Drigard & Castro
Abogados

Apartado 3692

Cra. 7 16-56
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As. 82.841

Señora
JEFE DE DIVISIÓN DE NUEVAS CREACIONES
SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO
E. S. D.

REF: Expediente No. 00 064.198 – solicitud de patente de invención a favor de KIMBERLY-CLARK WORLDWIDE, INC.

Respuesta a oficio No. 13169 del 2 de junio de 2005

CARLOS HUMBERTO PALACIO EASTMAN, portador de la tarjeta profesional No. 62154 del C.S.J., obrando como apoderado sustituto de la sociedad KIMBERLY-CLARK WORLDWIDE, INC, domiciliada en Neenah, Wisconsin, Estados Unidos de América, según lo acredita el documento de sustitución de poder anexo al presente escrito, me permito dar respuesta a las observaciones de carácter técnico y jurídico, relacionadas con la patentabilidad, para la concesión de la patente de acuerdo con la Decisión 486 según el concepto técnico No. 921 notificado por fijación en lista de fecha 30 de junio de 2005.

Teniendo en cuenta las objeciones del señor Examinador en relación con la claridad de la solicitud nos permitimos presentar un nuevo capítulo reivindicatorio de 1 a 28 reivindicaciones, el cual remplaza completamente el capítulo reivindicatorio anteriormente presentado.

En el nuevo capítulo reivindicatorio que estamos presentando, se ha modificado la reivindicación 1, la cual difiere de la anterior reivindicación 1 en que cada capa de piel incluye una mezcla de un primer polímero incompatible y un segundo polímero incompatible. Este lenguaje esta sustentado por la reivindicación 28 inicialmente presentada, y no amplía el alcance de la invención. La nueva reivindicación 1 (así como la reivindicación 28 inicialmente presentada) no limita los porcentajes del primer y segundo polímeros incompatibles.

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Las nuevas reivindicaciones 2 – 28 dependen de la reivindicación 1 y donde es apropiado son multidependientes.

El señor examinador objetó las reivindicaciones previas por carecer de claridad. Específicamente, el señor examinador objetó que las diferentes reivindicaciones independientes declararan diferentes rangos porcentuales del primer y segundo polímeros. La anterior reivindicación 1 requería de 20 – 80% del primer polímero incompatible, y de 20 – 80% del segundo polímero incompatible; la anterior reivindicación 8 declaraba 75 – 98% del primer polímero incompatible y de 2 - 25% del segundo polímero incompatible; y la reivindicación 28 inicialmente presentada no limitaba los rangos. Consideramos que esta objeción ha sido superada corrigiendo la reivindicación 1 de acuerdo con la reivindicación inicial 28, con el fin de no limitar los rangos. Sin embargo, como se indica en las reivindicaciones dependientes, los rangos óptimos variarán dependiendo de la combinación particular de primer y segundo polímeros empleada. Cuando se emplean los polímeros incompatibles declarados en las reivindicaciones 3 – 6, los rangos deseados son de 20 – 80% del primer polímero incompatible y de 20 – 80% del segundo polímero incompatible, como se declara en la reivindicación 2. Cuando se emplean los polímeros incompatibles declarados en las reivindicaciones 12 – 20, los rangos deseados son de 75 – 98% del primer polímero incompatible y de 2 – 20% del segundo polímero incompatible, como se declara en la reivindicación 11.

De otra parte, considerando las objeciones del señor examinador en relación con el nivel inventivo de la presente solicitud, basado en el documento ES 2163056 (que corresponde a EP 0.367.613), nuestro poderdante se permite argumentar lo siguiente:

El rechazo del señor examinador es respetuosamente objetado. Los siguientes comentarios se refieren a lo divulgado por EP 0.367.613.

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La referencia EP 0.367.613 divulga una película de polímero que tiene una superficie rugosa, sobre la que se puede escribir solo de un lado de la película. La película divulgada no tiene capas de piel en ambos lados, en donde cada capa de piel incluye una mezcla de un primer y un segundo polímeros incompatibles y tiene una pluralidad de grietas formadas allí. La capa sobre la que se puede escribir incluye una mezcla de polímeros químicamente incompatibles. Los polímeros incompatibles proporcionan a la capa una superficie con rugosidad para que se pueda escribir en ella. Adicionalmente, no hay sugerencia de hacer la película respirable al vapor de agua. Por el contrario, las películas divulgadas tienen baja permeabilidad a los gases (Ver página 2, líneas 29 - 32),

La películas de polímero que tiene superficies sobre las que se puede escribir típicamente se emplean en empacado (ver página 2, líneas 32 – 35). Es bien sabido que cuando una película se usa para empacado, no hay motivación para proporcionar una superficie sobre la que se puede escribir por ambos lados de la película. Solo se puede ver un lado de la película desde el exterior, mientras que el otro lado se encuentra escondido de la vista. En concordancia, EP 0.367.613 no motiva a una persona de habilidad ordinaria a proporcionar una película respirable que tiene capas de piel en ambos lados, en donde cada capa de piel incluye una mezcla de primer y segundo polímeros incompatibles.

Además, como se explica arriba, EP 0.367.631 no motiva a la persona con habilidad ordinaria en el arte a proporcionar una película respirable que tenga una tasa de transmisión de vapor de humedad ("MVTR") de al menos 500 gramos/m^2 – 24 horas. La referencia divulga que se desea una baja permeabilidad a los gases para películas de empacado (página 2, líneas 29 – 32).

Consecuentemente, la materia de las reivindicaciones modificadas que estamos presentando se basa en un nivel inventivo.

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EXPEDIENTE No. 00 064.198 Cont.

Por lo menos por las razones vistas aquí, creemos que las reivindicaciones presentes son patentables por sobre el antecedente citado. Por lo tanto, a la luz de los anteriores comentarios y las correcciones realizadas es posible reconocer que existe nivel inventivo en la presente invención. Consecuentemente, insistimos en que el nuevo capítulo reivindicatorio anexo distingue clara y evidentemente la invención con respecto al arte previo citado por el señor examinador y por lo tanto, cumple con los requisitos de novedad, nivel inventivo y aplicabilidad industrial exigidos por la Decisión 486 para poder acceder al derecho de patente solicitado. Para este propósito estamos anexando el recibo oficial de caja No. 05 – 58,443 por $91 000.

De la Señora Jefe,

Atentamente,

CARLOS HUMBERTO PALACIO E.
T.P. No.62154 del C.S.J.
C.C. No. 79.311.882 de Bogotá
Carrera 7 No. 16-56 piso 9

Bogotá, Septiembre 26 de 2005

MEV/yg
Anexos

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SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

NIT : 800176089-2

RECIBO OFICIAL DE CAJA : 05 - 58,443
FECHA : AGOSTO 5 DE 2005

C O N S I G N A C I O N

DEPOSITANTE	TIPO PAGO	BANCO	CUENTA	No. PAGO	FECHA PGO	Vr. PAGO
BRIGARD & CASTRO LTDA	CONSIGNACION	BANCO POPULAR	050-00110-6	32947199	04/08/2005	2,191,450.00

C O N C E P T O

CANT.	RENTISTICO	CONCEPTO		TOTAL CONCEPTO
1	50005-01-03 CAMBIO DE MODALIDAD Y MODIFICA	12 MARCAS Y LEMAS COMERCIALES		91,000.00
		TOTAL :	$	91,000.00

SON: NOVENTA Y UNO MIL PESOS

RESPONSABLE : _____

RECIBO DE CAJA APLICADO AL EXPEDIENTE No._____

REIVINDICACIONES

1. Una película respirable adelgazada y estirada que tiene una MVTR de por lo menos 500 gramos/m^2 – 24 horas, que comprende una capa de núcleo y una capa de piel a ambos lados de la capa de núcleo:

la capa de núcleo incluye una mezcla de uno o más polímeros termoplásticos y partículas rellenadoras, con vacíos alrededor de las partículas de rellenadoras;

cada capa de piel incluye una mezcla de un primer polímero incompatible y un segundo polímero incompatible, y tiene una pluralidad de grietas formadas en ella.

2 La película respirable de la reivindicación 1, caracterizada porque cada capa de piel incluye 20 – 80% en peso del primer polímero incompatible y de 20 – 80% en peso del segundo polímero incompatible.

3 La película respirable de la reivindicación 2, caracterizada porque el segundo polímero incompatible comprende un elastómero de copolímero de etileno-propileno que contiene un gran porcentaje de propileno y un porcentaje menor de etileno.

4 La película respirable de la reivindicación 3, caracterizada porque el primer polímero incompatible comprende polietileno ramificado de baja densidad.

5 La película respirable de la reivindicación 3, caracterizada porque el primer polímero incompatible comprende un copolímero de etileno vinil acetato que contiene hasta 12% en peso de acetato de vinilo.

6 La película respirable de la reivindicación 3, caracterizada porque el primer polímero incompatible comprende un copolímero de etileno y metil acrilato.

Dependiente
6 % -
Composición

7 La película respirable de cualquiera de las reivindicaciones 2 a 6, caracterizada porque por lo menos una capa de piel comprende 30 – 70% en peso del primer polímero incompatible y 30 – 70% en peso del segundo polímero incompatible.

8 La película respirable de cualquiera de las reivindicaciones 2 a 6, caracterizada porque por lo menos una capa de piel comprende 40 – 60% en peso del primer polímero incompatible y 40 – 60% en peso del segundo polímero incompatible.

9 La película respirable de cualquiera de las reivindicaciones 2 a 6, caracterizada porque cada capa de piel comprende 30 – 70% en peso del primer polímero incompatible y 30 – 70% en peso del segundo polímero incompatible.

10 La película respirable de cualquiera de las reivindicaciones 2 a 6, caracterizada porque cada capa de piel incluye 40 – 60% en peso del primer polímero incompatible y 40 – 60% del segundo polímero incompatible.

11 La película respirable de la reivindicación 1, caracterizada porque cada capa de piel incluye 75 – 98% en peso del primer polímero incompatible y 2 – 25% en peso del segundo polímero incompatible.

12 La película respirable de la reivindicación 11, caracterizada porque el primer polímero incompatible comprende polietileno ramificado de baja densidad y el segundo polímero incompatible comprende polipropileno.

13 La película respirable de la reivindicación 11, caracterizada porque el primer polímero incompatible comprende polietileno ramificado de baja densidad y el segundo polímero incompatible comprende poliestireno.

14 La película respirable de la reivindicación 11, caracterizada porque el primer polímero incompatible comprende polietileno ramificado de baja densidad y el segundo polímero incompatible comprende polibuteno.

15 La película respirable de la reivindicación 11, caracterizada porque el primer polímero incompatible comprende etileno vinil acetato, y el segundo polímero incompatible comprende polipropileno.

16 La película respirable de la reivindicación 11, caracterizada porque el primer polímero incompatible comprende etileno vinil acetato que contiene hasta 12% en peso de vinil acetato, y el segundo polímero incompatible comprende polibuteno.

17 La película respirable de la reivindicación 11, caracterizada porque el primer polímero incompatible comprende etileno vinil acetato que contiene hasta 12% en peso de vinil acetato, y el segundo polímero incompatible comprende polibuteno.

18 La película respirable de la reivindicación 11, caracterizada porque el primer polímero incompatible comprende etilen metil acrilato, y el segundo polímero incompatible comprende polipropileno.

19 La película respirable de la reivindicación 11, caracterizada porque el primer polímero incompatible comprende etilen metil acrilato, y el segundo polímero incompatible comprende poliestireno.

20 La película respirable de la reivindicación 11, caracterizada porque el primer polímero incompatible comprende etilen metil acrilato, y el segundo polímero incompatible comprende polibuteno.

21 La película respirable de cualquiera de las reivindicaciones 11 a 20, caracterizada porque por lo menos una capa de piel comprende 80 – 97% en peso del primer polímero incompatible y 3 – 20% en peso del segundo polímero incompatible.

22 La película respirable de cualquiera de las reivindicaciones 11 a 20, caracterizada porque por lo menos una capa de piel comprende 90 – 95% en peso del primer polímero incompatible y 5 – 10% en peso del segundo polímero incompatible.

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23 La película respirable de cualquiera de las reivindicaciones 11 a 20, caracterizada porque cada capa de piel comprende 80 – 97% en peso del primer polímero incompatible y 3 – 20% en peso del segundo polímero incompatible.

24 La película respirable de cualquiera de las reivindicaciones 11 a 20, caracterizada porque cada capa de piel comprende 90 – 95% en peso del primer polímero incompatible y 5 – 10% en peso del segundo polímero incompatible.

25 Un método para preparar una película respirable de múltiples capas de cualquiera de las reivindicaciones 1 a 24 que tiene un MVTR de al menos 500 gramos/m^2-24 horas, que comprende los pasos de:

coextrudir una capa de núcleo junto con una capa de piel a ambos lados de la capa de núcleo para formar una película coextrudida, la capa de núcleo incluye una mezcla de uno o más polímeros termoplásticos y un rellenador particulado, cada capa de piel incluye una mezcla de al menos dos polímeros incompatibles;

estirar la película coextrudida a 1.1 – 7.0 veces su longitud inicial en al menos una dirección para formar una película respirable de múltiples capas estirada y adelgazada;

formar vacíos en la capa de núcleo durante el estiramiento de la película; y

formar grietas en cada capa de piel durante el estiramiento de la película.

26 La película respirable de cualquiera de las reivindicaciones 1 a 24, para la formación de un laminado respirable que la comprende conjuntamente con una tela fibrosa no tejida.

27 La película respirable tal como se reivindica en la reivindicación 26, para la utilización en un artículo absorbente seleccionado del grupo que consiste de un pañal, un pantaloncito de entrenamiento, ropa de nadar,

un pantalón interior absorbente, un producto de incontinencia para adultos y un producto de higiene femenina.

28 La película respirable tal como se reivindica en la reivindicación 26, para la utilización en un artículo médico seleccionado del grupo que consiste de una prenda, una almohadilla interior, un vendaje, una cortina, y una tela para limpiar.

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AS: 82.841

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

REF.: Expediente No. 00 064198
Solicitante: KIMBERLY-CLARK WORLDWIDE, INC.

JUAN PABLO CADENA SARMIENTO, mayor y vecino de esta ciudad, identificado como aparece al pie de mi firma, obrando como apoderado principal de KIMBERLY-CLARK WORLDWIDE, INC.

por medio del presente escrito SUSTITUYO el poder a mi conferido en este trámite, con las mismas facultades otorgadas, a favor del doctor **CARLOS HUMBERTO PALACIO EASTMAN**, identificado como aparece al pie de su firma.

Señora Jefe,

JUAN PABLO CADENA SARMIENTO
C.C. No. 80.410.337 de Usaquén
T.P. 57492 del C.S.J.

ACEPTO:

CARLOS HUMBERTO PALACIO EASTMAN
C.C. No. 79.311.882 de Bogotá
T.P. 62154 del C.S.J.

DILIGENCIA DE PRESENTACION PERSONAL Y
RECONOCIMIENTO DE CONTENIDO Y FIRMA

El anterior escrito dirigido a: [illegible]

Fue presentado personalmente ante el suscrito Notario Cuarenta y Seis de Bogotá por JUAN PABLO CADENA SARMIENTO quien se identificó con la C. C. 80 410 337 de Usaquén T. P. 57 997 CSJ y además declaró que el contenido del anterior documento es cierto y que la firma que lo autoriza fue puesta por él, en constancia se firma en Bogotá, 28 SET 2005

Firma [illegible]

[illegible]

REPUBLICA DE COLOMBIA
Notaría Cuarenta y Seis del Círculo de Bogotá

195

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

En la Nota [illegible] de esta Circulo se cotejo la presente fotocopia que coincide con el original que se ha tenido a la vista.
14 JUN. 2005
NOTARIO CUARENTA
Agustin Castillo Zarate
Bogotá, D.C., Colombia

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2001
196

PODER

Yo (nosotros)

domiciliado(s) en

Nombro(amos) 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 obtentor 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; intervener 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.

A este efecto, lo(s) faculto(amos) 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 desistir a derechos concedidos o en curso de concesión; recibir toda clase de documentos y valores, dando el descargo respective, 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 demas facultades regales necesarias.

Este poder comprende la facultad de ratificar o

POWER OF ATTORNEY

I (We) Kimberly-Clark Worldwide, Inc.

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

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 lawfull 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 obtainers 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 exploration 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.

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.

This power includes the faculty to ratify or confirm [illegible] and commitments on my (our) behalf and

En la Notaría Cuarenta de este Círculo se cotejó la presente fotocopia con el original que se ha tenido a la vista.
14 JUN. 2005
NOTARIO CUARENTA
Agustín Castillo Zafra
Bogotá, D.C. - Colombia

(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 período de duración que aún no ha terminado; que el declarante está autorizado por dicha compaña para conferir este poder; que el sello estampado por él al pie de tal poder, en nombre y representación de la expresada compaña, 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

NOTARIAL CERTIFICATE
(CORPORATION)

197

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.

Cheryl R. Gorges

Notary Public (Seal)
My commission expires September 11, 2005

NOTARIAL CERTIFICATE
NATURAL PERSON

En la Notaría Cuarenta de este Círculo se cotejó la presente fotocopia que coincide con el original que se ha tenido a la vista.
14 JUN. 2005
NOTARIO CUARENTA
Agustín Castillo Zárate
Bogotá, D.C., Colombia

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198

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 Sarmiento** 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

En la Notaría Cuarenta del Círculo se cotejó la presente fotocopia con la misma con el original que se ha tenido a la vista.
14 JUN. 2005
NOTARIO CUARENTA
Agustín Castillo Zárate
Bogotá, D.C., Colombia

TRADUCCION OFICIAL NO.236/2005-.

TRADUCCION DE LOS SELLOS QUE SE ENCUENTRAN EN EL PODER OTORGADO POR **KIMBERLY-CLARK WORDLWIDE, INC.**, DOMICILIADA EN 401 N. LAKE STREET, NEENAH, WISCONSIN 54956, ESTADOS UNIDOS DE AMERICA, A LOS DOCTORES **RAMIRO CASTRO DUQUE** Y/O **JUAN PABLO CADENA SARMIENTO** Y/O **BEATRIZ JARAMILLO S.**

OTORGADO Y FIRMADO EN NEENAH, WISCONSIN, EL DIA 6 DE AGOSTO DE 2002

FIRMADO: NANCY LEE CARTER, SECRETARIO ASISTENTE

KIMBERLY-CLARK WORLDWIDE, INC.

CERTIFICADO NOTARIAL (SOCIEDAD)

HOY PERSONALMENTE COMPARECIO ANTE MI **NANCY LEE CARTER**, A QUIEN CONOZCO Y DE QUIEN ME CONSTA QUE FIRMO EL ANTERIOR DOCUMENTO, DEBIDAMENTE JURAMENTADO DECLARO Y DIJO QUE EL ES EL **SECRETARIO ASISTENTE** DE **KYMBERLY-CLARK WORLDWIDE, INC.**, SOIEDAD LEGALMENTE CONSTITUIDA PARA UN PERIODO DE DURACIÓN QUE AUN NO HA TERMINADO; QUE EL DECLARANTE ESTA AUTORIZADO POR DICHA COMPAÑÍA PARA CONFERIR ESTE PODER; QUE EL SELLO ESTAMPADO POR EL 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 ESTA COMPRENDIDO DENTRO DEL DE LA SOCIEDAD.

EL SUSCRITO NOTARIO HACE CONSTAR QUE TUVO A LA VISTA LAS PRUEBAS DE LA EXISTENCIA DE LA SOCIEDAD.

Y QUE QUIEN CONFIERE EL PRESENTE PODER ES SU REPRESENTANTE.

FIRMADO: CHERYL R. GORGES, NOTARIO PUBLICO, CON COMISIÓN

En la Notaría Cuarenta del Círculo se cotejó la presente fotocopia que coincide con el original que se tuvo a la vista.

14 JUN. 2005

NOTARIO CUARENTA
Agustín Castillo Zárate
Bogotá, D.C., Colombia

TRADUCCION OFICIAL NO.236/2005-.

APOSTILLA

CONVENIO DE LA HAYA DEL 5 DE OCTUBRE DE 1961

1. PAIS: ESTADOS UNIDOS DE AMERICA - ESTADO DE WISCONSIN
   EL PRESENTE DOCUMENTO PUBLICO
2. HA SIDO FIRMADO POR: CHERYL R. GORGES
3. ACTUANDO EN SU CAPACIDAD DE: NOTARIO PUBLICO
4. LLEVA EL SELLO DE: NOTARIO PUBLICO, ESTADO DE WISCONSIN.

CERTIFICADO

5. EN: MADISON, WISCONSIN
6. EL: 16 DE AGOSTO DE 2002
7. POR: SECRETARIO DE ESTADO, ESTADO DE WISCONSIN
8. BAJO EL NO.: 73756
9. SELLO: ESTADO DE WISCONSIN
10. FIRMADO: DOUGLAS LA FOLLETTE, SECRETARIO DE ESTADO.

LA TRADUCTORA OFICIAL

HELENA URIBE DE LEMOINE

En la Notaría Cuarenta de este Circulo se autenticó la presente fotocopia con relación al original que se tuvo a la vista.
14 JUN. 2005
NOTARIO CUARENTA
Agustín Castillo Zárate
Bogotá, D.C., Colombia

306

REPÚBLICA DE COLOMBIA

GAVIRI A

201

[redacted]

ORGANIZACIÓN ELECTORAL
REGISTRADURÍA NACIONAL DEL ESTADO CIVIL

REGISTRO CIVIL DE DEFUNCIÓN

Indicativo Serial 5562241

ORIGINAL PARA LA OFICINA DE REGISTRO

Datos de la oficina de registro

Clase de oficina: Registraduría		Notaría	X	Consulado		Corregimiento		Insp. de Policía		Código	9795

País - Departamento - Municipio - Corregimiento e/o Inspección de Policía

COLOMBIA CUNDINAMARCA BOGOTA D..C NOTARIA 32.

Datos 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

Datos de la defunción

Lugar de la Defunción: País - Departamento - Municipio - Corregimiento e/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

Juzgado que profiere la sentencia	Fecha de la sentencia
- - - - - - - - - - - - - - - - - - -	Año Mes Día

Documento presentado		Nombre y cargo del funcionario
Autorización judicial	Certificado Médico X	ANDRES DIAZ CAMPOS.- R.M. No. 79982662

Datos del denunciante

Apellidos y nombres completos

EDGAR DAVID REGINO H.

Documentos de Identificación (Clase y número)	Firma
C.C.No. 15.030.154 DE LORICA CORDOBA	[signature]

Primer testigo

Apellidos y nombres completos

- -

Documentos de Identificación (Clase y número)	Firma
- -	- - - - - - - - - - - -

Segundo testigo

Apellidos y nombres completos

- -

Documentos de Identificación (Clase y número)	Firma
- -	- - - - - - - - - - - -

Fecha de Inscripción	Nombre y firma del funcionario que autoriza
Año 2004 Mes 11 Día 02	BLANCA [illegible] RESTREPO NOTARIA [illegible]

ESPACIO PARA NOTAS

PADRES: ALFONSO CASTRO
MERCEDES DUQUE.

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO
DIVISION DE NUEVAS CREACIONES

2020
Bogotá, D.C., 6 de diciembre de 2005

Doctor
CARLOS HUMBERTO PALACIO EASTMAN
Apoderado

Oficio No. 13318

ASUNTO

Radicación	**00-64198**
Trámite	002
Evento	001
Actuación	430
Folios	021

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 140 a 160, los dibujos que se encuentran en los folios 43 a 44, el nuevo capítulo reivindicatorio que se encuentra en los folios 194 a 198 que comprende veintiocho (28) reivindicaciones, el concepto técnico No. 921 que junto con sus anexos se halla en los folios 180 a 188 y el memorial de respuesta que obra en los folios 189 a 192.

  El nuevo capítulo reivindicatorio fue anexado como respuesta al requerimiento de fondo arriba citado y fue aceptado porque no implica la ampliación de la materia presentada originalmente.

- De acuerdo con el folio 171 de la solicitud en estudio, se considerará la prioridad reivindicada sobre la solicitud de Estados Unidos No. 09/385,988 del 27 de agosto de 1999.

2. Objeto de la invención

- La invención propuesta se relaciona con una película de capas múltiples con capacidad para respirar que tiene una capa de núcleo y una o dos capas de piel adyacentes.

  En la **reivindicación independiente 1** se define una película respirable adelgazada y estirada que tiene una MVTR de por lo menos 500 g/m^2 – 24 horas, **que comprende** una capa de núcleo y una capa de piel sobre ambos lados de la capa de núcleo;

  La capa de núcleo incluye una mezcla de uno o más polímeros termoplásticos y partículas rellenadoras, con vacíos alrededor de las partículas rellenadotas;

  Cada capa de piel incluye una mezcla de un primer polímero incompatible y un segundo polímero incompatible, y tiene una pluralidad de grietas formadas en ella.

En la **reivindicación independiente 25** se define un método para preparar una película respirable de múltiples capas de cualquiera de las reivindicaciones 1 a 24 que tiene un MVTR de al menos 500 gramos/m^2 – 24 horas, que comprende los pasos de:

Coextruir una capa de núcleo junto con una capa de piel a ambos lados de la capa de núcleo para formar una película coextruida, la capa de núcleo incluye una mezcla de uno o más polímeros termoplásticos y un rellenador particulado, cada capa de piel incluye una mezcla de al menos dos polímeros incompatibles;

Estirar la película coextruida a 1.1 – 7.0 veces su longitud inicial en al menos una dirección para formar una película respirable de múltiples capas estirada y adelgazada;

Formar vacíos en la capa de núcleo durante el estiramiento de la película; y

Formar grietas en cada capa de piel durante el estiramiento de la película.

- Se afirma que las películas estiradas y adelgazadas con capacidad para respirar y los laminados que incluyen una películas con capacidad para respirar y una tela no tejida, son usados en los respaldos del pañal, en otros productos para el cuidado personal y en prendas médicas. Se menciona que típicamente las películas incluyen una capa de núcleo coextruida con una o dos capas de piel adyacentes.

  Una desventaja de las capas de piel es la de que éstas reducen la capacidad para respirar del vapor de agua de la película en general. Entre más gruesas son las capas de piel, mayor es la reducción en la capacidad de respirar. La optimización del grosor de la capa de piel requiere el proporcionar suficiente grosor de capa de piel para controlar la acumulación de matriz durante la extrusión y proporcionar la unión a una tela no tejida pero no demasiado grosor de capa de piel de manera que se perjudique esencialmente la capacidad para respirar en general. Esto puede ser un balance difícil de lograr, especialmente con vista a la corriente hacia películas y laminados con más capacidad para respirar.

- El objeto de la invención definido se catalogó como **B32B 27/00**, según la Clasificación Internacional de Patentes (IPC).

3. 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."

- Las reivindicaciones 26 a 28 son cláusulas que dan a entender que el señor solicitante espera poder proteger el uso de la película respirable definida en las reivindicaciones 1 a 24.

  En la reivindicación 26 se menciona que 'la película respirable [...] **para** la formación de un laminado respirable que la comprende conjuntamente con una tela fibrosa no tejida' (Negrita Personal). Con esta reivindicación se entiende que la película respirable se aplicará o **usará** en la formación del laminado respirable.

En la reivindicación 27 se menciona que 'la película respirable [...] **para la utilización en un artícul absorbente** seleccionado del grupo que consiste de un pañal, un pantaloncito de entrenamiento, ropa de nadar, un pantalón interior absorbente, un producto de incontinencia para adultos y un producto de higiene femenina' (Negrita Personal). Con esta reivindicación se entiende que la película respirable se aplicará o **usará** en la fabricación de un producto absorbente.

En la reivindicación 28 se menciona que 'la película respirable [...] **para la utilización en un artículo médico** seleccionado del grupo que consiste de una prenda, una almohadilla interior, un vendaje, una cortina y una tela para limpiar' (Negrita Personal). Con esta reivindicación se entiende que la película respirable se aplicará **o usará** en la fabricación de artículos médicos.

En este punto se puede analizar que aún cuando los preámbulos de las reivindicaciones se presentan en la forma para reclamar un producto, la materia de la invención corresponde a la aplicación o uso de la película respirable definida en las reivindicaciones 1 a 24.

Dado que la legislación colombiana contempla la protección de productos y procedimientos y no contempla la protección por patente de los usos de un producto, se recomienda que dichas reivindicaciones se eliminen.

- En conclusión, las reivindicaciones 26 a 28 no serían patentables de acuerdo con el artículo 14 de la Decisión 486.

4. 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 consultaron las bases de datos con que cuenta y tiene acceso la entidad y se consideró el **27 de agosto de 1999** como fecha para investigar el 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	US6072005	"BREATHABLE FILMS AND PROCESS FOR PRODUCING THEM"	6 de junio de 2000 **Publicación Internacional:** 14 de mayo de 1999
2	US5643239	"BREATHABLE DISPOSABLE SANITARY PRODUCT CONSTRUCTION"	1 de julio de 1997
3	ES2136056	"PELICULAS POLIMERICAS"	9 de mayo de 1990

5. 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.

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 al estado de la técnica:

- En el documento **US6072005** (llamado D1 de aquí en adelante) se divulga una película respirable que tiene propiedades físicas de barrera mejoradas la cual incluye una matriz de poliolefina modificada resistente al impacto y un rellenador particulado. La matriz de poliolefina incluye por lo menos un copolímero de polipropileno, solo o en combinación con otros polímeros. La película, y laminados incluida la película, proveen respirabilidad a la humedad y barrera a la penetración de líquidos. Los laminados que incluyen la película pueden ser usados en cubiertas externas del pañal y otras aplicaciones que requieren respirabilidad y resistencia a la penetración de líquidos.

  En D1 se enseña que la matriz (o núcleo) de la película puede contener uno o más polímeros adicionales mezclados con el polímero de impacto, por ejemplo polietileno de alta o baja densidad, polipropileno, etc.

  De los rellenadores de la matriz (o núcleo) se menciona que pueden ser seleccionadas de una amplia variedad de orgánicos e inorgánicos, por ejemplo carbonato de calcio, sílica, alúmina, sulfato de bario, arcillas no hinchables, entre otros.

  También, estructuralmente la película respirable puede poseer una matriz (o núcleo) y una o dos capas de piel delgadas de modo que la matriz quede en forma de emparedado entre las capas de piel. De estas últimas se menciona que pueden o no incluir un relleno pero deberían ser respirables respecto al vapor de agua.
  En D1 se resalta que el espesor y la composición de las capas de piel deberían seleccionarse de manera que no impida la transmisión de vapor a través de la matriz respirable.

- En el documento **US5643239** (llamado D2 de aquí en adelante) se divulgan pañales respirables, productos de higiene femenina o productos desechables sanitarios que incluyen una pluralidad de materiales que comprenden desde una hoja superior del lado de la piel del usuario permeable al vapor y al líquido y de un material hidrofílico. Una barrera es formada de un material no tejido multicapa el cual es hidrofóbico y permeable al vapor; también una hoja posterior es formada de un material multicapa no tejido el cual es hidrofóbico y permeable al vapor para limitar el escape de fluidos y permitir el del vapor.

En D2 se enseña que la respirabilidad de una hoja polimérica impermeable tal como la hoja posterior de un pañal debería lograrse mediante cubiertas poliméricas agrietadas o fracturadas de por ejemplo extruyendo etileno vinil acetato y así teniendo las grietas o fracturas suficientes para proveer dicha respirabilidad.

- En el documento **ES2136056** (llamado D3 de aquí en adelante) se divulgan películas poliméricas orientadas que comprenden una capa base de polipropileno que contiene microvacíos y con una capa escribible en ellas, comprendiendo la capa escribible una mezcla de un polietileno y al menos un polímero químicamente incompatible que contenga unidades derivadas de al menos una de etileno, propileno y 1-buteno y que sea distinta de un homopolímero etilénico.

  En D3 se enseña que las películas tienen una superficie rugosa provista por una mezcla de polímeros químicamente incompatibles, y esto se consigue sin el uso de un relleno en las capas asociadas a la principal.

  En cuanto a las proporciones en la mezcla polimérica para las capas escribibles se menciona que puede ser de 47,5% de polietileno y 50% de un copolímero de etileno y propileno.

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 puede ser un ingeniero químico que labore en la industria de materiales poliméricos y que atiende a planes de mejoramiento continuo normalmente formulados en las empresas.

- **La película respirable**

  De acuerdo con el capítulo reivindicatorio de la presente solicitud, se entiende que el principio técnico en el cual se centra la solución al problema corresponde a que la capa núcleo de la película respirable adelgazada y estirada posee vacíos alrededor de las partículas rellenadoras y, que cada capa de piel incluye mezcla de polímeros incompatibles con una pluralidad de grietas formadas en ella. Sin embargo, D1 contiene suficientes enseñanzas como para que un técnico de nivel medio versado en la materia se motive a desarrollar una película respirable adelgazada y estirada (D1; Columna 1, líneas 63 – 67) que tenga un MVTR de por lo menos 500 gramos / m^2 – 24 horas (D1; Columna 7, líneas 5 – 13), que esté comprendida por una capa de núcleo y una capa de piel a ambos lados de la capa de núcleo como se ve en la Figura 2, donde la capa de núcleo tenga vacíos como resultado de la incorporación de partículas rellenadoras en la extrusión del polímero termoplástico.
  La propuesta de la solicitud en estudio difiere de D1 en que las capas de piel están elaboradas de polímeros incompatibles y como consecuencia presentan grietas mientras que en D1 no se explicitan dichas características. No obstante, al analizar D2 se puede observar que facilitar la respirabilidad de una película polimérica mediante grietas o fracturas es algo que está sugerido y que para ello puede usarse un polímero tal como el etileno vinil acetato (EVA).

  Verdaderamente, un técnico de nivel medio versado en la materia que se encuentre dentro de la línea normal de desarrollo de la tecnología que tuviera acceso a D1 y D2 podría verse motivado a cuidar de incluir grietas o fracturas a las cubiertas de las películas poliméricas impulsado por la necesidad de mantener la respirabilidad de dichas películas como bien se expresa de forma explícita en los dos documentos.

De otra parte, en D3 se sugieren películas poliméricas que pueden una matriz cubierta por una o dos capas de piel (D3; Columna 3, líneas 28 – 30) donde las capas de piel se elaboren de polímeros incompatibles lo que implícitamente resulta en un agrietamiento de dichas capas.

Dado lo anterior, si un técnico de nivel medio versado en la materia que se encuentre dentro de la línea normal de desarrollo de la tecnología que tuviera acceso a D1 y D3 podría verse motivado a desarrollar películas poliméricas con estructura equivalente a las de la solicitud y cuyas capas de piel se elaboren de mezcla de polímeros incompatibles.

Según el estudio realizado, la enseñanza de guardar la respirabilidad de una película mediante cubiertas agrietadas o fracturadas forma parte de los conocimientos que tiene un técnico de nivel medio en la materia. De hecho, como la tendencia es que los productos desechables sanitarios sean respirables, D1 y D2 demuestran que dicha idea es convencional para un técnico de nivel medio versado en la materia y esto lo motivaría a que si realiza películas multicapas, estas también mantengan su respirabilidad sin ser interrumpida por las características propias de una o más de las capas que se incluyan. Esto demuestra que proponer una película como la de la solicitud no genera un efecto sorprendente que evidencie un salto tecnológico sobre el arte previo.

- **El método de preparación de la película respirable**

Según la reivindicación independiente 25 se entiende que el método para la preparación de la película respirable de múltiples capas fundamentalmente comprende dos etapas técnicas que son la coextrusión y el estirado de la película coextruida, ya que la formación de vacíos en la capa de núcleo y la formación de grietas en cada capa de piel son consecuencia directa de la etapa de estirado y se realizan mientras dure dicha etapa.

En D1 se tiene en cuenta que el espesor de la película polimérica, la composición, el contenido de elemento rellenador, el tamaño de partículas rellenadoras y el grado de estirado son factores los cuales ayudan a determinar la respirabilidad de la película microporosa (D1; Columna 6, líneas 27 – 30). También, se menciona que las películas multicapa pueden ser preparadas, entre otros métodos, por mezclado de poliolefinas (polímeros termoplásticos) con el rellenador disperso, extrusión de la película multicapa y estirado de alrededor de 1.1 a 7.0 veces su longitud original en por lo menos una dirección (D1; Columna 1, líneas 58 – 67).

Paralelamente en D3 se menciona que las películas se pueden producir de una manera conocida orientando una película que consista de una capa base de polipropileno (material termoplástico) y una capa de mezcla sobre ella. Esto se efectúa ventajosamente coextusionando estas capas par formar una película compuesta que es a continuación estirada en la dirección de la máquina, por ejemplo entre 4.5 y 7.1. También se afirma que cuando se usa una tercera capa polimérica, se puede formar mediante la coextrusión de la película compuesta de tres capas que es a continuación orientada biaxialmente bajo las condiciones de estiramiento anteriores (D3; Columna 3, línea 47 – Columna 4, línea 10).

Si un técnico de nivel medio versado en la materia tuviera acceso a D1 o D3 podría motivarse a coextruir las mezclas y estirar en la misma proporción del método propuesto.

De lo anterior se puede analizar que coextruir una mezcla para elaborar una multicapa y estirar la película a 1.1 – 7.0 veces su longitud inicial en al menos una dirección es un método convencional que un técnico se vería motivado a utilizar para elaborar películas poliméricas respirables equivalentes a las de la solicitud. Y esto es cierto porque por lo general, un técnico de nivel medio versado en la materia que realice desarrollos tiende a emplear los equipos y métodos convencionales aún para realizar otros productos mejorados, lo cual no extraña que realice investigaciones de rutina y se base en enseñanzas técnicas como por ejemplo las contenidas en D1 o D3.

Según lo antedicho, la propuesta de un método como el de la solicitud no genera un efecto sorprendente que evidencie un salto tecnológico sobre el arte previo.

- Por lo anteriormente expuesto, las invenciones definidas en las reivindicaciones 1 a 26 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 cumpliría con las disposiciones del artículo 18 de la Decisión 486 de la Comisión de la Comunidad Andina.

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

No.	Documento	Reivindicaciones Afectadas	Requisito que afecta
1.	US6072005 (D1) y US5643239 (D2)	1 – 24	Nivel Inventivo
2.	US6072005 (D1) y ES2136056 (D3)	1 – 24	Nivel Inventivo
3.	US6072005 (D1) o ES2136056 (D3)	25	Nivel Inventivo

Se anexan los apartes principales de las anterioridades en el documento adjunto.

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.

CLARA CASTELLANOS DE JAIMES
Jefe de División de Nuevas Creaciones (E)

El anterior requerimiento fue notificado por fijación en lista, de fecha 15 DIC. 2005

CONCEPTO TECNIC No. 1952	EXAMINAD R TECNICO Código No. 202042

US006072005A

United States Patent [19]

Kobylivker et al.

[11] **Patent Number: 6,072,005**

[45] **Date of Patent: Jun. 6, 2000**

[54] **BREATHABLE FILMS AND PROCESS FOR PRODUCING THEM**

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[52] **U.S. Cl.** **525/240**; 524/536

[58] **Field of Search** 525/240; 428/195; 524/536

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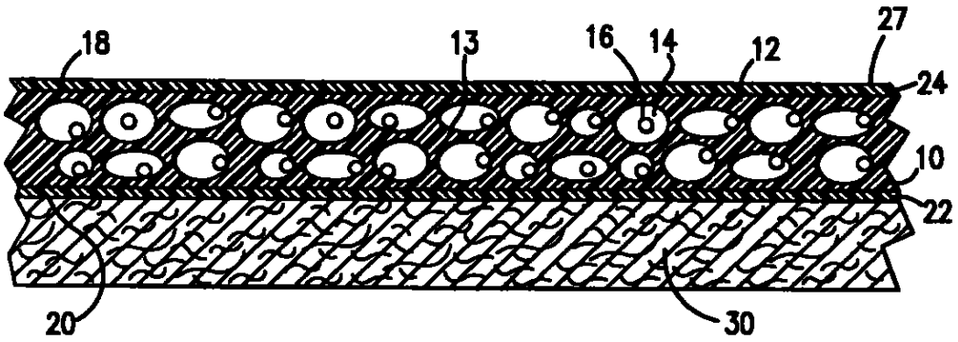
[57] **ABSTRACT**

A breathable film having improved physical and barrier properties includes a stretched impact modified polyolefin matrix and a particulate filler. The impact modified polyolefin matrix includes at least one impact polypropylene copolymer, alone or in combination with other polymers. The film, and laminates including the film, provide excellent moisture breathability and excellent barrier to penetration by liquids. Laminates including the film may be used in diaper outercovers and other applications requiring breathability and resistance to penetration by liquids.

32 Claims, 2 Drawing Sheets



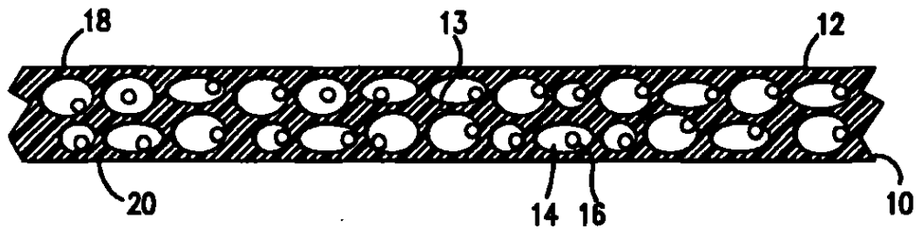


FIG.1

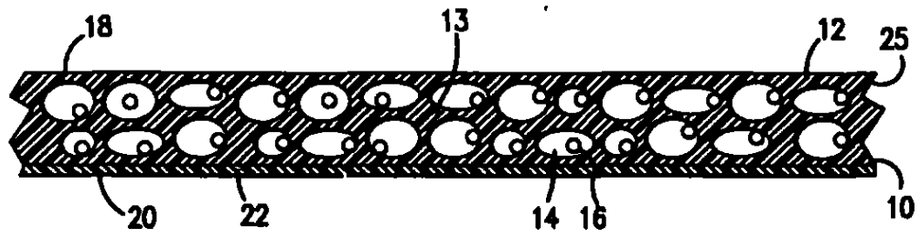


FIG.2

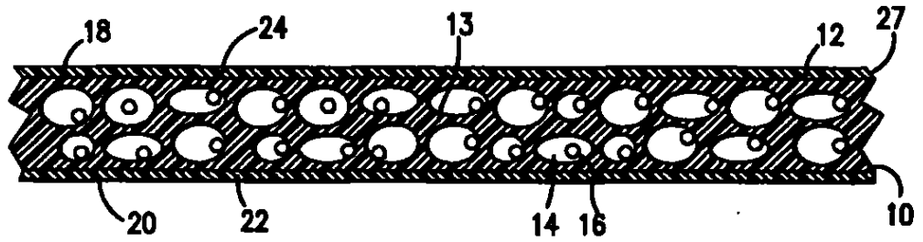


FIG.3

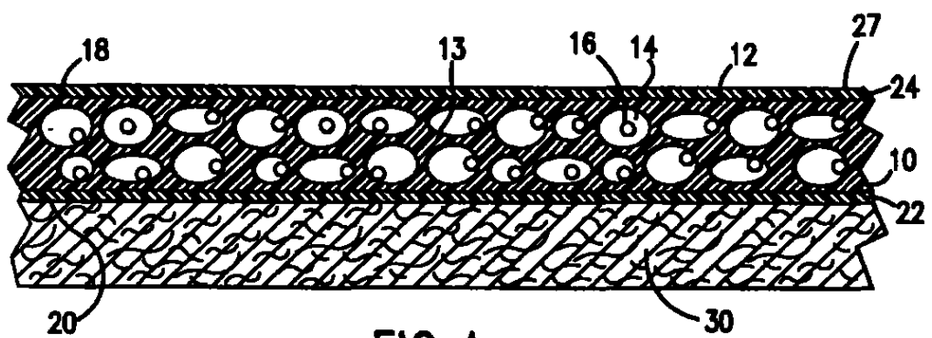


FIG.4

BREATHABLE FILMS AND PROCESS FOR PRODUCING THEM

FIELD OF THE INVENTION

This invention is directed to breathable polyolefin films having improved physical and barrier properties compared to conventional films of the same thickness. The invention also includes a method for making the breathable films having high impact strength.

BACKGROUND OF THE INVENTION

Vapor permeable, liquid impermeable polymeric films are known in the art. One method of making a polymeric film vapor permeable, includes mixing a matrix polymer with a substantial quantity (e.g. 10–70% by weight) of an organic or inorganic particulate filler such as, for example, calcium carbonate, and extruding a film from the blend. The matrix polymer may include a polyolefin, for instance polypropylene or polyethylene, various olefin copolymers, and/or polymer blends. The film may be a monolayer film, a multilayer film which contains the filled layer as a primary layer, or a multilayer film having more than one filled layer.

Then, the film is heated and stretched, causing voids to form in the areas surrounding the filler particles. The voided film is characterized by thin polymer membranes and/or fine pore networks which permit the molecular diffusion of water vapor through the film, but which block the passage of liquids. In essence, a tortuous path is created from one film surface to the other which permits transfer of vapors but not liquids.

Breathable films are employed in backsheets, for example as a backsheet component laminated to a nonwoven web and/or other layers, in many of today's personal care absorbent articles. Diapers are one example. Filled, stretched polyolefin films provide good water vapor transmission, making the diapers more comfortable to the wearer. As a result, the relative humidity and temperature within the diaper or other product can be reduced using laminates of breathable films and nonwoven webs. The breathable films themselves provide vapor breathability and liquid barrier, but are typically not strong enough to be used alone. The nonwoven webs provide strength as well as fabric-like properties to the laminates.

SUMMARY OF THE INVENTION

The present invention is a liquid pressure resistant breathable microporous polyolefin film having improved physical properties and barrier to water, urine and other water-based liquids compared to conventional breathable films of the same thickness. The invention also includes a method of making the breathable film having improved physical properties and barrier to water and water-based liquids. The breathable film includes about 30–90% by weight of an impact modified polyolefin matrix and about 10–70% by weight of a particulate filler, based on the weight of the film.

The liquid pressure resistant film is prepared by blending the impact modified polyolefin with the filler to form a substantially homogeneous dispersion of the filler in the polymer. Then, the blend is extruded into either a single-layer film or a multilayer film having the filled layer as one of its components. The film is then stretched at an elevated temperature below the melting temperature of the polymer, by about 1.1–7.0 times its original length in at least one direction. As the film is stretched, voids form around the filler particles resulting in the breathable film.

The impact modified polyolefin matrix includes from about 5–100% of an impact polypropylene copolymer, based on the weight of the polymer matrix. The impact polypropylene copolymer includes about 10–90 parts by weight of a first polymer segment A, about 10–90 parts by weight of a second polymer segment B, and optionally about 0–20 parts by weight of a third polymer segment C. The polymer segment A is mostly crystalline and is a propylene homopolymer or random propylene copolymer containing about 0–10% by weight of ethylene or a C_4–C_{10} alpha-olefin comonomer. The polymer segment B is a mostly amorphous random copolymer containing about 20–80% by weight propylene and about 20–80% by weight ethylene or a C_4–C_{10} alpha-olefin comonomer. The optional polymer segment C is mostly crystalline, and is a homopolymer or copolymer containing about 80–100% by weight of ethylene or a C_4–C_{10} alpha-olefin and about 0–20% by weight propylene. The polymer segments A, B and C may be chemically linked together in blocks, or may be blended) or both.

The impact modified polyolefin matrix may also contain about 0–95% by weight of one or more additional polyolefins, based on the weight of the matrix. The additional polyolefins may, for example, include one or more of high density polyethylene, low density polyethylene, linear low density polyethylene, very low density polyethylene, polypropylene homopolymer, propylene-ethylene block copolymers, and propylene-ethylene random copolymers. The additional polyolefins may include another impact polypropylene polymer, or another impact polymer.

By using an impact polypropylene copolymer contributing some or all of the polymer matrix, a breathable film is provided which has high strength and integrity, and which provides an excellent barrier to penetration by liquids (including pressurized liquids).

With the foregoing in mind, it is a feature and advantage of the invention to provide a breathable microporous filled polyolefin film having improved strength, and laminates of the film to one or more additional layers.

It is also a feature and advantage of the invention to provide a breathable microporous filled polyolefin film having improved barrier to liquid insults, including liquid insults applied under pressure, while remaining permeable to water vapor.

It is also a feature and advantage of the invention to provide laminates of the high strength filled polyolefin film to a spunbond web and/or other layers, and surgical gowns, wipes, and absorbent articles incorporating the laminates, which provide improved barrier to liquid insults.

The foregoing and other features and advantages of the invention will become further apparent from the following detailed description of the presently preferred embodiments, read in conjunction with the accompanying drawings. The detailed description and drawings are intended to be illustrative rather than limiting, the scope of the invention being defined by the appended claims and equivalents thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a cross-sectional view of an impact modified breathable filled polyolefin film of the invention;

FIG. 2 is a cross-sectional view of a two-layer breathable film including an impact modified breathable filled layer;

FIG. 3 is a cross-sectional view of a three-layer breathable film including an impact modified breathable filled layer;

FIG. 4 is a cross-sectional view of a laminate of an impact modified breathable polyolefin film and a spunbond web;

FIG. 5 is a schematic diagram of a process for making an impact-modified breathable polyolefin film and laminate.

DETAILED DESCRIPTION OF THE PRESENTLY PREFERRED EMBODIMENTS

The term "liquid pressure resistance" refers to the ability of a composition or film made therefrom to withstand the application of a load of liquid without fracturing, bursting or tearing. The liquid pressure resistance of a film depends on the thickness of the film, the material composition of the film, how the film is made and processed, the surrounding environment, and the method of testing. Methods of testing the liquid pressure resistance of a film or material include without limitation the Hydrostatic Pressure Test described in Method 5514 of Federal Test Methods Standard No. 191A, which is equivalent to AATCC Test Method 127-89 and INDA Test Method 80.4-92.

The term "impact modifier" refers generally to an additive, usually an elastomer or different type of plastic, which is incorporated into a plastic film or composition to improve its impact resistance. The term "impact modified," as used herein, refers to a film or material whose liquid pressure resistance (sometimes referred to as hydrohead pressure) has been made higher compared to prior art films and materials through the use of an impact modifier or a high impact material.

The present invention is directed to a liquid pressure resistant breathable polyolefin film. The term "high liquid pressure resistant" film includes both films made entirely of impact polymers mixed with filler, and films made from mixtures of conventional polymers (e.g. polyethylene or polypropylene) with impact polymers or impact modifiers, and filler. This quality is important whether the film is used in diaper backings or other applications.

Referring to FIG. 1, a single layer liquid pressure resistant breathable film **10** is shown. The film **10** includes a polymer matrix **12**, a plurality of voids **14** surrounded by relatively thin microporous membranes **13** defining tortuous paths, and one or more filler particles **16** in each void **14**. The film **10** is microporous and breathable. The microporous membranes **13** between the voids permit molecular diffusion of water vapor from a first surface **18** to a second surface **20** of the film **10**.

The impact polymer, which forms part or all of the polymer matrix **12** of the film **10**, may include about 10–90 parts by weight of a first polymer segment A, about 10–90 parts by weight of a second polymer segment B, and optimally about 0–20 parts by weight of a third polymer segment C. The polymer segment A is preferably at least about 80% crystalline, and includes about 90–100% by weight propylene, as a homopolymer or random copolymer with about 0–10% by weight of ethylene or a C_4–C_{10} alpha-olefin comonomer. The presently preferred polymer segment A is a random copolymer of propylene with a comonomer. The presently preferred comonomers are ethylene and butene. A highly preferred polymer segment A is a random copolymer including about 94–98% by weight propylene and about 2–6% by weight ethylene.

The polymer segment B is less than about 50% crystalline, and is preferably substantially amorphous. The polymer segment B is a random copolymer containing about 20–80% by weight propylene and about 20–80% by weight ethylene or a C_4–C_{10} alpha-olefin comonomer. Preferably, the polymer component B contains about 30–70% by weight propylene and about 30–70% by weight of the comonomer. The presently preferred comonomers are ethylene and butene. A highly preferred polymer segment B is a random copolymer containing about 45–65% by weight propylene and about 35–55% by weight ethylene.

The polymer segment C, when present, is more than about 50% crystalline. The polymer segment C is a homopolymer or random copolymer containing about 80–100% by weight ethylene or a C_4–C_{10} alpha-olefin, and about 0–20% by weight propylene. Again, ethylene and butene are the preferred comonomers. Generally, the comonomer will be the same for the polymer segments A, B and C.

The polymer segments A, B and C may be chemically linked, as in a block copolymer, or may be intimately blended together, or may be present as both chemically linked segments and blended segments. The impact polymer may be prepared using heterophasic polymerization techniques known in the art. For heterophasic polymerization, a single reactor is used to make the different polymer segments at different stages of the reaction. In a first reaction stage, the propylene-rich segment A can be produced by controlling the levels of propylene and comonomer (if any) to produce a highly crystalline propylene homopolymer or copolymer. Then, in a second reaction stage, the level of comonomer may be increased relative to the level of propylene entering the reactor, to produce the mostly amorphous polymer segment B. The polymer segment C may result as a by-product during the production of the polymer segment B, or may be produced in a third reaction stage by substantially increasing the level of comonomer relative to the level of propylene entering the reactor. It is believed that heterophasic polymerization yields an impact polymer whose segments A, B and C are chemically linked so that one molecule may contain a polymer segment A, a polymer segment B, and optionally a polymer segment C.

Preferably, the impact polymer described above will contain about 25–75 parts by weight of the first segment A, about 25–75 parts by weight of the second segment B, and about 0–10 parts by weight of the third segment C. More preferably, the impact polymer will contain about 40–60 parts by weight of the first segment A, about 40–60 parts by weight of the second segment B, and about 0–10 parts by weight of the third segment C.

Alternatively, the impact copolymer may comprise a random copolymer of propylene and butene including about 75–95% by weight propylene and about 5–25% by weight butene, preferably about 80–90% by weight propylene and about 10–20% by weight butene, more preferably about 82–86% by weight propylene and about 14–18% by weight butene.

In addition to the impact polymer described above, the polymer matrix may contain one or more additional polymers blended with the impact polymer. Examples of suitable additional polymers include without limitation high and low density polyethylene, polypropylene, copolymers of mainly ethylene with about 5–15% by weight C_3–C_{12} alpha-olefins (commonly known as linear low density polyethylene), copolymers of mainly ethylene with about 15–30% by weight C_3–C_{12} alpha-olefins (commonly known as very low density polyethylene), copolymers of mainly propylene with ethylene and/or C_4–C_{12} alpha-olefins, and flexible polyolefins including propylene-based polymers having both atactic and isotactic propylene groups in a main polypropylene chain. Other suitable matrix polymers include without limitation elastomers, for example polyurethanes, copolyether esters, polyamide polyether block copolymers, ethylene vinyl acetate copolymers, block copolymers having the general formula A—B—A' or A—B such as copoly(styrene/

ethylene-butene), styrene-poly(ethylene-propylene)-styrene, styrene-poly(ethylene-butylene)-styrene, polystyrene/poly(ethylene-butylene)/polystyrene, poly (styrene/ethylene-butylene/styrene), and the like.

A preferred additional polymer (for use with a segmented impact polypropylene copolymer described above) is very low density polyethylene, which is substantially amorphous and has a density of about 0.87–0.91 grams/cm^3. The very low density polyethylene can be made using either a metallocene or a Ziegler-Natta catalyst, and is preferably made using a metallocene catalyst. Another suitable additional polymer (for use with a random propylene-butene impact polymer described above) is a random propylene-ethylene copolymer including about 90–100% by weight propylene and about 0–10% by weight ethylene, preferably about 93–97% by weight propylene and about 3–7% by weight ethylene.

The impact polymer is suitably prepared using a Ziegler-Natta catalyst system, but can also be made using a constrained geometry and/or metallocene catalyst system. Constrained geometry and/or metallocene-catalyzed polyolefins are described, for instance, in U.S. Pat. Nos. 5,571,619; 5,322,728; and 5,272,326, the disclosures of which are incorporated herein by reference. Polymers made using metallocene catalysts have a very narrow molecular weight range. Polydispersity numbers (Mw/Mn) of below 4 and even below 2 are possible for metallocene-catalyzed polymers. These polymers also have a controlled short chain branching distribution compared to otherwise similar Ziegler-Natta catalyzed polymers. It is also possible, using a metallocene catalyst system, to closely control the isotacticity of the polymer.

The polymer matrix **12** of the film **10** includes about 5–100% by weight of the impact polymer described above, and about 0–95% by weight of the one or more additional polymers. Preferably, the polymer matrix includes about 25–90% by weight of the impact polymer and about 10–75% by weight of the one or more additional polymers. Most preferably, the polymer matrix includes about 50–75% by weight of the impact polymer and about 25–50% by weight of the one or more additional polymers. One polymer matrix, suitable for use in diaper backings, includes about 50–65% by weight of an impact-modified propylene-ethylene copolymer in which the first segment A contains about 2–6% by weight ethylene, the second segment B includes about 40–60 % by weight ethylene and the segments are present in roughly equal amounts; and about 35–50% by weight of a random propylene-ethylene copolymer. Another polymer matrix, suitable for use in diaper backings, includes about 50–65% by weight of the same impact-modified propylene ethylene copolymer and about 35–50% by weight of a metallocene-catalyzed very low density polyethylene having a density of about 0.87 grams/cm^3.

The polymer matrix itself constitutes about 30–90% by weight of the high impact breathable film layer **10**, preferably about 35–75% by weight, most preferably about 35–60% by weight. The film **10** also includes about 10–70% by weight of at least one particulate inorganic and/or organic filler **16**, preferably about 25–65% by weight, most preferably about 40–65% by weight. The filler particles **16** are preferably small, in order to maximize water vapor transmission through the voids **14**. Generally, the filler particles **16** should have a mean particle diameter of about 0.1–7.0 microns, preferably about 0.5–7.0 microns, most preferably about 0.8–2.0 microns.

The filler particles **16** in the high impact film layer may be selected from a wide variety of inorganic and organic fillers. Suitable inorganic fillers include without limitation calcium carbonate, non-swellable clays, silica, alumina, barium sulfate, sodium carbonate, talc, magnesium sulfate, titanium dioxide, zeolites, aluminum sulfate, diatomaceous earth, magnesium carbonate, barium carbonate, kaolin, mica, carbon, calcium oxide, magnesium oxide, and aluminum hydroxide. The inorganic filler may also be a swellable material such as sodium bentonite clay.

Suitable organic fillers include non-swellable polymer particles as well as water-swellable superabsorbent particles. Natural superabsorbent particles include guar gum, agar, pectin and the like. Synthetic superabsorbent particles include hydrogel polymers such as alkali metal salts of polyacrylic acids, polyacrylamides, polyvinyl alcohol, ethylene-maleic anhydride copolymers, polyvinyl ethers, methyl cellulose, carboxymethylcellulose, hydroxypropyl cellulose, polyvinyl morpholinone, and polymers and copolymers of vinyl sulfonic acid, polyacrylates, polyacrylamides, polyvinyl pyrridine, and the like. Other suitable polymers include hydrolyzed acrylonitrile grafted starch, acrylic acid grafted starch, and isobutylene maleic anhydride polymers and mixtures thereof The hydrogel polymers are preferably lightly crosslinked to render them substantially water insoluble. Crosslinking may be accomplished by irradiation or by covalent, ionic, Van Der Waals, or hydrogen bonding.

The polymer film thickness, composition, filler content, filler particles size and degree of stretching are factors which help determine the breathability of the high impact microporous film layer **10**. Generally, the film layer **10** will be less than about 50 microns thick, preferably less than about 30 microns thick, more preferably less than about 20 microns thick. The film **10** may be uniaxially or biaxially stretched The film may be uniaxially stretched to about 1.1–7.0 times its original length, preferably to about 1.5–6.0 times its original length, more preferably to about 2.5–5.0 times its original length. The film **10** may alternatively be biaxially stretched using techniques familiar to persons skilled in the art.

In the embodiment of FIG. **2**, the liquid pressure resistant breathable film layer **10** has a relatively thin outer skin layer **22** adjacent to it, in a two-layer film **25**. In the embodiment of FIG. **3**, the breathable film layer **10** is sandwiched between two outer skin layers **22** and **24**, in a three-layer film **27**. The inclusion of skin layers improves film processability and can also contribute heat seal properties to the multilayer films **25** and **27**. The multilayer films **25** and **27** can be prepared by cast or blown film coextrusion of the layers, by extrusion coating, or by any conventional layering process. The polymers in the skin layers **22** and **24** can be the same or different from the polymers in the breathable microporous layer **10**. Preferably, the polymers in the outer layer or layers have a lower softening point than in the breathable microporous layer **10**, and contribute to the heat sealability of the films **25** and **27**. The skin layer may or may not include a filler, but should be water vapor-breathable.

Also, the thickness and composition of the skin layers **22** and **24** should be selected so as not to substantially impair the moisture transmission through the breathable layer **10**. After stretching the film, the skin layers **22** and **24** each are generally less than about 10 microns thick, preferably less than about 5 microns thick, more preferably less than about 2.5 microns thick. After stretching, the overall film preferably has a basis weight of not more than about 25 grams/m^2. Preferred skin layer polymers include ethylene vinyl acetates, propylene vinyl acetates, ethylene methyl acrylates, polystyrene polyamides, other vapor-permeable

polymers, and blends of these with each other and with other polyolefins. The skin layers **22** and **24** may also include lesser quantities (e.g. about 0–40% by weight) of particulate fillers to further enhance their breathability.

Regardless of whether the high impact breathable microporous layer **10** is a monolayer film or a constituent of a multilayer film, the overall film should be constructed to function as a breathable microporous film having a water vapor transmission rate (WVTR) of at least about 300 gram/m^2–24 hours, measured using the procedure described below. Preferably, the overall film should have an WTR of at least about 1200 grams/m^2–24 hours, most preferably at least about 2000 grams/m^2–24 hours.

FIG. **5** illustrates a process for preparing a liquid pressure resistant breathable microporous film, and a laminate of the film to a nonwoven web. Referring to FIG. **5**, the film **10** is formed from a film extrusion apparatus **40**, which can be a cast or blown film unit, and which can be in-line or off-line. Typically, the apparatus **40** will include an extruder **41**. Filled resin including the polymer matrix material and filler is prepared in a mixer **43** and directed to extruder **41**. The film **10** is extruded between a pair of nip or chill rollers **42**, one of which may be patterned to impart an embossed pattern to the newly formed film **10**. The film may alternatively be flat cast onto only one chill roller.

From the film extrusion apparatus **40** or off-line supply rolls, the filled film **10** is directed to a film stretching unit **44** which can be a machine direction orienter, commercially available from vendors including the Marshall and Williams Co. of Providence, R.I. The stretching unit **44** includes a plurality of pairs of stretching rollers **46**, with each subsequent pair moving at a progressively faster speed than the preceding pair. The rollers **46** apply an amount of stress and progressively stretch the filled film **10** to a stretched length, where the film **10** becomes microporous and breathable. As shown, the film **10** is stretched only in the machine direction, which is the direction of travel of the film **10** through the process in FIG. **5**.

Advantageously, the film **10** may be uniaxially stretched to about 3–4 times its original length, using an elevated stretch temperature of about 150–200° F. for most polyolefin-based films. The elevated stretch temperature can be sustained by heating some of the stretch rollers **46**. The optimum stretch temperature varies with the type of matrix polymer in the film **10**, and is always below the melting temperature of the matrix polymer.

The liquid pressure resistant breathable microporous film **10** may be laminated to one or more substrates, such as a conventional nonwoven web, using conventional adhesive bonding or thermal bonding techniques known in the art. The type of substrate and bonding will vary depending on the end use application. An example of a laminate is shown in FIG. **4**, wherein a nonwoven web **30** is laminated to the multilayer film **27** of FIG. **3**. In the embodiment shown, the web **30**, which can be a spunbonded web of polypropylene or polyethylene, is bonded to the heat seal layer **22** of the multilayer film **27** to form a laminate suitable for use in surgical gowns, diaper backings, and other breathable end use applications.

Referring again to FIG. **5**, the film **10** may be laminated to nonwoven web **30** immediately after the film is stretched and immediately following manufacture of the nonwoven web. The nonwoven web **30**, which can be a spunbonded web, is formed by dispersing polymer filaments **50** from a pair of conventional spinnerette **48**, onto a conveyor assembly **52**. The filaments **50** are deposited onto the conveyor to form mat **54**. The filaments **50** of mat **54** are then compressed to cause inter-filament bonding using a pair of nip rollers **56**, resulting in the spunbonded web **30**. The spunbonded web **30** is then transported to the calender bonding rollers **58** and is thermally bonded to one side of the film **10**. The film **10** in FIG. **5** is simultaneously bonded on its other side to a second material **30***a* originating from a supply roll **62**. The second material **30***a* may be a second nonwoven web, or another film layer. The resulting laminate **32** is wound and stored onto a supply roll **60**.

Other examples of laminates and end uses in which the liquid pressure resistant breathable microporous film **10** may be useful are described in various patents and patent applications assigned to Kimberly-Clark Worldwide, Inc. These include without limitation U.S. application Ser. No. 08/359,986, filed Dec. 20, 1994; U.S. application Ser. No. 08/755,692, filed Nov. 25, 1996; and U.S. application Ser. No. 08/777,365, filed Dec. 27, 1996. These patent applications are incorporated herein by reference in their entirety.

Test Procedures

Water Vapor Transmission Rate (WVTR)

The following procedure is described for testing of the water vapor transmission rate (WVTR) for the liquid pressure resistant breathable films of the invention. The WVTR is measured in a manner similar to ASTM Standard Test Method for Water Vapor Transmission of Materials, Designation E-96-80 as follows. For the purposes of the present invention, 3 inch diameter (76 mm) circular samples are cut from the test material and from a control material, CELGARD® 2500 (Hoechst Celanese Corporation). CELGARD 2500 is a 0.0025 cm thick film composed of microporous polypropylene. Two or three samples are prepared for each material. Test cups used for testing are cast aluminum, flanged, 2 inches deep and come with a mechanical seal and neoprene gasket. The cups are distributed by Thwing-Albert Instrument Company, Philadelphia, Pa., under the designation Vapometer cup #681. One hundred millimeters of distilled water is poured into each Vapometer cup, and each of the individual samples of the test materials and control material are placed across the top area of an individual cup. Flanges are tightened to form a seal along the edges of the cups leaving the associated test material or control material exposed to the ambient atmosphere over a 62 millimeter diameter circular area (an open, exposed area of about 30 cm^2). The cups are then weighed, placed on a tray, and set in a forced air oven set at 100° F. (38° C.). The oven is a constant temperature oven with external air through it to prevent water vapor accumulation inside. A suitable forced air oven is, for example, a Blue M Power-O-Matic 60 oven distributed by Blue M Electric Co. of Blue Island, Ill. After 24 hours, the cups are removed from the oven and weighed. The preliminary, test WVTR value is calculated as follows:

$$\text{Test WVTR} = [(\text{grams weight loss over 24 hours}) \times 7571] \div 24$$

The relative humidity within the oven is not specifically controlled. Under predetermined set conditions of 100° F. and ambient relative humidity, the WVTR for CELGARD 2500 has been determined to be 5000 g/m^2/24 hours. Accordingly, CELGARD 2500 is run as a control sample with each test and the resulting values are corrected in accord with the variation of the control relative to its known WVTR.

Tensile Test (% Ultimate Elongation)

The percentage ultimate elongation can be measured using a constant rate of extension tester such as an Instron

-continued

	0.87 grams/cm³ density)	
	600 ppm Ronotec Dry 17 Stabilizer (300 ppm effective)	
	600 ppm Irgafos 168 Phosphite	
	Example 3	
	Sample #P5058-106-1	
65%	ECC FL-2029 Coated filler (1 micron, 8 microns top, marble)	
35%	95% Dow NG 3310 (3.3 MI, 0.917 density)	33.25% Total
	5% Dow 4012 (12 MI, 0.916 density)	1.75% Total
	900 ppm Irganox B17 stabilizer	
	400 ppm Irgafos 168 Phosphite	
	Example 4	
	Sample #P5058-106-2	
65%	ECC FL-2029 Coated filler (1 micron, 8 microns top, marble)	
35%	75% Dow NG 3310	26.25% Total
	20% Exxon ICP 7623	7.00% Total
	5% Dow 4012	1.75% Total
	900 ppm Irganox E17 stabilizer	
	400 ppm Irgaphos 168 Phosphite	
	Example 5	
	Sample #P5058-106-4	
64%	ECC FL-2029 Coated filler (1 micron, 8 microns top, marble)	
35%	95% Dow ELITE 5200	33.25% Total
	5% Dow 4012	1.75% Total
	900 ppm Irganox E17 Stabilizer	
	400 ppm Irgaphos 168 Phosphite	
	Example 6	
	Sample #P5058-106-5	
65%	ECC FL-2029 Coated filler (1 micron, 8 microns top, marble)	
35%	75% Dow ELITE 5200	26.25% Total
	20% Exxon ICP 7623	7.00% Total
	5% Dow 4012	1.75% Total
	900 ppm Irganox E17 Stabilizer	
	400 ppm Irgaphos 168 Phosphite	

The following results were obtained for WVTR, tensile strength and hydrohead pressure for the oriented films.

			WVTR grams/m²-	Tensile Test % Ultimate Elongation		Hydro-head Pressure
Example	Sample	Stretch	24 hrs.	MD	CD	(Millibars)
1	P5058-55E	3.4	4700			
2	P5058-55F	3.6	3800	29.3	191.6	
3	P5058-106-1	4.5	1871	65.3	176.7	42
4	P5058-106-2	4.2	1536	63.3	200.1	81
5	P5058-106-4	4.5	1956	57.5	29.1	32
6	P5058-106-5	4.2	1846	54.5	155.4	78

While the embodiments of the invention disclosed herein are presently considered preferred, various modifications and improvements can be made without departing from the spirit and scope of the invention. The scope of the invention is indicated in the appended claims, and all changes that fall within the meaning and range of equivalents are intended to be embraced therein.

We claim:

1. A breathable film including a breathable microporous polyolefin film layer, the layer comprising:

about 30–90% by weight of an impact modified polyolefin matrix; and

about 10–70% by weight of a particulate filler;

the film having an WVTR of at least about 300 grams/m²–24 hours;

wherein the impact-modified polyolefin matrix comprises a blend of first and second polymers selected from a) a heterophasic propylene-ethylene polymer blended with a very low density polyethylene, b) a propylene-butene polymer blended with a propylene-ethylene polymer, and c) combinations thereof.

2. The breathable film of claim 1, wherein the impact propylene copolymer comprises a heterophasic propylene-ethylene polymer including about 10–90 parts by weight of a first polymer segment A, about 10–90 parts by weight of a second polymer segment B, and about 0–20 parts by weight of a third polymer segment C;

the polymer segment A comprising a propylene homopolymer or random copolymer including about 90–100% by weight propylene and about 0–10% by weight of a comonomer selected from the group consisting of ethylene and alpha-olefins having 4–10 carbon atoms;

the polymer segment B comprising a random copolymer including about 20–80% by weight propylene and about 20–80% by weight of a comonomer selected from the group consisting of ethylene and alpha-olefins having 4–10 carbon atoms;

the polymer segment C comprising a random copolymer including about 0–20% by weight propylene and about 80–100% by weight of a monomer selected from the group consisting of ethylene and alpha-olefins having 4–10 carbon atoms.

3. The breathable film of claim 2, wherein the polymer segment A comprises a random copolymer including about 94–98% by weight propylene and about 2–6% by weight ethylene.

4. The breathable film of claim 2, wherein the polymer segment B comprises a random copolymer including about 45–65% by weight propylene and about 35–55% by weight ethylene.

5. The breathable film of claim 1, wherein the impact-modified polyolefin matrix comprises a heterophasic copolymer of propylene and ethylene blended with a very low density polyethylene.

6. The breathable film of claim 1, wherein the impact-modified polyolefin matrix comprises a propylene-butene copolymer blended with a propylene-ethylene copolymer.

7. The breathable film of claim 1, wherein the impact-modified polyolefin matrix comprises a random propylene-butene copolymer and a random propylene-ethylene copolymer.

8. The breathable film of claim 6, wherein the proplyene-butene copolymer comprises about 75–95% by weight propylene and about 5–25% by weight butene.

9. The breathable film of claim 6, wherein the copolymer comprises about 80–90% by weight propylene and about 10–20 % by weight butene.

10. The breathable film of claim 6, wherein the proplyene copolymer comprises about 82–86% by weight propylene-butene and about 14–18% by weight butene.

11. The breathable film of claim 6, wherein the propylene-ethylene copolymer comprises a random copolymer including at least about 90% by weight propylene and up to about 10% by weight ethylene.

12. The breathable film of claim 1, wherein the impact modified polyolefin matrix comprises about 25–90% by weight of the first polymer selected from heterophasic propylene-ethylene polymer and a propylene-butene polymer, and about 10–75% by weight of the second polymer selected from a very low density polyethylene and a propylene-ethylene polymer.

13. The breathable film of claim 12, wherein the impact modified polyolefin matrix comprises about 40–75% by weight of propylene copolymer and about 25–60% by weight of the second polymer.

14. The breathable film of claim 1, comprising about 35–75% by weight of the impact modified polyolefin matrix and about 25–65% by weight of the particulate filler.

15. The breathable film of claim 1, comprising about 40–60 % by weight of the impact modified polyolefin matrix and about 40–60 % by weight of the particulate filler.

16. The breathable film of claim 1, wherein the particulate filler comprises an inorganic filler.

17. The breathable film of claim 16, wherein the inorganic filler comprises a swellable filler.

18. The breathable film of claim 16, wherein the filler comprises calcium carbonate.

19. The breathable film of claim 1, wherein the particulate filler comprises an organic filler.

20. The breathable film of claim 19, wherein the organic filler comprises a superabsorbent polymer.

21. The breathable film of claim 1, wherein the film is stretch oriented at least uniaxially to about 1.1–7.0 times an original length.

22. The breathable film of claim 1, wherein the film is stretch oriented at least uniaxially to about 1.5–6.0 times its original length.

23. The breathable film of claim 1, wherein the film is stretch oriented at least uniaxially to about 2.5–5.0 times its original length.

24. A two-layer film comprising the breathable microporous polyolefin film layer of claim 1, and an adjacent breathable skin layer.

25. A multilayer film comprising the breathable microporous polyolefin film layer of claim 1, sandwiched between two breathable skin layers.

26. A breathable laminate, comprising:

the breathable microporous polyolefin film of claim 1; and

a nonwoven web laminated to the breathable microporous polyolefin film.

27. The laminate of claim 26, wherein the nonwoven web comprises a *spunbond* web.

28. The laminate of claim 27, wherein the spunbonded web comprises polypropylene.

29. The laminate of claim 26, wherein the film and web are thermally bonded together.

30. The laminate of claim 26, wherein the film and web are adhesively bonded together.

31. The breathable laminate of claim 26, wherein the breathable film has an WVTR of at least about 1200 grams/m^2–24 hours.

32. The breathable laminate of claim 26, wherein the breathable film has an WVTR of at least about 2000 grams/m^2–24 hours.

* * * * *

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[45] Date of Patent: Jul. 1, 1997

[54] **BREATHABLE DISPOSABLE SANITARY PRODUCT CONSTRUCTION**

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[52] U.S. Cl. 604/370; 604/366; 604/372; 604/378; 604/381

[58] Field of Search 604/358, 366, 604/370, 372, 378-382, 385.1, 385.2

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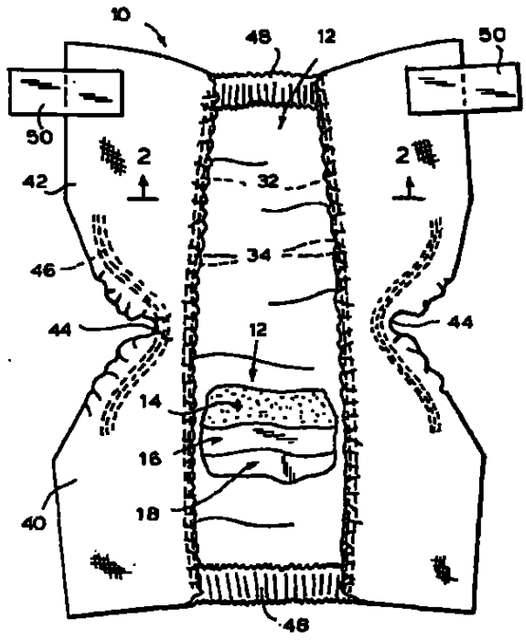
[57] **ABSTRACT**

A breathable diaper, feminine hygiene, or like disposable sanitary product construction includes a plurality of materials comprising, from the skin-facing side outwardly a topsheet of liquid- and vapor-permeable hydrophilic material. A core of highly absorbent material disposed outwardly of the topsheet for absorbing fluid received through said topsheet. The core has an inner surface in fluid communication with the topsheet, an outer surface and two lateral side surfaces. A barrier is formed of a multilayer non-woven material which is hydrophobic and vapor-permeable for limiting the outward escape of fluid therethrough while enabling the outward escape of heat and water vapor therethrough, such as a two-layer spunbond-meltblown or a three-layer spunbond-meltblown-spunbond. In use, the barrier is in a U-shaped configuration having a base disposed adjacent the core outer surface and a pair of flanges upstanding from the base and each extending inwardly adjacent to a respective one of the core lateral side surfaces. A backsheet is formed of a multilayer non-woven material which is hydrophobic and vapor-permeable for limiting the outward escape of fluid therethrough while enabling the outward escape of heat and water vapor therethrough, such as a two-layer spunbond-meltblown or a three-layer spunbond-meltblown-spunbond. The backsheet is disposed at least partially outwardly of the barrier base.

24 Claims, 4 Drawing Sheets



BREATHABLE DISPOSABLE SANITARY PRODUCT CONSTRUCTION

BACKGROUND OF THE INVENTION

The present invention relates to breathable diapers, feminine hygiene or like disposable sanitary product constructions, and more particularly to such a construction which is breathable and has an outer or backsheet surface which is cloth-like.

Disposable diapers for infants and incontinent older people are a major industry and, as such, constitute a crowded art, competitively speaking. In general, such sanitary product constructions comprise, from the skin-facing side outwardly, an inner topsheet (also called a cover or front sheet) which is liquid-permeable to facilitate entry of the fluid exudate from the wearer into the construction, a core of highly absorbent material for absorbing fluid received through the topsheet, and an outer backsheet formed of a vapor- and liquid-impermeable plastic to eliminate leakage of fluid from the diaper.

Such diapers have not proven to be entirely satisfactory. While the inner topsheet is typically in the form of a cloth-like material having a soft hand (which is correctly perceived as being comfortable for the baby to have adjacent to its skin), the outer backsheet plastic presents a rather cold, clammy surface which is at least perceived of as inhospitable and uncomfortable for the baby's skin. Further, the feel of the plastic backsheet to the parent or caregiver is inhospitable and uncomfortable in comparison to conventional cloth diapers. While the outer backsheet is less likely to come into contact with the baby's skin than the inner topsheet, the plastic backsheet is still perceived of as a negative and presumably discourages potential customers for disposable diapers.

Further, the plastic backsheet is impervious not only to fluid, but generally to heat and water vapor as well. Accordingly, the moisture vapor and the heat generated by the bodily exudate trapped within the diaper lead to conditions adjacent the wearer's skin which promote skin irritation, infection, and the like.

While the plastic backsheet is generally effective in precluding the passage of bodily exudate outwardly therethrough where the highly absorbent core is present, it is not efficient in preventing side leakage—that is, lateral leakage of fluids from the opposed side portions of the core sidewards between the leg gathers of the backsheet and the baby's skin. The obvious solution to the problem—tightening of the leg gathers—in turn presented problems in terms of the comfort of the baby, skin irritation, etc.

Accordingly, it is an object of the present invention to provide in one preferred embodiment a breathable diaper, feminine hygiene or like disposable sanitary product construction which has a cloth-like outer backsheet surface.

Another object is to provide in one preferred embodiment such a construction which is breathable to enable the escape of water vapor and heat therethrough.

A further object is to provide in one preferred embodiment such a construction which efficiently limits side leakage.

It is also an object of the present invention to provide a preferred embodiment of a disposable sanitary product construction having a backsheet surface which is cloth-like and of good hand, is breathable, and affords an efficient system for limiting side leakage.

It is a further object to provide such a construction which is simple and inexpensive to manufacture.

SUMMARY OF THE INVENTION

It has now been found that the above and related objects of the present invention are obtained in a breathable diaper, feminine hygiene or like disposable sanitary product construction. The construction includes a plurality of materials comprising, from the skin-facing side outwardly, a topsheet, a core, a barrier and a backsheet. The topsheet is formed of liquid- and vapor-permeable hydrophilic material. The core is formed of highly absorbent material for absorbing fluid received through the topsheet. The core has an inner surface in fluid communication with the topsheet, an outer surface and two lateral side surfaces. The barrier is formed of a multilayer non-woven material which is hydrophobic and vapor permeable for limiting the outward escape of fluid therethrough while enabling the outward escape of heat and water vapor therethrough. In use the barrier is in a U-shaped configuration having a base disposed adjacent the core outer surface and a pair of flanges upstanding from the base, each flange extending inwardly adjacent to a respective one of the core lateral side surfaces. The backsheet is formed of a multilayer non-woven material which is hydrophobic and vapor permeable for limiting the outward escape of fluid therethrough while enabling the outward escape of heat and water vapor therethrough. The backsheet is disposed at least partially outwardly of the barrier base.

In a preferred embodiment, the backsheet and/or barrier material is SM, a two-layer spunbond-meltblown non-woven fabric formed of a spunbond layer and a meltblown layer. In an optimal embodiment, the backsheet and/or barrier material is SMS, a three-layer spunbond-meltblown-spunbond non-woven fabric formed of two spunbond layers and a meltblown layer disposed intermediate the spunbond layers and bonding them together. The construction may include an additive or coating which increases the hydrophobicity of the material.

The topsheet may be a one-layer spunbond non-woven material, a fluid-distributing material, or a two-layer fabric formed of an inner layer of a liquid and vapor-permeable hydrophilic non-woven material and an outer layer of a fluid-distributing material. Preferably the barrier base is thicker than the barrier flanges to further limit the outward escape of fluid therethrough, and a portion of the barrier flanges and backsheet material includes elastic material such that, in use, a portion of the barrier flanges and backsheet material are gathered about the legs of the user.

The construction preferably includes a hydrophobic enhancer formed of a multilayer non-woven material which is hydrophobic and vapor-permeable for limiting the outward escape of fluid therethrough while enabling the outward escape of heat and water vapor therethrough. The hydrophobic enhancer is disposed at least partially outwardly of the barrier base and inwardly of the backsheet. The hydrophobic enhancer is preferably SM or SMS. The hydrophobic enhancer may be a hydrophobic coating disposed adjacent an inner surface of the backsheet, the coating being polymeric, but cracked or fractured to provide breathability thereto. The cracked coating is preferably an ethyl vinyl acetate (EVA) extrusion having cracks or fractures sufficient to provide breathability thereto.

While in the embodiments described above the barrier flanges are contiguous to the core lateral side surfaces, the present invention also encompasses the variant wherein the topsheet defines a topsheet base disposed adjacent the core inner surface and a pair of topsheet flanges extending outwardly from the topsheet base. Each topsheet flange is secured to a respective barrier flange at a point spaced from the adjacent core lateral side surface.

BRIEF DESCRIPTION OF THE DRAWING

The above and related objects, features, and advantages of the present invention will be more fully understood by reference to the following detailed description of the presently preferred, albeit illustrative, embodiments of the present invention when taken in conjunction with the accompanying drawing wherein:

FIG. 1 is a top plan view of a simple embodiment of a diaper according to the present invention, with successive portions thereof being removed to reveal details of internal construction;

FIG. 2 is a sectional view thereof taken along the line 2—2 of FIG. 1;

FIG. 3 is a top plan view of a more complex embodiment with successive portions thereof being removed to reveal details of internal construction;

FIG. 4 is a sectional view thereof taken along the line 4—4 of FIG. 3;

FIG. 5 is a fragmentary sectional view of a multilayered non-woven material—namely, a spunbond-meltblown-spunbond material;

FIG.6 is a sectional view of a variant of the simple embodiment; and

FIG. 7 is a sectional view of a variant of the complex embodiment.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawing, and in particular to FIGS. 1 and 2 thereof, therein illustrated is a simple embodiment of a breathable diaper according to the present invention, generally designated by the reference numeral 10. As will be appreciated by those skilled in the art, the principles of the disposable sanitary product construction may be used for other disposable sanitary products such as feminine hygiene products, e.g., catamenial pads and the like, although typically the manner of securing the construction in place on the wearer's body will differ.

The construction 10 includes a plurality of materials comprising, from the skin-facing side outwardly, a topsheet generally designated 12, a core generally designated 14, a barrier generally designated 16, and a backsheet generally designated 18.

As is typical in these constructions, the topsheet 12 is formed of a liquid- and vapor-permeable hydrophilic material. For example, a preferred topsheet is formed of a one-layer, spunbond, non-woven fabric, with a soft, cloth-like surface for contact with the wearer's skin. While various liquid- and vapor-permeable hydrophilic materials may be used for the topsheet 12, a satisfactory diaper must be capable of providing the cloth-like inner surface affording good hand (e.g., softness).

Alternatively, the topsheet 12 may be formed of a fluid-distributing material, preferably one offering the same soft cloth-like feel as the spunbond topsheet. The fluid-distributing material performs a wicking service, drawing the fluid of the exudate away from the wearer and spreading it over a greater area of the topsheet 12 for transmission to the core 14.

In the preferred, more complex embodiment 10' of the diaper illustrated in FIGS. 3 and 4, the topsheet 12' is a two-layer fabric formed of an inner layer 12A of a liquid- and vapor-permeable, hydrophilic, non-woven material, and an outer layer 12B formed of a fluid-distributing material.

Thus the preferred topsheet 12' is not only a liquid- and vapor-permeable hydrophilic material, but also a fluid-distributing material.

The topsheet 12 may comprise any of the materials heretofore employed for topsheets, e.g., spunbonded, polyester or polypropylene fibers, various non-woven fabrics, etc. having the desired wet and dry strengths as well as the liquid and vapor-permeability and hydrophilic characteristics earlier mentioned.

Referring now to FIGS. 1–4, in both embodiments 10 and 10', the core 14 is formed of a highly absorbent material and is disposed outwardly of the topsheet 12, 12' for absorbing fluid received through the topsheet. The core 14 has an inner surface 20 in fluid communication with the topsheet, an outer surface 22, and two lateral side surfaces 24, 24. (Typically, the core 14 extends longitudinally along the crotch, with the lateral side surfaces thereof being generally parallel to that longitudinal axis.) The core may be composed of any of the absorbent materials heretofore employed for that purpose in the diaper art, e.g., wood pulp or fluff, absorbent cotton fibers, polyester or polypropylene and the like, including mixtures thereof. Preferably, the core 14 is formed of a superslurper or like material which wicks the fluid received from the topsheet through and away from the topsheet, so that the topsheet generally presents a relatively dry inner surface to the wearer. As highly absorbent materials suitable for the core are well known in the conventional diaper, feminine hygiene and like sanitary product constructions art, further details thereof need not be provided herein.

The barrier 16 is disposed partially outwardly of the core 14 and is formed of a multilayer, non-woven material which is hydrophobic and vapor-permeable for limiting the outward escape of fluid therethrough, while enabling the outward escape of heat and water vapor therethrough. It has been found that the heat and humidity released by the accumulated body exudates, such as urine and feces, promote the irritation and itching which frequently develops when conventional disposable diapers are used. The barrier 16 of the present invention enables the heat and water vapor to escape outwardly from the core 14, through the barrier 16 and then further outwardly while at the same time limiting the outward escape of fluid (e.g., urine, blood, etc.) therethrough. The non-woven material may be spunbond, carded, spun-laced, meltblown or the like. A chemical finish may be applied in order to enhance its ability to repel specific fluids. The preferred materials are polyethylene, polypropylene, and the like.

The barrier material 16 is preferably SM or optimally SMS. SM is a two-layer spunbond-meltblown non-woven fabric formed of a spunbond layer and a meltblown layer. When SM is used, the meltblown layer is typically the inner layer. Referring now to FIG. 5, SMS is a three-layer, spunbond-meltblown-spunbond non-woven fabric formed of two spunbond layers S and a meltblown layer M disposed intermediate the spunbond layers and bonding them together. The spunbond and meltblown layers are typically formed of the same composition—preferably either polyethylene or propylene—although different compositions formed of other natural or synthetic materials may be used. Typically, the meltblown material is similar to the spunbond material, except that the fiber lengths are substantially smaller (such that the meltblown material by itself lacks tenacity and cannot used by itself). Multilayer non-woven materials which are hydrophobic and vapor-permeable (i.e., water vapor-permeable) are well known in the art, and accordingly it is not deemed necessary to set forth herein further details thereof. It will be appreciated, however, that

the layers forming the SM or SMS material may contain conventional additives to increase the hydrophobicity of the material, or even a coating, so long as the aforementioned desirable properties of the material are that adversely affected.

When the diaper is in use, as illustrated in FIG. 2, barrier 16 is U-shaped in cross-section and has a base 30 at least partially disposed adjacent the outer surface 22 of the core 14 and a pair of flanges 32 upstanding from the base 30. Each of the flanges 22 extends inwardly (towards the topsheet 12) closely adjacent to a respective one of the core lateral side surfaces 24.

Even after distribution over the major face of the core 14 by a fluid-distributing topsheet 12, 12', the fluid passing from the core 14 to the barrier 16 still tends to bunch at the center of the core 14 rather than at the lateral sides 24 thereof. Accordingly, preferably the barrier base 30 is thicker than the barrier flanges 32, thereby to further limit the outward escape of fluid through the barrier base 30.

A portion of the barrier flanges 32, especially adjacent the free ends thereof, includes elastic or other biasing material 34 such that, when worn, a portion of the barrier flanges 32 are gathered about the legs of the user, thereby to prevent the escape of fluid laterally from the diaper. The elastic material 34 may be embedded in a folded-over free end of the barrier flanges 32, as illustrated, or it may simply be glued or stitched thereto. Thus, when the diaper 10 or 10' is tautly stretched out, as illustrated in FIGS. 1 and 3, the barrier flanges 32 lay flat over the topsheet 12 or 12' and core 14 while, when the diaper is worn as illustrated in FIGS. 2 and 4, the barrier flanges 32 stand upright to prevent the lateral escape of fluid exudate from the diaper. Optionally the free ends of the barrier flanges 32 may be secured to the lateral edges of the top sheet 12 to limit fluid leakage therebetween.

It will be appreciated that the core 14 is encapsulated on all four sides: by the topsheet 12, 12' on its inner surface 20, the barrier base 30 on its outer surface 22, and the barrier flanges 32 on its lateral sides 24.

The backsheet 18, like the barrier 14, is formed of a multilayer non-woven material which is hydrophobic and vapor-permeable for limiting the outward escape of fluid therethrough while enabling the escape of heat and water-vapor therethrough. The preferred backsheet material is a two-layer SM or a three-layer SMS, as described supra. The backsheet 18 is at least partially disposed outwardly of the barrier base 30. Any fluid which passes out of the core 14 and through the barrier 16 encounters the backsheet 18, which further limits its outward escape.

The backsheet 18 is typically formed in the configuration of a conventional diaper having a front portion 40, a rear portion 42 and a crotch portion 44 therebetween. The crotch portion 44 typically includes elastic threads 46 for gathering the backsheet 18 around the legs of the wearer. The central longitudinal portion of the backsheet 18 may define gathers 48 at its opposed waist ends to assist in shaping the diaper and keeping the various components thereof in place—for example, by stitching therethrough to drape the gathers 48.

Conventional tape fasteners 50, such as adhesive or VELCRO tabs, are permanently fastened to the rear portion 42 of backsheet 18 so that they may be releasably attached to the front portion 40 when the diaper is placed on the wearer. The pair of conventional fasteners in the waist area permit releasably securing or refastening of the opposed ends of the backsheet 18 together around the waist of the wearer where the diaper is folded to engage the front and back of the body. The fasteners may employ refastenable pressure-sensitive adhesive and may be elastic in nature.

The presence of a backsheet 18 formed of a multilayer, non-woven material enables the outer surface of the diaper to have an outer surface with a cloth-like feel similar to that of a conventional cloth diaper. Accordingly, a potential purchaser of the diaper will be under the impression that he/she is affording twice the comfort and protection of a conventional diaper because a soft, cloth-like material forms both the topsheet 12 and the backsheet 18.

In the preferred, albeit more complex, embodiment 10' of the present invention illustrated in FIGS. 3 and 4, the construction 10' includes the backsheet 18' defining diaper outer surface 18A and a hydrophobic enhancer 18B formed of a multilayer, non-woven material. The multilayer, non-woven material of enhancer 18B is hydrophobic and vapor-permeable for limiting the outward escape of fluid therethrough while enabling the outward escape of heat and water vapor therethrough. The preferred enhancer material is a two-layer SM or a three-layer SMS as described, supra.

Preferably the hydrophobic enhancer 18B is at least partially disposed outwardly of the barrier base 30 and inwardly of the backsheet 18A. Indeed, the hydrophobic enhancer 18B may simply be a coating disposed adjacent the inner surface of backsheet 18A. The hydrophobic coating is preferably cracked or fractured to provide breathability thereto. Preferred coatings are polymers—e.g., an ethyl vinyl acetate (EVA) extrusion having cracks or fractures sufficient to provide breathability therethrough. It will be appreciated that the presence of the enhancer 18B as either a separate layer or as a coating on the inner surface of backsheet 18A does not detract from the desirable soft feel of the latter.

Fluid exudate escaping from the lateral sides of the core 14 are initially blocked by the barrier 16 and trapped in the U-shaped well 32, 30, 32 of the barrier 16. Even if the fluid exudate escapes the well of the barrier, it is still retained within the diaper by the backsheet 18 or the hydrophobic enhancer 18B and backsheet 18A, depending upon the embodiment of the diaper.

The various materials 12, 14, 16, 18 of diaper 10 or 12A, 12B, 14, 16, 18A, 18B of diaper 10' may be secured together with hot-melt or like adhesives or even simple mechanical or stitching means, as is customary in the diaper art.

The diaper 10, 10' according to the present invention is used in the same manner as a conventional diaper.

While the embodiments illustrated in FIGS. 1–4 have the barrier flanges 32 disposed contiguous to the core lateral side surfaces 24, and only optionally secured to the topsheet 12, alternatively the topsheet 12 and the barrier 16 may be directly secured together at a location optionally spaced from core 14. Thus, as illustrated in FIG. 6, the topsheet 12' defines a topsheet base 100 disposed adjacent the core inner surface 20 and a pair of topsheet flanges 102 extending outwardly from the topsheet base 100. The topsheet flanges 102 are U-shaped, each topsheet flange 102 having one leg 104 disposed contiguous to or very closely adjacent to the core lateral side surface 24, the topsheet base 106 being disposed generally parallel to the barrier base 30, and the other topsheet flange leg 108 being secured to the barrier flange 32, as illustrated at 110. As illustrated in FIG. 7, clearly the principles of this variant are equally applicable to a variant of the more complex embodiment illustrated in FIGS. 3 and 4, and, indeed, the configuration of the topsheet flanges and the barrier flanges may be varied substantially as long as each topsheet flange is secured to a respective barrier flange in such a manner as to minimize side leakage.

To summarize, the present invention provides a breathable diaper, feminine hygiene or like disposable sanitary

product construction which has a cloth-like outerback sheet surface, is breathable to enable the escape of water vapor and heat therethrough, and efficiently limits side leakage of fluid. The construction is simple and inexpensive to manufacture.

Now that the preferred embodiments of the present invention have been shown and described in detail, various modifications and improvements thereon will become readily apparent to those skilled in the art. Accordingly, the spirit and scope of the present invention is to be interpreted broadly and limited only by the appended claims, and not by the foregoing specification.

We claim:

1. A breathable diaper, feminine hygiene, or like disposable sanitary product construction including a plurality of materials comprising, from the skin-facing side outwardly:

(A) a topsheet of liquid- and vapor-permeable hydrophilic material;

(B) a core of highly absorbent material disposed outwardly of said topsheet for absorbing fluid received through said topsheet, said core having an inner surface in fluid communication with said topsheet and an outer surface;

(C) a barrier formed of a multilayer non-woven material which is hydrophobic and vapor-permeable for limiting the outward escape of fluid therethrough while enabling the outward escape of heat and water vapor therethrough, said barrier having a base disposed adjacent said core outer surface; and

(D) a backsheet formed of a multilayer non-woven material which is hydrophobic and vapor permeable for limiting the outward escape of fluid therethrough while enabling the outward escape of heat and water vapor therethrough, said backsheet being disposed at least partially outwardly of said barrier base.

2. The construction of claim 1 wherein said backsheet material is a two-layer spunbond-meltblown non-woven fabric formed of a spunbond layer and a meltblown layer.

3. The construction of claim 1 wherein said backsheet material is a three-layer spunbond-meltblown-spunbond non-woven fabric formed of two spunbond layers and a meltblown layer disposed intermediate said spunbond layers and bonding them together.

4. The construction of claim 1 including an additive or coating which increases the hydrophobicity of said backsheet material.

5. The construction of claim 1 wherein a portion of said backsheet material includes elastic material such that, in use, a portion of said backsheet material is gathered about the legs of the user.

6. The construction of claim 1 wherein said barrier material is a two-layer spunbond-meltblown non-woven fabric formed of a spunbond layer and a meltblown layer.

7. The construction of claim 1 wherein said barrier material is a three-layer spunbond-meltblown-spunbond non-woven fabric formed of two spunbond layers and a meltblown layer disposed intermediate said spunbond layer and bonding them together.

8. The construction of claim 1 including an additive or coating which increases the hydrophobicity of said barrier material.

9. The construction of claim 1 wherein said topsheet is a one-layer spunbond non-woven material.

10. The construction of claim 1 wherein said topsheet is formed of a fluid-distributing material.

11. The construction of claim 1 wherein said topsheet is a two-layer fabric formed of an inner layer of a liquid and vapor permeable hydrophilic non-woven material and an outer layer of a fluid-distributing material.

12. The construction of claim 1 which includes a hydrophobic enhancer formed of a multilayer non-woven material which is hydrophobic and vapor-permeable for limiting the outward escape of fluid therethrough while enabling the outward escape of heat and water vapor therethrough, said hydrophobic enhancer being disposed at least partially outwardly of said barrier base and inwardly of said backsheet.

13. The construction of claim 12 in which said hydrophobic enhancer is a two-layer spunbond-meltblown non-woven fabric formed of a spunbond layer and a meltblown layer.

14. The construction of claim 12 in which said hydrophobic enhancer is a three-layer spunbond-meltblown-spunbond non-woven fabric formed of two spunbond layers and a meltblown layer disposed intermediate said spunbond layer and bonding them together.

15. The construction of claim 1 including a hydrophobic coating disposed adjacent an inner surface of said backsheet.

16. The construction of claim 15 wherein said coating is cracked or fractured to provide breathability thereto.

17. The construction of claim 16 wherein said cracked coating is polymeric.

18. The construction of claim 16 wherein said cracked coating is an ethyl vinyl acetate (EVA) extrusion having cracks or fractures sufficient to provide breathability thereto.

19. The construction of claim 1 wherein said core also has two lateral side surfaces and in use said barrier has a U-shaped configuration with a pair of flanges upstanding from said barrier base, each said flange extending inwardly adjacent to a respective one of said core lateral side surfaces.

20. The construction of claim 19 wherein said barrier base is thicker than said barrier flanges to further limit the outward escape of fluid therethrough.

21. The construction of claim 19 wherein a portion of said barrier flanges includes elastic material such that in use a portion of said barrier flanges are gathered about the legs of the user.

22. The construction of claim 19 wherein said barrier flanges are contiguous to said core lateral side surfaces.

23. The construction of claim 19 wherein said topsheet defines a topsheet base disposed adjacent said core inner surface and a pair of topsheet flanges extending from said topsheet base, each topsheet flange being secured to a respective barrier flange.

24. A breathable diaper, feminine hygiene, or like disposable sanitary product construction including a plurality of materials comprising, from the skin-facing side outwardly:

(A) a vapor-permeable topsheet of hydrophilic, fluid-distributing, non-woven material, said topsheet including an inner layer of hydrophilic non-woven material and an outer layer of fluid-distributing material;

(B) a core of highly absorbent material disposed outwardly of said topsheet for absorbing fluid received through said topsheet, said core having an inner surface in fluid communication with said topsheet, an outer surface and two lateral side surfaces;

(C) a hydrophobic and vapor-permeable barrier formed of a three-layer spunbond-meltblown-spunbond non-woven fabric formed of two spunbond layers and a meltblown layer disposed intermediate said spunbond layers and bonding them together, for limiting the outward escape of fluid therethrough while enabling the outward escape of heat and water vapor therethrough, in use said barrier being in a U-shaped configuration having a base disposed adjacent said core outer surface

and a pair of flanges upstanding from said base and each extending inwardly adjacent to a respective one of said core lateral side surfaces;

(D) a vapor-permeable hydrophobic enhancer formed of a three-layer spunbond-meltblown-spunbond non-woven fabric formed of two spunbond layers and a meltblown layer disposed intermediate said spunbond layers and bonding them together, for limiting the outward escape of fluid therethrough while enabling the outward escape of heat and water vapor therethrough, said enhancer being disposed at least partially outwardly of said barrier; and

(E) a hydrophobic and vapor-permeable backsheet formed of a three-layer spunbond-meltblown-spunbond non-woven fabric formed of two spunbond layers and a meltblown layer disposed intermediate said spunbond layers and bonding them together, for limiting the outward escape of fluid therethrough while enabling the outward escape of heat and water vapor therethrough, said backsheet being disposed at least partially outwardly of said enhancer.

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