

Señor Jefe

DIVISION DE NUEVAS CREACIONES

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

Bogotá, D.C.

SUPERINDUSTRIA Y COMERCIO
Modificación : 01037439 00000002 Folios: 94
Fecha (UTC): 2001-06-22 14:38:35
Tramite : 002 PATENTES 0 1 REGISTRADO/ 444 REPLA-STR
Dependencia: 2020 DIVISION DE NUEVAS CREACIONES

Re.: Expediente No. 01/37.439
Solicitud de patente a nombre de
BKI HOLDING CORPORATION
Código 02 - 01 - 444

En relación con la solicitud contenida en el Expediente de la referencia y, en particular, dando respuesta a su último oficio proferido dentro del mismo, por medio del presente escrito me permito manifestarle:

1. Por una equivocación incurrida en la preparación de la solicitud se omitió incluir el nombre y domicilio de dos (2) inventores adicionales, siendo estos

- John Perry Baker, domiciliado en Memphis, Estado de Tennessee, Estados Unidos de América; y
- David W. Wu, domiciliado en Bartlett, Estado de Tennessee, Estados Unidos de América.

2. Acompaño la copia certificada de la solicitud estadounidense No. 60/204,418 de 12 de Mayo de 2000, de la cual se reivindica prioridad, certificada su conformidad por la Administración que la recibió.

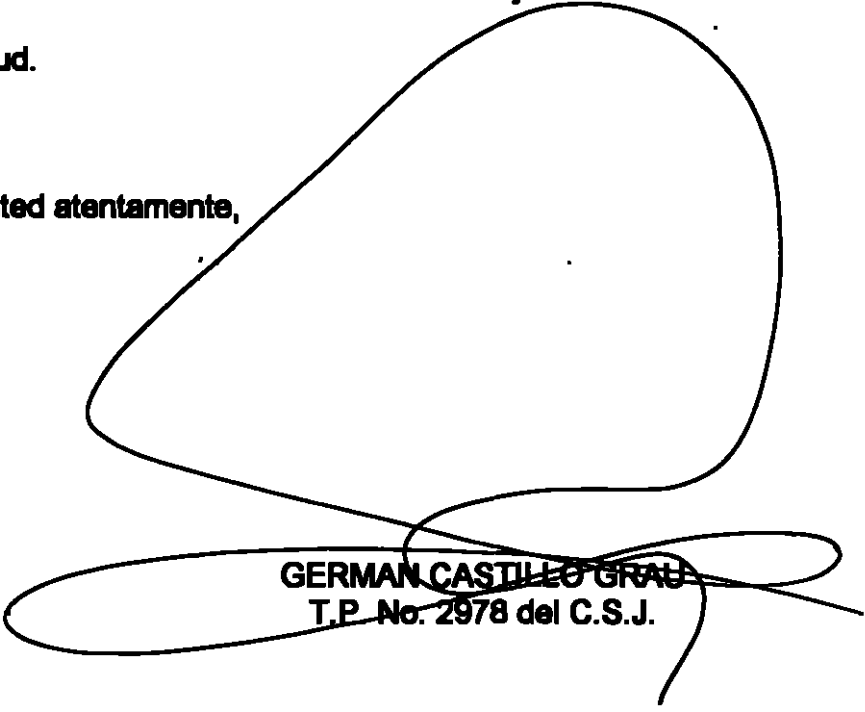
3. Acompaño la copia certificada de la solicitud estadounidense No. 60/252,544 de 22 de Noviembre de 2000, de la cual se reivindica prioridad, certificada su conformidad por la Administración que la recibió.
4. Acompaño el documento en que consta la cesión del derecho a la patente otorgado por los cuatro (4) inventores a la sociedad solicitante, debidamente firmado, autenticado ante Notario Público y legalizado por Apostilla.
5. Acompaño un nuevo juego de las Figuras 1 – 14B, a que se refiere la descripción.
6. Acompaño el arte final de la Figura característica de la invención, dos ejemplares en tamaño 12 x 12 cm.
7. Acompaño el comprobante de pago por concepto de la tasa establecida para la reivindicación de una de las prioridades, habiéndose presentado ya el de la otra, Recibo No. 52.530/01-
8. Acompaño el comprobante de pago por concepto de la tasa establecida para modificación de solicitudes en trámite, Recibo No. 52.222 /01-

Teniendo en cuenta la modificación introducida, acompaño un nuevo formato del petitorio de la solicitud, nuevo Resumen, y un nuevo extracto para su publicación en la Gaceta de la Propiedad Industrial.

Le solicito se sirva agregar este escrito y sus anexos al expediente.

Renuncio al término faltante de traslado y le solicito continuar el trámite de la solicitud.

De Usted atentamente,



GERMAN CASTILLO GRAU
T.P. No. 2978 del C.S.J.



106 172

Industria y Comercio

SUPERINTENDENCIA

NIT : B00176089-2

SUPERINDUSTRIA Y COMERCIO

Radicación : 01037439 00000002

Folios: 94

Fecha (AMD): 2001-08-22 14:30:56

Trámite : 002 PATENTES D 1 REGISTRO/ 444 REQUERIDA

Dependencia: 2020 DIVISION DE NUEVAS CREACIONES

RECIBO OFICIAL DE CAJA : 01 - 52,222
FECHA : AGOSTO 21 DE 2001

***** CONSIGNACION *****

DEPOSITANTE	TIPO PAGO	BANCO	CUENTA	No. PAGO	FECHA PAGO	Vr. PAGO
CASTILLO BRAU Y ASOCIADOS	CONSIGNACION	BANCO POPULAR	050-00110-6	5885220	21/08/2001	146,880.00

***** CONCEPTO *****

CANT.	RENTISTICO	CONCEPTO	TOTAL CONCEPTO
1	50005-01-03	CAMBIO DE MODALIDAD Y MODIFICA	
		12 MARCAS Y LEAS COMERCIALES	73,440.00
		TOTAL :	\$ 73,440.00

SON: SETENTA Y TRES MIL CUATROCIENTOS CUARENTA PESOS

RESPONSABLE :

RECIBO DE CAJA APLICADO AL EXPEDIENTE No.

Carrera 13 No. 27-00 Pisos 5, 7 y 10
Conmutador 382 0840
Fax 350 5220
E-mail: info@sic.gov.co
www.sic.gov.co
Bogotá, D.C., Colombia

173
107

Industria y Comercio

SUPERINTENDENCIA

SUPERINDUSTRIA Y COMERCIO

Radicación : 01037439 00000002

Folios: 94

Fecha (AMB): 2001-08-22 14:30:55

Trámite : 002 PATENTES D 1 REGISTRADO/ 44 REPUESTA

Dependencia: 2020 DIVISION DE NUEVAS CREACIONES

NIT : 800176089-2

RECIBO OFICIAL DE CAJA : 01 - 32,330
FECHA : AGOSTO 22 DE 2001

***** CONSIGNACION *****

DEPOSITANTE	TIPO PAGO	BANCO	CUENTA	No. PAGO	FECHA PGO	Vr. PAGO
CASTILLO GRAU Y ASOCIADOS	CONSIGNACION	BANCO POPULAR	050-00110-6	5886372	22/08/2001	525,020.00

***** CONCEPTO *****

CANT.	RENTISTICO	CONCEPTO	TOTAL CONCEPTO
1	50005-01-01	SOLICITUDES	
		82 INVOCACION DE UNA PRIORIDAD EN NU	100,000.00
		TOTAL :	\$ 100,000.00

SON: CIENTO MIL PESOS

RESPONSABLE : _____

RECIBO DE CAJA APLICADO AL EXPEDIENTE No. _____

Carrera 13 No. 27-00 Pisos 5, 7 y 10
Conmutador 382 0840
Fax 350 5220
E-mail: info@sic.gov.co
www.sic.gov.co
Bogotá, D.C., Colombia

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PA 411646



THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

May 17, 2001

THIS IS TO CERTIFY THAT ANNEXED HERETO IS A TRUE COPY FROM THE RECORDS OF THE UNITED STATES PATENT AND TRADEMARK OFFICE OF THOSE PAPERS OF THE BELOW IDENTIFIED PATENT APPLICATION THAT MET THE REQUIREMENTS TO BE GRANTED A FILING DATE UNDER 35 USC 111.

APPLICATION NUMBER: 60/204,418

FILING DATE: May 12, 2000



**By Authority of the
COMMISSIONER OF PATENTS AND TRADEMARKS**

P. SWAIN

Certifying Officer

✓

05-15-00

APPROV 134
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EXPRESS MAIL CERTIFICATE

Date 5/12/00 Label No. 62508889264

I hereby certify that, on the date indicated above I deposited this paper or fee with the U.S. Postal Service & that it was addressed for delivery to the Assistant Commissioner for Patents, Washington, DC 20231 by "Express Mail Direct Office to Addressee" service.

Name (Print) D B Park Signature [Signature]

PLEASE CHARGE ANY DEFICIENCY UP TO \$300.00 OR CREDIT ANY EXCESS IN THE FEES DUE WITH THIS DOCUMENT TO OUR DEPOSIT ACCOUNT NO. 04-0100

DARBY & DARBY P.C.
805 Third Avenue
New York, New York 10022
212-527-7700

Docket No: 1313/OG996

Date: May 12, 2000

Box Provisional-Application
Assistant Commissioner for Patents
Washington, DC 20231

Sir:

Enclosed please find a provisional application for United States patent as identified below:

Inventor/s (ALL inventors, including NAME, plus city and state of RESIDENCE for each):

John P. ERSPAMER, Bartlett, Tennessee, U.S.A.
Brian E. BOEHMER, Bartlett, Tennessee, U.S.A.

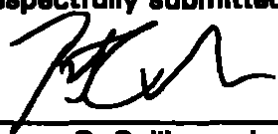
Title: ABSORBENT STRUCTURE WITH INTEGRAL VAPOR TRANSMISSIVE,
MOISTURE BARRIER

including the items indicated:

PROVISIONAL PATENT APPLICATION COVER SHEET

1. Specification and 0 claims: 0 indep.; 0 dep.; 0 multiple dep.
2. [X] Drawings, 5 sheets (Figs. 1-7)
3. [] Assignment for recording to:
4. [] Verified Statement Claiming Small Entity Status
5. [X] Check in the amount of \$150.00, (\$150 filing; \$0 recording)

Respectfully submitted,



Robert C. Sullivan, Jr.
Reg. No. 30,499
Attorney for Applicants

60201118-051200

MAILING LABEL WTD

Docket No. 1313/OG996

133
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EXPRESS MAIL CERTIFICATE

Date 5/12/99 Mail No. 02 508 339 264

I hereby certify that, on the date indicated above I deposited this paper or file with the U.S. Postal Service and that it was addressed for delivery to the Commissioner of Patents & Trademarks, Washington, DC 20234 by "Express Mail Post Office" delivery service.

Name (Print)

Signature

1313/0G996

**ABSORBENT STRUCTURE WITH INTEGRAL VAPOR
TRANSMISSIVE, MOISTURE BARRIER**

FIELD OF THE INVENTION

The present invention relates to absorbent structures useful in absorbent products such as disposable diapers, feminine hygiene products such as sanitary napkins and pantliners, absorbent surgical pads, adult incontinence products, and the like. More particularly, the present invention is directed to an absorbent structure including an absorbent core for absorbing and retaining fluids and a vapor-transmissive, moisture barrier integral therewith.

BACKGROUND OF THE INVENTION

Feminine hygiene products, such as sanitary napkins pantliners, and the like, are typically constructed with a body side liquid pervious topsheet, a liquid impervious backsheets and an absorbent structure (or core) sandwiched between the two. The construction of a typical product is such that the topsheet and backsheets are in intimate contact with the absorbent core and stabilized with an adhesive to keep them in intimate contact.

The backsheets is positioned on the garment-facing side of the product. The backsheets is necessary to provide a fluid barrier between the absorbent core and the user, preventing body exudates, imbibed by the absorbent core, from soiling the skin or clothing of the user.

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The backsheet is typically impermeable to moisture vapor, i.e., it has little or no vapor transmission properties. Thus, any vapors generated in use, such as perspiration or vaporization of volatiles by body heat, cannot escape and can cause skin wetness and discomfort while the product is being used.

There has been a trend in the market to design "breathability" into absorbent products to improve skin health and comfort of the user. In such products, the liquid impervious backsheet is replaced with a microporous material that has vapor transmission properties. The backsheet barrier is interrupted (i.e. no longer continuous) with small pores to allow vapors to escape. However, there is also an opportunity for the fluid to strike through the backsheet material, particularly upon the application of pressure commonly encountered during normal use of the absorbent product, resulting in wetting of the skin or clothing of the user.

Accordingly, the use of a breathable, microporous backsheet in an absorbent product requires that additional steps be taken to protect the user from exposure to the body exudates imbibed by the absorbent core. One option is to overdesign the absorbent core such that it has sufficient absorbent capacity to hold the fluid and prevent it from exiting the core and striking through the backsheet. This results in thicker, less comfortable products and adds undesirable expense to the cost of the absorbent core material.

Alternatively, an additional barrier material may be positioned between the absorbent core and the microporous backsheet. The additional barrier material may be a synthetic nonwoven or an apertured film. The material serves to provide additional barrier properties but also provides a space or gap between the absorbent core and the backsheet reducing the possibility that the fluid will strike through the core. The requirement for two separate layers adds expense and additional manufacturing steps to the structure.

Illustrative examples of absorbent products incorporating breathable backsheets are found in U.S. Patents 3,932,682 to Loft et al., 3,989,867 to Sisson, 4,196,245 to Kitson et al., 4,306,559 to Nishizawa et al., 4,341,216 to Obenour, 4,609,584 to Cutler et al., 4,626,252 to Nishizawa et al., 4,681,793 to Linman et al., 4,713,068 to Wang et al., 4,713,069 to Wang et al., 4,758,239 to Yeo et al., 4,818,600 to Braun et al., 4,828,556 to Braun et al., 5,364,381 to Soga et al., 5,498,463 to McDowall et al., 5,560,974 to Langley and 5,843,056.

All U.S. patents cited herein are hereby incorporated by reference. In the case of conflict of terminology, the present disclosure controls.

It would be desirable to provide an absorbent core for use in an absorbent product, having an integral vapor-transmissive, moisture barrier. Such a core would be less expensive and easier to manufacture than prior art arrangements involving separately formed materials which must be combined and adhered together to form a product.

SUMMARY OF THE INVENTION

It is one object of the present invention to provide a unitary absorbent core, including a fibrous absorbent layer and a vapor-transmissive, moisture barrier integral with one surface of the absorbent layer, which is thinner and more comfortable in use in an disposable absorbent product, such as feminine hygiene products, diapers and adult incontinence products.

It is another object of the present invention to provide a unitary absorbent core including an integral vapor-transmissive, moisture barrier which is less expensive to manufacture compared to absorbent cores incorporating apertured films, synthetic nonwovens and adhesives.

It is yet another object of the present invention to provide a unitary absorbent core including an integral vapor-transmissive, moisture barrier which allows for simple conversion into a finished absorbent product, based on the reduction in the number of raw materials and process steps required to carry out the conversion.

It is another object of the present invention to provide a unitary absorbent core including an integral vapor-transmissive, moisture barrier which is highly breathable, but also maintains an acceptable moisture barrier.

These and other objects are met by the present invention which is directed to a unitary absorbent core, including a fibrous, absorbent layer having an upper fluid receiving surface and a lower surface, and a hydrophobic vapor-transmissive, moisture barrier integral with the lower surface of the absorbent layer. The barrier is a hydrophobic latex applied to one surface of the absorbent layer as a foam. The absorbent core exhibits both a high water vapor transmission rate and a hydrostatic head pressure.

BRIEF DESCRIPTION OF THE FIGURES

Fig. 1 is a schematic representation of a conventional absorbent product having a topsheet and a non-permeable backsheet.

5 Fig. 2 is a schematic representation of a conventional absorbent product having a topsheet and a microporous backsheet with an apertured film layer.

Fig. 3 is a schematic representation of one embodiment of the present invention, including an optional microporous backsheet.

Figs. 4-7 are a photomicrographs generated by scanning electron microscopy (SEM) comparing surfaces treated according to the present invention and untreated surfaces.

DETAILED DESCRIPTION OF THE INVENTION

The unitary absorbent core of the present invention, include a fibrous, absorbent layer, or core, having an upper fluid receiving surface and a lower surface, and a vapor-transmissive, moisture barrier integral with the lower surface of the absorbent layer.

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20 The fibrous absorbent core may be formed using materials and techniques well known in the art. For example, the core may include one or more layers or strata of natural or synthetic fibers, hereafter the "absorbent layer". Cellulosic fibers are preferred for use in the absorbent layer. A web of such layers or strata may be formed using wet-laid or air-laid techniques, although air-laid processing is preferred. Binders such as thermal bicomponent fibers, may be incorporated in the absorbent layer. Small amounts of a latex spray may be applied to the surfaces of the absorbent layer to reduce "dust-off" of loose fibers and other particles. Further, for improved absorption of fluids, superabsorbent polymers (SAP) may be incorporated into the absorbent layer. SAPs may be incorporated into the absorbent layer as particles, granules, flakes, etc., and may be included as a discrete layer or mixed with the fibers of the absorbent layer.

The vapor-transmissive, moisture barrier is formed by applying a polymeric latex to the surface of the layer. Suitable polymer latex materials include both natural and synthetic polymers. Several manufacturers supply such latex materials including Rohm and Hass, B.F. Goodrich and Unichem Corp. A preferred latex is Unibond 0903 which is an acrylic polymer.

5 The latex can be applied by a variety of methods known in the art, including spraying, brushing, doctor blade, roller, and foam. Application by foam is most preferred.

After application of the latex to the surface of the absorbent layer, the latex is cured by removing water by drying or heat application. Optionally, crosslinking agents or other curing agents may be employed. Other additives typically included in the latex application.

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microporous backsheet may be included below the latex treatment surface as shown in Fig. 3. An apertured film, microporous material is available, for example, from Tredegar Corp., Richmond, VA, under the VISPORE tradename.

The following examples are provided to illustrate the invention but are not intended to limit its scope.

TEST METHODS

The following test methods were used to measure strikethrough, hydrostatic head and air porosity for the structures prepared in the following examples.

Frazier porosity - Air porosity of absorbent core samples was determined using an air permeability tester (TAPPI T-205). Specifically, four handsheets per experimental sample were tested using the air permeability tester. For each handsheet, a pressure drop of one half inch of water was established across the handsheet and air flow through the sheet was measured by the pressure drop across an orifice indicated on a vertical manometer. The average manometer reading was converted to air permeability using conversion tables.

Preparation of Synthetic Menstrual

The synthetic menstrual fluid used in these Examples contains the following ingredients in the designated amounts:

- Deionized water 903.3 g
- Sodium chloride 9.0 g
- Polyvinylpyrrolidone 122.0 g
- Biebrich Scarlet 4.0 g
- Total solution volume 1 liter

Biebrich Scarlet (red dye) can be obtained from Sigma Chemical Co., St. Louis, MO.

Polyvinylpyrrolidone (PVP, weight-average molecular weight approximately 55,000) can be obtained from Aldrich, Milwaukee, WI. Sodium chloride (ACS grade) can be obtained from J.T. Baker, Phillipsburg, NJ. The dry ingredients are mixed in water for at least two hours to ensure

complete dissolution. The solution temperature is adjusted to 22°C exactly. Sixteen milliliters of solution is pipetted into the UL adapter chamber of a Brookfield Model DV-II+ viscometer (Brookfield Engineering Laboratories, Inc., Stoughton, MA). The UL spindle is placed into the chamber and the viscometer speed is set to 30 rpm. The target viscosity is between 9 and 10 centipoise. Viscosity can be adjusted with additional water or PVP.

Strikethrough Test for Moisture Barrier

Samples were prepared into 4 in. x 4 in. squares. Each sample was placed onto a 4x4 Plexiglas backplate with the SAP-containing side facing up. The sample was covered with a 0.125 in. thick piece of 4in x 4in Plexiglass having a 1.25 in diameter hole in the center. A 5ml insult of synthetic menses at room temperature is introduced through the opening. After the sample has been allowed to absorb the insult for 20 minutes, a tared stack of 10 Whatman #3 filter papers are placed beneath the prototype pad. A 2500g weight is placed on the plexiglass cover and allowed to stand for 2 minutes. After 2 minutes, the filter papers are removed and weighed. Strikethrough is calculated as follows:

$$\text{Strikethrough (g)} = \text{Wet filter paper weight (g)} - \text{Tare filter paper weight (g)}$$

Hydrostatic Head Test

Hydrostatic head is measured by employing a modified version of test method ISO 811:1981 - EN 20811:1992. The reported method is modified by employing a testing diameter of 60 mm; a cylinder length of 100 mm, a manometer diameter of 10 mm (internal), a dosing pump equipped with a T-valve for rapid cylinder filling, and employing a 10% w/v in water solution of calcium chloride (anhydrous, analytical reagent grade). The calcium chloride is employed to inhibit swelling of any SAP particles in the test sample, which might otherwise interfere with web integrity during the test.

EXAMPLES

A 150 gm multibonded airlaid nonwoven absorbent core containing 25% SAP was treated with hydrophobic latex material to form a moisture barrier on one surface of the web. The moisture barrier properties are measured as resistance to strikethrough under load and height of a column of water (hydrostatic head) required for strikethrough. Air permeability was measured as Frazier Air Porosity.

COMPARATIVE EXAMPLE 1: Untreated Web

A 150 gm multibonded web was prepared. The web contained 69.7% fluff pulp (Foley fluff, Buckeye Technologies Inc., Memphis, TN, 12.0% bicomponent fibers (Type AL-Adhesion-C, Fiber Visions, Macon, GA; 1.3 % Latex (Airflex 124 Vinyl Acetate-Ethylene Emulsion, Air Products and Chemicals, Allentown, PA); and 17.0% particulate polyacrylate superabsorbent (SXM 70, Stockhausen Inc., Greensboro, NC).

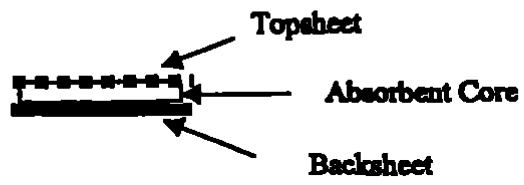
EXAMPLE 1 - Web Treated With Hydrophobic Latex

One surface of the 150 gm airlaid web described in Comparative Example 1 was coated with 10 gm of Unibond 0930 latex (Unichem Corp, Greenville, SC). The coating process was based on foam coating. The hydrophobic latex was whipped into a free standing foam at 10% solids using a Kitchen Aid household blender and extruded onto the surface of the airlaid web. The foam was lightly calendared and the foam collapsed. The latex was then cured at 140 ° C. for 10 minutes.

TABLE 1

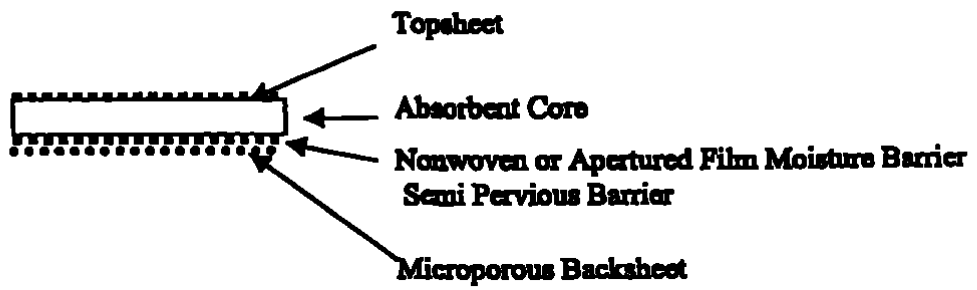
<u>Coating</u>	<u>Strikethrough</u> <u>(g)</u>	<u>Hydrostatic Head</u> <u>(mm)</u>	<u>Air Porosity</u> <u>(CFM)</u>
None	2.25	<5	211
10 gm Unibond 0903	0.08	85	235

Figure 1



PRIOR ART

Figure 2



PRIOR ART

Figure 3

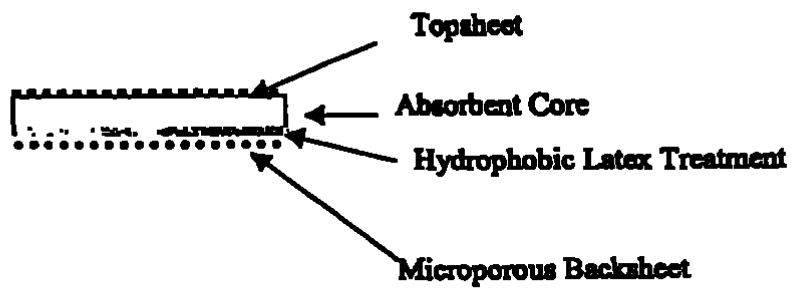


FIGURE 4
EXPERIMENTAL AIRLAD STRUCTURE - Untreated Surface
Hitachi Scanning Electron Microscope (BSE image)
Mag. 80X



FIGURE 5
EXPERIMENTAL AIRLAD STRUCTURE - Treated Surface
Hitachi Scanning Electron Microscope (BSE image)
Mag. 80X



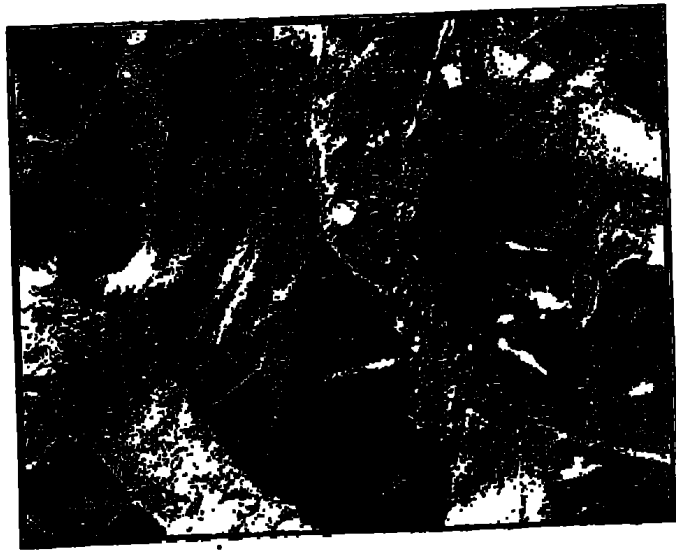
FIGURE 6
EXPERIMENTAL AIRLAD STRUCTURE - Untreated Surface
Hitachi Scanning Electron Microscope (BSE image)
Mag. 350X



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FIGURE 7
EXPERIMENTAL AIRLAD STRUCTURE - Treated Surface
Hitachi Scanning Electron Microscope (BSE image)
Mag. 350X



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THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

May 17, 2001

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APPLICATION NUMBER: 60/252,544

FILING DATE: November 22, 2000



**By Authority of the
COMMISSIONER OF PATENTS AND TRADEMARKS**

T. Lawrence

**T. LAWRENCE
Certifying Officer**

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DARBY & DARBY P.C.
805 Third Avenue
New York, New York 10022
212-527-7700

Docket No: 1313/OG996US1

Date: November 22, 2000

Box Provisional-Application
Assistant Commissioner for Patents
Washington, DC 20231

Sir:

Enclosed please find a provisional application for United States patent as identified below:

Inventor/s (ALL inventors, including NAME, plus city and state of RESIDENCE for each):

John P. ERSPAMER, Lakeland, Tennessee, U.S.A.
Brian E. BOEHMER, Bartlett, Tennessee, U.S.A.

Title: ABSORBENT STRUCTURE WITH INTEGRAL VAPOR TRANSMISSIVE,
MOISTURE BARRIER

including the items indicated:

PROVISIONAL PATENT APPLICATION COVER SHEET

60252544-112200

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127

1. Specification and 35 claims: 3 indep.; 13 dep.; 19 multiple dep.
2. ☒ Drawings, 9 sheets (Figs. 1-11)
3. ☐ Assignment for recording to:
4. ☐ Verified Statement Claiming Small Entity Status
5. ☒ Check in the amount of \$150.00, (\$150 filing; \$0 recording)

Respectfully submitted,



Robert C. Sullivan, Jr.
Reg. No. 30,499
Attorney for Applicants

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Docket No. 1313/OG996US1

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1313/0G996US1

**ABSORBENT STRUCTURE WITH INTEGRAL VAPOR
TRANSMISSIVE MOISTURE BARRIER**

FIELD OF THE INVENTION

The present invention relates to absorbent structures useful in absorbent products such as disposable diapers, feminine hygiene products such as sanitary napkins and pantliners, absorbent surgical pads, adult incontinence products, and other personal hygiene articles. More particularly, the present invention is directed to an absorbent structure including an absorbent core for absorbing and retaining fluids and a vapor-transmissive, moisture barrier integral therewith.

BACKGROUND OF THE INVENTION

Feminine hygiene products, such as sanitary napkins, pantliners, and other personal hygiene articles, are typically constructed with a body side liquid pervious topsheet, a liquid impervious backsheet and an absorbent structure, or core, sandwiched between the two. The construction of a typical product is such that the topsheet and backsheet are in intimate contact with the absorbent core and stabilized with an adhesive to keep them in intimate contact.

The backsheet is positioned on the garment-facing side of the product. The backsheet is necessary to provide a fluid barrier between the absorbent core and the user, preventing body exudates, imbibed by the absorbent core, from soiling the skin or clothing of the user.

The backsheet is typically impermeable to moisture vapor, that is, it has little or no vapor transmission properties. Thus, any vapors generated in use, such as perspiration or vaporization of volatiles by body heat, cannot escape and can cause skin wetness and discomfort while the product is being used.

5 There has been a trend in the state of the art to design "breathability" into absorbent products to improve skin health and comfort of the user. In such products, the liquid impervious backsheet is replaced with a microporous material that has vapor transmission properties. The backsheet barrier is interrupted with small pores to allow vapors to escape; thus, the backsheet is not continuous. However, there is also an opportunity for the fluid to strike
10 through the backsheet material, particularly upon the application of pressure commonly encountered during normal use of the absorbent product, resulting in wetting of the skin or clothing of the user.

Accordingly, the use of a breathable, microporous backsheet in an absorbent product requires that additional steps be taken to protect the user from exposure to the body
15 exudates imbibed by the absorbent core. One option is to overdesign the absorbent core such that it has sufficient absorbent capacity to hold the fluid and prevent it from exiting the core and striking through the backsheet. This results in thicker, less comfortable products and adds undesirable cost to the absorbent core.

Alternatively, an additional barrier material may be positioned between the
20 absorbent core and the microporous backsheet. The additional barrier material may be a synthetic nonwoven or an apertured film. The material serves to provide additional barrier properties but also provides a space or gap between the absorbent core and the backsheet reducing the possibility that the fluid will strike through the core. The requirement for two separate layers adds expense and additional manufacturing steps to the structure.

25 Illustrative examples of absorbent products incorporating breathable backsheets are found in U.S. Patents 3,932,682 to Loft et al., 3,989,867 to Sisson, 4,196,245 to Kitson et al., 4,306,559 to Nishizawa et al., 4,341,216 to Obenour, 4,609,584 to Cutler et al., 4,626,252 to Nishizawa et al., 4,681,793 to Limman et al., 4,713,068 to Wang et al., 4,713,069 to Wang et al., 4,758,239 to Yeo et al., 4,818,600 to Braun et al., 4,828,556 to Braun et al., 5,364,381 to Soga et
30 al., 5,498,463 to McDowall et al., 5,560,974 to Langley and 5,843,056 to Good et al., all of which are hereby incorporated by reference.

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Illustrative examples of absorbent products incorporating foams in absorbent products are found in U.S. Patents 4,554,297 to Dabi, 4,740,528 to Garvey et al., 5,260,345 to DesMarais et al., 6,040,494 to Kalentun et al. and 6,107,356 to DesMarais, WO 99/61518 to Chen et al. and WO 00/13637 to Carlucci et al, all of which are hereby incorporated by reference.

5 The disclosure WO 00/13637 describes an absorbent article containing a single foam layer, characterized by an absorbent-core portion of the foam treated to be hydrophilic and a backsheet portion treated to be hydrophobic.

SUMMARY OF THE INVENTION

10 It would be desirable to provide an absorbent core for use in an absorbent product having an integral vapor-transmissive moisture barrier. Such a core would be less expensive and easier to manufacture than prior art arrangements involving separately formed materials which must be combined and adhered together to form a product

15 It is one object of the present invention to provide a unitary absorbent core, including a fibrous absorbent layer and a vapor-transmissive moisture barrier integral with one surface of the absorbent layer, which is thinner and more comfortable in use in disposable absorbent products, such as feminine hygiene products, diapers and adult incontinence products.

20 It is another object of the present invention to provide a unitary absorbent core including an integral vapor-transmissive moisture barrier which is less expensive to manufacture compared to absorbent cores incorporating apertured films, synthetic nonwovens and adhesives.

25 It is yet another object of the present invention to provide a unitary absorbent core including an integral vapor-transmissive moisture barrier which allows for simple conversion into a finished absorbent product, based on a reduction in the number of raw materials and process steps required to carry out the conversion.

30 It is another object of the present invention to provide a unitary absorbent core including an integral vapor-transmissive moisture barrier that is highly breathable, but also maintains a significant moisture barrier.

These and other objects are met by the present invention which is directed to a unitary absorbent core comprising a fibrous absorbent layer having an upper fluid receiving surface and a lower surface with a hydrophobic vapor-transmissive moisture barrier integral with the lower surface of the absorbent layer. In a preferred embodiment, the barrier may be a hydrophobic latex emulsion applied to one surface of the absorbent layer. The absorbent core exhibits both a high water vapor

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transmission rate and a significant hydrostatic head (hydrohead) pressure. The absorbent core may have a moisture barrier which has a structure which substantially is fibers coated with hydrophobic material, or it may have a moisture barrier which has a reticulated remnant of a barrier material emulsion extending from the lower surface region of the absorbent layer to form an outer reticulated foam barrier.

BRIEF DESCRIPTION OF THE FIGURES

Figure 1 is a schematic representation of a conventional absorbent product having a topsheet and a non-permeable backsheets.

Figure 2 is a schematic representation of a conventional absorbent product having a topsheet and a microporous backsheets with an apertured film layer.

Figure 3 is a schematic representation of one embodiment of the present invention, including an optional microporous backsheets.

Figure 4 is a photomicrograph generated by scanning electron microscopy (SEM) at a magnification of 80X of an untreated lower surface of an absorbent layer of a unitary absorbent core.

Figure 5 is a photomicrograph generated by scanning electron microscopy (SEM) at a magnification of 80X of an treated lower surface of an absorbent layer of a unitary absorbent core.

Figure 6 is a photomicrograph generated by scanning electron microscopy (SEM) at a magnification of 350X of an untreated lower surface of an absorbent layer of a unitary absorbent core.

Figure 7 is a photomicrograph generated by scanning electron microscopy (SEM) at a magnification of 350X of an treated lower surface of an absorbent layer of a unitary absorbent core.

Figure 8 is a photomicrograph generated by scanning electron microscopy (SEM) at magnifications of 45X and 80X of an untreated lower surface of an absorbent layer of a unitary absorbent core.

Figure 9 is a photomicrograph generated by scanning electron microscopy (SEM) at magnifications of 250X and 450X of an untreated lower surface of an absorbent layer of a unitary absorbent core.

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Figure 10 is a photomicrograph generated by scanning electron microscopy (SEM) at magnifications of 45X and 80X of a treated lower surface of an absorbent layer of a unitary absorbent core with reticulated remnant of the barrier material emulsion.

Figure 11 is a photomicrograph generated by scanning electron microscopy (SEM) at magnifications of 250X and 450X of a treated lower surface of an absorbent layer of a unitary absorbent core with reticulated remnant of the barrier material emulsion.

DETAILED DESCRIPTION OF THE INVENTION

All U.S. patents cited herein are hereby incorporated by reference. In the case of a conflict in terminology, the present disclosure controls.

The unitary absorbent core of the present invention includes a fibrous, absorbent layer having an upper fluid receiving surface and a lower surface, and a vapor-transmissive moisture barrier integral with the lower surface of the absorbent layer.

The fibrous absorbent core may be formed using materials and techniques well known in the art. For example, the core may include one or more layers or strata of natural or synthetic fibers, hereinafter referred to as an "absorbent layer." Cellulosic fibers are preferred for use in the absorbent layer. The absorbent layer may be formed using wetlaid or airlaid techniques, although airlaid processes are preferred. Binders, such as, for example, wet strength agents, latex emulsions, thermal bicomponent fibers and combinations thereof, may be incorporated into the absorbent layer. Small amounts of a water-based hydrophilic emulsion binder may be applied to the surfaces of the absorbent layer to reduce "dust-off" of loose fibers and other particles. Further, for improved absorption of fluids, superabsorbent polymers (SAP) may be incorporated into the absorbent layer. SAP may be incorporated into the absorbent layer as particles, granules, flakes, etc., and may be included as a discrete stratum or mixed with the fibers of the absorbent layer. Materials such as fillers, perfumes, surfactants, and additives may be included in the core. Desirable absorbent cores suitable for use in the practice of this invention and components suitable for use in the cores are described in WO 99/16961, WO 99/63922, WO 99/63923, WO 99/63925, WO 00/41882, WO 00/38607, all of which are hereby incorporated by reference.

The structures of this invention can include natural fibers, synthetic fibers or mixtures of both natural and synthetic fibers. Examples of the types of natural fibers which can be used in the present invention include fluffed cellulose fibers prepared from cotton, softwood and/or hardwood

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pulps, straw, keaf fibers, cellulose fibers modified by chemical, mechanical and/or thermal treatments, keratin fibers such as fibers obtained from feathers, bagasse, hemp, and flax, as well as man-made staple fibers made with natural polymers such as cellulose, chitin, and keratin. Cellulosic fibers include chemically modified cellulose such as chemically stiffened cellulosic fibers by crosslinking agents, fibers treated with mercerizing agents and cellulose acetate. Examples of suitable synthetic matrix fibers include polyethylene, polypropylene, polyester, including polyester terephthalate (PET), polyamida, polyacetates, cellulose acetate and rayon fibers. Certain hydrophobic synthetic fibers, such as polyolefina, may be surface treated with surfactant to improve wettability, or may be used untreated, depending upon their placement in the core.

Examples of binders which may be useful in the absorbent structure of the present invention include polymeric binders in a solid or liquid form. The term "polymeric binder" refers to any compound capable of creating interfiber bonds between matrix fibers to increase the integrity of the stratum. At the same time, the binder may optionally bind fibers and SAP particles to each other. For example, a dispersion of natural or synthetic elastomeric latex may be used as a binder. Thermoplastic fibers or powder, which are well known in the art, are also commonly used to provide bonding upon heating of the absorbent structure to the melting point of the thermoplastic fiber or powder. Other binders, which can be used for stabilizing the absorbent structure of the present invention, include bonding agents used to bond cellulose fibers. These agents include polymers dispersed in water, which are cured after application to the fibrous web and create bonds between fibers or between fibers and SAP particles. Examples of such agents include various cationic starch derivatives and synthetic cationic polymers containing crosslinkable functional groups such as polyamide-polyamine epichlorohydrin adducts, cationic starch, dialdehyde starch and the like. Any combination of the above-described polymeric binders may be used for stabilizing the structure of the present invention.

Suitable binders for use in the structures of the invention include binders in liquid form or having a liquid carrier, including latex binders. Useful latex binders include vinyl acetate and acrylic ester copolymers, ethylene vinyl acetate copolymers, styrene butadiene carboxylate copolymers, and polyacrylonitriles, and sold, for example, under the trade names of Airbond, Airflex and Vinac of Air Products, Inc., Hycar and Geon of Goodrich Chemical Co., and Fulatex of H. B. Fuller Company. Alternatively, the binder may be a non-latex binder, such as epichlorohydrin and the like.

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For bonding the fibers specifically, and for structural integrity of the unitary absorbent core generally, water-based latex binders may be used. Alternatively, or in combination with a latex binder, thermoplastic binding material (fibers or powders) may be used for bonding upon heating to the melting point of the thermoplastic binding material. Suitable thermoplastic binding material

5 includes thermoplastic fibers, such as bicomponent thermoplastic fibers ("bico"). Preferred thermoplastic binding fibers provide enhanced adhesion for a wide range of materials, including synthetic and natural fibers, particles, and synthetic and natural carrier sheets. An exemplary thermoplastic bico fiber is Celbond Type 255 Bico fiber from KoSa.

Other suitable thermoplastic fibers include polypropylenes, polyesters, nylons and

10 other olefins, or modifications thereof. A preferred thermoplastic fiber is FiberVisions type AL-Adhesion-C Bicomponent Fiber, which contains a polypropylene core and an activated copolyolefin sheath.

In certain embodiments, the binder in the invention is a binding fiber, which comprises less than about 10 percent by weight of the SAP particles. In other embodiments of the

15 invention, the binder fibers comprise less than about 7 percent by weight of the absorbent structure.

Functional particles for use in the absorbent cores of the invention include particles, flakes, powders, granules or the like which serve as absorbents, odor control agents, such as, for example, zeolites or calcium carbonates, fragrances, detergents, antimicrobial agents and the like. The particles may include any functional powder or other particle having a particle diameter up to

20 3,000 μ (microns). In some preferred embodiments, the functional particles used in the core include super absorbent polymer particles ("SAP").

U.S. Patent Nos. 5,147,343; 5,378,528; 5,795,439; 5,807,916; and 5,849,211, which describe various superabsorbent polymers and methods of manufacture, are hereby incorporated by reference. Examples of the types of SAP particles which may be used in this invention, include

25 superabsorbent polymers in their particulate form such as irregular granules, spherical particles, staple fibers and other elongated particles. The term "superabsorbent polymer" or "SAP" refers to a normally water-soluble polymer, which has been cross-linked. There are known methods of making water-soluble polymers such as carboxylic polyelectrolytes to create hydrogel-forming materials, now commonly referred to as superabsorbents or SAPs, and it is well known to use such

30 materials to enhance the absorbency of disposable absorbent articles. There are also known methods of crosslinking carboxylated polyelectrolytes to obtain superabsorbent polymers. SAP particles

useful in the practice of this invention are commercially available from a number of manufacturers, including Dow Chemical (Midland, Michigan), Stockhausen (Greensboro, North Carolina), and Chemdal (Arlington Heights, Illinois). One conventional granular superabsorbent polymer is based on poly(acrylic acid) which has been crosslinked during polymerization with any of a number of multi-functional co-monomer crosslinking agents, as is well known in the art. Examples of multifunctional crosslinking agents are set forth in U.S. Patent Nos. 2,929,154; 3,224,986; 3,332,909; and 4,076,673, all of which are hereby incorporated by reference. Other water-soluble polyelectrolyte polymers are known to be useful for the preparation of superabsorbents by crosslinking, these polymers include carboxymethyl starch, carboxymethyl cellulose, chitosan salts, gelatin salts, etc. They are not, however, commonly used on a commercial scale to enhance absorbency of disposable absorbent articles, primarily due to lower absorbent efficiency or higher cost.

Superabsorbent particulate polymers are also described in detail in U.S. Patents 4,102,340 and Re 32, 649, both of which are hereby incorporated by reference. Suitable SAPs yield high gel volumes or high gel strength as measured by the shear modulus of the hydrogel. Such preferred SAPs contain relatively low levels of polymeric materials that can be extracted by contact with synthetic urine (so-called "extractables"). SAPs are well known and are commercially available from several sources. One example is a starch graft polyacrylate hydrogel marketed under the name IM1000 (Hoechst-Celanese; Portsmouth, VA). Other commercially available superabsorbents are marketed under the trademark SANWET (Sanyo Kasei Kogyo; Kabushiki, Japan), SUMIKA GEL (Sumitomo Kagaku Kabushiki; Haishi, Japan), FAVOR (Stockhausen; Garyville, LA) and the ASAP series (Chemdal; Aberdeen, MS). Most preferred for use with the present invention are polyacrylate-based SAPs. As used in the present invention, SAP particles of any size or shape suitable for use in an absorbent core may be employed.

The vapor-transmissive moisture barrier integral with the lower surface of the absorbent layer is formed by applying a hydrophobic material to a fibrous substrate for which it is desirable to impart a barrier to the transmission of liquids, but for which it is desirable to permit the passage of vapors including water vapor. Figures 4 and 6 show the lower surface of the absorbent layer of an airlaid nonwoven absorbent core, as prepared in Example A below, which is untreated. Figures 5 and 7 show the treated lower surface of the absorbent layer of an airlaid nonwoven absorbent core, as prepared in Example B below. The term "vapor-transmissive moisture barrier

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integral with the lower surface of an absorbent layer" as used herein means that the barrier material coats at least some of the individual fibers of the absorbent layer, as shown in Figures 5 and 7, but that a continuous film is not formed. The absorbent layer remains vapor-transmissive since the pore structure between the untreated fibers, shown in Figures 4 and 6, remains substantially open after treatment to form the barrier, as shown in Figures 5 and 7. With the moisture barrier in place on the substrate, the unitary absorbent core has a hydrohead of 30 mm or greater as measured by modified EDANA nonwoven repellency test 120.1-80, a strikethrough of 1.8 g or less as measured by the standard strikethrough test, an air permeability of 18 m³/min/m² (60 ft³/min/ft²) or greater as measured by modified ASTM D 737-96, and a water vapor transmission rate (WVTR) of 500 g/m²/24 hr or greater. In one embodiment, the unitary absorbent core has a hydrohead of 85 mm or greater, a strikethrough of 0.08 or less, and an air porosity of 235 CFM or greater.

Within the scope of this invention is a vapor-transmissive moisture barrier integral with the lower surface of an absorbent layer where the hydrophobic barrier material coats at least some of the individual fibers of the absorbent layer, and where a reticulated remnant of a barrier material emulsion extends from the surface region of the absorbent layer to form an outer reticulated foam barrier as shown in Figures 10 and 11. In Figure 10, the SEM photomicrograph at 80X shows several fibers intermingled with the reticulated remnant of the barrier material emulsion.

Hydrophobic materials suitable for use in this invention include a wide variety of materials known for water repellency, such as, for example, water insoluble thermoplastic organic materials including hydrocarbons and naturally occurring resins from petroleum, asphalt and coal tar, silicon compounds including polyorganosiloxanes, polysiloxanes containing halogens, especially fluorine, halohydrocarbons, especially polymers containing chlorine and fluorine, and various polymers in the form of natural or synthetic emulsions. Emulsion polymers suitable for use in this invention include lattices containing polymers, copolymers, as well as mixtures and blends of polymers and copolymers, containing in polymerized form one or more monomers of vinyl acetate, vinyl chloride, vinyl alcohol, acrylics, acrylates, acrylonitrile, ethylene, propylene, styrene, butadiene, isoprene, and various halogenated counterparts thereof.

In a preferred embodiment, the vapor-transmissive moisture barrier is formed by applying a hydrophobic polymeric latex emulsion to the lower surface of the absorbent layer. In at least one embodiment, it is desirable that a barrier is produced which has a contact angle for water on the film cast from an emulsion of about 90° or greater, as measured by the contact angle test.

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Suitable hydrophobic polymeric emulsions include emulsions of both natural and synthetic polymers, including synthetic latexes. Several manufacturers supply such latex emulsions including Rohm and Haas, B.F. Goodrich, Air Products Polymers and Unichem Inc. A preferred latex emulsion is Unibond 0930 (Unichem Inc., Greenville, SC) which is an acrylic polymer. The emulsion can be applied by a variety of methods known in the art, including spray, brush, doctor blade, roller, and foam. Foam application is preferred.

The preferred application process involves the injection of air into an emulsion to form bubbles and create a temporary foam, or froth. In this application process, the collapse of the froth and elimination of air bubbles during the process of drying and curing the emulsion occurs.

Advantages of foam application are more uniform reagent distribution, ability to apply reagent at higher solids contents, and more control over reagent penetration into the substrate.

For the embodiment of this invention where the moisture barrier produced has a reticulated remnant of a barrier material emulsion extending from the lower surface region of the absorbent layer to form an outer reticulated foam barrier, it is preferable to use a foam that has greater stability than the easily collapsable foams used for moisture barrier formation where no outer reticulated foam barrier is produced.

For a description of suitable conventional foaming procedures and foam stabilizers and foaming agents, reference is made to Mage, E. W., "Latex Foam Rubber," John Wiley and Sons, New York (1962) and Rogers, T. H., "Plastic Foams", Paper, Reg. Tech. Conf., Palisades Sect., Soc. Plastics Engrs., New York, November, 1964. Most common are the alkali metal, ammonia, and amine soaps of saturated or unsaturated acids having, for example, from about 12 to about 22 carbon atoms. Examples of suitable soaps include tallow soaps and coconut oil soaps, preferably the volatile amine or ammonia soaps, so that the volatile portion is vaporized from the foam. Other useful foaming-foam-stabilizing agents include lauryl sulfate-lauryl alcohol, lauryl sulfate-lauric acid, sodium lauryl sulfate, and other commonly used foamed stabilizers or foaming agents.

A preferred emulsion for the formation of the moisture barrier produced with a reticulated remnant of a barrier material emulsion extending from the lower surface region of the absorbent layer to form an outer reticulated foam barrier is Unibond 0938 from Unichem, which is an acrylic copolymer dispersed in a water base. Application by foam is preferred for Unibond 0938.

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Unibond 0938 is engineered so that it does not collapse on the surface upon which it is foamed. After the Unibond 0938 foam is dried and cured, an elastic, reticulated structure, a reticulated remnant of the barrier material emulsion remains on the surface. See Figures 8-11, which are scanning electron micrographs (SEM's) of treated and untreated surfaces.

5 Generally, whether the moisture barrier formed has a reticulated remnant of the barrier material emulsion is a consequence primarily of the stability of the foam, which is influenced by the nature of the emulsion polymer in the emulsion, whether a foam stabilizer is used and the process conditions during application. In practice this is easily controlled.

10 After application of the latex emulsion to the surface of the absorbent layer, the emulsion is cured by removing water by drying or heat application. Optionally, crosslinking agents or other curing agents may be employed. Other additives may be included in the emulsion, such as biocides, water repellents, fillers and colorants.

15 Whichever application technique is used, it is important that the latex emulsion be applied in a sufficient quantity to at least partially coat a majority of individual fibers in the surface region of the absorbent layer. As used herein, "surface region" refers to the fibers of the absorbent layer directly exposed to the surface and several layers of fibers below such outermost fibers to a depth of from about 0.05 mm to about 0.8 mm from the surface. As used herein, "partially coat" refers to the average portion of the surface area of a specific fiber, coated with emulsion. Preferably, the fibers are coated by at least enough emulsion to render the fibers hydrophobic.

20 At the same time, it is important that the amount of latex emulsion applied not be so great that a continuous layer or film of polymer results. A continuous layer is disadvantageous because of the adverse affect on water vapor permeability of the resultant structure.

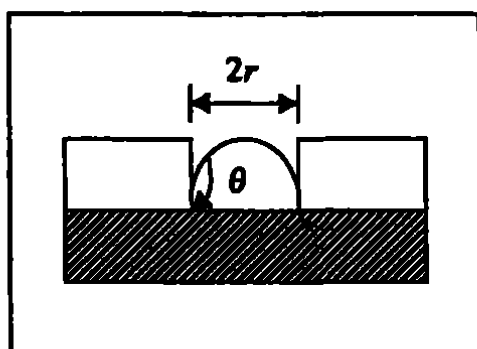
25 The amount of emulsion necessary to provide coated fibers without forming a continuous film or layer depends upon the density of the absorbent layer, the type of fibers employed, the type and physical properties of the emulsion employed, the method of application and the method of curing the absorbent core.

30 Without wishing to be bound by theory, it is believed that application of at least a partial coating of surface fibers with latex emulsion provides a hydrophobic moisture barrier, but because a continuous film or layer is not present, the pores created by adjacent coated fibers permit transmission of water vapor through the barrier.

In a preferred embodiment, the present invention includes a topsheet and an absorbent core treated with a hydrophobic latex emulsion as described herein. In a second preferred embodiment, a microporous backsheets may be included below the latex treated surface as shown in Figure 3. A microporous material is available, for example, from Tredegar Film Products (Richmond, VA) under the EXAIRETM trade name, which is calcium carbonate filled polyolefin films where pores are formed at calcium / polymer interface sites when the film is deliberately stretched during production.

The applicants do not wish to be bound by theory, however, fabric water repellency and breathability have been studied for several decades (A. W. Adamson, Physical Chemistry of Surfaces, Second Edition, Wiley, 1967, Chapters VII and X), and a nonwoven web of fibers can be modeled as a bundle of cylindrical pores (capillaries) of radius r . See Figure A-1.

Figure A-1. Schematic drawing of a pore



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The fluid pressure required to penetrate the interfiber pores of a nonwoven web can be approximated from Laplace's equation for the penetration of a fluid into a tube:

where:

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- P = pressure required to push fluid through the tube
- γ = fluid surface tension
- θ = advancing contact angle
- r = pore radius

This equation can be used to describe web wetting ($\theta < 90^\circ$, P is positive) or web water repellency ($\theta > 90^\circ$, P is negative). In the case of water repellency, the fluid will not wet the web unless a pressure of P is applied to push the fluid into the web.

From the equation, barrier quality is predicted to be enhanced by increasing the contact angle with a water-repellent finish. In other words, the pores of the web should be rendered as hydrophobic as possible.

Apparent contact angles can be increased by surface roughness on the macroscale and microscale. Application of a waterproofing agent that causes microscopic pore surface roughness will lead to an increase in apparent contact angle, thus improving barrier quality.

From the equation, barrier quality is predicted to be enhanced by reducing the size of the interfiber pores. Ideally, the web should be as strong as possible. As pressure builds, weakness in the web will cause deformation, and deformation increases r , thus lowering pressure P . Web strength can be enhanced by, for example, increasing the amount of binder in the web.

The size of interfiber pores in a fibrous web is determined by the fiber size and the density or extent of compaction of the web. Increasing the density of the web can reduce the size of interfiber pores, or using smaller diameter fibers at the same density can reduce them. Smaller fibers pack together more efficiently in a densified web, resulting in smaller interfiber pores. From the equation, using smaller fibers serves to decrease r , thus raising pressure P .

Filler material can be added to the hydrophobic emulsion to reduce the size of interfiber pores. From the equation, the addition of filler serves to decrease r , thus raising pressure P . The addition of filler to the treatment of the present invention increases barrier performance by partially blocking the pores of the nonwoven web, resulting in improved barrier quality. Filler suitable for use in the practice of this invention include calcium carbonate, various kinds of clay (bentonite and kaolin), silica, alumina, barium sulfate, sodium carbonate, talc, magnesium sulfate, titanium dioxide, zeolites, aluminum sulfate, cellulose-type powders, diatomaceous earth, magnesium sulfate, magnesium carbonate, barium carbonate, mica, carbon, calcium oxide, magnesium oxide, aluminum hydroxide, pulp powder, wood powder, cellulose derivative, polymer particles, chitin and chitin derivatives.

From the equation, barrier quality is predicted to be directly proportional to the fluid surface tension. The barrier treatment should be as durable as possible. Any additives in the barrier

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treatment that will dissolve in the fluid will likely lower its surface tension, thus lowering pressure P.

The contact angle test may be used to determine the contact angle of water on films cast from materials used to make the barrier, and in particular, water-based latex emulsions.

5 The emulsion is diluted with water to form a solution containing 10% solids. The solution is poured onto a borosilicate microscope slide to form a visible coat. The coated slide is set aside to dry overnight at ambient temperature and humidity. The coated slide is cured in a forced-air oven at 140°C for five minutes. The advancing contact angle is measured using an FTÅ 200 (First Ten Angstroms, Portsmouth, VA) with reverse-osmosis treated water injected with a 27-gauge
10 needle. The FTÅ 200 measures the advancing contact angle by the drop shape method.

Contact angles were measured for a naked slide (a "blank"), for Unibond 0930 and Unibond 0938 (both acrylic latex emulsions from Unichem Inc., Greenville, SC) and for Airflex 192 (ethylene-vinyl acetate latex emulsion, Air Products Polymers, Allentown, PA).

15 Water prefers to wet some surfaces and prefers to bead on others. A surface can be classified as hydrophilic, or water loving, with a water contact angle less than 90°, or hydrophobic, or water hating, with a water contact angle greater than 90°, based on the shape that a drop of water assumes when placed on that surface.

Table B-1. Contact angle measurements for films cast from latex emulsions

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Material	Contact angle
Naked glass slide (blank)	47.5
Unibond 0930	95.9
Unibond 0938	105.8
Airflex 192	44.4

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Table B-1 shows results from contact angle measurements for films cast with Unibond 0930 and Unibond 0938 (Unichem Inc., Greenville, SC) and Airflex 192 (Air Products Polymers, Allentown, PA) latex emulsions. Table B-1 shows that Unibond 0930 and Unibond 0938 were both successful in rendering the surface of the microscope slide hydrophobic with a
30 contact angle greater than 90°. Table B-1 shows that Airflex 192 was not successful in rendering the slide hydrophobic since it produced a contact angle less than 90°.

The applicants do not suggest that the results of this contact angle test are definitive in determining which materials can be used in the practice of this invention. However,

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any materials capable of delivering a contact angle greater than 90° in this test would be a candidate for possible use in the present invention, provided that the material can be applied to a surface of an absorbent layer to render it hydrophobic without creating a continuous film which does not permit the passage of vapor. The hydrophobic emulsions Unibond 0930 and Unibond 0938 (Unichem Inc., Greenville, SC) are preferred latex emulsions for use in the practice of the present invention.

In an alternative process for the preparation of a unitary absorbent core comprising a fibrous absorbent layer having an upper fluid receiving surface and a lower surface with a hydrophobic vapor-transmissive moisture barrier integral with the lower surface of the absorbent layer, a hydrophobic material may be dissolved in a suitable solvent and contacted with the lower surface of the absorbent layer followed by causing the solvent to be removed. The solution may be applied to the lower surface of the absorbent layer by spraying, or the lower surface of the absorbent layer may be brought into contact with the solution by brief partial immersion, followed by draining and evaporation of the solvent.

Breathable fibrous materials and unitary absorbent cores of this invention desirable have a hydrohead as measured by modified EDANA nonwoven repellency test 120.1-80 of 30 mm or more, preferably of 50 mm or more, more preferably of 70 mm or more, and even more preferably of 90 mm or more.

Breathable fibrous materials and unitary absorbent cores of this invention desirable have a strikethrough as measured by the standard strikethrough test of 1.8 g or less, preferably of 1.2 g or less, more preferably of 0.7 g or less, and even more preferably of 0.1 or less.

Breathable fibrous materials and unitary absorbent cores of this invention desirable have an air permeability as measured by modified ASTM D 737-96 of 18 m³/min/m² (60 ft³/min/ft²) or greater, preferably of 31 m³/min/m² 100 ft³/min/ft² or greater, more preferably of 43 m³/min/m² 140 ft³/min/ft² or greater, and even more preferably of 61 m³/min/m² 200 ft³/min/ft² or greater.

Breathable fibrous materials and unitary absorbent cores of this invention desirably have water vapor transmission rate as measured by the water vapor transmission rate (WVTR) test which is a modification of ASTM E 96-95 of 500 g/m²/24 hr or greater, preferably of 1000 g/m²/24 hr or greater, more preferably of 2000 g/m²/24 hr or greater, and even more preferably of 3000 g/m²/24 hr or greater.

Breathable fibrous materials and unitary absorbent cores of this invention having a WVTR of 500 g/m²/24 hr or greater desirably have barrier effectiveness values of 10 mm or greater, more desirably of 30 mm or greater, preferably of 50 mm or greater, more preferably of 75 mm or greater, still more preferably of 100 mm or greater.

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TEST METHODS

The following test methods were used to measure strikethrough, hydrostatic head and air porosity for the structures prepared in comparative example A and example B.

10 Frazier porosity - Air porosity of absorbent core samples was determined using an air permeability tester. Specifically, four handsheets per experimental sample were tested using the air permeability tester. For each handsheet, a pressure drop of 1.3 cm (one half inch) of water was established across the handsheet and air flow through the sheet was measured by the pressure drop across an orifice indicated on a vertical manometer. The average manometer reading was converted to air permeability using conversion tables.

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Preparation of Synthetic Menses

The synthetic menstrual fluid used in these Examples contains the following ingredients in the designated amounts:

- 20 Deionized water 903.3 g
Sodium chloride 9.0 g
Polyvinylpyrrolidone 122.0 g
Biebrich Scarlet 4.0 g
Total solution volume 1 liter

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Biebrich Scarlet (red dye) can be obtained from Sigma Chemical Co., St. Louis, MO. Polyvinylpyrrolidone (PVP, weight-average molecular weight approximately 55,000) can be obtained from Aldrich, Milwaukee, WI. Sodium chloride (ACS grade) can be obtained from J.T. Baker, Phillipsburg, NJ. The dry ingredients are mixed in water for at least two hours to ensure
30 complete dissolution. The solution temperature is adjusted to 22°C exactly. Sixteen milliliters of solution is pipetted into the UL adapter chamber of a Brookfield Model DV-II+ viscometer

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(Brookfield Engineering Laboratories, Inc., Stoughton, MA). The UL spindle is placed into the chamber and the viscometer speed is set to 30 rpm. The target viscosity is between 9 and 10 centipoise. Viscosity can be adjusted with additional water or PVP.

5 Strikethrough Test for Moisture Barrier

Samples were prepared into 10.3 cm X 10.3 cm (4 in. x 4 in.) squares. Each sample was placed onto a 10.3 cm X 10.3 cm (4x4) Plexiglas backplate with the SAP-containing side facing up. The sample was covered with a 3.2 mm (0.125 in.) thick piece of 10.3 cm X 10.3 cm (4in x 4in) Plexiglass having a 3.2 cm (1.25 in) diameter hole in the center. A 5ml insult of synthetic menses at room temperature is introduced through the opening. After the sample has been allowed to absorb the insult for 20 minutes, a tared stack of 10 Whatman #3 filter papers are placed beneath the prototype pad. A 2500g weight is placed on the plexiglass cover and allowed to stand for 2 minutes. After 2 minutes, the filter papers are removed and weighed. Strikethrough is calculated as follows:

15 $\text{Strikethrough (g)} = \text{Wet filter paper weight (g)} - \text{Tare filter paper weight (g)}$

Hydrostatic Head Test

Hydrostatic head is measured by employing a modified version of test method ISO 811:1981 - EN 20811:1992. The reported method is modified by employing a testing diameter of 60 mm; a cylinder length of 100 mm, a manometer diameter of 10 mm (internal), a dosing pump equipped with a T-valve for rapid cylinder filling, and employing a 10% w/v in water solution of calcium chloride (anhydrous, analytical reagent grade). The calcium chloride is employed to inhibit swelling of any SAP particles in the test sample, which might otherwise interfere with web integrity during the test.

EXAMPLES

A 150 gsm multibonded airlaid nonwoven absorbent core containing 25% SAP was treated with hydrophobic latex material to form a moisture barrier on one surface of the web. The moisture barrier properties are measured as resistance to strikethrough under load and height of a column of water (hydrostatic head) required for strikethrough. Air permeability was measured as Frazier Air Porosity.

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COMPARATIVE EXAMPLE A: Untreated Web

A 150 gsm multibonded web was prepared. The web contained 69.7% fluff pulp (Foley fluff, Buckeye Technologies Inc., Memphis, TN, 12.0% bicomponent fibers (Type AL-Adhesion-C , Fiber Visions, Macon, GA; 1.3 % Latex (Airflex 124 Vinyl Acetate-Ethylene Emulsion, Air Products and Chemicals, Allentown, PA); and 17.0% particulate polyacrylate superabsorbent (SXM 70, Stockhausen Inc., Greensboro, NC).

EXAMPLE B - Web Treated With Hydrophobic Latex

One surface of the 150 gsm airlaid web described in Comparative Example 1 was coated with 10 gsm of Unibond 0930 latex (Unichem Corp, Greenville, SC). The coating process was based on foam coating. The hydrophobic latex was whipped into a free standing foam at 10% solids using a Kitchen Aid household blender and extruded onto the surface of the airlaid web. The foam was lightly calendered and the foam collapsed. The latex was then cured at 140 ° C. for 10 minutes.

TABLE 1

<u>Coating</u>		Strikethrough	Hydrostatic Head	Air Porosity
		(g)	(mm)	(CFM)
20	None	2.25	<5	211
	10 gsm Unibond 0903	0.08	85	235

As can be seen from the data in Table 1, the latex treated sample provided a greatly reduced strikethrough and a much higher hydrostatic head compared to the untreated control. At the same time, the permeability of the test structure was slightly better than the control.

The following test methods were used to measure water vapor transmission rate, air permeability, strikethrough and hydrostatic head for the structures prepared in the following examples.

Water vapor transmission rate

The method is used to determine the water vapor transmission rate (WVTR) through airlaid handsheets is a modification of ASTM E 96-95.

Apparatus for this test includes a vapometer cup (#68-1, Thwing-Albert Instrument Co., Philadelphia, PA) and a forced-air oven capable of maintaining a temperature of 38°C plus or minus 1°C (Lindberg/Blue M, Lindberg/Blue M Co., Asheville, NC, or equivalent). A circular sample 7.6 cm (three inches) in diameter is cut from a handsheet. One hundred milliliters of deionized water is placed into the vapometer cup. The test material is placed over the cup opening. The screw-on flange is tightened over the test material, leaving an exposed sample area of 33.17 square centimeters. The initial weight of the cup is recorded. The cup is placed on a tray and set in the forced-air oven for 24 hours at 38°C. After 24 hours, the cup is removed from the oven and reweighed to determine total water loss. WVTR is calculated as follows:

$$\text{WVTR (g/m}^2\text{/24 hours)} = [\text{total water loss over 24 hours (g)} \times 301.5]$$

The report for each test includes the average WVTR ($n=3$) for treated samples compared to the average WVTR ($n=3$) for the untreated control material. Note that the relative humidity within the oven is not specifically controlled in this test.

Air permeability

This method is a modification of the standard air permeability test for woven and nonwoven fabrics, ASTM D 737-96. Air permeability through the treated samples is compared with air permeability through untreated samples to give relative permeability effectiveness.

Air permeability of absorbent core handsheets is determined using an air permeability tester (Model 9025, modified with digital "A" and "B" gauges, U.S. Testing Co., Inc., 1415 Park Ave., Hoboken, NJ 07030). Specifically, three handsheets per experimental sample ($n=3$) are tested using the air permeability tester. For each handsheet, a pressure drop of 1.3 cm (0.5 in.) of water is established across the handsheet. Airflow through the sheet is measured by the pressure drop across an orifice indicated on a vertical manometer. The average manometer reading is converted to air permeability using conversion tables provided by the manufacturer of the air permeability tester. Air permeability is reported as airflow in $\text{m}^3/\text{min}/\text{m}^2$ and cubic feet per minute per square foot ($\text{ft}^3/\text{min}/\text{ft}^2$).

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Synthetic menses

The synthetic menstrual fluid used in these examples contains the following ingredients in the designated amounts:

- 5 Deionized water 903.3 g
- Sodium chloride 9.0 g
- Polyvinylpyrrolidone 122.0 g
- Biebrich Scarlet 4.0 g
- Total solution volume 1 liter

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Biebrich Scarlet (red dye) was obtained from Sigma Chemical Co., St. Louis, MO. Polyvinylpyrrolidone (PVP, weight-average molecular weight approximately 55,000) was obtained from Aldrich, Milwaukee, WI. Sodium chloride (ACS grade) was obtained from J.T. Baker, Phillipsburg, NJ. The dry ingredients are mixed in water for at least two hours to ensure complete dissolution. The solution temperature is adjusted to 22°C exactly. Sixteen milliliters of solution is pipetted into the UL adapter chamber of a Brookfield Model DV-II+ viscometer (Brookfield Engineering Laboratories, Inc., Stoughton, MA). The UL spindle is placed into the chamber and the viscometer speed is set to 30 rpm. The target viscosity for the synthetic menses is between 9 and 10 centipoise. Viscosity can be adjusted with additional water or PVP.

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Strikethrough

This test is used to measure the resistance of sample materials to penetration by synthetic menses.

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Samples are cut into 10.3 cm X 10.3 cm (4 in. x 4 in.) squares. Each sample is placed onto a 10.3 cm X 10.3 cm (4 in. x 4 in.) Plexiglas bottom plate with the treated side facing down. The sample is covered with a 3.2 mm (0.125 in.) thick, 10.3 cm X 10.3 cm (4 in. x 4 in.) Plexiglas top plate with a 3.2 cm (1.25-in.) diameter hole cut in its center. A 5 ml insult of synthetic menses (room temperature) is introduced through the hole in the top plate. After waiting for 20 minutes, a tared stack of 10 Whatman #3 filter papers, 110 mm circles, (Whatman International Ltd., England)

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is placed on the bottom plate beneath the sample. A 2500 g weight is placed on the Plexiglas top

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plate and is allowed to stand for 2 minutes. After 2 minutes, the filter papers are removed and weighed. Strikethrough is calculated as follows:

$$\text{Strikethrough (g)} = \text{Wet filter paper weight (g)} - \text{Tare filter paper weight (g)}$$

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This test is usually run in triplicate (n=3) and the average value is reported in the unit of grams.

Hydrostatic head

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Hydrostatic head (hydrohead) is measured by using a modified version of the EDANA nonwoven repellency test 120.1-80. This EDANA test is based on test method ISO 811:1981 - EN 20811:1992. The EDANA method is modified by using a testing diameter of 60 mm; a cylinder length of 100 mm; a manometer diameter of 10 mm (internal); a dosing pump equipped with a T-valve for rapid cylinder filling; and an aqueous test solution of 10% (w/v) calcium chloride (General Chemical Co., Parsippany, NJ). The calcium chloride is used to inhibit swelling of any SAP particles in the test sample, which might otherwise interfere with web integrity during the test. This test is usually run in triplicate (n=3) and the average result is reported in the unit of millimeters of hydrohead.

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EXAMPLES

The following examples are presented to provide a more detailed understanding of the invention. The specific materials and parameters are exemplary and are not intended to limit the scope of the invention.

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Examples 1 and 2: laboratory application of frothed emulsion

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Example 1. untreated core. A three-layer, multibonded absorbent core was prepared on an airlaid pilot line containing three forming heads. The first or bottom layer of the core contained 40 gsm of fluff pulp (Foley Fluffs, Buckeye Technologies Inc., Memphis, TN) and 5 gsm of bicomponent binder fiber (Type AL-Adhesion-C, 1.55 dpf x 4 mm, FiberVisions, Macon, GA). The second or middle layer contained 33 gsm of fluff pulp (Foley Fluffs, Buckeye Technologies Inc.,



Memphis, TN), and 7 gm of bicomponent binder fiber (Type AL-Adhesion-C, 1.55 dpf x 4 mm, FiberVisions, Macon, GA). The third or top layer contained 32 gm of fluff pulp (Foley Fluffs, Buckeye Technologies Inc., Memphis, TN), 6 gm of bicomponent binder fiber (Type AL-Adhesion-C, 1.55 dpf x 4 mm, FiberVisions, Macon, GA), 25 gm of granular polyacrylate superabsorbent (Favor SXM 70, Stockhausen Inc., Greensboro, NC) and 2 gm of latex adhesive (Airflex 124 ethylene-vinyl acetate emulsion, Air Products Polymers, Allentown, PA) sprayed on top for dust control. The absorbent core had an overall basis weight of 150 gm and a density of 0.1 g/cc.

Example 2. laboratory application of hydrophobic emulsion. The bottom surface (wire side) of the 150 gm airlaid absorbent core described as Example 1 was coated with 9.0 gm (dry basis) of Unibond 0930 latex emulsion (Unichem Corp., Greenville, SC). The core was treated in the laboratory using a process based on the application of a foam or froth. A water-based emulsion containing 10% latex solids and 1% frothing aid (Unifroth 0448, Unichem Inc., Greenville, SC) was whipped into froth using a household blender. The froth was placed onto the surface of the absorbent core with the aid of a screed. The froth was lightly calendared and the froth collapsed. The emulsion was dried and cured in a forced-air oven at 140°C for 10 minutes.

Table 1. Test results for laboratory application of breathable barrier

Example	Barrier, gm	Hydrohead, mm	Strikethrough, g	Air permeability, m ³ /min/m ² (ft ³ /min/ft ²)
1	0.0	<5	2.25	64.3 (211)
2	9.0	85	0.08	71.6 (235)

The data in Table 1 shows that the treated core, Example 2, provided a reduced strikethrough and a higher hydrostatic head compared to the untreated "blank", Example 1. At the same time, the air permeability of the treated core was slightly better than the control.

Examples 3 through 7: pilot-scale application of frothed emulsion

Example 3, untreated core. A three-layer, multibonded absorbent core was prepared on an airlaid pilot line containing three forming heads. The first or bottom layer of the core contained 40 gm of Grade ND-416 pulp (Weyerhaeuser Co., Tacoma, WA) and 5 gm of bicomponent binder fiber (Type AL-Adhesion-C, 1.55 dpf x 4 mm, FiberVisions, Macon, GA). The

second or middle layer contained 33 gm of fluff pulp (Foley Fluffs, Buckeye Technologies Inc., Memphis, TN), and 7 gm of bicomponent binder fiber (Type AL-Adhesion-C, 1.55 dpf x 4 mm, FiberVisions, Macon, GA). The third or top layer contained 32 gm of fluff pulp (Foley Fluffs, Buckeye Technologies Inc., Memphis, TN), 6 gm of bicomponent binder fiber (Type AL-Adhesion-C, 1.55 dpf x 4 mm, FiberVisions, Macon, GA), 25 gm of granular polyacrylate superabsorbent (Favor SXM 70, Stockhausen Inc., Greensboro, NC) and 2 gm of latex adhesive (Airflex 192 ethylene-vinyl acetate emulsion, Air Products Polymers, Allentown, PA) sprayed on top for dust control. The absorbent core had an overall basis weight of 150 gm and a density of 0.1 g/cc.

Example 4. core treated with hydrophobic emulsion on pilot line. The bottom surface (wire side) of the 150 gm airlaid absorbent core described as Example 3 was treated with 10 gm (dry basis) of Unibond 0930 latex emulsion (Unichem Corp., Greenville, SC). The core was treated with the hydrophobic latex emulsion on an airlaid pilot line using a process based on the application of a foam or froth. A water-based emulsion containing 10% latex solids and a frothing aid (Unifroth 0448, Unichem Corp., Greenville, SC, added to the emulsion in the amount of 0.5% based on total emulsion solids) was applied to the core as froth using a Gaston Systems applicator (Chemical Foam System, Gaston Systems Inc., Stanley, NC).

Example 5. additional binder fiber. Example 5 was prepared the same as Example 4, except that an additional 5 gm of bicomponent binder fiber (Type AL-Adhesion-C, 1.55 dpf x 4 mm, FiberVisions, Macon, GA) was added to the first or bottom layer of the absorbent core.

Example 6. high solids application. Example 6 was prepared the same as Example 4, except that the hydrophobic emulsion was applied to the core as a frothed, water-based emulsion composed of 20.8% latex solids and in the amount of 6.2 gm (dry basis).

Example 7. increased add on. Example 7 was prepared the same as Example 6, except that the hydrophobic emulsion was applied in the amount of 10.4 gm (dry basis).

Table 2. Test results for pilot line application of breathable barrier

Example	Barrier, gm	Hydrohead, mm	Strikethrough, g	Air permeability, m ³ /min/m ² (ft ³ /min/ft ²)	WVTR, g/m ² /24hr
3	0.0	<5	2.72	47.8 (157)	4192
4	10.0	35	1.79	46.0 (151)	n/d
5	10.0	73	0.62	44.5 (146)	4128
6	6.2	38	1.17	46.0 (151)	n/d
7	10.4	60	0.11	43.3 (142)	3800

Table 2 shows test results for Examples 3 through 7. Comparing the test results for Example 3 (untreated "blank") with those for Example 4, Example 4 indicates that application of the barrier material, the hydrophobic emulsion, raises the hydrohead and, at the same time, lowers the amount of fluid that strikes through the core.

Example 5 was prepared identically to Example 4, except that Example 5 contained twice the amount of bicomponent binder fiber in the bottom layer of the core compared to Example 4. Comparing the test results for Example 4 with those for Example 5, Table 2 shows that the additional binder fiber facilitates a boost in barrier properties by increasing hydrohead and decreasing strikethrough.

Example 7 was prepared identically to Example 6, except that an additional 4.2 gm (dry basis) of hydrophobic emulsion was applied to Example 7. Table 2 shows that the additional emulsion serves to boost barrier properties by increasing hydrohead and decreasing strikethrough.

The micrographs of Figures 4 through 7 show that the pore size of the web does not appreciably change by the application of the barrier material. Table 2 corroborates the visual evidence of Figures 4 through 7, in that Table 2 shows that air permeability and WVTR do not change appreciably when the barrier is applied to the absorbent core.

Examples 8 and 9: addition of fillers to the hydrophobic emulsion

Example 8. bentonite. The following materials were combined to form a water-based emulsion with 10% latex solids and 3.3% bentonite clay: 75 g Unibond 0930 (Unichem Inc., Greenville, SC, supplied as a water-based emulsion with 40% latex solids), 3 g Unifroth 0448 (Unichem Inc., Greenville, SC), 222 g water and 10 g bentonite clay (Black Hills Bentonite Co., Casper, WY). The bottom surface (wire side) of the 150 gm airlaid absorbent core described as Example 3 was treated with 9.4 gm (dry basis) of the bentonite-containing emulsion. The core was treated in the laboratory using a process based on the application of a foam or froth. The bentonite-containing emulsion was whipped into froth using a household blender. The froth was placed onto the surface of the absorbent core with the aid of a screed. The froth was lightly calendered and the froth collapsed. The emulsion was dried and cured in a forced-air oven at 140°C for 10 minutes.

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Example 9. diatomaceous earth. The following materials were combined to form a water-based emulsion with 10% latex solids and 16.7% diatomaceous earth: 75 g Unibond 0930 (Unichem Inc., Greenville, SC, supplied as an aqueous solution with 40% latex solids), 3 g Unifroth 0448 (Unichem Inc., Greenville, SC), 222 g water and 50 g diatomaceous earth (Celite 5 Diatomite, Manville Products Co., Lompoc, CA). The bottom surface (wire side) of the 150 gsm airlaid absorbent core described as Example 3 was treated with 11.8 gsm (dry basis) of the diatomaceous earth-containing emulsion. The core was treated in the laboratory using a process based on froth application. The diatomaceous earth-containing emulsion was whipped into froth using a household blender. The froth was extruded onto the surface of the absorbent core. The froth was lightly calendered and the froth collapsed. The emulsion was dried and cured in a forced-air oven at 140°C for 10 minutes. Note that Example 3 is the barrier substrate, or untreated "blank", for Examples 4, 6, 7, 8 and 9.

Table 3. Test results for laboratory application of breathable barrier. Examples with fillers

Example	Barrier, gsm	Hydrohead, mm	Air permeability, m ³ /min/m ² (ft ³ /min/ft ²)
8, bentonite clay	9.4	97	33.5 (110)
9, diatomaceous earth	11.8	69	35.4 (116)

Table 3 shows hydrohead and air permeability data for Examples 8 and 9. Compared to Examples 4, 6 and 7, adding bentonite clay or diatomaceous earth to the hydrophobic emulsion serves to increase hydrohead at the expense of a modest drop in air permeability.

Examples 10 and 11: A lighter, superabsorbent-free core

Example 10. untreated superabsorbent-free core. A two-layer, multibonded absorbent core was prepared on an airlaid pilot line using two forming heads. The first or bottom layer of the core contained 34.5 gsm of Grade ND-416 pulp (Weyerhaeuser Co., Tacoma, WA) and 5.5 gsm of bicomponent binder fiber (Type AL-Adhesion-C, 1.55 dpf x 4 mm, FiberVisions, Macon, GA). The second or top layer contained 57.5 gsm of fluff pulp (Foley Fluffs, Buckeye Technologies Inc., Memphis, TN), 9.5 gsm of bicomponent binder fiber (Type AL-Adhesion-C, 1.55 dpf x 4 mm,

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FiberVisions, Macon, GA) and 3 gsm of latex adhesive (Airflex 124 ethylene-vinyl acetate emulsion, Air Products Polymers, Allentown, PA) sprayed on top for dust control. The core had an overall basis weight of 110 gsm and a density of 0.1 g/cc.

Example 11. treated superabsorbent-free core. The bottom surface (wire side) of the 110 gsm airlaid absorbent core described as Example 10 was treated with 13 gsm (dry basis) of Unibond 0930 latex emulsion (Unichem Inc., Greenville, SC). The core was treated with the hydrophobic latex emulsion on an airlaid pilot line using a process based on the application of a foam or froth. A water-based emulsion containing 20% latex solids and a frothing aid (Unifroth 0448, Unichem Corp., Greenville, SC, added to the emulsion in the amount of 0.5% based on total latex solids) was applied to the core as froth using a Gaston Systems applicator (Chemical Foam System, Gaston Systems Inc., Stanley, NC).

Table 4. Test results for pilot line application of breathable barrier. Examples with superabsorbent-free absorbent core

Example	Barrier, gsm	Hydrohead, mm	Strikethrough, g	Air permeability, m ³ /min/m ² (ft ³ /min/ft ²)
10	0.0	n/d	n/d	42.1 (138)
11	13.0	92	0.92	42.7 (140)

Table 4 shows that application of the hydrophobic emulsion to the superabsorbent-free core resulted in a barrier with significant hydrohead without any loss of air permeability through the core.

Examples 12 through 15: additional substrates

The substrates in Examples 12 through 15 were treated in the laboratory using a process based on the application of a foam or froth. A water-based emulsion containing 10% latex solids (Unibond 0930, Unichem Inc., Greenville, SC) and 1% frothing aid (Unifroth 0448, Unichem Inc., Greenville, SC) was whipped into froth using a household blender. The froth was placed onto the surface of the absorbent core with the aid of a screed. The froth was lightly calendered and the froth collapsed. The emulsion was dried and cured in a forced-air oven at 140°C for 15 minutes.

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Example 12. Vizorb 3905. Vizorb 3905 is a commercial product of Buckeye Technologies Inc. (Memphis, TN). Vizorb 3905 is formed on a tissue carrier, contains 24.5% granular polyacrylate superabsorbent, and has an overall basis weight of 250 gm. Example 12 was treated with 2.3 gm of hydrophobic emulsion (dry basis) on the tissue side of the substrate.

5 Example 13. Vizorb 3004. Vizorb 3004 is a commercial product of Buckeye Technologies Inc. (Memphis, TN). Vizorb 3004 is formed on a nonwoven carrier (spunbond polypropylene), contains no superabsorbent, and has an overall basis weight of 82 gm. Example 13 was treated with 4.3 gm of hydrophobic emulsion (dry basis) on the carrier side of the substrate.

10 Example 14. synthetic nonwoven. The substrate for Example 14 was a commercially available nonwoven (spunbond polypropylene), 22 gm, obtained from Avgol Nonwoven Industries (Holon, Israel). Example 14 was treated with 10.1 gm of hydrophobic emulsion (dry basis).

Table 5. Test results for laboratory application of breathable barrier. Additional substrates

Example	Basis weight, gm	Density, g/cc	Barrier, gm	Hydrohead, mm
12, Vizorb 3905	250	0.11	2.3	28 (0, untreated)
13, Vizorb 3004	82	0.08	4.3	36 (0)
14, synthetic nonwoven	22	0.10	10.1	39 (0)

15 Table 5 shows hydrohead results for Examples 12 through 14. Table 5 shows that the breathable barrier of the present invention (as measured by hydrohead) can be built into a wide variety of substrates including airlaid, wetlaid and synthetic nonwovens. Examples 13 and 14 show that the barrier of the present invention can be formed on a synthetic nonwoven, and that the synthetic nonwoven can stand alone (Example 14) or it can be a component of a structure (Example 13). Example 12 shows that the barrier of the present invention can be formed on a wetlaid
20 nonwoven (tissue).

Example 15. eucalyptus fiber. A two-layer thermal bonded absorbent core was prepared using a laboratory pad former (Buckeye design, Buckeye Technologies Inc., Memphis, TN). The absorbent core contained 108 gm of bleached eucalyptus kraft pulp (Aracruz Celulose USA, Raleigh, NC) and 12 gm of bicomponent binder fiber (Type AL-Adhesion-C, 1.55 dpf x 4 mm,

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FiberVisions, Macon, GA). The core had an overall basis weight of 120 gsm and a density of 0.10 g/cc. Example 15 was treated with 6.1 gsm of hydrophobic emulsion (dry basis).

Table 6. Test results for laboratory application of breathable barrier. Eucalyptus absorbent core.

Example	Basis weight, gsm	Barrier, gsm	Hydrohead, mm	Strike-through, g	Air permeability, m ³ /min/m ² (ft ³ /min/ft ²)
15, eucalyptus	120	6.1	140	0.00	21.9 (72)

Typical fluff pulp used in absorbent cores (e.g. Foley Fluffs, Buckeye Technologies, Inc., Memphis, TN; Grade ND-416, Weyerhaeuser Co., Tacoma, WA) is manufactured from coniferous wood, or softwood. It is well known to those skilled in the art that pulp fibers from deciduous wood, or hardwood, have a fiber length of about half and a fiber diameter of about half that of softwood pulp fibers. Table 6 shows hydrohead and strikethrough results for Example 15, constructed from eucalyptus hardwood pulp. Comparing all of the examples, the best hydrohead value and the lowest strikethrough value was obtained with Example 15.

Examples 16 and 17: laboratory and pilot-scale application of the stand-up foam barrier

Example 16, laboratory application of hydrophobic stand-up foam. A three-layer, multibonded absorbent core was prepared on an airlaid pilot line containing three forming heads. The first or bottom layer of the core comprised 16.3 gsm of fluff pulp (Foley Fluffs, Buckeye Technologies Inc., Memphis, TN), 16.3 gsm of Grade HPF pulp (Buckeye Technologies Inc., Memphis, TN), 8.0 gsm of bicomponent binder fiber (Type AL-Adhesion-C, 1.55 dpf x 4 mm, FiberVisions, Macon, GA) and 1.5 gsm of latex adhesive (Airflex 192 ethylene-vinyl acetate emulsion, Air Products Polymers, Allentown, PA) foamed on the bottom for dust control. The second or middle layer comprised 35.6 gsm of fluff pulp (Foley Fluffs, Buckeye Technologies Inc., Memphis, TN), and 5.8 gsm of bicomponent binder fiber (Type 255, 2.8 dpf x 4 mm, KoSa, Salisbury, NC). The third or top layer comprised 33.1 gsm of fluff pulp (Foley Fluffs, Buckeye Technologies Inc., Memphis, TN), 4.7 gsm of bicomponent binder fiber (Type 255, 2.8 dpf x 4 mm, KoSa, Salisbury, NC), 26.3 gsm of granular polyacrylate superabsorbent (Grade 1186, Stockhausen Inc., Greensboro, NC) and 2.2 gsm of latex adhesive (Airflex 192 ethylene-vinyl acetate emulsion,

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Air Products Polymers, Allentown, PA) sprayed on top for dust control. The absorbent core had an overall basis weight of 150 gsm and a density of 0.1 g/cc. The bottom surface (wire side) of the 150 gsm airlaid absorbent core was treated with 48.8 gsm (dry basis) of Unibond 0938 latex emulsion (Unichem Corp., Greenville, SC). The core was treated in the laboratory using a process based on foam application. A water-based emulsion containing 50% latex solids and 1% frothing aid (Unifroth 0448, Unichem Inc., Greenville, SC) was whipped into foam using a household blender. The foam was placed onto the surface of the absorbent core with the aid of a screed. The emulsion was dried and cured in a forced-air oven at 140°C for 15 minutes. Upon drying and curing, a reticulated polymeric structure, or stand-up foam, remained on the bottom surface of the core.

Example 17. pilot-line application of stand-up foam. The bottom surface (wire side) of the base core of Example 16 was treated with 35.0 gsm (dry basis) of Unibond 0938 latex emulsion (Unichem Corp., Greenville, SC). The core was treated with the hydrophobic latex emulsion on an airlaid pilot line using a process based on foam application. A water-based emulsion containing 40% latex solids was applied to the core as foam using a Gaston Systems applicator (Chemical Foam System, Gaston Systems Inc., Stanley, NC). Upon drying and curing, a reticulated polymeric structure, or stand-up foam, remained on the bottom surface of the core.

Table 7. Test results for stand-up foam barrier, Examples 16 and 17

Example	Barrier, gsm	Hydrohead, mm	Strikethrough, g	Air permeability, m ³ /min/m ² (ft ³ /min/ft ²)
16	48.8	110	0.02	29.3 (96)
17	35.0	111	0.00	44 (144)

Table 7 shows test results for Examples 16 and 17 for the stand-up foam barrier. These examples provided minimal strikethrough and substantial hydrohead compared to the untreated cores of similar construction (Examples 1 and 3).

Examples 18 and 19: additional pilot-scale examples with lower barrier basis weight

Example 18, untreated core. A two-layer, multibonded absorbent core was prepared on an airlaid pilot line using two forming heads. The first or bottom layer of the core comprised 50 gsm of Grade ND-416 pulp (Weyerhaeuser Co., Tacoma, WA) and 7 gsm of bicomponent binder

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fiber (Type 255, 2.8 dpf x 4 mm, KoSa, Salisbury, NC). The second or top layer comprised 55 gm of fluff pulp (Foley Fluffa, Buckeye Technologies Inc., Memphis, TN), and 11 gm of bicomponent binder fiber (Type 255, 2.8 dpf x 4 mm, KoSa, Salisbury, NC), 25 gm of granular polyacrylate superabsorbent (Favor SXM 70, Stockhausen Inc., Greensboro, NC) and 2 gm of latex adhesive (Airflex 192 ethylene-vinyl acetate emulsion, Air Products Polymers, Allentown, PA) sprayed on top for dust control. The absorbent core had an overall basis weight of 150 gm and a density of 0.1 g/cc.

Example 19. pilot-line application of stand-up foam barrier. The bottom surface (wire side) of the base core described as Example 18 was treated with 20 gm (dry basis) of Unibond 0938 latex emulsion (Unichem Corp., Greenville, SC). The core was treated with the hydrophobic latex emulsion on an airlaid pilot line using a process based on foam application. A water-based emulsion containing 41.8% latex solids was applied to the core as foam using a Gaston Systems applicator (Chemical Foam System, Gaston Systems Inc., Stanley, NC). Upon drying and curing, a reticulated polymeric structure, or stand-up foam, remained on the bottom surface of the core.

Table 8. Test results for stand-up foam barrier, Examples 18 and 19

Example	Barrier, gm	Hydrohead, mm	Strikethrough, g	Air permeability, m ³ /min/m ² (ft ³ /min/ft ²)	WVTR, g/m ² /24hr
18	0.0	<5	2.82	42.4 (139)	4720
19	20.0	81	0.16	28 (92)	4369

The data in Table 8 shows that the treated core, Example 19, provided a reduced strikethrough and a higher hydrostatic head compared to the untreated "blank", Example 18. Concomitantly, the air permeability of the treated core was reduced 34% compared to the untreated core.

Example 20: laboratory application of stand-up foam, additional substrate

Example 20. Vizorb 3905. Vizorb 3905 is a commercial product of Buckeye Technologies Inc. (Memphis, TN). Vizorb 3905 is formed on a tissue carrier, contains 24.5% granular polyacrylate superabsorbent, and has an overall basis weight of 250 gm. A water-based emulsion containing 40% latex solids (Unibond 0938, Unichem Inc., Greenville, SC) and 1% frothing aid (Unifroth 0448, Unichem Inc., Greenville, SC) was whipped into foam using a household blender. The foam was placed onto the tissue side of the Vizorb 3905 core with the aid

of a screed. The emulsion was dried and cured in a forced-air oven at 140°C for 15 minutes. Upon drying and curing, a reticulated polymeric structure, or stand-up foam, remained on the bottom surface of the core.

5 Table 9. Test results for laboratory application of breathable barrier, additional substrate

Example	Basis weight, gsm	Density, g/cc	Barrier, gsm	Hydrohead, mm
20, Vizorb 3905	250	0.11	24.3	160 (0, untreated)

10 Barrier effectiveness value

Hydrohead and strikethrough are two important attributes for a breathable moisture barrier. It is of interest to minimize strikethrough and, concomitantly, maximize hydrohead. A combination parameter, the barrier effectiveness value, can be devised with contributions from both hydrohead and strikethrough:

- 15 where:
- BEV* = barrier effectiveness value, mm
- HH* = hydrohead, mm
- 20 *STV* = strikethrough, g
- HH₅₀* = strikethrough value chosen at which *BEV* equals 50% of the *HH*, g

In effect, the barrier effectiveness value penalizes the hydrohead for finite strikethrough. In this construction, the numerical value for hydrohead is reduced if strikethrough is finite. The higher the strikethrough, the more that hydrohead is reduced. In this construction, *BEV* equals *HH* when *STV* is zero. In addition, *BEV* equals half the *HH* when *STV* equals the *HH₅₀*. Any discussion of barrier effectiveness and *BEV* values assumes that the materials under consideration have a WVTR of 500 g/m²/24 hr or greater.

30 Table 10. Barrier effectiveness values (*BEV*) for hydrohead and strikethrough results presented in the examples

Example	Hydrohead, <i>HH</i> , mm	Strikethrough, <i>STV</i> , g	<i>BEV</i> (<i>HH</i> ₅₀ = 0.75), mm
1	5	2.25	1.3
2	85	0.08	76.8
3	5	2.72	1.1
4	35	1.79	10.3
5	73	0.62	40.0
6	38	1.17	14.8
7	60	0.11	52.3
11	92	0.92	41.3
15	140	0.00	140.0
16	110	0.02	107.1
17	111	0.00	111.0
18	5	2.82	1.1
19	81	0.16	66.8

Table 10 shows barrier effectiveness values (*BEV*) for the examples for which both hydrohead and strikethrough were measured.

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WHAT IS CLAIMED IS:

1. A unitary absorbent core comprising a fibrous absorbent layer having an upper fluid receiving surface and a lower surface with a hydrophobic vapor-transmissive moisture barrier integral with the lower surface of the absorbent layer.

5

2. The unitary absorbent core of Claim 1, wherein the absorbent layer comprises natural fibers, synthetic fibers or a mixture thereof.

3. The unitary absorbent core of one of claims 1-2, wherein the hydrophobic moisture barrier comprises a hydrophobic material which at least partially coats the fibers of the lower surface of the absorbent layer.

10

4. The unitary absorbent core of one of claims 1-3 wherein the hydrophobic material is a natural or synthetic polymer.

15

5. The unitary absorbent core of one of claims 1-4 further comprising from about 5 to about 90 percent by weight of SAP.

20

6. The unitary absorbent core of one of claims 1-5 having a hydrohead of 30 mm or more.

7. The unitary absorbent core of Claim 6 having a hydrohead of 50 mm or more.

8. The unitary absorbent core of Claim 7 having a hydrohead of 70 mm or more.

25

9. The unitary absorbent core of one of claims 1-8 having a strikethrough of 1.8 g or less.

10. The unitary absorbent core of Claim 9 having a strikethrough of 1.2 g or less.

30

11. The unitary absorbent core of Claim 10 having a strikethrough of 0.7 g or less.

12. The unitary absorbent core of one of claims 1-11 having an air permeability of 18 m³/min/m² (60 ft³/min/ft²).

13. The unitary absorbent core of one of claims 1-12 having a water vapor transmission rate of 500 g/m²/24 hr or greater.

14. The unitary absorbent core of claim 13 having a water vapor transmission rate of 1000 g/m²/24 hr or greater.

15. The unitary absorbent core of claim 14 having a water vapor transmission rate of 2000 g/m²/24 hr or greater.

16. The unitary absorbent core of claim 15 having a water vapor transmission rate of 3000 g/m²/24 hr or greater.

17. The unitary absorbent core of one of claims 1-16 having a barrier effectiveness value of 30 mm or greater.

18. The unitary absorbent core of claim 17 having a barrier effectiveness value of 50 mm or greater.

19. The unitary absorbent core of claim 18 having a barrier effectiveness value of 75 mm or greater.

20. The unitary absorbent core of one of claims 1-19, wherein the moisture barrier has a structure which substantially is fibers coated with hydrophobic material.

21. The unitary absorbent core of one of claims 1-19, wherein the moisture barrier has a reticulated remnant of a barrier material emulsion extending from the lower surface region of the absorbent layer to form an outer reticulated foam barrier.

22. An absorbent article comprising:
- (A) a liquid pervious top sheet, and
 - (B) a unitary absorbent core of one of claims 1-21.

- 5 23. The absorbent article of Claim 22 further comprising:
- (C) a microporous backsheet.

24. The article of Claim 22 or Claim 23, wherein the article is an infant disposable diaper,
a training pant, an absorbent surgical pad, an adult incontinence device, a sanitary napkin, a
10 pantiliner or a feminine hygiene pad.

25. A process for the production of a unitary absorbent core comprising a fibrous
absorbent layer having an upper fluid receiving surface and a lower surface with a hydrophobic
vapor-transmissive moisture barrier integral with the lower surface of the absorbent layer
15 comprising:

- (a) producing a fibrous absorbent layer having upper and lower surfaces,
- (b) applying to the fibrous absorbent layer a hydrophobic material which at least partially
coats the fibers of the lower surface of the material.

- 20 26. The process of Claim 25, wherein the fibrous absorbent layer comprises natural fibers,
synthetic fibers or a mixture thereof.

27. The process of one of claims 25-26, wherein the hydrophobic material is a natural or
synthetic polymer.

- 25 28. The process of one of claims 25-27, wherein the core comprises from about 5 to
about 90 percent by weight of SAP.

29. The process of one of claims 25-28, wherein the hydrophobic material is an emulsion
30 polymer.

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30. The process of Claim 29, wherein the emulsion polymer is applied in the form of a foam.

31. The process of one of claims 25-30, wherein the fibrous absorbent layer is a nonwoven produced by an airlaid process.

32. The process of one of claims 25-31, wherein the moisture barrier produced has a structure which substantially is fibers coated with hydrophobic material.

33. The process of one of claims 25-31, wherein the moisture barrier produced has a reticulated remnant of a barrier material emulsion extending from the lower surface region of the absorbent layer to form an outer reticulated foam barrier.

34. A unitary absorbent core produced by the process of one of claims 25-33.

35. A breathable fibrous material having a surface with a hydrophobic vapor-transmissive moisture barrier integral therewith comprising natural fibers, synthetic fibers or a mixture thereof, and a hydrophobic material which at least partially coats the fibers of a surface of the material.

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Figure 1. Conventional Product Construction

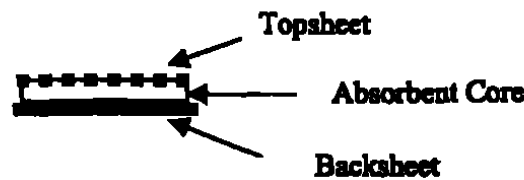


Figure 2. Conventional Breathable Product Construction

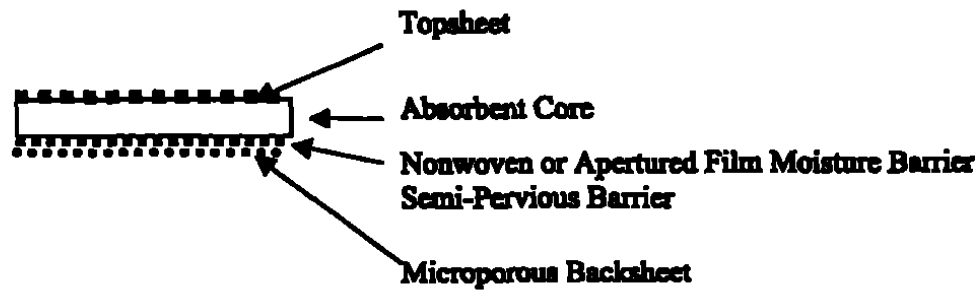
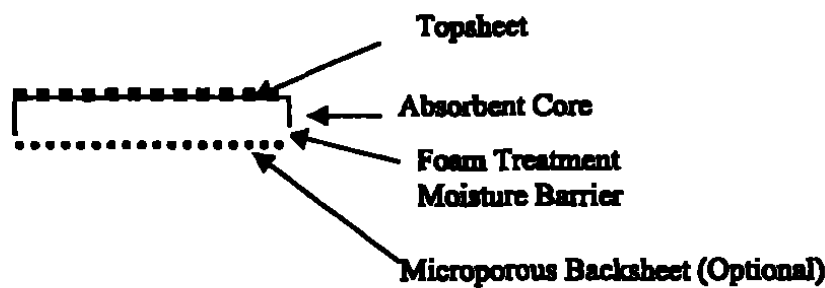
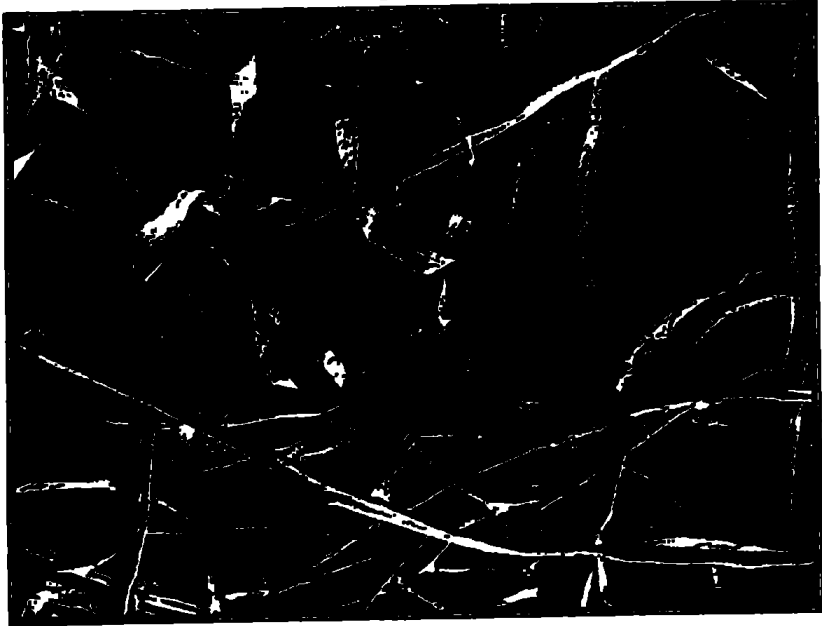


Figure 3. Unitary Absorbent Core with Integral Moisture Barrier



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FIGURE 4
EXPERIMENTAL AIRLAD STRUCTURE - UNTREATED SURFACE
Hitachi Scanning Electron Microscope (BSE Image)
Mag. 80X



of

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FIGURE 5
EXPERIMENTAL AIRLAD STRUCTURE - TREATED SURFACE
Hitachi Scanning Electron Microscope (BSE image)
Mag. 80X



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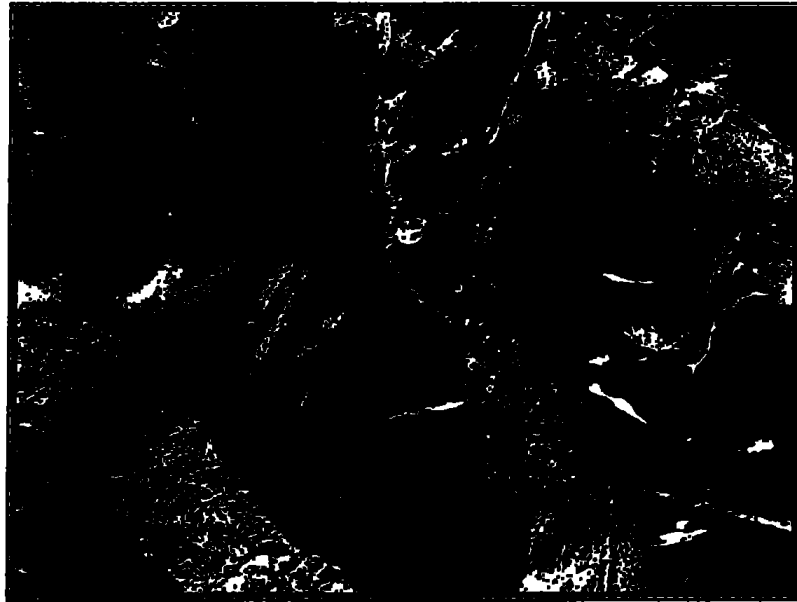
FIGURE 6
EXPERIMENTAL AIRLAID STRUCTURE - UNTREATED SURFACE
Hitachi Scanning Electron Microscope (BSE image)
Mag. 350X



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FIGURE 7
EXPERIMENTAL AIRLAID STRUCTURE - TREATED SURFACE
Hitachi Scanning Electron Microscope (BSE image)
Mag. 350X



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**FIGURE 8. ABSORBENT C RE
WITH UT FOAM BARRIER
Hitachi Scanning Electron Microscope**



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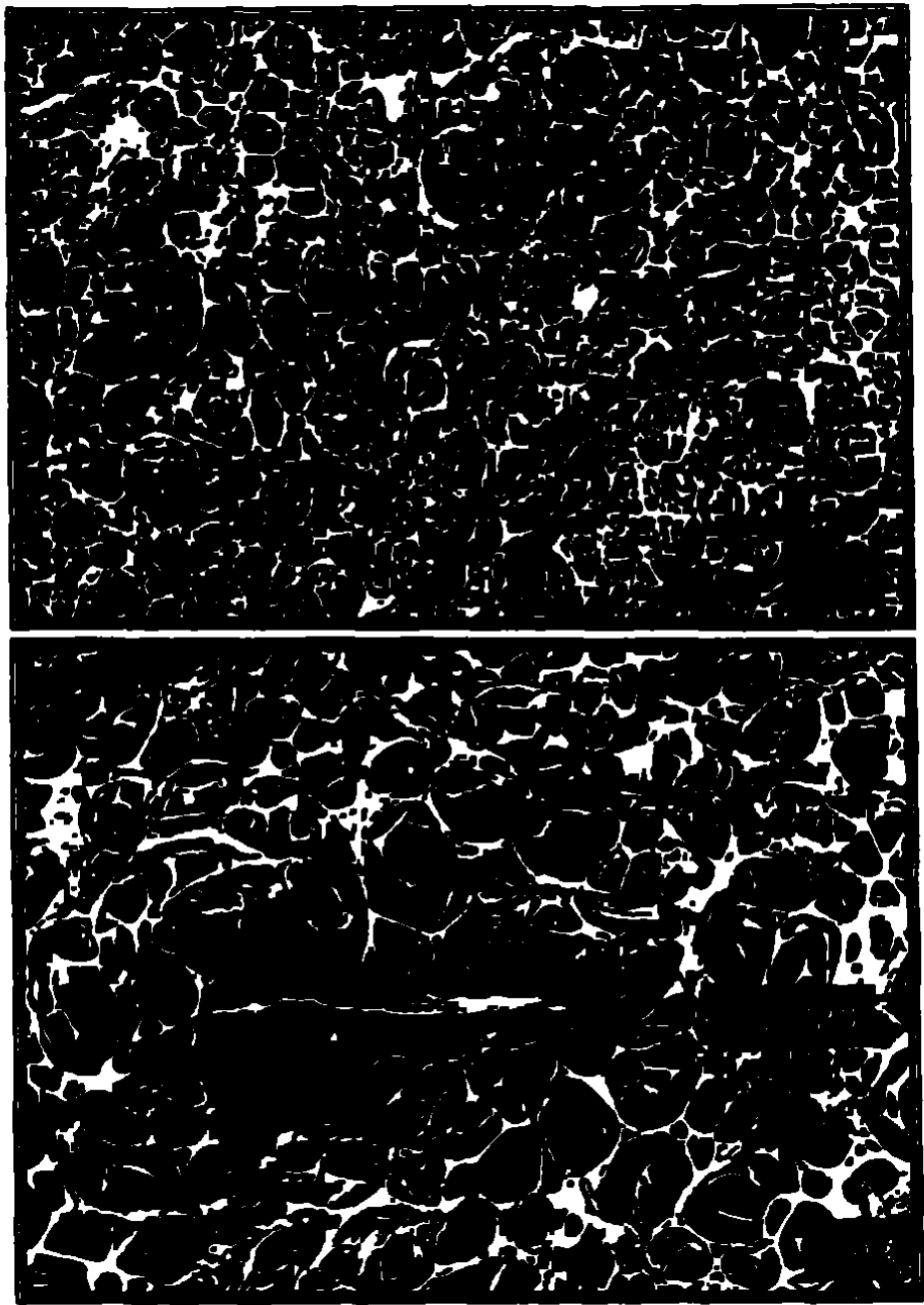
**FIGURE 9. ABSORBENT CORE
WITHOUT FOAM BARRIER
Hitachi Scanning Electron Microscope**



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00221-4452209

**FIGURE 10. ABSORBENT CORE
WITH FOAM BARRIER**
Hitachi Scanning Electron Microscope

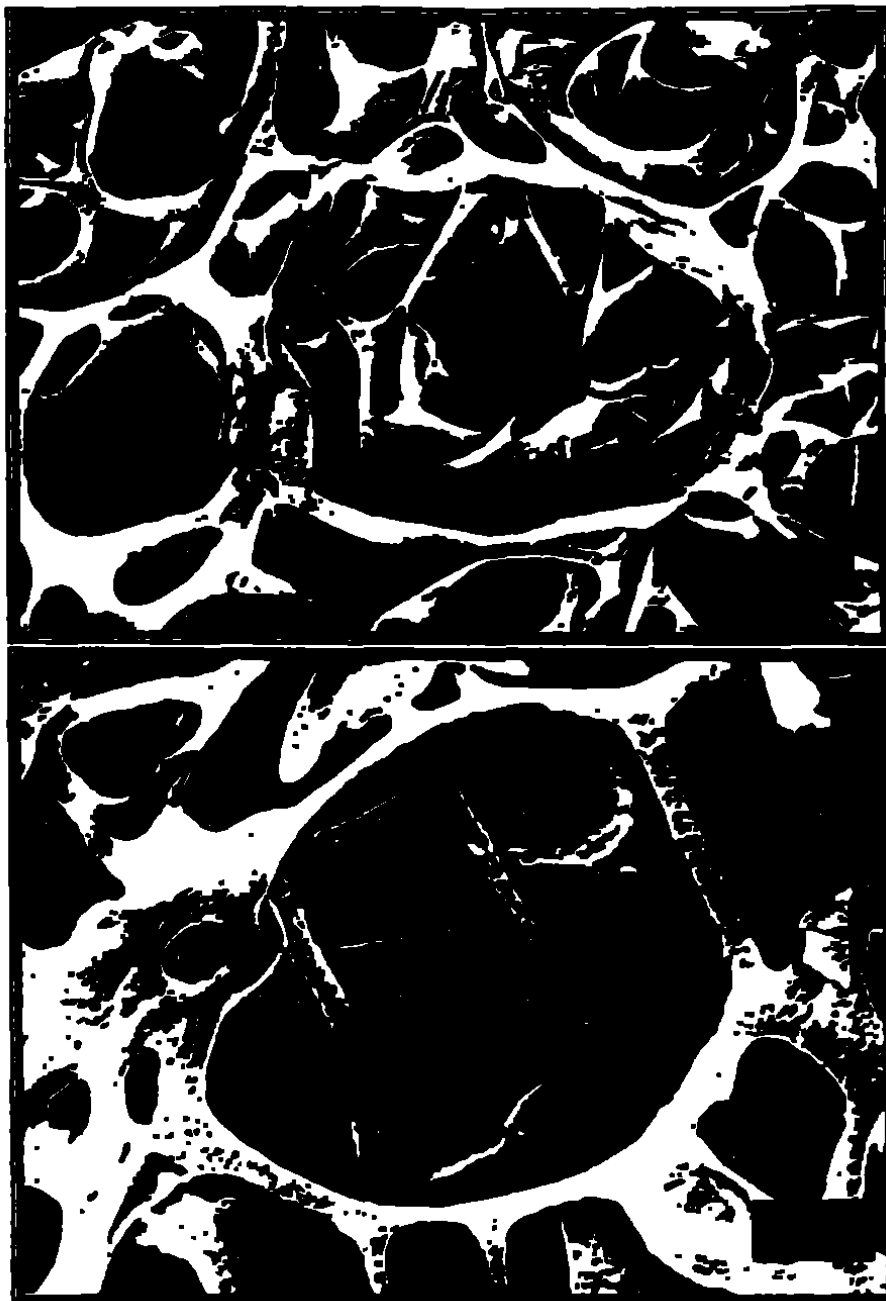


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**FIGURE 11. ABSORBENT CORE
WITH FOAM BARRIER**
Hitachi Scanning Electron Microscope



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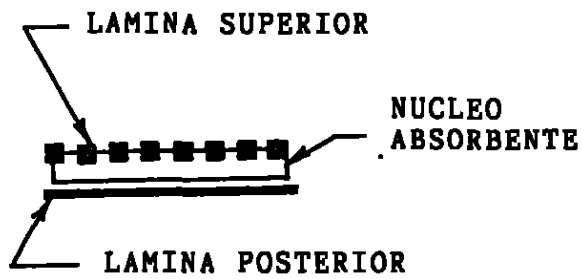


FIG. 1

FIG. 1A

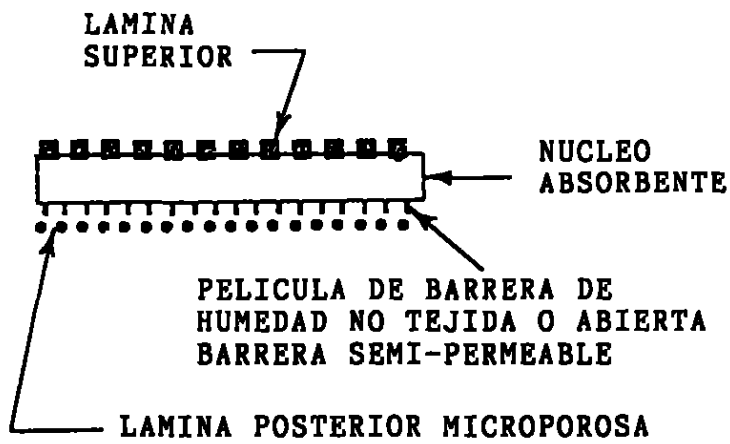
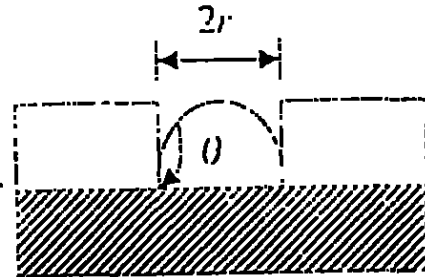


FIG. 2

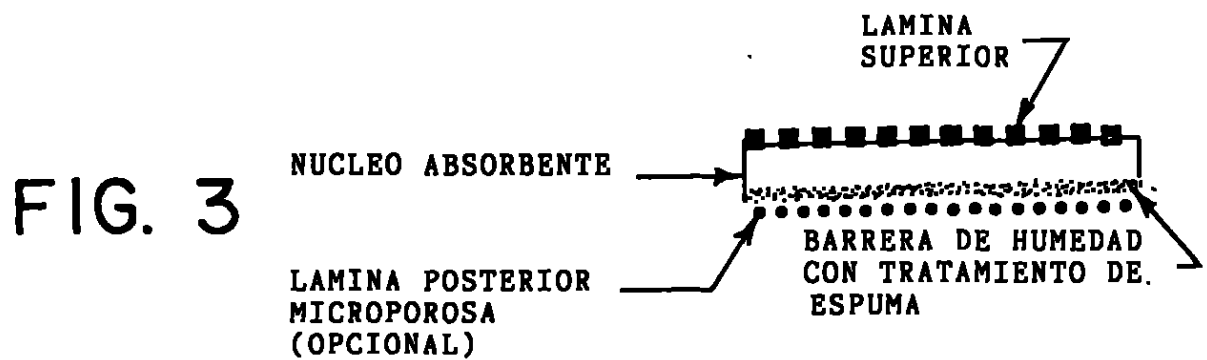


FIG. 4



FIG. 5

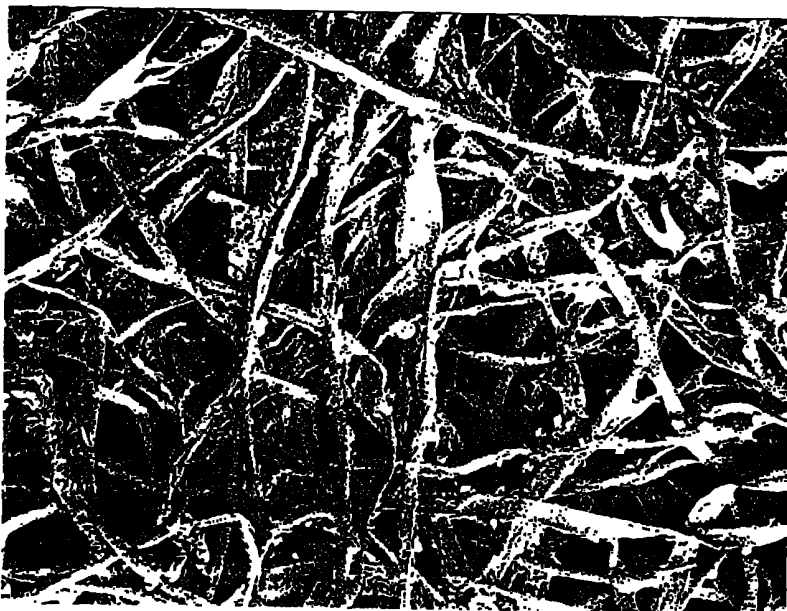


FIG. 6



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FIG. 7



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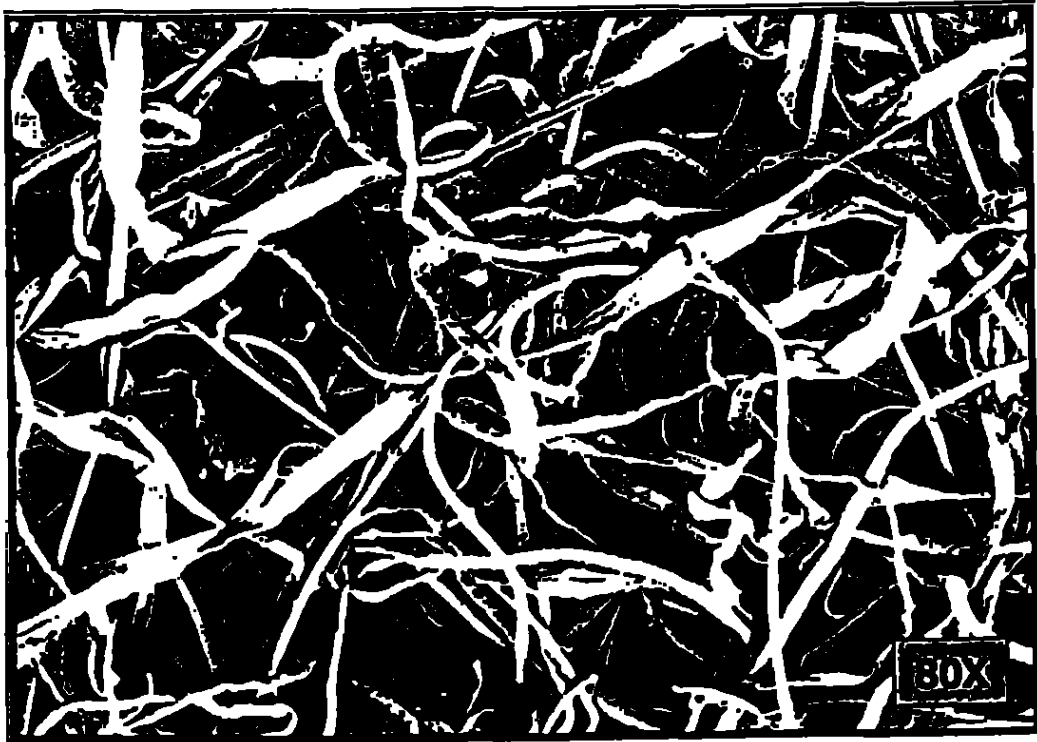
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FIG. 8A



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FIG. 8B



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20A
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FIG. 9A



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FIG. 9B

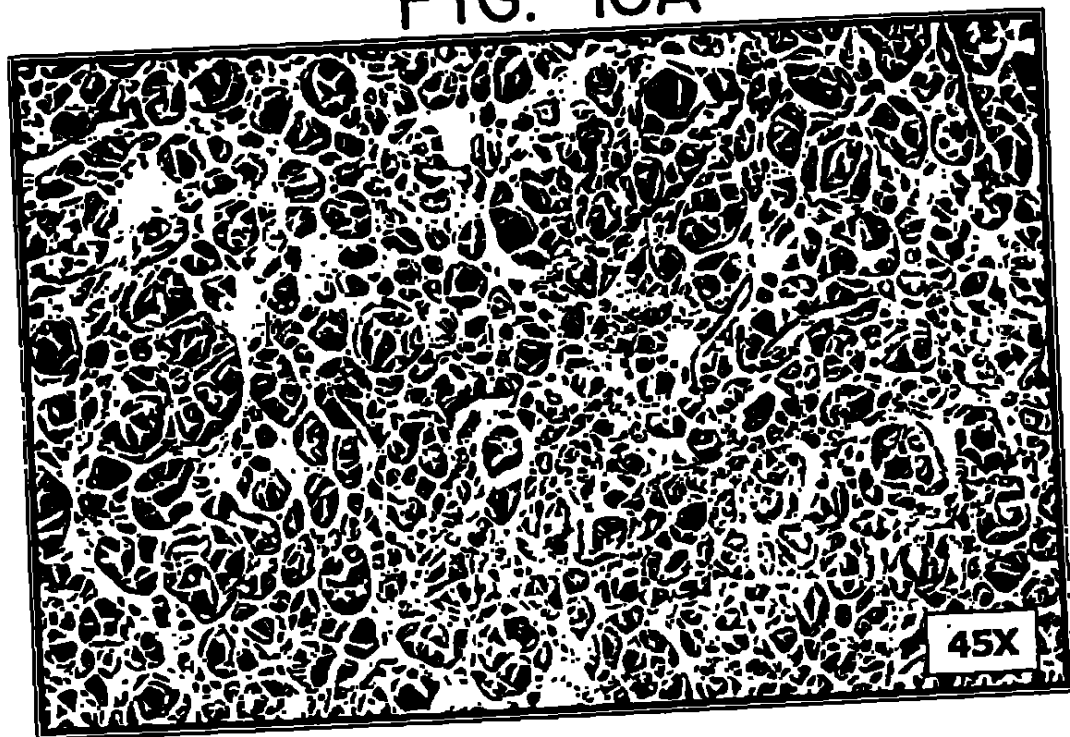


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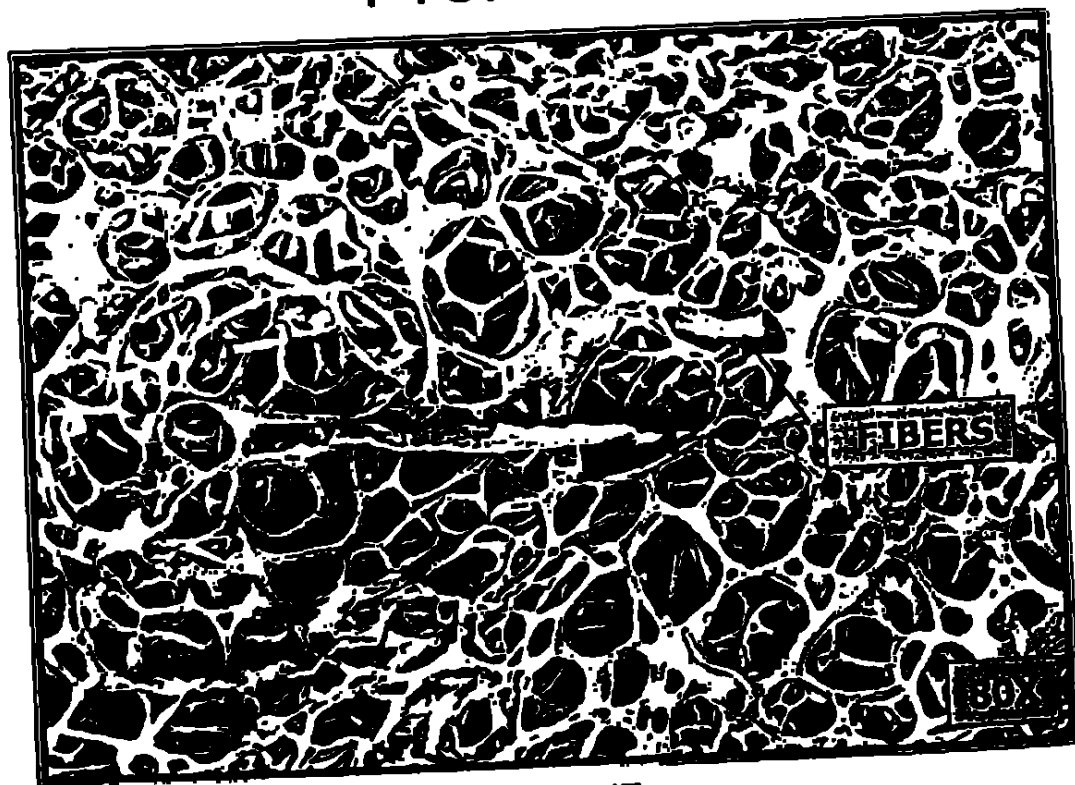
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FIG. 10A



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FIG. 10B



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FIG. IIA



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FIG. IIB



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FIG. 12A

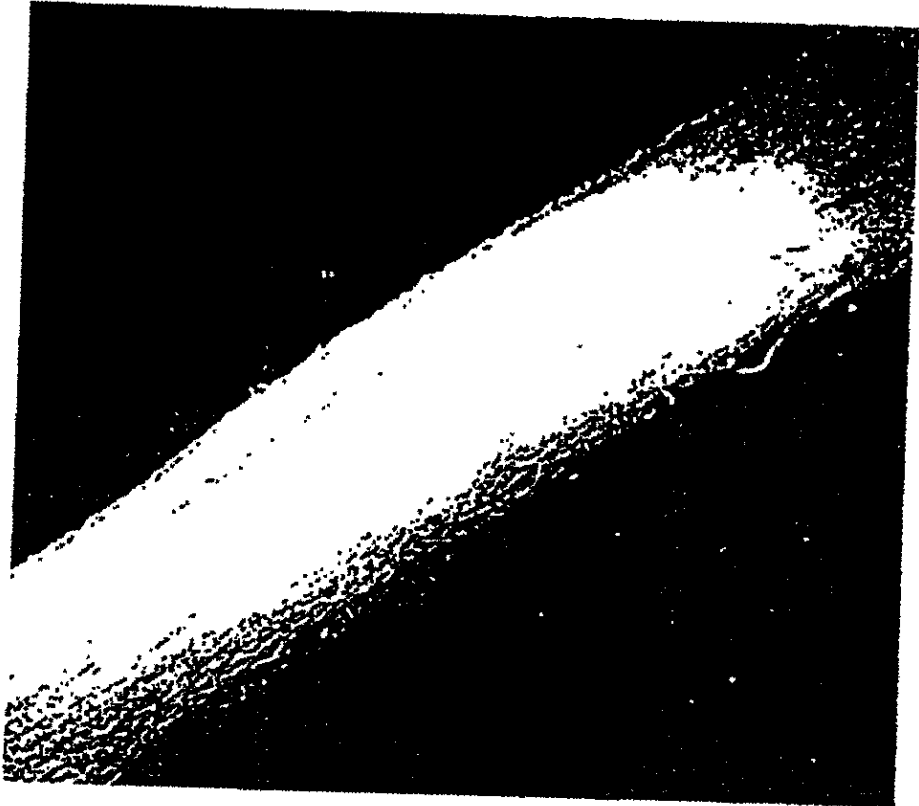


FIG. 12B



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FIG. 13A

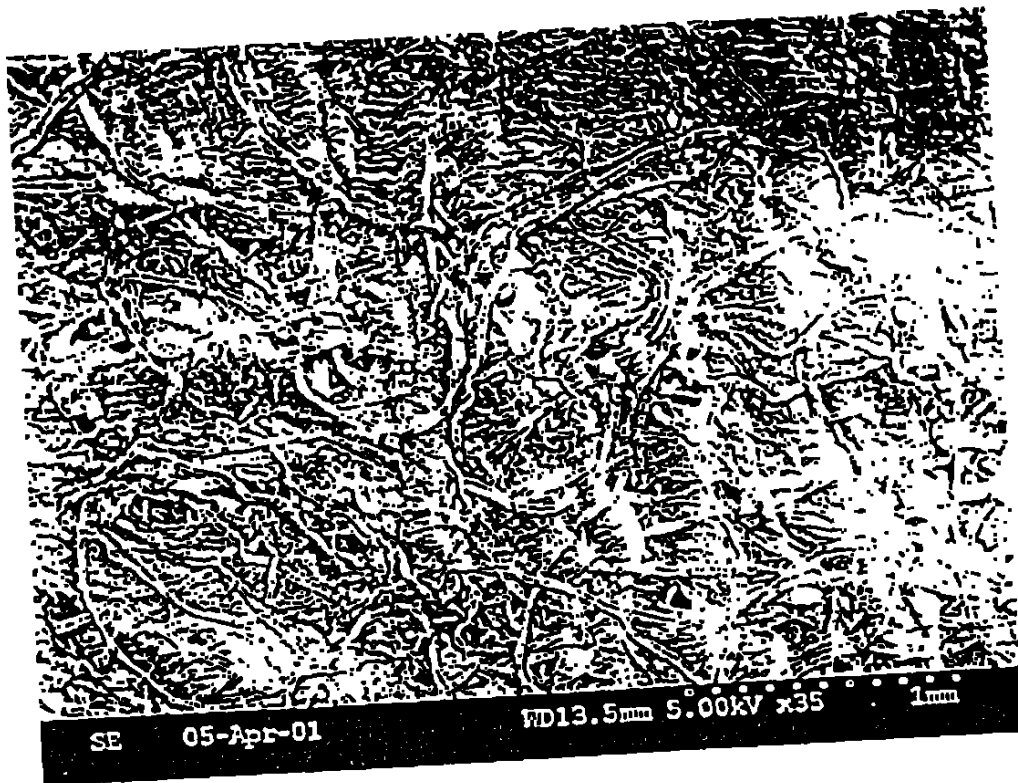
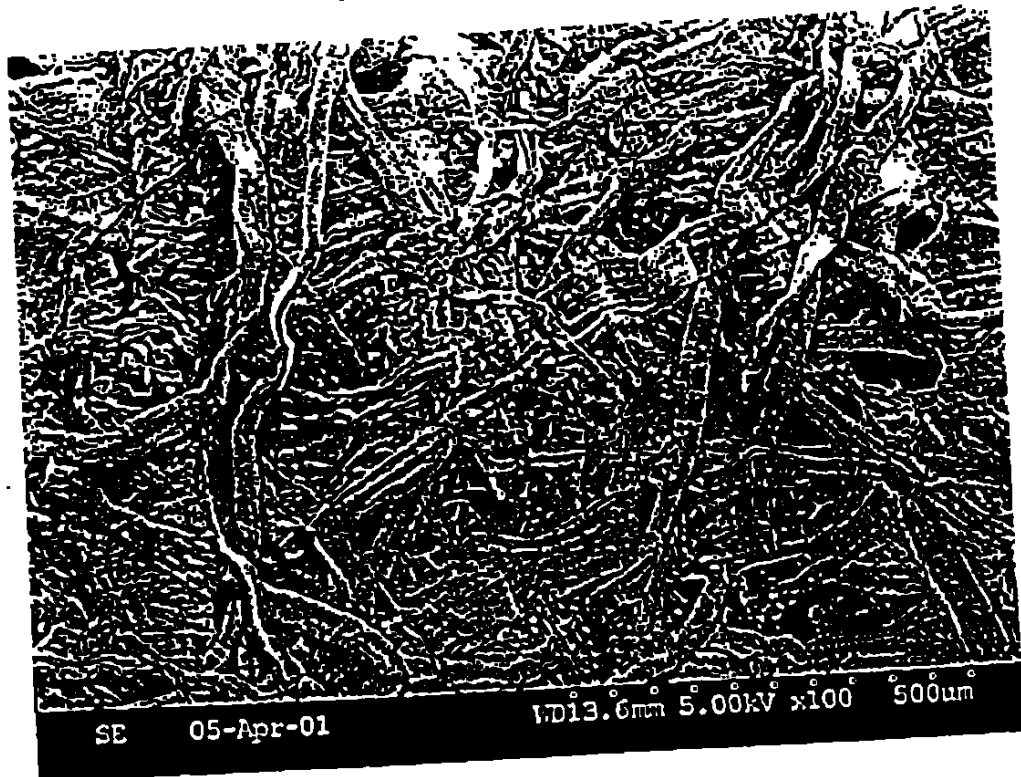


FIG. 13B



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FIG. 14A

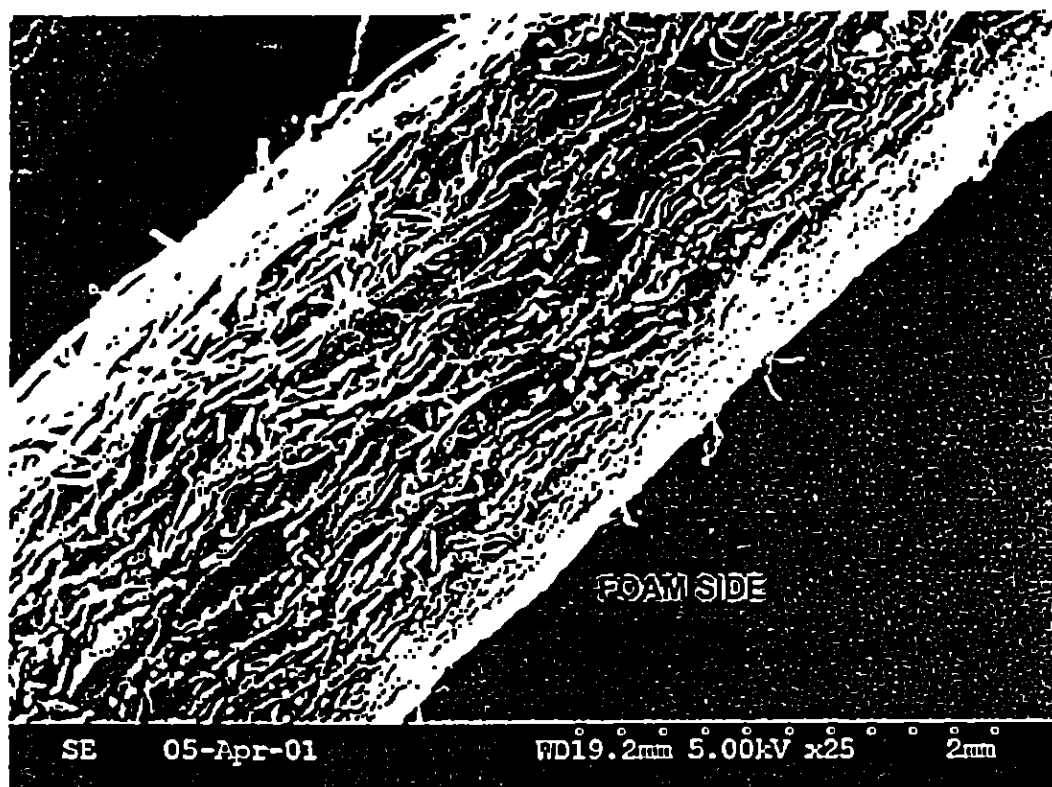
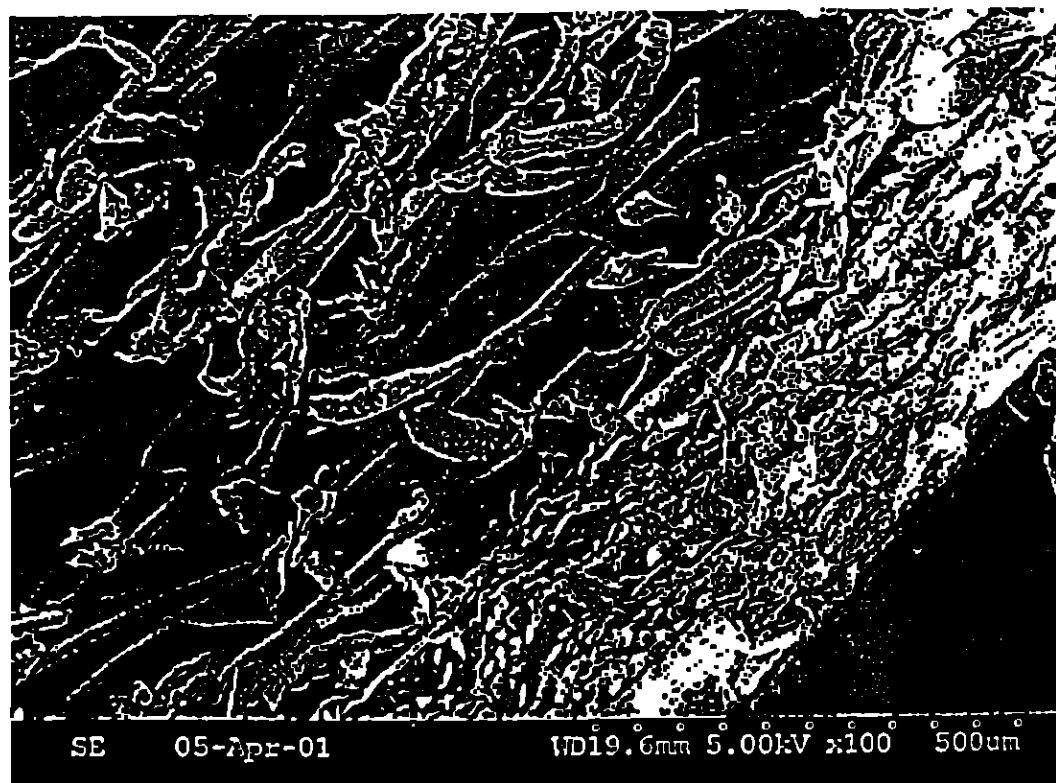


FIG. 14B



FORMULARIO UNICO DE SOLICITUD DE PATENTE
2000-3

SOLICITUD DE:

☐ 1☒ X

Patente de Invención

☐

Patente de Modelo de Utilidad

☐ 2

SOLICITANTE

(71)

Nombre: BKJ HOLDING CORPORATION

Dirección: 300 Delaware Street

Teléfono: Fac

E-mail

Domicilio: Wilmington, Estado de Delaware, E.U.A.

IDENTIFICACION

C.C. ☐ NIT ☐C.E. ☐ Otro ☐

Número

☐ 3REPRESENTANTE
APODERADO

(74)

Nombre: GERMAN CASTILLO GRAU

Dirección Carrera 13 No. 37-43, Piso 12

Teléfono: 2857480 Fac 2858287

E-mail info@castillograu.com

IDENTIFICACION

C.C. ☒ X NIT ☐C.E. ☐ OTRO ☐

Número 17.017.671 TP 2.978

☐ 4

INVENTOR(ES)

(72)

Nombre: Ver lista adjunta

Dirección:

Teléfono: Fac

E-mail

Domicilio Ver lista adjunta

IDENTIFICACION

C.C. ☐ NIT ☐C.E. ☐ OTRO ☐

Número

☐ 5

Título (54)

ESTRUCTURA ABSORBENTE CON BARRERA INTEGRAL DE HUMEDAD
TRANSMISORA DE VAPOR☐ 6

Clasificación Internacional (51)

☐ 7

Prioridad

SI ☒ X NO ☐

(33) País de Origen

E.U.A.

E.U.A.

(32) Fecha

May. 12, 2000

Nov. 22, 2000

(31) Número de Solicitud

80/204.418

80/252.544

☐ 8

Para publicar a partir de la fecha de la presente solicitud a los:

6 meses ☐12 meses ☐18 meses ☐Otro ☐☐ 9

Comprobante de pago N°:

Fecha:

Instrucciones para el diligenciamiento del presente formulario, ver reverso de esta página.

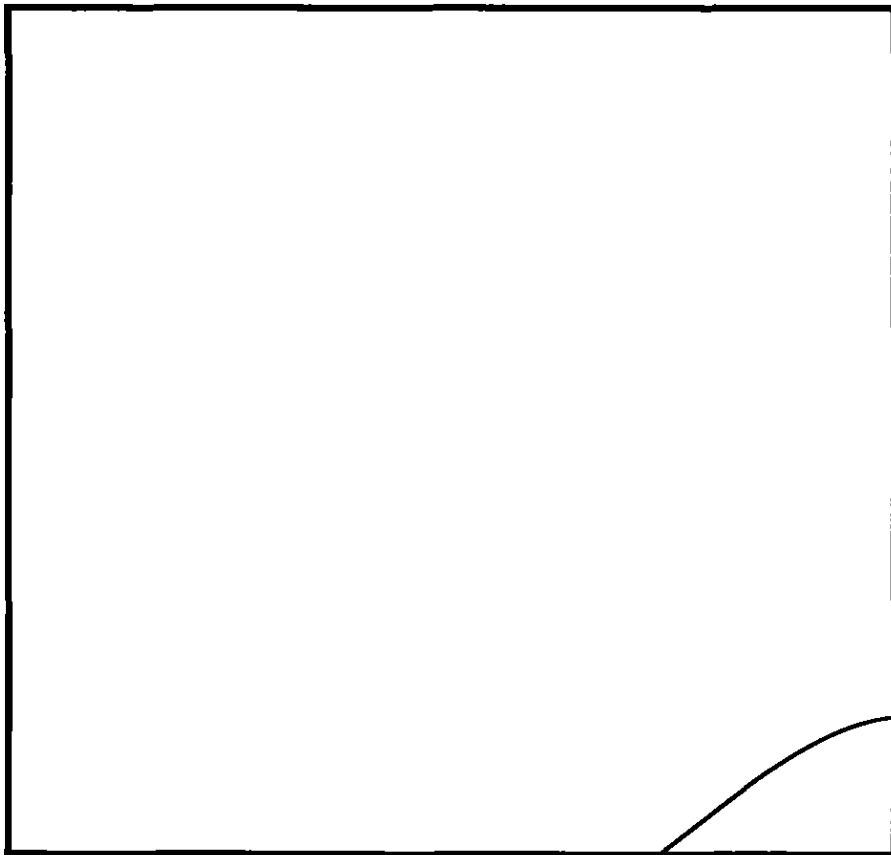
10

ANEXOS

- ☒ Comprobante de pago de la tasa de presentación de la solicitud
- ☐ Comprobante de pago de la tasa por concepto de excedente de palabras en la publicación
- ☒ Comprobante de pago por reivindicación de prioridad
- ☒ Certificado de existencia y representación legal cuando el solicitante sea persona jurídica
- ☒ Poderes, si fuere el caso
- ☒ Copia certificada de la primera solicitud, si se reivindica prioridad
- ☐ Traducción simple de la primera solicitud, si se reivindica prioridad
- ☒ Documento de cesión del inventor al solicitante o a su causante
- ☒ Descripción de la invención
- ☒ Una o más reivindicaciones
- ☒ Dibujos y/o planos necesarios
- ☐ De ser el caso, copia del contrato de acceso
- ☐ De ser el caso, documento que acredite la licencia o autorización de uso de conocimientos tradicionales de las comunidades indígenas.
- ☐ De ser el caso, certificado de depósito del material biológico
- ☒ Arte final 12 x 12

11

FIGURA CARACTERISTICA



12

NOMBRE: GERMAN CASTILLO GRAU

FIRMA:

C.C. 17017971 de Bogotá T. 2.978 del C.S.J.

Instrucciones para la presentación de los anexos, ver reverso de esta página

FORMATO DE DIGITALIZACION
RELACION DE ANEXOS

Royal
Technologies S.A.

Expediente No		01-37439	No de Fols
Item		No de unidades	✓
1	CD		
2	DVD		
3	REVISTA		
4	LIBRO		
5	PERIODICO		
6	DISQUETES		
7	SOBRE DE MANILA		
8	SOBRE BLANCO TAMAÑO CARTA		
9	SOBRE BLANCO TAMAÑO OFICIO X		
10	OTROS		

Observaciones: Ark final

29. Un proceso para la producción de un núcleo absorbente unitario que presenta un peso básico de alrededor de 75 gsm. o mayor que comprende una capa absorbente fibrosa que presenta una superficie receptora de fluido superior y una superficie inferior con una barrera de humedad transmisora de vapor hidrofóbica integral con la superficie inferior de la capa absorbente que comprende:

a. producir una capa absorbente fibrosa que presente superficie superior e inferior,

b. aplicar a la superficie inferior de la capa absorbente fibrosa un material hidrofóbico el cual al menos cubre parcialmente al menos algunas de las fibras de la superficie inferior de la capa absorbente.



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Industria y Comercio
SUPERINTENDENCIA

2do. EXAMEN DE FORMA PATENTE DE INVENCION

Folio 239

Radicación no 01-33439

Concepto Técnico no 957

Clasificación Internacional de Patentes A 61 F 13/15

Practicado el examen de acuerdo a lo establecido en el Art. 38 de la Decisión 486 se determinó que esta solicitud de Patente de Invención:

- SI ☒ NO ☐ Contiene un resumen de la invención (Art.26-e).
- SI ☒ NO ☐ Contiene el título o nombre de la invención (Art.27-d).
- SI ☒ NO ☐ Contiene la descripción de la invención (Art.28-b).
- SI ☒ NO ☐ NO ES APLICABLE ☐ Contiene los dibujos necesarios para comprender la invención (Art.28-d)
- SI ☒ NO ☐ Contiene una o más reivindicaciones. (Art.26-c).
- SI ☐ NO ☐ NO ES APLICABLE ☒ Han sido desarrollados los productos y/o procedimientos a partir de recursos genéticos o de sus productos derivados de los que cualquiera de los Países Miembros es país de origen. (Art. 26- h).
- SI ☐ NO ☐ NO ES APLICABLE ☒ Los productos y/o procedimientos han sido obtenidos o desarrollados a partir de los conocimientos tradicionales de las comunidades indígenas, afroamericanas, o locales de los países miembros, de acuerdo a lo establecido en la Decisión 391 y sus modificaciones y reglamentaciones vigentes.(Art.26-i).
- SI ☒ NO ☒ La invención se refiere a un producto relativo a un material biológico. (Art.26-j).
- * SI ☒ NO ☐ La prioridad coincide con la materia reivindicada.
- SI ☒ NO ☐ CUMPLE LOS REQUISITOS TÉCNICOS

OBSERVACIONES Y OTROS: SI ☒ NO ☐ ver hoja(s) anexa(s)

* ^{AUTORE} NO PRESENTÓ TRADUCCIONES PERTINENTES, JUERO SI SE TENDRÁ EN CUENTA PRIORIDAD

EXAMINADOR TÉCNICO

202042

Bogotá D. C., 11 DE ABRIL 02

Carrera 13 No. 27-00 Pisos 5, 7 y 10

Conmutador: 382 0840

Fax: 382 2695

E-mail: info@slc.gov.co

www.slc.gov.co

Bogotá, D.C., Colombia

Folio 218

2020
Bogotá DC

Doctor
GERMAN CASTILLO GRAU
Apoderado

REFERENCIA:	Radicación No.	01-37439
	Trámite	002
	Evento	001
	Actuación	416
	Oficio No.	1125
	Folios	001

Teniendo en cuenta que la solicitud de privilegio de patente que se tramita bajo el expediente indicado en la referencia, reúne los requisitos de forma establecidos en los artículos 26 y 27 de la Decisión 486 de la Comisión de la Comunidad Andina, y en las demás disposiciones vigentes sobre la materia, se envía el extracto de la solicitud a la Oficina de Comunicaciones para efecto de su publicación en la Gaceta de Propiedad Industrial, conforme lo establece el artículo 40 de la misma Decisión.

Cúmplase

Dado en Bogotá DC, a los 29 de Mayo de 2002


ALIX CARMENZA CÉSPEDES DE VERGEL
Jefe de la División de Nuevas Creaciones

Bogotá, DC, El extracto de esta solicitud fue publicado en el número de la Gaceta de Propiedad Industrial, de fecha 13 de Mayo de 2002. El término hábil señalado por la ley expiró el 27 de Mayo de 2002. Pisos 5, 7 y 10
y Si ____ NO ____ se presentaron oposiciones por parte de terceros.

Comunicador: 382 0840

Fax: 382 2695

E-mail: info@sic.gov.co

Bogotá, D.C., Colombia

202042

DIVISION DE NUEVAS CREACIONES

RADICACIÓN EXPEDIENTE No. 01-37439

**EL EXTRACTO DE LA PRESENTE SOLICITUD DE PATENTE DE INVENCION FUE PUBLICADO EN
LA GACETA DE PROPIEDAD INDUSTRIAL No 520, DE FECHA 27 DE SEPTIEMBRE DE 2002, EL
TERMINO HABIL SEÑALADO POR LA LEY EXPIRA EL 26 DE DICIEMBRE DE 2002.**

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

SE PRESENTARON OPOSICIONES POR PARTE DE TERCEROS.

SI _____

NO X

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

142

RADICACIÓN: 1-37439

EDICTO No. 5275

LA SECRETARÍA GENERAL AD-HOC HACE SABER:

Que esta Superintendencia profirió Resolución No. 8625 de 31-MAR-2003. Que el contenido de la parte resolutive es como sigue: El Superintendente de Industria y Comercio.

RESUELVE

ARTICULO PRIMERO: Declarar abandonada la solicitud de privilegio de patente de invención contenida en el expediente de la referencia.

ARTICULO SEGUNDO: Notificar personalmente el contenido de la presente resolución al doctor Gerardo Castillo Grau, o a quien haga sus veces, quien actúa como apoderado de BKI Holding Corporation, entregándole copia de la misma, advirtiéndole que contra ella procede el recurso de reposición interpuesto ante la Superintendencia de Industria y Comercio, al momento de la notificación o dentro de los 5 días hábiles siguientes a ella.

NOTIFÍQUESE Y CUMPLASE

Dada en Bogotá, D.C., a los

31 MAR 2003

LA SUPERINTENDENTE DE INDUSTRIA Y COMERCIO,


MÓNICA MURCIA PÁEZ

Para notificar a los interesados, se fija el presente EDICTO en lugar visible al público en la SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO, por el término de (10) diez días hábiles contados a partir de las 8:30 a.m. de hoy.

Secretaría General Ad-Hoc 23-ABR-2003
Secretaría General Ad-Hoc
EDICTO No. 5275

Este edicto se desliza hoy 07-MAY-2003 a las cinco (5:00 p.m.)