Cross-Linked Fibers and Related Papermaking Fibers," issued in 1969 to L. J. Bernfield. Though any blend of wet mill pulp fibers can be used, high-yield pulp fibers are the wet mill pulp fibers of choice for many embodiments of the present invention for their low cost and good field handling performance when used according to the procedure described below.

The amount of high-yield or wet mill pulp fibers in the basement can be at least about 10 dry weight percent or greater, more specifically about 15 dry weight percent or greater, more specifically about 20 dry weight percent or greater, still more specifically about 30 dry weight percent or greater, and still more specifically from about 30 to 100 percent. For layered treatments, these same amounts can be applied to one or more of the individual layers. Because wet mill pulp fibers are generally less soft than other paper-making fibers, in some applications it is advantageous to incorporate them into the middle of the final product, such as placing them in the center layer of a three-layered basement or, in the case of a two-ply product, placing them in the heavily-facing layers of each of the two plies.

"Water retention value" (WRV) is a measure that can be used to characterize some fibers useful for purposes of this

invention. WRV is measured by dispersing 0.5 grams of fibers in deionized water, making at least 8 hours, then centrifuging the slurry in a 1.9 inch diameter cell with a 100 mesh screen at the bottom of the tube at 1000 G for 30 minutes. The samples are weighed, then dried at 105° C. for two hours and then weighed again. WRV is (wet weight - dry weight)/dry weight. High yield pulp fibers can have a WRV of about 0.7 or greater and characteristically have a WRV of about 1 or greater and preferably from about 1 to about 2. Low-yield, cross-linked fibers typically have a Water Retention Value of less than about 1, specifically less than about 0.7 and more specifically still less than about 0.6.

"Burst" is a measure of the amount of liquid water which can be retained out of a wetted web into an adjacent dry fiber paper and is intended to estimate the tendency of a wetted web to wet the side. The burst test is performed by cutting a sample of a three web to a rectangle of dimensions 4 inch by 4 inch. The test is performed in a Tappi standard burst (209-301, 72° F). The initial air dry weight of the sample is a value of 3.0 grams (±0.15 g) of which water per gram of constituent air dry fiber. The process of repeatedly spraying and weighing the sample until the paper mass has been reached should take no more than 2 minutes. Once the sample is wetted, a single dry weight of 65 fibers, whose mass has been measured and recorded, is placed on the center of the wet three sample and a head is immediately placed on the fiber disk. The head is a cylindrical disk of aluminum having a diameter of 4.3 inches and a thickness of 1 inch for a mass of 725 g. The aluminum disk should be centered about the fiber disk. The fiber paper on the wet sample reaches water head for 30 seconds, at which time the head and the fiber paper are immediately removed. The fiber paper is then weighed, and the additional mass relative to the initial air dry mass is reported in grams as the burst value.

"Horizontal Burst" is the burst value of a sample divided by the constituent dry mass of the sample.

"Absorbency at 0.075 psi" is a measure of basement absorbent capacity under a head of 0.075 psi. The test requires two metal plates cut to a length of 6 inches and a width of 4 inches. A lower plate is 0.125-inch thick and the upper plate is 9/16-inch thick chambers having a mass of 813 g, which imparts a head of 0.075 psi when placed flat on a three sample. The center of the upper plate has a cylindrical hole 0.25 inches in diameter. To perform the test, 4-inch samples of dry three are cut, with the 6-inch length being aligned with the machine direction. Multiple three plies are stacked to achieve a three stack weight as close to 2.6 grams as possible. This three stack is placed between the two basement plates, which is flat in a larger tray. A draining basket with 50 ml of deionized water is placed directly above the hole in the upper plate. The basket is opened and water is allowed to slowly enter the hole in the upper plate until the hole is filled with a column of water that is maintained as high as possible without spilling above or spilling onto the upper surface of the plate. This is done until the sample is apparently saturated. Apparent saturation is the point at which water begins to leave any edge of the sample. The mass of water that has been removed from the basket is taken as the value for "Horizontal Absorbency at 0.075 psi." At that point, the tray containing the plate is tilted at a 45° angle for 30 seconds to allow some of the liquid in the

sample to drain. The mass of any liquid that drains out is subtracted from the previous "Horizontal Absorbency at 0.075 psi" value to yield "Total Absorbency at 0.075 psi." For the basement, the horizontal absorbency at 0.075 psi can be about 5 g or greater, or alternatively 7 g or greater, 9 g or greater, 11 g or greater, or from about 6 g to about 10 g. The final absorbency at 0.075 psi may be about 4 g or greater, about 6 g or greater, about 8 g or greater, about 10 g or greater, or from about 6 to about 12 g. The final absorbency of the cover may be about 5 to 40% less than that of the basement sheet, while the horizontal absorbency may be greater or lower than that of the basement.

"Whole side" of a through-air dried paper web is the side of the web that was in contact with the through-air dryer fabric (TAD fabric) during through-drying. Typically the fabric side of a through-dried sheet often the most pleasant tactile properties for contact with side.

"Air side" of a through-air dried paper web is the side of the web that was not in contact with the through-air dryer fabric (TAD fabric) during through-drying. Typically the air side of a through-dried sheet feels somewhat more silky than the fabric side of the same sheet.

"Density" can be determined by measuring the volume of a sample and using a TAD model (Charles Machine, Inc., Asheville, N.C.) with a head of 0.289 psi, e.g., using a TAD model 49-70 with an enlarged piston. Density is calculated by dividing the column by the bulk weight of the sheet. The density is useful for the purpose of this invention can have low, substantially uniform densities (high bulk), which is preferred for wet laid structures, or may have a distribution of mass of varying density, which is preferred in sheet laminates. Substantial density uniformity is obtained, for example, by through-drying to final density without difficulty compressing the web. In general, the density of the basement of this invention can be about 0.3 gram per cubic centimeter (g/cc) or less, more specifically about 0.15 g/cc or less, still more specifically about 0.1 g/cc or less and can be from about 0.05 to 0.3 g/cc or from about 0.07 to 0.2 g/cc. It is desirable that the basement structure, once formed, be dried without substantially reducing the number of wet-mill fiber bundles. Through-drying, which is a common method for drying sheets and towels, is a preferred method of producing the structure. Basement made by wet laying followed by through-drying typically have a density of about 0.1 gram per cubic centimeter, whereas air-dried basement usually used for diaper shell typically have densities of about 0.25 gram per cubic centimeter. All of such basements are within the scope of this invention.

As used herein, "dry bulk" is measured with a thickness gauge having a circular platen 5 inches in diameter such that a pressure of 0.05 psi is applied to the sample, which should be conditioned at 50% relative humidity and at 72° F. for 24 hours prior to measurement. The basement as well as the uncombined web can have a dry bulk of 3 cc/g or greater, preferably 6 cc/g or greater, more preferably 9 cc/g or greater, more preferably still 11 cc/g or greater, and most preferably between 8 cc/g and 20 cc/g.

"Wet strength agents" are materials used to immobilize the bonds between the fibers in the wet state. Typically the means by which fibers are held together in paper and some produce hydroxyl groups and sometimes combinations of hydroxyl groups and covalent sulfur bonds. In the present invention, it is desirable to provide a material that will allow bonding of fibers in such a way as to immobilize the fiber to fiber bond points and make them resistant to disruption in the wet state. In this instance the

wet state usually will occur when the product is largely saturated with water or other aqueous solutions, but could also mean significant saturation with body fluids such as urine, blood, mucus, semen, many bowel movements, lymph and other body exudates.

There are a number of materials commonly used in the paper industry to impart wet strength to paper and board that are applicable to this invention. These materials are known in the art as "wet strength agents" and are commercially available from a wide variety of sources. Any material that when added to a paper web or sheet results in providing the sheet with a wet strength that is greater than the dry strength of the sheet, is a wet strength agent. For the purposes of differentiating permanent from temporary wet strength, permanent will be defined as those means which, when incorporated into paper or other products, will provide a product that retains more than 50% of its original wet strength after exposure to water for a period of at least five minutes. Temporary wet strength agents are those which show less than 50% of their original wet strength after being saturated with water for five minutes. Bulk claims of material and application in the present invention. The amount of wet strength agent added to the pulp fibers can be at least about 0.1 dry weight percent, more specifically about 0.2 dry weight percent or greater, and still more specifically from about 0.1 to about 3 dry weight percent based on the dry weight of the fibers.

Permanent wet strength agents will provide a more or less long-term wet resistance to the structure. In contrast, the temporary wet strength agents would provide structure that had low density and high resistance, but would not provide a structure that had long-term resistance to exposure to water or body fluids. The mechanism by which the wet strength is generated has little influence on the products of this invention as long as the essential property of generating water-resistant bonding at the fiber-to-fiber point is obtained.

Subclass permanent wet strength agents are typically water soluble, cationic oligomers or polymeric resins that are capable of either crosslinking with themselves (chemically) or with the cellulose or other constituent of the wood fiber. The most widely-used materials for this purpose are the class of polyurethane or polyacetaldehyde (PAA) type resins. These materials have been described in patents issued to Kala (U.S. Pat. Nos. 3,700,623 and 3,773,976) and are sold by Hercules, Inc., Wilmington, Del., as KALADUR 557H. Related materials are described by Huls Chemical Co., Charlotte, N.C. and Chem-Pac Products, Inc., Atlanta, Ga.

Polyamide-epichlorohydrin resins are also useful in bonding fibers in this invention. Materials developed by Monsanto and marketed under the BANTO 228 label are linear saturated polyamide-epichlorohydrin resins that can be used in the present invention. These materials are described in patents issued to Fawcett (U.S. Pat. No. 3,884,436; U.S. Pat. No. 3,899,589; U.S. Pat. No. 4,128,338 and U.S. Pat. No. 4,347,585) and von Dornan (U.S. Pat. No. 4,322,931). Although they are not so commonly used in consumer products, polyethylene glycol resins are also suitable for immobilizing the bond points in the products of this invention. Another class of permanent-type wet strength agents are exemplified by the endocyclic resins obtained by reaction of formaldehyde with melamine or urea.

Subclass temporary wet strength resins include, but are not limited to, those resins that have been developed by Amer-

105

106

minutes should elapse between the completion of the compression test on the dry sample and the completion of moisture application. Allow 45-60 minutes from the final application of spray to the beginning of the subsequent compression test to provide time for internal wicking and absorption of the spray. Between these and flow meters will elapse between the completion of the dry compression test and initiation of the wet compression expansion.

Once the desired mass range has been reached, as indicated by a digital balance, the sample is mounted on the lower furnace plate and the test sequence is initiated. Following the measurement, the sample is placed in a 100° C. oven for drying, and the oven dry weight will be recorded later (sample should be allowed to dry for 30-60 minutes, after which the dry weight is measured).

Note that creep recovery can occur between the two compression cycles to 2 psi, so the time between the cycles may be important. For the instrument settings used in these furnace tests, there is a 30 second period (±4 sec) between the beginning of compression during the two cycles to 2 psi. The beginning of compression is defined as the point at which the load cell reading exceeds 0.02 lb. However, there is a 3-6 second interval between the beginning of compression in the first thickness measurement (comp to 0.025 psi) and the beginning of the subsequent compression cycle to 2 psi. This interval between the beginning of the second compression cycle to 2 psi and the beginning of compression for the first thickness measurement is approximately 20 minutes.

The utility of a web or sheet structure having a high Wet Compressed Bulk (WCB) value is obvious. For a web material which can maintain high bulk water compression can maintain higher field capacity and is less likely to allow field to be squeezed out when it is compressed.

High Wet Springback Ratio values are especially desirable because a wet material that springs back after compression can maintain high pore volume for effective leach and distribution of subsequent leachants of field, and such a material can regulate field during its expansion which may have been expelled during compression. In clays, for example, a wet region may be compressively compressed by leachant action or changes in body position. If the material is unable to regulate its bulk when the compressive force is released, its effectiveness for leaching field is reduced.

High Leaching Energy Ratio values for a material are also useful. For such a material resistance to rapid compression (LSR is based on a measure of the energy required to compress a sample) of leachant less than the peak load of 2 psi, even after it has been heavily compressed once. Maintaining such wet elastic properties is believed to contribute to the fast of the material when used in absorbent articles, and may help maintain the fit of the absorbent article against the wearer's body, in addition to the general advantages secured when a structure can maintain its pore volume when wet.

The hydrophilicity-related character of this invention, and the associated, inherently hydrophilic materials useful in practicing this invention can exhibit one or more of the foregoing properties. More specifically, said absorbent webs and composites can have a Wet Compressed Bulk of about 6 cubic centimeters per gram or greater, more specifically about 7 cubic centimeters per gram or greater, more specifically about 8 cubic centimeters per gram or greater, and still more specifically about 9 cubic centimeters per gram or greater. The Compressive Ratio can be about 0.7 or less, more specifically about 0.6 or less, still more specifically about 0.5 or less, and still more specifically from 0.4 to about 0.7. Also, they can have a Wet

Springback Ratio of about 0.6 or greater, more specifically about 0.7 or greater, more specifically about 0.8, and still more specifically from about 0.8 to about 0.9. The Leaching Energy Ratio can be about 0.6 or greater, more specifically 0.7 or greater, more specifically about 0.8 or greater, and still more specifically from about 0.75 to about 0.9. Fluid bulk can be about 6 cubic centimeters per gram or greater or preferably about 13 cubic centimeters per gram or greater.

"In-Plane Permeability". An important property of porous media, particularly for absorbent products, is the permeability to liquid flow. The complex, interconnected pathways between the solid particles and boundaries of a porous media provide routes for fluid flow which may offer significant flow resistance due to the narrowness of the channels and the tortuosity of the pathways.

For paper, permeability is commonly expressed in terms of gas flow rates through a sheet. This practice is useful for comparing similar sheets, but does not truly characterize the permeability of flowing field with the porous structure and provides no direct information about flow in a wet sheet. The standard engineering definition of permeability provides a more useful parameter, though one less easily measured. The standard definition is based on Darcy's law $K = A \cdot L \cdot \Delta P / (Q \cdot \eta \cdot t)$, where K is the permeability, A is the cross-sectional area of the sheet, L is the thickness of the sheet, ΔP is the pressure drop across the sheet, Q is the flow rate, η is the viscosity of the fluid, and t is the time. The value of K is in cm². In Equation (1), the permeability is an empirical permeability parameter relating fluid velocity to pressure drop and viscosity. For a homogeneous medium, K is not a function of ΔP , sample length, or viscosity, but is an intrinsic parameter describing the flow resistance of the medium. In a compressible medium, permeability will be a function of the degree of compression. Darcy's permeability is a fundamental parameter for processes involving fluid flow in fibrous webs.

Standard permeability has units of cm² and for single voids cylindrical pores is proportional to the cross-sectional area of a single pore. However, the permeability of most real materials cannot be quantified from an optical measurement of pore size. Permeability is determined not only by pore size, but also pore orientation, tortuosity, and interconnectedness. Large pores in the body of an object may be inaccessible to fluid flow or accessible only through narrow pores offering high flow resistance. Even with a full three-dimensional description of the pore space of a material from x-ray tomography or other imaging techniques, it is difficult to predict or calculate the permeability. Permeability and pore size determinations are related but distinct pieces of information about a material. For example, a sheet of material with diameter, corresponding holes punched in it may have very large pores (the holes), while still having negligible in-plane permeability. Such sheets have many large pores, but typically low negligible permeability in any direction unless there are holes that individual holes can extend from one face to the other of the sheet sample.

Most studies of permeability in paper have focused on flow in the z-direction (normal to the plane of the sheet), which is of practical importance in wet pressing and other

$$V = \frac{K \cdot \Delta P}{\eta \cdot L} \quad (1)$$

where V is the superficial velocity (flow rate divided by area), K is the permeability, η is the fluid viscosity, and ΔP is the pressure drop in the flow direction across a distance L . The value of K is in cm². In Equation (1), the permeability is an empirical permeability parameter relating fluid velocity to pressure drop and viscosity. For a homogeneous medium, K is not a function of ΔP , sample length, or viscosity, but is an intrinsic parameter describing the flow resistance of the medium. In a compressible medium, permeability will be a function of the degree of compression. Darcy's permeability is a fundamental parameter for processes involving fluid flow in fibrous webs.

Standard permeability has units of cm² and for single voids cylindrical pores is proportional to the cross-sectional area of a single pore. However, the permeability of most real materials cannot be quantified from an optical measurement of pore size. Permeability is determined not only by pore size, but also pore orientation, tortuosity, and interconnectedness. Large pores in the body of an object may be inaccessible to fluid flow or accessible only through narrow pores offering high flow resistance. Even with a full three-dimensional description of the pore space of a material from x-ray tomography or other imaging techniques, it is difficult to predict or calculate the permeability. Permeability and pore size determinations are related but distinct pieces of information about a material. For example, a sheet of material with diameter, corresponding holes punched in it may have very large pores (the holes), while still having negligible in-plane permeability. Such sheets have many large pores, but typically low negligible permeability in any direction unless there are holes that individual holes can extend from one face to the other of the sheet sample.

Most studies of permeability in paper have focused on flow in the z-direction (normal to the plane of the sheet), which is of practical importance in wet pressing and other

web operations. However, paper is an anisotropic material (for example, see E. L. Bostick, "The Fine Anatomy of Paper: Products and Fibers Building Blocks," Svensk Papperstidning, 66: 219 (1963), meaning that field flow properties are a function of direction. In this case, different flow directions will appear to have different apparent permeabilities. The many possibilities of flow direction and porous gradients in such a medium can be encompassed with a multidimensional form of Darcy's law,

$$\vec{V} = \frac{K \cdot \nabla p}{\eta}$$

where $\vec{V}$ is the superficial velocity vector (volumetric flow rate divided by cross-sectional area of the flow), η is the viscosity of the fluid, K is a second-order tensor and ∇p is the pressure gradient.

If a Cartesian coordinate system is chosen to correspond with the principal flow directions of the porous medium, then the permeability tensor becomes a diagonal matrix (see J. Durst, "Dynamics of Fluids in Porous Media," Academic Press, New York, N.Y., 1977, pp. 136-151):

$$K = \begin{bmatrix} K_x & 0 & 0 \\ 0 & K_y & 0 \\ 0 & 0 & K_z \end{bmatrix}$$

where K_x , K_y , and K_z are the principal permeability components in the x-, y- and z-directions, respectively. In porous media, flow directions will generally correspond to the coordinate directions (taken here as x, y and z) and the machine-direction (taken as x, the direction of maximum in-plane permeability) in the plane, and the transverse or thickness direction (y). Thus, the anisotropic permeability of typical machine-made paper can be characterized with three permeability parameters, one for the machine-direction, one for the cross-direction, and one for the z-direction. (In some cases, as when there are subfibers in the headsheet of the paper machine, the direction of maximum permeability may be slightly off from the machine direction; the direction of maximum in-plane permeability and the direction orthogonal to that should be used for the x- and y-directions, respectively. In this case,) In headsheet, there may be no pronounced direction of orientation for fibers lying in the plane, so the x- and y-direction permeability values should be equal (in other words, such a sheet is isotropic in the plane).

In spite of the past focus on z-direction permeability in paper, in-plane permeability (both K_x and K_y , or in-plane permeability) is important in a variety of applications, especially in absorbent articles. Body fluids or other liquids flowing into the absorbent article usually enter the article in a narrow, localized region. Efficient use of the absorbent medium requires that the incoming fluid be distributed laterally through in-plane flow in the absorbent article, otherwise the local capacity of the article to absorb the incoming liquid may be overwhelmed resulting in leakage and poor utilization of the absorbent core. The ability of fluid to flow in the plane of the article is a function of the driving force for field flow, which can be a combination of capillary wicking and hydraulic pressure from field forces, and of the ability of the porous medium to conduct flow, which is described in large part by the Darcy permeability of the material. Two-plane flow and non-Newtonian liquids or suspensions complicate the physics, but the in-plane permeability of the porous medium is a critical factor for rapid in-plane distribution of

liquid leachant. Especially in the case of urine management, where liquid flow rates may come for in excess of the ability of capillary forces, high in-plane permeability is needed in the leach layer to allow the fluid to be distributed laterally rather than to leak.

While many past studies of liquid permeability in paper focused exclusively on measuring K_z , for x-direction flow, more recently, methods have been taught for measuring permeability in the plane of a paper sheet. J. D. Lindsay and J. H. Brady teach methods for in-plane and z-direction permeability measurements of saturated paper in "Studies of Anisotropic Permeability with Applications to Water Removal in Pulp Mill Part I," Tappi J., 74(4): 115-127 (1991) and "Studies of Anisotropic Permeability with Applications to Water Removal in Pulp Mill Part II," Tappi J., 74(11): 167-174 (1991). Related methods have been published by K. L. Adams, R. M. Maitz, and L. Stenlund in "Forced In-Plane Flow of an Aqueous Solution in Fibrous Networks," Polymer Engineering and Science, 26(20): 1434-1441 (1986); J. D. Lindsay in "Relative Flow Permeability in Fibrous Media: Measurements and Analysis, Including Discussion of Flow," Tappi J., 73(4): 225-235 (June 1990); J. D. Lindsay and J. R. Maitz, "Characterization of In-Plane Flow in Paper," AIChE 1289 and 1990 Forest Products Symposium, Tappi Press, Atlanta, GA (1992), p. 121; and D. H. Hesterman, J. D. Lindsay, and R. A. Stronitz, "Using Edge-Flow Tests to Measure the In-Plane Permeability of Paper," Tappi J., 74(4): 261 (1991).

The basic method used in most of these publications is injection of fluid into the center of a paper disk that is constrained between two flat surfaces to force the fluid flow to be in the radial direction, proceeding from the injection point at the center of the disk to the outer edge of the disk. This is illustrated in FIG. 9, which depicts a sheet 41 in which a central hole 42 has been punched and into which fluid is injected by means of an injection port 43 of the same size as the punched hole. Fluid is forced to flow to the outer radial edge 45. For a liquid-saturated sheet of constant thickness subject to steady radial field flow in the manner described in the work of Lindsay and others, the equation relating average in-plane permeability to field flow is:

$$K_x = \frac{Q \cdot \eta \cdot L}{\pi \cdot \Delta P \cdot R^2} \quad (4)$$

where R_x is the radius of the paper disk 41, R_z is the radius of the central hole 42 in the sample into which fluid is injected through an injection port 43, L is the thickness of the paper, ΔP is the constant pressure above atmospheric pressure at which fluid is injected into the disk (the gauge pressure at the injection point); Q is the volumetric flow rate of liquid, and K_x is the in-plane permeability, technically the average radial permeability, defined as the average of the two in-plane permeability components. The disk diameter is 5 inches. The central hole hole 42 was consistently 0.575 inches (4 hole) and was created using a paper punch tool. The test apparatus for in-plane permeability measurements is depicted in FIG. 10 and FIG. 11, which is similar in principle to the apparatus taught by Lindsay and Brady, previously cited. Tapping 46 connects water from a water reservoir to an injection port drilled into a 1-inch thick Plexiglas support plate 48. The support plate is transparent to permit viewing of the tested sample, especially in cases when an opaque dye solution is injected into the sample. A mirror at a 45 degree angle below the support plate facilitates viewing and photography. The water reservoir 49 provides a nearly constant hydraulic head 49 for field

injection during the test. The volumetric flow rate is obtained by timing the change in water reservoir mass as a function of time, and converting the water mass flow rate to a volumetric flow rate. Volumetric flow rate is converted to mass flow rate.

In using the apparatus, a paper disk 41, cut to be 5-inches in diameter and having a central hole diameter of 0.275-inches, is placed on the support plate 44 over the injection port 44 (0.275 inches diameter) and is then fastened with water. The fluid injection flow 43 and the injection port 44 should be filled with water and efforts should be taken to avoid air bubbles being trapped in the sheet or in the injection port. The hole diameter of the sample 41 should be less than the diameter of the hole in the support plate to insure liquid contact in the center of the sample. The edges of the sample should be ground to a wedge-like condition of the liquid medium to every air bubble and flow under the sheet. Multiple studies of sheets can be handled in the same way, although preliminary sample wetting may be needed to remove loosely air bubbles. The goal in removing air bubbles is to ensure the flow behavior that trapped air bubbles can cause.

Once the vessel sample is in place, a cylindrical metal plate 47, 5-inches in diameter, is gently lowered on top of the sample to provide a constant compressive load and to provide a reference surface on its top for thickness measurements with displacement gauges 48. These displacement gauges 48 are used, spaced approximately evenly around the edge of the top of the metal cylinder 47, in order to measure the average thickness of the sheet 41. The sample thickness is taken as the average of the three displacement volume values to a zero point when no sample is present. A suitable thickness gauge is the Mitutoyo Digimatic Indicator, Model 543-225-1, with a 5-inch scale (traveling distance of the measuring spindle) and a resolution of 1 micrometer. The thickness gauges are slightly rounded relative to the support plate. The rounding of the thickness gauges can be used and lowered (without changing the position of the body of the gauge) by use of a cable to provide clearance for moving the metal plates onto the sample. The small force applied by the thickness gauges 48 should be added to the weight of the metal plates 47 to obtain the total force applied to the sample 41; this force, when divided by the cross-sectional area of the sample and plate, should be 0.8 psi.

A hydraulic head of 15 inches is used to drive the liquid flow. The head is the vertical distance 49 between the water line 50 of the supply reservoir 51 and the plane of the sample 41. This head is achieved by placement of a water bottle 52, filled to a specified level 53, on a mass balance 55 at a fixed height relative to the support plate 44 on which the sample sits. As the sample is being placed on the support plate, the water reservoir is at such a height that the water level 50 in the reservoir is nearly the same as (or slightly greater than) the support plate 44 on which the sample sits. When the sample has been introduced and placed under the compressive load of the metal plates, the water reservoir is then raised and placed on a mass balance 55 such that the water level is 15 inches above the support plate. A flow is induced and the water reservoir mass is recorded at 20 seconds or 30 seconds intervals for a least 90 seconds. The thickness readings of the three gauges is also recorded regularly during the test. The volume change, the estimated sample thickness is allowed to equilibrate under the compressive load for at least 30 seconds before the water level is raised and flow is through the sample begins.

The change in water reservoir mass as a function of time gives the mass flow rate, which can easily be converted to

a volumetric flow rate for use in Equation 4. Normal engineering principles should be used to ensure that the proper units (preferably SI units) are used in applying Equation 4.

In performing in-Plane Permeability measurements, it is important that the sample be uniformly compressed against the surrounding medium to prevent large channels or openings that would provide paths of least resistance for substantial liquid flow that could bypass much of the sample itself. Ideally, the liquid will flow uniformly through the sample, and this can be maintained by injecting dyed fluid into the sample and observing the shape of the dyed region through the transparent support plate. Injected dye should spread out uniformly from the injection point. In sample samples, the shape of the moving dye region should be nearly circular. In materials with in-plane anisotropy due to flow orientation or small-scale structural anisotropy, the shape of the dye region should be oval or elliptical, and nearly symmetric about the injection point. A suitable dye for such tests is Visumatic Purple II made by Milliken Chemical Corp. (Barnes, N.C.). This is a fugitive dye that does not change color on drying, allowing for easy visualization of liquid flow through the Brown medium.

As will be illustrated in the Examples, the water and boundaries of the Brown medium possess very high in-Plane Permeability. The in-Plane Permeability can be about 0.1×10^{-10} square centimeters or greater, more specifically about 0.3×10^{-10} square centimeters or greater, still more specifically about 0.5×10^{-10} square centimeters or greater, still more specifically about 0.8×10^{-10} square centimeters, and still more specifically about 1.0×10^{-10} square centimeters.

BRIEF DESCRIPTION OF THE DRAWINGS
FIG. 1 is a cross-section of an absorbent web comprising a continuous, multilayered laminate having zones of hydrophilic material.

FIG. 2 depicts the absorbent web of FIG. 1 in contact with an underlying absorbent fibrous layer.

FIG. 3 depicts the absorbent web of FIG. 1 attached to an inverted laminate having similar topography.

FIG. 4 depicts a paper machine suitable for producing the continuous, multilayered laminate of the present invention shown in FIG. 1.

FIG. 5 depicts a version of FIG. 2 in which the low regions of the laminate are provided with apertures.

FIG. 6 depicts a pattern of hydrophilic material printed onto a hydrophilic laminate.

FIG. 7 depicts a height profile and several material flow lines to illustrate the definition of material surface area and the PID height.

FIG. 8 depicts a CADSYN profile from Example 13 of the present invention.

FIG. 9 portrays the flow pattern in a paper disk during an in-Plane Permeability measurement (single view).

FIG. 10 is a side view of the in-Plane Permeability apparatus.

FIG. 11 is a top view of the brass plates and thickness gauges in the in-Plane Permeability apparatus.

FIG. 12 depicts the grayscale height map of a section of uncoated Brown laminate showing relatively high regions in light gray and lower regions in darker gray or black.

FIG. 13 is a graph of mass flow rate versus time and flow rate versus time for samples of Example 1.

FIG. 14 is a table of physical property results for Examples 3-6.

FIG. 15 is a table of physical property results for Examples 7-10.

FIG. 16 shows physical property test data for Examples 3 to 6.

FIG. 17 shows physical property test data for Examples 7 to 10.

DETAILED DESCRIPTION OF THE DRAWINGS
FIG. 1 shows a cross-section of a continuous, multilayered hydrophilic laminate 1, preferably a multilayered cellulose-based sheet, onto which hydrophilic material 2 has been deposited on the uppermost region 3 of the continuous laminate to form a composite absorbent web. The upper side of the web having the hydrophilic material 2 can serve as the skin-forming layer of a garment or liner in an absorbent article. The hydrophilic material preferably resides only on the elevated regions of the laminate as shown, preferably protruding less than about 50% of the thickness of the laminate, more specifically no more than about 30% of the thickness of the laminate, and most preferably no more than about 10% of the thickness of the laminate. For some products, it may be desirable that the hydrophilic material be almost exclusively on the upper (outer) surface of the sheet on the upper surface of the laminate, with very little protrusion into the laminate itself. The hydrophilic material deposits generally have a thickness that runs some distance above the underlying hydrophilic laminate, in some embodiments, the distance above the underlying hydrophilic laminate can be less than 3 mm, less than 0.5 mm, less than 0.1 mm, less than 0.05 mm, or between 0.05 and 0.5 mm. In some preferred embodiments, the thickness of the hydrophilic deposits relative to the total thickness of the hydrophilic laminate can be less than 50%, alternatively less than about 30%, alternatively less than about 10%, or between about 5% and 25%.

For best performance in terms of liquid absorption, the density of the laminate preferably should be substantially uniform throughout any characteristic cross-section of the laminate, as is characteristic of uncoated, through-air dried sheets and other paper sheets that have been dried by largely noncompressive means. Such a laminate is relatively free of regions having low permeability and low absorbent capacity and tends to be more uniform when wet. The depressed regions 4 of the laminate are substantially hydrophilic and can serve much as apertures do in an apertured film by providing open space to receive liquid and by providing regions in the midst of hydrophilic material where liquid can be wicked into or absorbed within, the surface being the hydrophilic laminate itself and optionally an underlying absorbent core preferably in liquid communicating contact with the composite web.

The underlying absorbent core is preferably a fibrous mat such as a mat of felt pulp. One such embodiment is depicted in FIG. 2, where the laminated hydrophilic laminate 1 is in direct contact with a fibrous mat 5. For enhanced transport of liquid out of the composite web into the fibrous mat, the fibrous mat 5 may be provided with a heterogeneous structure having high density regions with small pores to provide high capillary pressure to pull liquid out of the composite web, while still having a significant amount of low density regions to provide adequate pore space to hold large quantities of fluid and to provide high permeability regions. A heterogeneously densified fibrous mat 5 can have a relatively dense upper layer in contact with the laminate 1, or it can have a pattern of densified regions imparted by

combed or other means, preferably with at least some of the densified regions in direct contact with the lower hydrophilic portion 4 of the laminate 1.

As shown in FIG. 3, the laminated hydrophilic laminate 1 can also be in contact 6 with a web of similar topography having depressions 7 to form a sandwich structure with significant lateral gaps 8. Preferably, the web provides a combination of desired material properties: wet resistance, to maintain shape and bulk when wet; absorbency and good capillary structure to provide rapid uptake of fluid in the hydrophilic zones, softness on the upper surface on the body side for improved comfort; flexibility for comfort during wear; and a three-dimensional texture to reduce contact area against the body, thus resulting in less of a wet feel when wet.

The laminated hydrophilic laminate can be produced by a wide variety of methods. Preferably, the laminate, prior to any embossing that may be desired, is characterized by a low-density three-dimensional structure created in substantial part before the sheet reaches a solid level (dynamic level) of about 60% or higher and preferably about 70% or higher. Suitable low-density three-dimensional structures can be achieved by a variety of means known in the art of papermaking, tissue production, and absorbent web production, including but not limited to the use of specially treated high-bulk fibers such as carded or chemically treated fibers as an additive in the furnish, including the fibers taught by C. C. Van Hatten in "Nonwoven Fibers with Combed Cellulose Layers," U.S. Pat. No. 3,339,550, issued Sep. 5, 1967, which is hereby incorporated by reference; mechanical debonding means, such as differential velocity ("web") transfer between fibers or webs, as taught by C. C. Van Hatten in "Nonwoven Fibers with Combed Cellulose Layers," U.S. Pat. No. 3,339,550, issued Sep. 5, 1967, which is hereby incorporated by reference; mechanical stretching or "wet stretching" of the sheet web, including the stretching taught by M. A. Houtman et al. in U.S. Pat. No. 3,438,585, "Method for Increasing the Internal Bulk of Through-Air Dried Tissue," issued Feb. 20, 1969, hereby incorporated by reference, and M. A. Houtman et al. in U.S. Pat. No. 3,411,434, "Method for Increasing the Internal Bulk of Web-Formed Tissue," issued May 2, 1969, hereby incorporated by reference; stretching of the sheet into a three-dimensional web or fabric, such as the fabric disclosed by Chis et al. in U.S. Pat. No. 3,428,466, "Apparatus for Making Bulk Tissue Products," issued Jul. 4, 1969, which is hereby incorporated by reference, including differential velocity transfer onto or from solid three-dimensional webs or fabrics; wet stretching of the sheet; hydroentanglement of fibers; wet casting; and the optional use of chemical debonding agents. Laminated hydrophilic laminates may also be produced from combinations of production and post-treatment, such as embossment disclosed in commonly owned U.S. Pat. No. 3,369,323, "Process for Making a High Pulp Content Nonwoven Composite Fabric," issued Feb. 14, 1969 to Claude H. Evershed et al., hereby incorporated by reference.

Air laid mixtures of cellulosic and synthetic fibers are within the scope of the present invention. Poly fibers for air laying may be prepared by extrusion, as by a spinneret, or other means known in the art. Methods of forming air laid materials are well known in the art. Including, for example, the methods disclosed by Dunning and Day in U.S. Pat. No. 2,978,734, issued Aug. 24, 1961, and U.S. Pat. No. 2,558,928, issued Oct. 26, 1955 to Phipps et al., both of which are hereby incorporated by reference. Suitable preforming fibers for air laying may include laminated or reinforced, low or high yield fibers, and chemically treated fibers such as amorphous pulp, chemically modified or conditioned fibers, conditioned fibers, and the like.

FIG. 2 depicts the absorbent web of FIG. 1 in contact with an underlying absorbent fibrous layer.

FIG. 3 depicts the absorbent web of FIG. 1 attached to an inverted laminate having similar topography.

FIG. 4 depicts a paper machine suitable for producing the continuous, multilayered laminate of the present invention shown in FIG. 1.

FIG. 5 depicts a version of FIG. 2 in which the low regions of the laminate are provided with apertures.

FIG. 6 depicts a pattern of hydrophilic material printed onto a hydrophilic laminate.

FIG. 7 depicts a height profile and several material flow lines to illustrate the definition of material surface area and the PID height.

FIG. 8 depicts a CADSYN profile from Example 13 of the present invention.

FIG. 9 portrays the flow pattern in a paper disk during an in-Plane Permeability measurement (single view).

FIG. 10 is a side view of the in-Plane Permeability apparatus.

FIG. 11 is a top view of the brass plates and thickness gauges in the in-Plane Permeability apparatus.

FIG. 12 depicts the grayscale height map of a section of uncoated Brown laminate showing relatively high regions in light gray and lower regions in darker gray or black.

FIG. 13 is a graph of mass flow rate versus time and flow rate versus time for samples of Example 1.

FIG. 14 is a table of physical property results for Examples 3-6.

FIG. 15 is a table of physical property results for Examples 7-10.

FIG. 16 shows physical property test data for Examples 3 to 6.

FIG. 17 shows physical property test data for Examples 7 to 10.

DETAILED DESCRIPTION OF THE DRAWINGS
FIG. 1 shows a cross-section of a continuous, multilayered hydrophilic laminate 1, preferably a multilayered cellulose-based sheet, onto which hydrophilic material 2 has been deposited on the uppermost region 3 of the continuous laminate to form a composite absorbent web. The upper side of the web having the hydrophilic material 2 can serve as the skin-forming layer of a garment or liner in an absorbent article. The hydrophilic material preferably resides only on the elevated regions of the laminate as shown, preferably protruding less than about 50% of the thickness of the laminate, more specifically no more than about 30% of the thickness of the laminate, and most preferably no more than about 10% of the thickness of the laminate. For some products, it may be desirable that the hydrophilic material be almost exclusively on the upper (outer) surface of the sheet on the upper surface of the laminate, with very little protrusion into the laminate itself. The hydrophilic material deposits generally have a thickness that runs some distance above the underlying hydrophilic laminate, in some embodiments, the distance above the underlying hydrophilic laminate can be less than 3 mm, less than 0.5 mm, less than 0.1 mm, less than 0.05 mm, or between 0.05 and 0.5 mm. In some preferred embodiments, the thickness of the hydrophilic deposits relative to the total thickness of the hydrophilic laminate can be less than 50%, alternatively less than about 30%, alternatively less than about 10%, or between about 5% and 25%.

For best performance in terms of liquid absorption, the density of the laminate preferably should be substantially uniform throughout any characteristic cross-section of the laminate, as is characteristic of uncoated, through-air dried sheets and other paper sheets that have been dried by largely noncompressive means. Such a laminate is relatively free of regions having low permeability and low absorbent capacity and tends to be more uniform when wet. The depressed regions 4 of the laminate are substantially hydrophilic and can serve much as apertures do in an apertured film by providing open space to receive liquid and by providing regions in the midst of hydrophilic material where liquid can be wicked into or absorbed within, the surface being the hydrophilic laminate itself and optionally an underlying absorbent core preferably in liquid communicating contact with the composite web.

The underlying absorbent core is preferably a fibrous mat such as a mat of felt pulp. One such embodiment is depicted in FIG. 2, where the laminated hydrophilic laminate 1 is in direct contact with a fibrous mat 5. For enhanced transport of liquid out of the composite web into the fibrous mat, the fibrous mat 5 may be provided with a heterogeneous structure having high density regions with small pores to provide high capillary pressure to pull liquid out of the composite web, while still having a significant amount of low density regions to provide adequate pore space to hold large quantities of fluid and to provide high permeability regions. A heterogeneously densified fibrous mat 5 can have a relatively dense upper layer in contact with the laminate 1, or it can have a pattern of densified regions imparted by

combed or other means, preferably with at least some of the densified regions in direct contact with the lower hydrophilic portion 4 of the laminate 1.

As shown in FIG. 3, the laminated hydrophilic laminate 1 can also be in contact 6 with a web of similar topography having depressions 7 to form a sandwich structure with significant lateral gaps 8. Preferably, the web provides a combination of desired material properties: wet resistance, to maintain shape and bulk when wet; absorbency and good capillary structure to provide rapid uptake of fluid in the hydrophilic zones, softness on the upper surface on the body side for improved comfort; flexibility for comfort during wear; and a three-dimensional texture to reduce contact area against the body, thus resulting in less of a wet feel when wet.

The laminated hydrophilic laminate can be produced by a wide variety of methods. Preferably, the laminate, prior to any embossing that may be desired, is characterized by a low-density three-dimensional structure created in substantial part before the sheet reaches a solid level (dynamic level) of about 60% or higher and preferably about 70% or higher. Suitable low-density three-dimensional structures can be achieved by a variety of means known in the art of papermaking, tissue production, and absorbent web production, including but not limited to the use of specially treated high-bulk fibers such as carded or chemically treated fibers as an additive in the furnish, including the fibers taught by C. C. Van Hatten in "Nonwoven Fibers with Combed Cellulose Layers," U.S. Pat. No. 3,339,550, issued Sep. 5, 1967, which is hereby incorporated by reference; mechanical debonding means, such as differential velocity ("web") transfer between fibers or webs, as taught by C. C. Van Hatten in "Nonwoven Fibers with Combed Cellulose Layers," U.S. Pat. No. 3,339,550, issued Sep. 5, 1967, which is hereby incorporated by reference; mechanical stretching or "wet stretching" of the sheet web, including the stretching taught by M. A. Houtman et al. in U.S. Pat. No. 3,438,585, "Method for Increasing the Internal Bulk of Through-Air Dried Tissue," issued Feb. 20, 1969, hereby incorporated by reference, and M. A. Houtman et al. in U.S. Pat. No. 3,411,434, "Method for Increasing the Internal Bulk of Web-Formed Tissue," issued May 2, 1969, hereby incorporated by reference; stretching of the sheet into a three-dimensional web or fabric, such as the fabric disclosed by Chis et al. in U.S. Pat. No. 3,428,466, "Apparatus for Making Bulk Tissue Products," issued Jul. 4, 1969, which is hereby incorporated by reference, including differential velocity transfer onto or from solid three-dimensional webs or fabrics; wet stretching of the sheet; hydroentanglement of fibers; wet casting; and the optional use of chemical debonding agents. Laminated hydrophilic laminates may also be produced from combinations of production and post-treatment, such as embossment disclosed in commonly owned U.S. Pat. No. 3,369,323, "Process for Making a High Pulp Content Nonwoven Composite Fabric," issued Feb. 14, 1969 to Claude H. Evershed et al., hereby incorporated by reference.

Air laid mixtures of cellulosic and synthetic fibers are within the scope of the present invention. Poly fibers for air laying may be prepared by extrusion, as by a spinneret, or other means known in the art. Methods of forming air laid materials are well known in the art. Including, for example, the methods disclosed by Dunning and Day in U.S. Pat. No. 2,978,734, issued Aug. 24, 1961, and U.S. Pat. No. 2,558,928, issued Oct. 26, 1955 to Phipps et al., both of which are hereby incorporated by reference. Suitable preforming fibers for air laying may include laminated or reinforced, low or high yield fibers, and chemically treated fibers such as amorphous pulp, chemically modified or conditioned fibers, conditioned fibers, and the like.

Useful flow properties include those of Hunsman et al. disclosed in U.S. Pat. No. 5,502,768, issued Mar. 26, 1996, and U.S. Pat. No. 5,796,626, issued Sep. 26, 1999, both of which are hereby incorporated by reference. Flow-reducing methods known in the art may also be employed, including the composite disclosed by Smith et al. in U.S. Pat. No. 5,553,003, issued Sep. 3, 1996, hereby incorporated by reference. The pulp flows may be enhanced in air or steam and combined or supplemented with newly formed, low synthetic flows from a multistage or sequential process, or the pulp flows may be added with a stream of relatively short, cut synthetic fibers (preferably less than 22 mm in length) attached in air. Binding agents and adhesives may be used to impart adhesion and wet strength to the air laid structure, or they may be applied to partially melt some of the synthetic fibers to provide bonding. One embodiment comprises inclusion of papermaking fines and multistage polymer losses in "cellulose" as taught in U.S. Pat. No. 4,109,224 issued to Anderson et al.; U.S. Pat. No. 4,879,170 issued to Rabinowitz et al.; and U.S. Pat. No. 4,931,325 issued to Rabinowitz et al.; all hereby incorporated by reference. For the purposes of this invention, steps should be taken to impart appropriate texture to the web. Such steps may include forming on a screen having a pattern of low and high permeabilities to produce a web of patterned holes, weight and thickness, spot coating, patterned bonding, embossing, pulling out some of the web in the x-direction to change the surface in a preferential pattern, ultrasonic pattern bonding, web disruption with hydraulic jets of liquid, air or both. Desirably, inherently hydrophilic synthetic fibers may be treated to increase wettability with respect to water, when or where, using methods such as mechanical coating, supercritical fluid deposition of surfactants or other surface active agents on the fiber surface, deposition of particles or nanoparticles, cationic discharge treatment, etching, coating with hydrophilic entities, and the like. When synthetic fibers are used in the production of the basement, they may constitute 70% or less by weight of the basement, preferably 40% or less, more preferably 20% or less, more preferably still 10% or less, and most preferably between about 1% and about 10%. Alternatively, the web may comprise between about 1% and about 10% synthetic fibers. Alternatively, the web may comprise between about 1% and 20% of synthetic polymer fibers. A lower content of synthetic fiber is generally desirable to reduce cost, although other factors may be more important in determining the optimum fiber mix for a specific product. Other suitable methods for incorporation in filament articles of the present invention include the melt web of Thorne et al. in U.S. Pat. No. 5,502,644, issued Oct. 8, 1996, hereby incorporated by reference.

In a preferred embodiment, the basement is a wet-laid sheet produced without drying and dried by non-compressive means. Techniques for producing melt sheets are disclosed by R. J. Smith and G. A. Engel in U.S. Pat. No. 5,399,412, "Uncoated Throughlaid Tensile and Woven Having High Strength and Abrasion," issued Mar. 21, 1995; R. F. Clark and D. R. Westhead in U.S. Pat. No. 5,045,588, "Non-coated Hand or Wiper Tissue," issued Sep. 17, 1991; and J. B. Hayward et al., "Forming Machine for Making Coated Throughlaid Tissue Sheet," U.S. Pat. No. 5,391,300, Nov. 7, 1995; all hereby incorporated by reference.

A preferred method for producing the basement for the present invention is depicted in FIG. 4. For simplicity, the various laminating steps schematically used to define the several fabric rows are shown but not numbered. It will be

appreciated that variations from the apparatus and method illustrated in FIG. 4 can be made without departing from the scope of the invention. Fibers in a melt web former having a tapered protruding lamina 10 which projects or deflects a stream 11 of an aqueous suspension of papermaking fines onto the forming fabric 13 which serves to support and carry the newly-formed wet web downstream in the process as the web is partially dewatered to a consistency of about 10 dry weight percent. Additional dewatering of the wet web can be carried out, such as by vacuum suction, while the wet web is supported by the forming fabric. The lamina 10 may be a conventional lamina or may be a modified lamina capable of producing a multiphase wet web. For example, it may be desirable to provide relatively short or straight fibers in one layer of the basement to give a layer with high capillary pressure, while the other layer comprises relatively longer, loftier, or more curled fibers for high permeability and high absorbent capacity and high pore volume. It may also be desirable to apply different chemical agents to separate layers of a single web to optimize dry and wet strength, pore space, wicking angle, appearance, or other properties of a web. Multiple laminations may also be used to create a layered structure, as is known in the art.

The wet web is transferred from the forming fabric to a transfer fabric 17 preferably traveling at a slower speed than the forming fabric in order to impart increased stretch into the web. This is commonly achieved in an "over" transfer. One useful means of performing such transfer is taught in U.S. Pat. No. 5,667,456, issued Mar. 4, 1997 to G. A. Engel et al., hereby incorporated by reference. The relative speed difference between the two fabrics can be from 5-60 percent, preferably greater than 10%, more preferably from about 10 to 60 percent, and most preferably from about 30 to 40 percent. Transfer is preferably carried out with the assistance of a vacuum draw 18 such that the forming fabric and the transfer fabric simultaneously converge and diverge at the leading edge of the vacuum draw.

The web is then transferred from the transfer fabric to the throughlaid fabric 19 with the aid of a vacuum transfer roll 20 or a vacuum transfer shoe, optionally using a fluid gap transfer as previously described. The throughlaid fabric can be traveling at about the same speed or a different speed relative to the transfer fabric. If desired, the throughlaid fabric can be run at a slower speed to further enhance stretch. Transfer is preferably carried out with vacuum assistance to ensure deformation of the sheet is consistent to the throughlaid fabric, thus yielding desired bulk and appearance. Suitable throughlaid fabrics are described in U.S. Pat. No. 5,435,666 issued to Karl Chis et al., previously incorporated by reference.

In a preferred embodiment, the fabric comprises a multiphase layer supported on or integrally connected to a lead bonding layer, said multiphase layer comprising elongated, solid elements having an aspect ratio of at least 4, preferably at least 6, more preferably at least 10, more preferably still at least 20, and most preferably between about 5 and about 30. The fabric may be woven or nonwoven. In one embodiment, the fabric is a woven fabric wherein the lead bonding layer comprises interwoven machine-direction warp and cross-direction chain and the multiphase layer comprises additional warp or chain interweaves in the warp of the lead bonding layer, wherein the highest laminae of the lead bonding layer by about 0.1 mm or greater, preferably 0.3 mm or greater, more preferably 0.5 mm or greater, and most preferably between about 0.1 mm and about 2 mm. For purposes of imparting improved

cross-direction stretch of the basement, the elongated, solid elements of the multiphase layer should be preferentially oriented in the machine direction.

The number of elongated, solid elements per square inch of the fabric should be between about 5 and about 300, more preferably between about 10 and about 100. The resulting throughlaid basement will have elevated regions preferably comprising between about 5 and about 200 protrusions per square inch having a height relative to the plane of the basement, as measured in the mechanical state and unswollen state, of about 0.1 mm or greater, preferably 0.2 mm or greater, more preferably about 0.3 mm or greater, and most preferably from about 0.35 to about 0.6 mm. When the basement structure comprises a relatively planar portion with both protrusions and depressions depending therefrom, the relatively planar portion is where on the plane of the basement, in some directions, a basement plane may not be well defined. In such cases, the protrusion height can be measured relative to the characteristic depth of the deepest depression. In any case, the protrusion height relative to the characteristic depth of the deepest depression, as measured in the mechanical state and unswollen state, can be about 0.1 mm or greater, preferably 0.3 mm or greater, more preferably about 0.4 mm or greater, more preferably still about 0.5 mm or greater, and most preferably from about 0.4 to about 1.3 mm. In one specific embodiment, the elevated regions of the basement correspond to elevated machine-direction laminae from a multiphase layer of a three-dimensional throughlaid fabric used to produce an unswollen throughlaid web. When formed in this manner, the basement will have relatively high values of cross-direction stretch prior to failure, as measured in standard tensile tests, of 6% or greater, preferably 9% or greater, and more preferably 12% or greater, due to the high cross-direction topography imparted by the elevated machine-direction elements on a throughlaid fabric. The machine-direction stretch can be enhanced by such transfer and can be at least as great as the cross-direction stretch and preferably at least 10% and more preferably at least 14%.

The level of vacuum used for the web transfer can be from about 5 to about 15 inches of mercury (75 to about 380 millimeters) of mercury, preferably about 5 inches (125 millimeters) of mercury. The vacuum shoe (negative pressure) can be supplemented or replaced by the use of positive pressure from the opposite side of the web to blow the web onto the next fabric in addition to or as a replacement for sucking it onto the next fabric with vacuum. Also, a vacuum roll or rolls can be used to replace the vacuum shoe(s).

While supported by the throughlaid fabric, the web is then dried to a consistency of about 64 percent or greater by the throughlaid 21 and then transferred to a carrier fabric 22. The dried basement 23 is transferred to the melt 24 using carrier fabric 22 and an optional carrier fabric 25. An optional prewarmed tunnel 26 can be used to facilitate transfer of the web from carrier fabric 22 to fabric 25. Suitable carrier fabrics for this purpose are Albany International 9404 or 9404 and Atlas 959 or 957, all of which are relatively smooth fabrics having a fine texture. Although not shown, and including or supplementing off-line conditioning can be used to improve the smoothness and surface of the basement.

The basement may be dried, performed, or provided with treatment beyond by coating, etching, or the placing of other surface features. Such perforations or apertures may exist in the transfer of fluid into or out of the basement. Preferably, the apertures are provided near or within

depressed areas of the basement laminae that serve as hydrophilic zones. FIG. 5 depicts a cross-section of one such embodiment in which the basement 1 has been provided with perforations 27 in the low hydrophilic regions.

Co-spraying of the unswollen material with the wicking laminae, wherein the unswollen web and the basement are simultaneously sprayed in with the spraying of a low-layer structure, is possible while the range of the present invention but is not preferred. Co-spraying tends to place hydrophilic water from the unswollen web over the hydrophilic center of the basement in the spaces, such that fluid entering the apertures might encounter a hydrophilic barrier between 2 and the basement. It is desired that fluid entering the apertures be able to flow into the basement. Apertures in the basement may enhance subsequent transport into the wicking layer, but the hydrophilic properties of the basement should contribute positively to the fluid handling performance of the composite cover material.

FIGS. 7 to 11 have been previously discussed.

FIG. 12 shows a representative portion of a propylene height map of a basement structure of potential value in the present invention, supplied by the CADSVEN model Inter-Science (Pittsford, N.Y., Pennsylvania 15860, Mich.) having a 38-mm field of view. The shown is an unswollen through-air dried basement having a surface depth of about 0.3 mm. Presumably, the basement is wetted or modeled prior to complete drying to impart an Overall Surface Depth in the dried condition of about 0.1 mm, or greater, more preferably about 0.3 mm, or greater, still more preferably about 0.4 mm, or greater, and most preferably from about 0.4 to about 0.6 mm. In another preferred embodiment, the basement fiber content at least 10% by weight of high yield or other wet retention pulp fibers and an effective amount of wet strength resin such that the wicking tensile ratio is at least about 0.1. The basement, dried regions of the basement preferably offer relatively smooth and flat planes in order to be placed against skin with relatively little sense of grittiness or abrasion.

The hydrophilic material 3 on the basement as shown in FIG. 1 is preferably deposited on relatively elevated regions of the web, such as the light gray or white regions on the height map of FIG. 12, in order to place hydrophilic material in contact with the user's body when the web is used as a pad or in an intimate article. The hydrophilic material is preferably deposited over a large enough portion of the basement to make a distinct improvement in dry feel with still allowing rapid transport by wicking in the x-direction (machine direction, normal to the plane of the web) in multiple hydrophilic regions. The proper application of hydrophilic material is a function of the upper surface of the hydrophilic basement will generally result in a decrease of solvent volume relative to the basement thickness (assuming an improvement in the dry feel) of at least about 10%, more specifically at least about 20%, more specifically at least about 30%, still more specifically at least about 40%, and most specifically from about 10% to about 60%. The resulting solvent volume is preferably less than about 1 in. more specifically less than about 0.6 in. more specifically less than about 0.5 in. still more specifically less than about 0.4 in. and most specifically less than about 0.3 in. The resulting laminated fabric value is preferably less than about 1, more specifically less than about 0.7, more specifically less than about 0.5, still more specifically less than about 0.4, and most specifically less than about 0.3. In one embodiment, there is essentially no hydrophilic material present below the

50% wetted line of a characteristic profile of the web, or below the midpoint of a typical cross section of covered web.

In one embodiment, the hydrophobic matter is applied in a manner designed to limit lateral (x-y plane) wicking of liquids to prevent leakage or leakage from the edges of an absorbent article while also improving the dry feel. Providing this embodiment actually means that hydrophobic material or materials is added to the upper surface of the hydrophobic matter protrudes substantially into the lumen to establish a barrier region to lateral liquid wicking, while the remainder of the hydrophobic matter is applied more lightly to avoid substantial penetration into the lumen. The barrier region may also use hydrophobic matter in 50 to the dependence of the web to prevent flow of liquid along surface channels or pores. Different hydrophobic materials and application means may be used for the two or more regions of differing penetration depth or differing bulk weight of application. One approach suitable for use in absorbent articles such as feminine pads or liners, is to apply longitudinal bands of a hydrophobic material in liquid flow, such as a solid web or polymeric component, applied heavily enough to permeate the lumen for a significant portion of the thickness of the absorbent, with said bands being near the edges of the absorbent article to limit leakage from the edge. The remaining portion of the lumen may be treated with hydrophobic matter applied more superficially to be less penetrating.

Suitable hydrophobic materials may comprise compounds which are solid or highly viscous at room temperature but become liquid or significantly less viscous at elevated temperatures, enabling application of the liquid at elevated temperatures by pressure printing, spray, brush application, or other means, whereupon the liquid solidifies, gels, or becomes substantially less fluid at room temperature or body temperature. The hydrophobic agent may also be dissolved, dispersed, or emulsified in a liquid carrier, such as water, and applied to the web by means such as coating, spraying, or painting, whereupon part of the liquid carrier is removed by evaporation, sorption, or other means to leave a hydrophobic coating or impregnation on the web. The hydrophobic agent may also comprise solid particles such as PTFE, polyolefins, or other polymers that have been ground and formulated into a viscous paste or cream. Additionally, the hydrophobic matter may be in solid form, such as fibers or particles that are attached adhesively to the lumen or attached by entanglement, hydroentanglement, electrostatic attraction, and so forth.

Suitable hydrophobic materials include silicone compounds, fluorocarbons, PTFE, wax, wax emulsions, polyurethane emulsions, fats and fatty acid derivatives, polyethers, esters, polyamides, glycerites, and the like, as well as mixtures of the same. Several suitable materials containing solidified mixtures of waxes and oils are disclosed in commonly owned U.S. Pat. No. 5,601,871, "Soft Thermal Unwoven Thongpadded Tissue," issued Feb. 11, 1997 to D. Knapik et al., herein incorporated by reference. Disclosed therein are compounds consisting of oil, wax, and especially fatty alcohols, solid compositions having melting points between about 30° C. to about 70° C. When distributed selectively sufficiently over an uncoated tissue, said compositions significantly reduce liquid leaks rates and reduce friction against the skin. It is believed that the hydrophobic compositions disclosed by Knapik et al. could also be used advantageously in the present invention through a nonconformally nonuniform application of said compo-

sition to a portion of the most elevated regions of a three-dimensional, resilient, hydrophobic lumen in such a manner as to avoid significant reduction of liquid leaks rates.

As disclosed by Knapik et al., suitable oils include, but are not limited to, the following classes of oils: paraffins or mineral oils, such as mineral oil and petroleum; animal oils, such as milk oil and lanolin oil; plant oils, such as olive oil, sunflower oil, and avocado oil; and silicone oils, such as dimethylsiloxane and dimethylsiloxane. Suitable waxes include, but are not limited to the following classes: animal waxes, such as beeswax and ceresine wax; petroleum waxes, such as paraffin and ceresine waxes; silicone waxes, such as alkyl dimethyl siloxane or cyclosiloxane waxes, such as cyclosiloxane and cyclosiloxane waxes. Useful silicone compounds and methods of application are known in the art, including those of Knapik et al. U.S. Pat. No. 5,382,363, issued Apr. 12, 1994, and Knapik et al. U.S. Pat. No. 5,391,355, issued Jan. 7, 1997, both of which are hereby incorporated by reference.

The amount of fatty alcohol, if present, in the composition of Knapik et al. can include those having a carbon chain length of C₁₂-C₂₀, including cetyl alcohol, myristyl alcohol, behenyl alcohol, and decyl alcohol. For some embodiments of the present invention, it is desired that the hydrophobic material have a melting point well above typical body temperature since absorbent articles containing the web of the present invention may be worn against the body under hot conditions, and any melting of the hydrophobic material may interfere with the performance of the absorbent article and offset the advantage of a dry feel. For such articles containing the composition of Knapik et al. and other compositions, said compositions should have a melting point above about 30° C., specifically above 40° C., more specifically above about 45° C., and more specifically still above 50° C.

Other suitable hydrophobic compositions comprise up to 30 weight percent oil and from about 50 to about 100 weight percent wax, said compositions having a melting point of from about 40° C. to about 200° C., more specifically from 70° C. to about 160° C., more specifically above 75° C., and more specifically still from about 80° C. to 140° C. For purposes herein, "melting point" is the temperature at which the majority of the melting occurs, it being recognized that melting actually occurs over a range of temperatures. Hydrophobic materials may also be used which do not melt or which degrade or decompose prior to or during melting.

Examples of water repellent agents which are potentially useful in the present invention include polyolefins emulsions such as Amcol 988 of American Cyanamid; fluorocarbon emulsions such as FC-98, FC-98A, and the SCOTCH-GARD compounds sold by Minnesota Mining and Manufacturing and Miflume F-14 and Miflume F-51K, sold by KCI. Also suitable are high molecular weight organic fluorocarbons which can be formed into aqueous emulsions for use of application and handling. An example of a potentially useful wax emulsion is Fluorobond, sold by 3M. A variety of other water-repellent materials that can be applied to paper webs are covered and disclosed in U.S. Pat. No. 5,490,180, issued Feb. 13, 1996 to Paul H. Rasmussen and Calvin J. Volz, incorporated herein by reference. Rasmussen and Volz disclose means particularly for the use of mixtures of fatty acids and polymers for aqueous paper sheets. Various wax and polymer compositions of potential value for the present invention are disclosed in U.S. Pat. No. 5,628,171 to Knapik et al.; U.S. Pat. No. 5,617,050 to Knapik et al.; U.S. Pat. No. 5,387,149 to Dushay et al.; U.S. Pat.

No. 5,165,685 to Rasmussen et al.; and U.S. Pat. No. 5,391,621 to Fowell, et al., all of which are hereby incorporated by reference. Mixtures of hydrophobic lines and wax may also be used, including those taught in U.S. Pat. No. 4,317,169 to Gotsch et al., herein incorporated by reference. British Pat. No. 1,563,331 to Voss teaches a method for coating paper and paperboard to make them water resistant by coating them with an aqueous latex coating composition. The latex coating composition is an acrylic polymer and a metal stearate or wax where the wax is at least 20% by weight of the total acrylic polymer and metal stearate present. The metal stearate is preferably calcium stearate. Latex emulsions, latex films, and water absorbing polymers may be used, including those disclosed in U.S. Pat. No. 5,011,484, issued Apr. 30, 1991 to Nichols and Kim, herein incorporated by reference, which also discloses emulsions containing chitosan. Potentially useful latexes also include those disclosed by Rasmussen et al. U.S. Pat. No. 4,929,495, and the various latex compositions are disclosed in U.S. Pat. No. 4,443,970, issued May 1, 1984, both of which are hereby incorporated by reference. After application, the coating is dried or cured on the paper. For the present invention, the composition would be applied immediately to the upper surface of a lumen.

Other examples of aqueous emulsions and emulsifiable compositions for coating paper and the like are found in U.S. Pat. No. 5,080,176 to Stannard et al. and U.S. Pat. No. 5,528,843 to Cross (aqueous mixtures of polyurethane wax, a polymeric resin emulsified and a fatty acid are added to water containing an anionic soap-forming agent such as an ammonium salt, followed by agitation and homogenizing to form an aqueous emulsion coating composition). The hydrophobic matter may also comprise formulations intended to permeate skin and/or hair. For example, the hydrophobic matter may include a hydrophobic base such as mineral oil, wax, paraffins, ceresin, and the like, emulsified with effective amounts of skin softening additives or permeation agents such as urethanes and/or surfactants, and/or other agents, such as Vitamin E (alpha-tocopherol), lanolin, silicone compounds suitable for skin care, ceramides, plant oils, fatty acids, and the like. The hydrophobic material may also be applied in films or particulate form and attached to the lumen through thermal fusion, chemical bonding through the use of a binder agent or adhesive, particularly a water-resistant binder, entrapment (resulting from high velocity impact against a porous web, electrostatic attachment, and the like). In a preferred embodiment, the hydrophobic material, whether applied as films, as particles, or as a liquid or slurry, may be continuously deposited to form an interconnected network, such as the network of films shown in FIG. 6, in which case the hydrophobic regions are isolated from one another. In addition to suitable previously described, useful particulate hydrophobic agents include talcum powder and lipophilic powders.

Preferably, the hydrophobic material is applied to the elevated regions with an area-covered local dry basis weight in the range of from about 0.5 to about 50 gsm, more specifically in the range of from about 1 to about 10 gsm, even more specifically about 5 gsm or less, and most specifically about 3 gsm or less. The hydrophobic matter preferably comprises about 10% or less of the total mass of the dry absorbent web, more specifically about 5% or less, and most specifically about 1% to about 15% of the total mass of the dry absorbent web. The bulk weight of the underlying absorbent can be from about 10 to about 200 gsm, more specifically from about 15 to about 70 gsm, and most specifically from about 15 to about 40 gsm. For multi-ply sheet structures, it is preferred that the bulk weight be less than about 40 gsm and more specifically less than about 30 gsm.

In addition to hydrophobic matter, other agents may be suitably added to the lumen in accordance with the invention, including superabsorbent particles or films. Superabsorbent material may be deposited or attached in the depressed regions of the upper surface of the lumen, or partially may be incorporated within the lumen structure of the lumen, attached to the lower surface of the lumen, or incorporated between the lumen and an adjacent absorbent core. Other chemical agents may be added to either surface or both surfaces, or dispersed throughout the lumen, applied to inner or outer layers of the lumen, or applied to selected surface regions of the lumen, including application in a regular pattern as by pressure printing. Such chemical agents include emulsions, silicones, chemical surfactants, surfactants, optical brighteners, wet strength agents, quaternary ammonium salts, proteins, crosslinking agents, vitamins, biocides, perfumes, dyes, chemical abrasives, plasticizers for high yield films, urethanes or other agents for odor control, and the like. Chemically and/or physically active agents may be incorporated in the surface of the present invention for their anti-bacterial or other health benefits, including and other anti-bacterial agents may also be incorporated.

Various mechanical and physical treatments may be applied to the lumen before or after addition of hydrophobic material to improve the mechanical properties, surface, or functionality of the web. Such treatments include bonding, differential velocity transfer between lumen or fabric, penetration by high velocity air jets, wetting, hydroentanglement, ultrasonic, soft dry calendaring, thermal gradient calendaring, steam discharge treatment, electrostatic formation, ultrasonication, dry creasing, embossing, shearing, and shearing. Preferably, the lumen is not co-oriented with the machine.

Also within the scope of the present invention are absorbent webs in which both sides of the web have been treated with hydrophobic material. Such an embodiment may be useful for absorbent towels and other materials where absorption may occur on either surface. In that case, it is preferred that hydrophobic material be placed on the most elevated regions of both surfaces, the elevated regions being the highest regions when the respective surface is facing up. When the dependent on the upper surface will generally correspond to elevated regions on the lower surface when the lower surface is facing up, especially when the web has substantially uniform thickness throughout its cross section, the hydrophobic material on one surface will generally not be superposed directly over other hydrophobic material on the other surface but for hydrophobic regions on the two surfaces will tend to be in a staggered relationship to each other. The type of hydrophobic material, its method of application, and the amount applied may differ on both sides. Likewise, multiple applications of different hydrophobic materials may be performed on a single surface to achieve desired properties or a desired visual appearance, including the use of multilayered fiber patches, colored adhesives, and the like.

The steps of the present invention also include multi-ply lumen structures and laminates with one or more layers being the dual-sided absorbent web described above. For example, the traditional full-ply absorbent core used in

Fig

Example 1

To demonstrate an example of a method, wet radiant absorbent web with improved dry feel, a suitable basement was prepared and modified by addition of hydrophobic material in the form of paraffin. The basement was produced on a continuous three machine machine adapted for uncoated through-dry drying, similar to the machine configuration shown in FIG. 4. The machine comprises a transfer section, a transfer section, a through-dry section, a subsequent transfer section and a roll. A sheet of paper was fed at approximately 150 consistency was prepared from 100% square bleached chemically modified pulp (BCTMP), pulped for 20 minutes at about 495 consistency prior to drying. The square BCTMP is commercially available as Tundra 2150S, produced by Tundra Corp. of Tuckermansville, Quebec, Canada. Kyronex 2971X wet strength agent, manufactured by Hercules, Inc., Wilmington, Del., was added to the square sheet at a dosage of about 0.05% of the sheet weight. The sheet was then fed, deposited on a fine burning fabric and deformed by vacuum boxes to form a web with a consistency of about 125%. The web was then transferred to a transfer fabric (Lindsay Wire 933-002) using a vacuum roller at a fast transfer point with an apparent speed differential between the two fabrics. The web was further transferred from the transfer fabric to a woven through-dry fabric at a second transfer point using a second vacuum roller. The through-dry fabric used was a Lindsay Wire T-116-3 cloth (Lindsay Wire Division, Appleton, Wis., U.S. Pat. No. 5,429,989 issued to Kai F. Chai et al. The T-116-3 fabric is well suited for creating suitable, three-dimensional structures. At the second transfer point, the through-dry fabric was traveling more slowly than the transfer fabric, with a velocity differential of 2.5%. The web was then passed over a heated through-dry where the sheet was dried. The heated transfer was approximately 200° F. The sheet was then transferred from the through-dry fabric to transfer fabric, from which the sheet was rolled. The roller paper machine for producing the uncoated paper was operated at a speed of approximately 20 feet per minute. The total weight of the dry basement was approximately 30 gms (grams per square meter). The sheet had a thickness of 0.04 mm when measured with a plate gauge at 0.05 psi, for a dry bulk of 16.4 mil. The sheet density is about 0.42 gm.

Examples of the basement were conditioned under typical environmental conditions for several days, then cut to a number of 6 inch by 12 inch sheets which were then treated with paraffin using a variety of methods. A rectangular slab of Galfen® paraffin for home casting was used to apply a small quantity of wax on the fabric side surface of the uncoated basement produced as described above. Several basement samples were treated individually on a Corning PC-351 hot plate set at a low power level of 2.5. The samples were held in light contact with the heated surface by hand for 5 to 10 seconds, then removed and placed on a table. The slab of wax was then immediately dragged over the heated sample surface to deposit a small quantity of wax on the most elevated regions of the upper surface. In one version, the fabric side of the basement was in contact with the heated surface, while in a second version, the air side of the basement was heated. In applying the wax, the slab was held at about a 300 angle relative to the plane and the lower end of the slab was placed on the basement. The slab was then dragged with light force (estimated at about 0.5 to 1 pound)

over one entire surface of the basement such that the contacting end of the slab was the trailing edge. Care was taken to apply the wax uniformly. The objective was to avoid making the wax sheet the method was would impregnate the basement and not remain on the surface, but to facilitate the deposition of wax onto the basement through heat. Heating and wax treatment was done successively on various sheets 3-inches square or 6-inches square until the entire basement sample was treated. The wax slab was weighed before and after application. The typical amount of wax applied in the 6 inch by 12 inch basement was about 0.08 g.

Upon subsequent wetting of the resulting absorbent web, absorbent upper sections of the wax-treated web appeared slightly lighter than untreated regions, as if the wax had trapped some air next to the fibers. Based on the physical appearance, it was evident that wax was partially distributed on the uppermost regions of the basement surface, occupying a small fraction of the total surface area estimated to be about 10%.

Mean Rowet values for untreated and wax-treated samples are shown in Table 1. Also listed are mean Rowet values for untreated samples divided by the combined dry mass of the sample. The graph in FIG. 14 depicts the mean values and the 95% confidence intervals about the mean (1.96 * standard deviation/square root of sample size). The treatment with paraffin resulted in a significant decrease in Rowet. The decrease in Rowet value is measured to be indicative of a dryer feel if the sheet was wetted in contact with skin, for less fluid could pass through the local, elevated hydrophobic barrier to contact the skin. The wax-treated samples also felt slightly less grippy than the untreated samples, apparently due to small degree of hydrophobicity afforded by the paraffin on the highest portions of the treated surface.

TABLE 1

Rowet Values for Example 1.

Treatment Method	Rowet Value, g	Normalized Rowet (Rowet/Dry Mass)
Untreated	0.440	0.126
Wax, slab-side hot	0.320	0.070
Wax, fabric-side hot	0.280	0.064

Example 2

In order to further illustrate this invention, uncoated through-dry absorbent basement was produced using the method substantially as described in Example 1. More specifically, single-layer, single-ply sheet was made from uncoated surface absorbent, bleached chemically modified pulp (BCTMP) sheet. After pulping and filtering of the BCTMP sheet, Kyronex 2971X was added at 20 milligrams per square meter of pulp. The forming fabric in this case was an Appleton Wire 944M fabric and the first transfer fabric was a Lindsay 936 fabric. Sheet transfer was performed at the first transfer point, during the transfer from the forming fabric to the Lindsay 936 transfer fabric. The degree of rank transfer was 35%. The differential velocity transfer process used the vacuum alone gravity taught in U.S. Pat. No. 5,667,836, issued Mar. 4, 1997 to B. A. Hagel et al., previously incorporated by reference. At this second transfer point, from the transfer fabric to the through-dry fabric, both fabrics were running at substantially the same speed of about 40 feet per minute. The web was then transferred to a through-dry fabric (Lindsay Wire T-116-3). The through-

drying fabric was traveling at a speed substantially the same as the transfer fabric. The web was then carried over a through-dry fabric at a low temperature of about 315° F. and dried to final degrees of about 94-98 percent consistency. The final weight of the web was 60 gms.

The resulting uncoated through-dry absorbent basement was used in measurements of In-Plane Permeability using a stack of two disks, yielding a value of 1.07×10^{-10} m². Wet wicking testing gave a WCH (Wick Capillary Height) value of 0.65 cm, a hydrophobicity of 0.003, and an LSP of 0.024. The bulk measured at 0.1 psi was 14.2 mil.

After several weeks of storage under typical environmental conditions, the basement was then treated with paraffin wax essentially as described in Example 1. Two strips were prepared, 12 inches long. For each strip, the fabric side of a 6-inch square region was heated in contact with the Corning PC-351 hot plate at a power setting of 2.5 for about 1 minute, then removed and placed fabric-side up on a flat surface. A slab of paraffin wax was then dragged over the surface to deposit about 0.08 g of wax on the surface of the first strip and 0.07 g of wax on the surface of the second. The two strips were then cut into 4-inch by 6-inch segments. All segments from the first strip (labeled 1A, 1B, and 1C) were tested for Rowet and one segment from the second strip was tested in addition to 3 similar untreated strips of the same size (labeled 2A, 2B, and 2C). Rowet values for the waxed segments were significantly lower than the untreated samples, with the exception of segment 1A, which had a value similar to untreated samples. This sample was apparently wet, impaired the uncoated sample for the test, so the additional available moisture may have inflated the Rowet value. However, it is important that the wetting operation may have been performed gently in the region that would later be in contact with the skin when the paper is used during testing. The mean Rowet for the waxed samples, excluding sample 1A, is 0.407 g compared to the untreated mean of 0.440 g, an apparent reduction of 33%. Normalized Rowet also drops significantly due to hydrophobic treatment. Here, Rowet values less than 0.08 g no longer as evidence of improved dry feel.

TABLE 2

Rowet Values for Example 2.

Sample Treatment	Dry Mass, g	Wet Mass, g	Rowet, g	Normalized Rowet (Rowet/Dry Mass)
1A Untreated	0.80	1.00	0.440	0.126
1B Waxed	0.84	1.02	0.420	0.440
1C Waxed	0.80	1.00	0.407	0.126
2 Untreated	1.00	1.14	0.437	0.437
2A Waxed	0.97	1.00	0.400	0.126
2B Waxed	1.00	1.00	0.402	0.402
2C Waxed	1.00	1.00	0.400	0.400

To determine if the small amount of permeability consistently achieved was applied to the treated basement, the treated segments were fully immersed in tap water and then held by a clamp and allowed to drip for 60 seconds, then weighed. The "Dripping Wet Mass" for untreated samples 1 and 2 was 7.8 and 8.3 g, respectively. The "Dripping Wet Mass" for samples 1A, 1B, and 1C was 7.44, 7.33, and 7.9 g, respectively. For sample 2, it was 8.00 g. Given the variability and overlap of the data ranges for treated and untreated samples, there is no clear evidence of a significant decrease in absorbent capacity of the waxed samples.

Example 3-4

In order to further illustrate a method of making absorbent webs of this invention, basements were produced using

non-wet radiant northern softwood kraft fibers (NSWF), with and without a wet strength agent (20 lbs Kyronex/ton of fiber), and wet radiant fibers (Kyronex BCTMP), with and without a wet strength agent (20 lbs Kyronex/ton of fiber), using an uncoated through-dry process substantially as shown in FIG. 4.

The fiber was pulped at 495 consistency in the hydro-pulper for 30 minutes. The fiber was pumped into a stock chest and diluted to 1.05% consistency. 200/ton of Kyronex 2971X was added to the stock chest and allowed to mix for 30 minutes. A single-layer, bleached sheet of 30 gsm dry weight was formed on an Albany 944M forming fabric and deformed with rollers (127 millimeters) of mercury vacuum. The forming fabric was traveling at 60 gpm (0.35 meters per second). The sheet was transferred at a 15% rank transfer to a Lindsay 933-002 transfer fabric traveling at 60 gpm (0.35 meters per second). The vacuum in the transfer between the forming fabric and transfer fabric was 10 inches (254 millimeters) of mercury.

The sheet was vacuum transferred at 12 inches (305 millimeters) of mercury to a through-dry fabric (Lindsay T-116-3) traveling at the same speed as the transfer fabric, 60 gpm (0.35 meters per second). The sheet and through-dry fabric traveled over a fourth vacuum at 12 inches (305 millimeters) of mercury just prior to entering a Honeycomb through-dry operating at 200° F. (93° C) and dried to a final degree of 94-98% consistency.

The basement was aged for over 3 days at less than 30% humidity at 70° F. (21° C).

The basement was tested for physical characteristics in a standard environment of 50%RH humidity and 23° C/65° F. The wet and dry strength were tested using a 3-inch (7.62 cm) sample width, 4-inch (10.16 cm) jaw span at 10 inches (25.4 cm/min) constant speed. Collaps was measured with the TMI tester at 0.289 psi.

Physical property results are shown in the table of FIG. 14. Example 6 exhibited substantially greater wet wicking, as measured by the Wet Wicking Recovery Test, than the other three samples. In addition, Example 6 also showed a high wicking rate. The proposition of Example 6 in particular makes it suitable for use as a basement that can be collected and later recover much of its original bulk upon wetting. When treated with hydrophobic materials such as silicone or talcum powder, such a substantial absorbent web can provide high absorbency and a dry feel when the hydrophobic regions are from the remainder of the sheet after wetting.

Example 7-10

Further examples were created similar to those described in Examples 3-4, but for the purpose of exploring the bulk weight effect on a bulky, absorbent, wet radiant basement. Four bulk weight levels of 30, 24, 18 and 12 gsm of 100% square BCTMP with 200/ton Kyronex were produced.

The fiber was pulped at 495 consistency in the hydro-pulper for 30 minutes. The fiber was pumped into a stock chest and diluted to 1.05% consistency. 200/ton of Kyronex 2971X was added to the stock chest and allowed to mix for 30 minutes. A single-layer, bleached sheet was formed on an Albany 944M forming fabric and deformed with 4 rollers (102 millimeters) of mercury vacuum. The forming fabric was traveling at 60 gpm (0.35 meters per second). The sheet was transferred at a 15% rank transfer to a Lindsay 933-002 transfer fabric traveling at 60 gpm (0.35 meters per second). The vacuum in the transfer between the forming fabric and transfer fabric was 7 inches (178 millimeters) of mercury.

TABLE 4-continued

Index results for acceptable specimens for the remainder of Table 1.			
Run Sample	Wet day (g)	Wet day (g)	Wet day (g)
11 1 + 20% A	10	10	10
12 1 + 20% A	10	10	10
13 1 + 20% A	10	10	10
14 1 + 20% A	10	10	10
15 1 + 20% A	10	10	10

It is believed that index results could be improved significantly by increasing the exposed area of the laminate.

By placing drops of the egg white solution directly on BCTMP and laminated substrate uncured sheets, it was observed that BCTMP offers some rigid features, especially because of the more open pore structure of the BCTMP sheet. Dissolved air held steps with a density of about 0.3 only also gave rigid features of the sheet.

Example 17

The ability of the present invention to serve as an improvement over aperture films can be evidenced in this example, wherein a moist hydrophilic laminate is provided with a non-porous aperture structure and then subsequently dried to impart high wet resistance, followed by peeling or casting of hydrophilic matter on the most elevated regions of the body-containing side of the aperture web, resulting in a composite material having hydrophilic apertures and a hydrophilic upper surface. In particular, a double web of body weight from about 10 gsm to about 100 gsm, more preferably from about 20 gsm to about 30 gsm, drying amorphous in aperture before the web has dried to about 40% solids, and preferably before the web has dried above about 40% solids. The web may be subjected first or second prior to aperture. Aperturing can be done by perforation on a roll connecting the body side of the web while residing on a surface having mating depressions, such that interlocking of the protrusions and the depressions causes apertures to be formed away from the body-containing side of the web to create a non-porous, three-dimensional topography with regions of the web adjacent the apertures having some x-direction fiber orientation. Apertures in the laminate can also be created by cutting, self-cutting, stamping, or differential air pressure. Differential air pressure can be used when the web resides on a perforated but otherwise low-permeability carrier. The weak, moist web residing on a perforated surface permits air pressure to cause protrusion of films over the perforations to define and break free from the plane of the web and to descend partly in the x-direction. After the 3-D apertures are created in the web state, the web should be dried to completion without significantly disrupting the protrusion or aperture state it has achieved. The structure of the web will then have high wet resistance, particularly if low yield films or wet strength additives are used. As a result, the laminate is provided with apertures and the lower surface of the laminate is provided with three-dimensional protrusions extending from the laminate which are adjacent to the apertures and may surround or partially surround the apertures, forming hydrophilic aperture walls. The protrusions or aperture walls, by virtue of being dried in their three-dimensional state, also have good wet resistance, or a tendency to subside the films and orientation in which they were dried even after being wetted, especially if high yield films or wet strength agents were used in making the web. Preferably, the apertures have an open area of at least 15% and more

permeability at least 20%, and have a characteristic or effective diameter preferably of from about 0.2 mm to about 4 mm, more specifically from about 0.5 mm to about 2 mm, and most specifically about 0.5 mm or greater.

After non-compressive drying, the body-containing side of the web (the side remote from the descending sides of the apertures) is treated with hydrophilic matter. This may be placed onto the web in discontinuous drops or film spread apart regions. Alternatively, the web may be coated or printed by a smooth printing surface having a film of the hydrophilic matter in the solution, liquid state, or slurry state. Wetness or minimum of water, oil, and emulsions may be especially preferred. The resulting structure has hydrophilic elevated regions while the walls of the apertures descending away from the hydrophilic matter are still hydrophobic. The hydrophilic matter is inherently bonded to the surface of the hydrophilic web. Because the laminate is providing structural integrity, the hydrophilic matter can be continuous but weak or discontinuous, and generally would not be expected to be capable of being removed from the laminate without being severely damaged or disintegrating. It provides a dry feel adjacent the body and, if properly selected, can enhance the soft, pleasant feel of the cover. The underlying bareness provides excellent absorbency and provides excellent the traditional aperture film the flow direct to the chamber can. However, by using wetting and flow channels underneath the laminate will provide for good field handling and absorbent capacity.

It will be appreciated that the foregoing examples, given for purposes of illustration, are not to be construed as limiting the scope of this invention, which is defined by the following claims and all equivalents thereof.

We claim:

1. A laminate web having a dry feel when wet, comprising:
 - (a) an inherently hydrophilic laminate comprising paper-making fibers and having an upper surface and a lower surface, said upper surface having elevated and depressed regions, further characterized by a Wet Compressed Bulk of about 5 or greater; and
 - (b) hydrophilic matter deposited on the elevated regions of the upper surface of said laminate such that the depressed regions remain substantially hydrophobic.
2. The laminate web of claim 1 wherein said laminate is a wet-aid sheet.
3. The laminate web of claim 1 wherein said laminate is an absorbent structure.
4. The laminate web of claim 1 further characterized by a Wet Compressed Bulk of about 6 or greater.
5. The laminate web of claim 1 wherein the hydrophilic matter is discontinuous.
6. The laminate web of claim 1 further characterized by a Wet value of about 0.65 g or less and a Normalized Wet value of about 0.6 or less.
7. The laminate web of claim 1 wherein said laminate has an Overall Surface Depth of about 0.2 mm or greater, and an In-Plane Permeability of at least 0.5x10⁻¹⁰ cm².
8. The laminate web of claim 1 wherein said hydrophilic matter comprises synthetic fibers firmly attached to the upper surface of said laminate such that about 50% or less of the surface area of the laminate is covered with the specific fibers.
9. The laminate web of claim 1 wherein said web has an Overall Surface Depth of about 0.2 mm or less when dry and

an Overall Surface Depth of about 0.3 mm or greater when wetted to a saturation content of 100%.

10. The laminate web of claim 1 wherein said laminate has a wettable surface area of at least 0.1.

11. The laminate web of claim 1 wherein said elevated regions comprise from 5 to 500 protrusions per square inch having a characteristic height of at least 0.2 mm relative to said depressed regions.

12. The laminate web of claim 1 wherein at least 30% of the upper surface of said laminate contains substantially less of hydrophilic matter and said web has a Wet value of 0.6 g or less.

13. The laminate web of claim 1, further having a characteristic topographical profile having a 50% material line representing a horizontal line through the profile at such an elevation that 50% of the length of the line passes through regions beneath the surface of the web, wherein essentially all of said hydrophilic matter resides above the 50% material line.

14. The laminate web of claim 1 further comprising macrofibrillar particles attached to said laminate.

15. A laminate web having a Wet value of about 1 g or less, comprising:

(a) an inherently hydrophilic laminate comprising paper-making fibers and having an upper surface and a lower surface, said upper surface having elevated and depressed regions with an Overall Surface Depth of 0.2 mm or greater in the macrofibrillar and wettable state, said laminate further having a Wet Compressed Bulk of at least 6 or greater; and

(b) hydrophilic matter deposited on the elevated regions of the upper surface of said laminate.

16. The laminate web of claim 15 wherein said laminate is an absorbent structure.

17. An absorbent article comprising the laminate web of claim 15.

18. The laminate web of claim 1 wherein said laminate further comprises apertures and said lower surface of the laminate further comprises wet-resistant protrusions adjacent said apertures, wherein said apertures have been formed by application of differential pressure across the laminate in a single state, and wherein said protrusions comprise fibers that have been deflected away from the plane of the web during said application of differential pressure, and wherein the laminate is then dried without substantial mechanical disruption.

19. An absorbent web having a dry feel when wet comprising:

(a) an inherently hydrophilic laminate comprising paper-making fibers and having an upper surface and a lower surface, said upper surface having elevated and depressed regions, further characterized by a Wet Springback Ratio of about 0.7 or greater; and

(b) hydrophilic matter deposited on the elevated regions of the upper surface of said laminate such that the depressed regions remain substantially hydrophobic.

20. The laminate web of claim 19 wherein said laminate is an absorbent web.

21. The laminate web of claim 19 wherein said laminate is a wet-aid web.

22. The laminate web of claim 19 wherein said laminate is non-compressively dried.

• • • • •

TABLE 4

Index results for acceptable specimens for the remainder of Table 1.

Run Sample	Wet day (g)	Wet day (g)	Wet day (g)
1 1	10	10	10
2 1	10	10	10
3 1	10	10	10
4 1 + 20% A	10	10	10
5 1 + 20% A	10	10	10
6 1 + 20% A	10	10	10
7 1 + 20% A	10	10	10
8 1 + 20% A	10	10	10
9 1 + 20% A	10	10	10
10 1 + 20% A	10	10	10

114

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

RADICACIÓN: 4-39436

EDICTO No. 8369

**LA SECRETARÍA GENERAL AD-HOC
HACE SABER:**

Que esta Superintendencia profirió Resolución No. 12254 de 30-ABR-2007. Que el contenido de la parte resolutive es como sigue: El Superintendente de Industria y Comercio.

RESUELVE

ARTICULO PRIMERO: Negar el privilegio de patente de invención para la solicitud

correspondiente a "HOJA DE CUBIERTA PARA PRODUCTOS PARA EL CUIDADO PERSONAL", que entró en fase nacional en virtud del Tratado de Cooperación en Materia de Patentes (PCT).

ARTICULO SEGUNDO: Notificar personalmente el contenido de la presente resolución al doctor Juan Pablo Cadena Samierito, o a quien haga sus veces, en su calidad de apoderado de Kimberly - Clark Worldwide, Inc., entregándole copia de la misma, advirtiéndole que contra ella procede el recurso de reposición interpuesto ante el Superintendente de Industria y Comercio, al momento de la notificación o dentro de los 5 días hábiles siguientes a ella.

NOTIFÍQUESE Y CUMPLASE
Dada en Bogotá, D.C., a los

30 ABR 2007

EL SUPERINTENDENTE DE INDUSTRIA Y COMERCIO,


JUAN PABLO CADENA SAMIERITO

Para notificar a los interesados, se fija el presente EDICTO en lugar visible al público en la SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO, por el término de (10) diez días hábiles contados a partir de las 8:00 a.m. de hoy.

Secretaría General Ad-Hoc 15-MAY-2007
Secretaría General Ad-Hoc
EDICTO No. 8369

Este edicto se desfila hoy 29-MAY-2007 a las 4:30 p.m.