Castillo Grau & Asociados
ABOGADOS

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SUPERINDUSTRIA Y COMERCIO
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Señor Jefe

DIVISION DE NUEVAS CREACIONES

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

Santafé de Bogotá, D.C.

RE.: Expediente No. 00 1.054
Solicitud de patente a nombre de
BKI HOLDING CORPORATION
Código 02 - 01 - 01

En relación con la solicitud contenida en el expediente de la referencia y en particular para dar cumplimiento a lo establecido en el Artículo 4, D.- (3) del Convenio de París, con el presente escrito acompaño:

- La Copia certificada de la solicitud de patente estadounidense 60/116,036, de la cual se reivindica prioridad, debidamente traducida en su capítulo reivindicatorio.

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

De Usted atentamente,

GERMAN CASTILLO GRAU

T.P. No. 2978

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PA 196964

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

January 20, 2000

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: ***60/116,036***
FILING DATE: ***January 11, 1999***

By Authority of the
COMMISSIONER OF PATENTS AND TRADEMARKS

T. Wallace
T. WALLACE
Certifying Officer

ESTADOS UNIDOS DE AMÉRICA

A TODOS A QUIENES LLEGUE EL PRESENTE:

DEPARTAMENTO DE COMERCIO DE LOS ESTADOS UNIDOS

Oficina de Marcas y Patentes

20 de enero de 2000.

LA PRESENTE CERTIFICA QUE LA ADJUNTA ES UNA COPIA TOMADA DE LOS REGISTROS DE LA OFICINA DE MARCAS Y PATENTES DE LOS ESTADOS UNIDOS, DE LOS DOCUMENTOS DE LA SOLICITUD DE PATENTE ABAJO IDENTIFICADA Y LA CUAL CUMPLE CON LOS REQUISITOS PARA QUE LE SEA CONFERIDA UNA FECHA DE RADICACIÓN SEGÚN 35 USC 111.

NÚMERO DE SOLICITUD *60/116,036*

FECHA DE RADICACIÓN: *11 de enero de 1999*

Por Autoridad del

COMISIONADO DE MARCAS Y PATENTES

(FIRMA) T. WALLACE

Oficial de Certificaciones

(SELLO DORADO DE OBLEA)

* * * *

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MATERIALES ABSORBENTES FLEXIBLES DE ALTA INTEGRIDAD Y PRODUCTOS DE LOS MISMOS

REIVINDICACIONES:

1. Un absorbente que comprende:

   a. entre 20 y 80% por peso de fibras;

   b. menos de 80% por peso de polímero superabsorbente; y

   c. un ligando.

2. El absorbente de la reivindicación 1, en donde las fibras ligantes comprenden menos del 10% por peso del absorbente.

3. El absorbente de la reivindicación 1, en donde las fibras ligantes comprenden menos del 7% por peso del absorbente.

4. El absorbente de la reivindicación 1, en donde la integridad del absorbente es superior a 1N/5cm.

5. El absorbente de la reivindicación 1, en donde la integridad del absorbente es superior a 10N/5cm.

6. El absorbente de la reivindicación 1, en donde las fibras son lanillas de HPF, en donde el polímero superabsorbente es Z1049, y en donde el ligando es fibra ligante T-255.

7. El absorbente de la reivindicación 6, en donde las fibras están presentes en aproximadamente 56.3% por peso, en donde el polímero superabsorbente está presente en aproximadamente 37.% por peso, y en donde el ligando está presente en aproximadamente 6.2% por peso.

8. El absorbente de la reivindicación 1, en donde las fibras son Lanilla Foley, en donde el polímero superabsorbente es SXM4750, y en donde el ligando es fibra ligante T-255.

9. El absorbente de la reivindicación 8, en donde las fibras están presentes en aproximadamente 36.1% por peso, en donde el polímero superabsorbente está presente en aproximadamente 59.7% por peso, y en donde el ligando está presente en aproximadamente 4.2% por peso.

10. Una estructura absorbente que comprende el absorbente de la reivindicación 7 en combinación con un vehículo.

11. La estructura superabsorbente de la reivindicación 10, en donde el vehículo es un tejido de celulosa.

12. La estructura absorbente de la reivindicación 10, en donde el vehículo es poliéster no tejido.

13. Una estructura absorbente que comprende el absorbente de la reivindicación 10 en combinación con uno o más absorbentes.

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EXPRESS MAIL CERTIFICATE

Date 1/11/99 Label No. EM445425655

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

D B Peek — Name (Print)

D B Peek — Signature

PLEASE CHARGE ANY DEFICIENCY UP TO $300 00 OR CREDIT ANY EXCESS IN FUTURE FEES DUE WITH RESPECT TO THIS APPLICATION TO OUR DEPOSIT ACCOUNT NO. 04-0100

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

Docket No: 1313/0F139

Date: January 11, 1999

Hon. Commissioner of
Patents and Trademarks
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):

Jacek DUTKIEWICZ, Cardova, TN 38018

Title: HIGH INTEGRITY PLIABLE ABSORBENT MATERIALS AND PRODUCTS THEREOF

including the items indicated:

1. Specification and 13 claims: 1 indep.; 12 dep.; _ multiple dep.
2. [X] Drawings, 1 sheets (Fig. 1)
3. [X] Check in the amount of $150.00, ($150.00 filing)

Respectfully submitted,

Adam M. Goodmann

Adam M. Goodmann, Esq.
Reg. No. P-43,640
Attorney for Applicant(s)

PROVISIONAL PATENT APPLICATION COVER SHEET

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1313/0F139

HIGH INTEGRITY PLIABLE ABSORBENT MATERIALS AND APPLICATIONS THEREOF

FIELD OF THE INVENTION

This invention relates to absorbents (i.e. absorbent materials) and absorbent structures. This invention includes absorbents containing fibers and superabsorbent polymers linked by binder.

BACKGROUND OF THE INVENTION

Absorbent structures are important in a wide range of absorbent articles including baby diapers, adult incontinence products, sanitary napkins and the like. These and other applications, have created a need for absorbents with better pliability and integrity.

Pliability is necessary to ensure that the absorbent can easily conform itself to the shape of the human body or to the shape of a component (for example another absorbent layer) of the absorbent article adjacent to it. This in turn prevents the formation of gaps and channels between the absorbent article and the human body or between various parts in the absorbent article. The liquid might flow through such gaps and channels and cause undesired leaks.

Integrity is necessary to ensure that the absorbent does not deform and uncover parts of the surface being protected which would then become unprotected and

exposed to the liquid. Prior absorbents have been deficient in either pliability, integrity, or both. For example, conventional core has good conformability because of its high pliability but at the same time it may disintegrate easily during use.

The absorbent materials described herein exhibit a superior combination of pliability and integrity. The improved pliability of the disclosed absorbent materials provides increased comfort and reduced leak potential. Further, the improved integrity of the disclosed absorbent materials reduces the risk of deformation of the absorbent material and better protects the surface from exposure to liquid.

SUMMARY OF THE INVENTION

This invention provides absorbents with high integrity and high pliability. In one embodiment of the invention, the tensile strength of the absorbent is such that 1 newton of X-directional force would be required to break a 5cm wide sample of the sheet. Also included within the scope of the invention are absorbent structures prepared from 2 or more absorbents and optionally including one or more carriers.

BRIEF DESCRIPTION OF THE FIGURES

Figure 1 depicts an absorbent structure containing the absorbent component of the invention on a polyester nonwoven carrier and a different absorbent component on a cellulose tissue carrier.

DETAILED DESCRIPTION OF THE INVENTION

All references described in this application are hereby fully incorporated by reference.

This is invention includes an absorbent comprising: (a) between 20 and 80% by weight of fibers; (b) less than 80% by weight of superabsorbent polymer (SAP); and (c) binder. In one example of the invention, the binder is a binding fiber which comprises less than about 10% by weight of the absorbent. In another example of the invention, the binder fibers comprise less than about 7% by weight of the absorbent.

The absorbent material of this invention can be made by various forming methods and by using various raw materials such as natural and synthetic fibers, various types of SAP powders or fibers, and different kinds of fibrous, powder-like or liquid binders. Examples of the types of fibers which can be used here include: fluffed cellulose fibers prepared from softwood and/or hardwood pulps, cellulose fibers modified by chemical, mechanical and/or thermal treatments, keratin fibers such as fibers obtained from chicken feathers, as well as man-made staple fibers made with natural polymers such as cellulose, chitin, keratin, and with synthetic polymers such as polyester, polyamide and polypropylene.

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 making superabsorbent polymers, are hereby incorporated by reference. Examples of the types of superabsorbent polymers, which may be used in this invention, include: SAPs in their particulate form such as irregular granules, spherical particles, staple fibers and other elongated particles. The term "superabsorbent polymer" refers to a normally water-soluble polymer, which has been cross-linked prior to using it as a component of the absorbent structure of this invention. There are known methods of

making water-soluble polymers such as carboxylic polyelectrolytes to create hydrogel-forming materials, now commonly referred to as superabsorbents, and to use such materials to enhance the absorbency of dispensable absorbent articles. There are also known methods of crosslinking carboxylated polyelectrolytes to obtain superabsorbent polymers. Superabsorbent polymer granules useful in the practice of this invention are commercially available from a number of manufacturers, such as Dow Chemical (Midland, Michigan), Stockhausen (Greensboro, North Carolina), and Chemdal (Arlington Heights, Illinois). 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 well-known in the art. Examples of multi-functional 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 incorporated by reference herein. 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, gelatine salts etc. They are not, however, commonly used on a commercial scale to enhance absorbency of dispensable absorbent articles mainly due to their higher cost.

Examples of binders useful for making the absorbent structure of this invention include polymeric binders in a solid or liquid form. The term "polymeric binder" refers to any compound capable of bonding the fibers or fibers and superabsorbent granules to each other. For example, a natural or synthetic latex may be used as a binder. Examples of suitable latex binders are polymers and copolymers of acrylate, vinyl acetate and styrene-butadiene. Thermoplastic fibers or powder, which are well known in he art, are also commonly used to

provide bonding upon heating to the melting point of the thermoplastic fiber or powder. Other binders, which can be used for stabilizing the absorbent structure of this invention, include bonding agents commonly used to bond cellulose fibers. They are polymers dispersed in water, which are cured after application to the fibrous web and create bonds between fibers or between fibers and superabsorbent granules. Such agents are for example various cationic starch derivatives and synthetic cationic polymers containing crosslinkable functional groups such as polyamide-polyamine epichlorohydrine adducts. Any combination of the above-described polymeric binders may be used for stabilizing the structure of the present invention.

As used herein, integrity is the tensile strength of a sheet and is expressed in units (Newtons) of x-directional force required to break a 5 cm wide sample of the sheet. The tensile strength of the absorbent material may be measured by the following procedure: (a) cut a pad of absorbent material to desired sample dimensions (i.e. 5cm wide by 4" long)(the integrity tests described herein were performed on absorbent material having dimensions of 1" wide and 4" long); (b) reset tensile strength tester to clear any previous tests from memory (button marked "RST"); (c) insert sample into air-pressurized clamping device in tester; (d) press start button to initiate test; and (e) observe slow, continuous stretching of sample. When machine completes test, display shows maximum tensile strength achieved by sample as well as % elongation. Appropriate numbers are then recorded. Result of tensile strength units are represented in Newtons. The integrity of the absorbent structure of this invention is intended to be higher than 1N/5cm, preferably higher than 10N/5cm.

As used herein, the pliability of the absorbent structure is the amount of energy necessary to bend a

sheet, in this case the sheet being the absorbent structure of the invention. The more energy that has to be used to bend the sheet the less pliable the sheet is. Pliability can be measured by the following procedure: (a) cut a pad of the absorbent material to desired sample dimensions (the pliability tests described herein were performed on absorbent material having dimensions of 1" wide by 2.5" long); (b) insert sample into Gurley tester clamp; (c) secure with thumbscrews; (d) apply appropriate weights to lever arm (weight varies depending on sample pliability, available weights are 5g, 25g, 50g, and 200g); (e) press motor button to pass sample over weighted lever arm; and (f) observe and record maximum number reached by arrow on weighted lever arm. Repeat in reverse direction. Average both numbers. Multiply number by appropriate factor determined by sample size, weight used, and weight distance from center on lever arm (factors shown in table mounted on Gurley tester). The result, S, is in milligrams. P is defined here according to the following formula: $P = 10000/S$.

In the present invention a high level of pliability with sufficient integrity has been achieved by applying relatively small amounts of binder and relatively low pressure during calandering of the sheet after it has been cured. Usually, higher amounts of binders are used which result in relatively high integrity but low pliability.

The integrity of the absorbent structure of this invention is higher than that of a conventional core made with only fluff and SAP powder and sufficiently high for converting the sheet and for its use. In one embodiment, the absorbent has an integrity greater than 1N/5cm. In another embodiment, the absorbent has an integrity greater than 5N/5cm. In yet another embodiment, the absorbent has an integrity greater than 10N/5cm.

The pliability of the absorbent structure is

such that it allows the material to conform itself easily to the shape of the human body or to the shape of a component (for example another absorbent layer) of the absorbent article adjacent to it. In an embodiment, the absorbent structure has a basis weight between 50 and 1500 gsm and a pliability of between about 0.2 and 3.

To further increase the levels of pliability and integrity of absorbent, absorbent structures may be additionally treated using various chemical and/or mechanical processes. Without being bound by any theory, it is believed that, for a given composition of the absorbent structure, the right level of pliability and integrity will be achieved with an appropriate ratio of bonded to unbonded structural elements. If the number of bonds between the fibers or between the fibers and superabsorbent granules is too small, then the pliability of the structure will be too high to achieve improved performance of the absorbent structure during use because it will not hold well enough onto flat surfaces and will not ensure desired coverage of flatter parts of the body. They will then become exposed to the liquid and will not be dried well by the absorbent material inside the absorbent article. On the other hand, if the number of bonds in the absorbent structure is too high, then the pliability becomes too low and the structure becomes less conformable. Thus, its performance is no longer good due to possible formation of undesirable channels and gaps through which the liquid may freely flow and leak out of the absorbent article.

As exemplified below, the absorbent may be used in combination with a carrier such as cellulose tissue or polyester nonwoven. The absorbents may also be used in combination to form an absorbent structure.

The invention is further described in the following non-limiting examples.

EXAMPLE 1

An absorbent structure was assembled by joining together Components A and B described below. Both absorbent components were made by dry-forming on an M&J pilot machine. The resultant structure is illustrated in Figure 1. It exhibited improved performance due to the combination of appropriate levels of pliability and integrity.

Component A. Two forming heads were used and they were fed with the same composition and amount of raw materials. The product was laid on a carrier, which was 40gsm Brand 6810 polyester (polyethylene terephthalate) nonwoven (PGI). The composition of the formed structure having basis weight of 320 gsm was 56.3% HPF fluff (Buckeye Technologies, Memphis, TN), 37.5% Z1049 SAP (Stockhausen, Greensboro, NC) and 6.2% T-255 binder fiber (Hoechst). The sheet was calandered after curing with minimum pressure to a thickness of 3mm.

Component B. The first forming head was fed with Foley Fluff (Buckeye Technologies) at 75 gsm and T-255 binder fiber (Hoechst, Charlotte, NC) at 3 gsm. The second forming head was fed with Foley Fluff (Buckeye Technologies) at 55 gsm, T-255 binder fiber (Hoechst, Charlotte, NC) at 12 gsm, and SXM4750 SAP (Stockhausen) at 215 gsm. The product was laid on a carrier, which was Duni Finner K1801 cellulose tissue. The sheet was calandered after curing to a thickness of 2mm.

EXAMPLE 2

An absorbent structure having total basis weight of about 720 gsm was made with 22.5% Foley fluff (Buckeye), 18.6% SAP (SXM70, Stockhausen), 4.4% binder fiber T-255 (Hoechst), cellulose carrier tissue (15 gsm) and sprayed with latex on the surface (1.3 gsm). This absorbent structure had a pliability of about 0.3.

What is claimed is:

1. An absorbent comprising:
   a. between 20 and 80% by weight of fibers;
   b. less than 80% by weight of superabsorbent polymer; and
   c. binder.

2. The absorbent of claim 1, wherein the binder fibers comprise less than 10% by weight of the absorbent.

3. The absorbent of claim 1, wherein the binder fibers comprise less than 7% by weight of the absorbent.

4. The absorbent of claim 1, wherein the integrity of the absorbent is greater than 1N/5cm.

5. The absorbent of claim 1, wherein the integrity of the absorbent is greater than 10N/5cm.

6. The absorbent of claim 1, wherein the fibers are HPF fluff, wherein the superabsorbent polymer is Z1049, and wherein the binder is T-255 binder fiber.

7. The absorbent of claim 6, wherein the fibers are present in about 56.3% by weight, wherein the superabsorbent polymer is present in about 37.5% by weight, and wherein the binder is present in about 6.2% by weight.

8. The absorbent of claim 1, wherein the fibers are Foley Fluff, wherein the superabsorbent polymer is SXM4750, and wherein the binder is T-255 binder fiber.

9. The absorbent of claim 8, wherein the fibers are

present in about 36.1% by weight, wherein the superabsorbent polymer is present in about 59.7% by weight, and wherein the binder is present in about 4.2% by weight.

10. An absorbent structure comprising the absorbent of claim 7 in combination with a carrier.

11. The absorbent structure of claim 10, wherein the carrier is cellulose tissue.

12. The absorbent structure of claim 10, wherein the carrier is polyester nonwoven.

13. An absorbent structure comprising the absorbent of claim 10 in combination with one or more absorbents.

ABSTRACT OF THE INVENTION

This invention provides an absorbent comprising: (a) between 20 and 80% by weight of fibers; (b) less than 80% by weight of superabsorbent polymers; and (c) binder. The absorbent is characterized by its combination of high integrity and high pliability. Also included are absorbent structures made up of 2 or more absorbents and optionally including one or more carriers.

FIGURE 1