

Clarke, Mader & Co

COLO

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



No. 08-116816- -00001-0000

Fecha: 2008-11-21 15:42:11 Dep: 2020 NUECREACION
Tra: 2 PATENTES Eve: 1 REGDEPOSITO
Act: 329 CTOINFORMACION Folios: 114

P-1716

**SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO
DIVISION DE NUEVAS CREACIONES**

E. S. D.

Ref.: Expediente No. 08-116.816
Solicitud de Patente a nombre de
McNeil-PPC, Inc.

Yo, JIMENA ESCOBAR URIBE, identificada como aparece al pie de mi firma, domiciliada en la Carrera 11 No. 86-53, piso 6, obrando como apoderada de la sociedad **McNeil-PPC, Inc.**, domiciliada en Skillman, New Jersey, Estados Unidos de América, solicitante de la patente de la referencia, atentamente me permito presentar las copias certificadas de la solicitud de patente números 11/958,986 presentada en Estados Unidos de América el día 18 de diciembre de 2007 y 60/984,218 de 31 de octubre de 2007, con la debida traducción de lo pertinente.

Señor Superintendente,

JIMENA ESCOBAR URIBE

C.C.39.779.452 de Usaquén

T.P. 68228

Cód. 5376

ESTADOS UNIDOS DE AMÉRICA
A TODOS AQUELLOS A QUIENES EL PRESENTE LLEGUE:

DEPARTAMENTO DE COMERCIO DE LOS ESTADOS UNIDOS
Oficina de Patentes y Marcas de los Estados Unidos

Noviembre 4, 2008

Por medio del presente se certifica que adjunto se encuentra una copia de los archivos de la Oficina de Patentes y Marcas de los Estados Unidos de aquellos papeles de la solicitud de patente abajo identificada, la cual cumplió con los requisitos para que se le otorgara una fecha de presentación bajo 35 USC 111.

Número de Solicitud: 11/958,986

Fecha de Presentación: Diciembre 18, 2007

El código del país y el número de su solicitud de prioridad para ser usado en presentación en el extranjero bajo la Convención de París, es US11/958,986

Por la autoridad del
Comisionado de Patentes y Marcas

(fdo) E. BORNETT

Oficial Certificador

Sello oficial de la Oficina de Patentes y Marcas de los
Estados Unidos de América.

REIVINDICACIONES

Reivindico:

5 1. Una toalla sanitaria adherible al cuerpo, que comprende

una capa de cubierta permeable a fluido;

una capa que retiene fluido; y

0

una capa de barrera que tiene un adhesivo conectable
dispuesto sobre por lo menos primeras porciones de ésta
en donde dicha toalla sanitaria satisface lo siguiente

5

$$G/tE > 0.1 \text{ N/m}; \text{ y } tGE < 2 \times 10^5 \text{ N}^2/\text{M}^2$$

2. La toalla sanitaria adherible al cuerpo de la
reivindicación 1, en donde dicha capa de barrera tiene
una primera porción y una segunda porción, dicha segunda
0 porción tiene un adhesivo adherible al cuerpo dispuesto
allí; y en donde dicho ensamble de retención de fluidos
está dispuesto en relación traslapante con dicha primera
porción de dicha capa de barrera definiendo por lo tanto
un área de yuxtaposición entre dicho ensamble de
5 retención de fluidos y dicha capa de barrera; y en donde
dicho ensamble de retención de fluido se asegura a dicha
capa de barrera a lo largo de una porción seleccionada
de dicha área de yuxtaposición.

3. La toalla sanitaria adherible al cuerpo de la reivindicación 2, en donde la porción seleccionada del área de yuxtaposición tiene una fracción de área que es de aproximadamente 20% a aproximada 80% del área de yuxtaposición.

4. La toalla sanitaria adherible al cuerpo de la reivindicación 2, en donde la porción seleccionada del área de yuxtaposición tiene una fracción de área que es de aproximadamente 30% a aproximada 70% del área de yuxtaposición.

5. La toalla sanitaria adherible al cuerpo de la reivindicación 2, en donde la relación traslapante entre dicha primera porción de dicha capa de barrera y dicha porción de retención de fluidos define adicionalmente un región periférica de yuxtaposición, y en donde por lo menos aproximadamente 50% de la región periférica de yuxtaposición no se asegura a la capa de barrera.

6. La toalla sanitaria adherible al cuerpo de la reivindicación 2, en donde la relación traslapante entre dicha primera porción de dicha capa de barrera y dicha porción de retención de fluidos define adicionalmente un segmentos de no adhesión y un segmento de adhesión, y donde la longitud del segmento de no adhesión 52 es

mayor de aproximadamente 15% de aquel de la longitud de los segmentos de adhesión.

7. La toalla sanitaria adherible al cuerpo de la reivindicación 2, que comprende adicionalmente una capa de barrera adicional posicionada intermedia a ensamble de retención de fluido y la capa de barrera extensible.

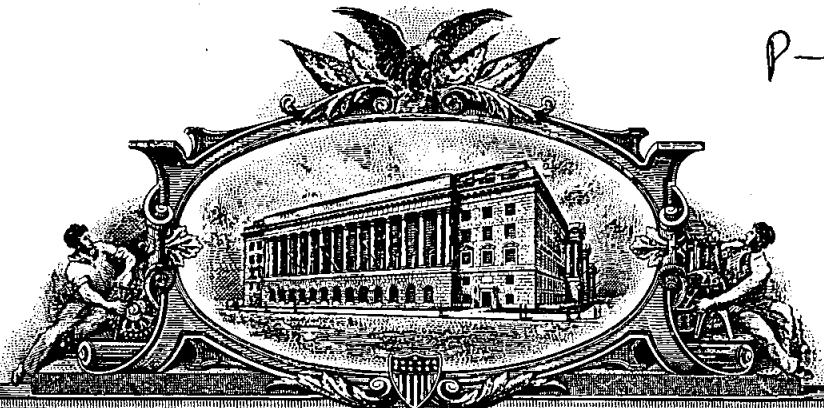
8. La toalla sanitaria adherible al cuerpo de la reivindicación 7, en donde la capa de barrera adicional no se extiende más allá del área de yuxtaposición.

9. La toalla sanitaria adherible al cuerpo de la reivindicación 7, en donde la capa de barrera adicional está libre de adhesivo para estar en contacto con el cuerpo.

10. La toalla sanitaria adherible al cuerpo de la reivindicación 2, en donde dicha barrera extensible comprende adicionalmente una tercera porción que tiene una superficie para contacto con el cuerpo, en donde la tercera porción está libre de adhesivo para contacto con el cuerpo.

P-1716

PA 1726868



THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

November 04, 2008

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: 11/958,986

FILING DATE: December 18, 2007

THE COUNTRY CODE AND NUMBER OF YOUR PRIORITY APPLICATION, TO BE USED FOR FILING ABROAD UNDER THE PARIS CONVENTION, IS US11/958,986

By Authority of the
Under Secretary of Commerce for Intellectual Property
and Director of the United States Patent and Trademark Office




E. BORNETT
Certifying Officer

6

UTILITY PATENT APPLICATION TRANSMITTAL		Attorney Docket No. PPC-5287-USNP1
		First Inventor LEONARD G. ROSENFELD
		Title BODY-ATTACHABLE SANITARY NAPKIN

APPLICATION ELEMENTS <i>See MPEP Chapter 600 concerning utility patent application contents.</i>	ADDRESS TO: Commissioner for Patents P.O. Box 1450 Alexandria, VA 22313-1450
--	---

1. ☒ Fee Transmittal Form (e.g., PTO/SB/17) <i>(submit an original and a duplicate for fee processing)</i> 2. ☐ Applicant claims small entity status. 3. ☒ Specification [Total Pages 39] <i>(Preferred arrangement set forth below)</i> - Descriptive Title of the Invention - Cross Reference to Related Applications - Statement Regarding Fed sponsored R&D - Reference to sequence listing, a table, or a computer program listing appendix - Background of the Invention - Brief Summary of the Invention - Brief Description of the Drawings <i>(if filed)</i> - Detailed Description - Claim(s) - Abstract of the Disclosure 4. ☒ Drawing(s) (35 USC 113) [Total Sheets 5] 5. Oath or Declaration [Total Pages 3] a. ☒ Newly executed (original or copy) b. ☐ Copy from a prior application (37 CFR 1.63(d)) <i>(for continuation/divisional with Box 18 completed)</i> i. ☐ DELETION OF INVENTOR(S) Signed statement attached deleting inventor(s) named in the prior application, see 37 CFR 1.63(d)(2) and 1.33(b). 6. ☐ Application Data Sheet. See 37 CFR 1.76	7. ☐ CD-ROM or CD-R in duplicate, large table or Computer Program (Appendix) 8. Nucleotide and/or Amino Acid Sequence Submission (if applicable, all necessary) a. ☐ Computer Readable Form (CRF) b. ☐ Specification Sequence Listing on: i. ☐ CD-ROM or CD-R (2 copies); or ii. ☐ paper c. ☐ Statement verifying identity of above copies ACCOMPANYING APPLICATION PARTS 9. ☐ Assignment Papers (cover sheet & document(s)) 10. ☐ 37 CFR 3.73(b) Statement ☐ Power of Attorney <i>(when there is an assignee)</i> 11. ☐ English Translation Document <i>(if applicable)</i> 12. ☐ Information Disclosure Statement (IDS)/PTO-1449 ☐ Copies of IDS Citations 13. ☐ Preliminary Amendment 14. ☐ Return Receipt Postcard (MPEP 503) <i>(Should be specifically itemized)</i> 15. ☐ Certified Copy of Priority Document(s) <i>(if foreign priority is claimed)</i> 16. ☐ Request and Certifications under 35 U.S.C. 122 (b)(2)(B)(i). Applicant must attach form PTO/SB/35 or its equivalent. 17. ☐ Other
--	---

18. ☐ If a CONTINUING APPLICATION, check appropriate box and supply the requisite information below and in a preliminary amendment, or in an Application Data Sheet under 37 CFR 1.76:

☐ Continuation ☐ Divisional ☐ Continuation-in-Part (CIP) of prior application No.: , filed

Prior application information: Examiner Group Art Unit:

For CONTINUATION or DIVISIONAL APPS only: The entire disclosure of the prior application, from which an oath or declaration is supplied under Box 5b, is considered a part of the disclosure of the accompanying continuation or divisional application and is hereby incorporated by reference. The incorporation can only be relied upon when a portion has been inadvertently omitted from the submitted application parts.

19. CORRESPONDENCE ADDRESS

☒ Customer Number or Bar Code Label 000027777 or ☐ Correspondence Address below

Name: Philip S. Johnson, Esq.
 Address: Johnson & Johnson
 One Johnson & Johnson Plaza
 New Brunswick, NJ 08933-7003 USA

20. TELEPHONE CONTACT

Please direct all telephone calls or telefaxes to Paul J. Higgins at:
 Telephone: (732) 524-1728 Fax: (732) 524-2808

21. SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

NAME	Paul J. Higgins	Reg. No. 44,152
SIGNATURE	/Paul J. Higgins/	
DATE	December 18, 2007	

FEE TRANSMITTAL	<i>Complete if Known</i>	
	Application Number	Unassigned
	Filing Date	December 18, 2007
	First Named Inventor	Leonard G. Rosenfeld
	Group Art Unit	Unassigned
	Examiner Name	Unassigned
	Attorney Docket Number	PPC-5287-USNP1

FEE CALCULATION

CLAIMS AS FILED

(1)	(2)	(3)	(4)	(5)
FOR:	NUMBER FILED	NUMBER EXTRA	RATE	BASIC FEE \$310.00
TOTAL CLAIMS	10 - 20 =	0	x 50.00	\$ 0.00
INDEPENDENT CLAIMS	1 - 3 =	0	x 210.00	\$ 0.00
SEARCH FEE	NA	NA	NA	\$ 510.00
EXAMINATION FEE	NA	NA	NA	\$ 210.00
APPLICATION SIZE FEE If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 25 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).	0 - 100 =	/50	x 250.00 (If the specification and drawings exceed 100 sheets of paper, for each additional 50 sheets or fraction thereof)	\$
MULTIPLE DEPENDENT CLAIMS	☐	N/A	\$360.00	
			TOTAL FEES	\$1,030.00

METHOD OF PAYMENT

- ☒ Please charge our Deposit Account as indicated on the Fee Transmittal Sheet filed via EFS in the amount of \$1,030.00.
- ☒ The Commissioner is hereby authorized to charge any additional fees which may be required in connection with the filing of this communication, or credit any overpayment, to our Deposit Account.

SUBMITTED BY:			<i>Complete (if applicable)</i>
Typed or Printed Name	Paul J. Higgins		Reg. No. 44,152
Signature	/Paul J. Higgins/	Date: December 18, 2007	Deposit Account No. 10-0750

Electronic Acknowledgement Receipt

EFS ID:	2608310
Application Number:	11958986
International Application Number:	
Confirmation Number:	1996
Title of Invention:	BODY-ATTACHABLE SANITARY NAPKIN
First Named Inventor/Applicant Name:	Leonard G. Rosenfeld
Customer Number:	27777
Filer:	Paul J. Higgins./Kristine Kingsbury
Filer Authorized By:	Paul J. Higgins.
Attorney Docket Number:	PPC-5287-USNP1
Receipt Date:	18-DEC-2007
Filing Date:	
Time Stamp:	16:29:50
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	\$1030
Patent confirmation Number	1838
Deposit Account	100750
Authorized User	

Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes) /Message Digest	Multi Part /.zip	Pages (if appl.)
1		PPC5287USNP1APPLICATION.pdf	399243 9cad26ea87c7c50d9387282a9c408a70ed029d5b	yes	39
	Multipart Description/PDF files in .zip description				
	Document Description		Start		End
	Specification		1		35
	Claims		36		38
	Abstract		39		39
arnings:					
ormation:					
2	Transmittal of New Application	PPC5287USNP1APPLNTRANSLTR.pdf	467589 d98b4a4471183dfb34c17c9342ddb849fd29182	no	4
arnings:					
ormation:					
3	Drawings-only black and white line drawings	PPC5287USNP1DRAWING S1.pdf	128819 333481bb82a315cbc11711bhd6efbeffed161b30	no	5
arnings:					
ormation:					
4	Oath or Declaration filed	PPC5287USNP1EXECUTE DDECLARATION.pdf	150338 2a5c211e0b5624619cfc99a609f2d1940426121	no	3
arnings:					
ormation:					
5	Fee Worksheet (PTO-06)	fee-info.pdf	8368 9c49148d2e2d16954feda89187b66d6ab975ff90	no	2
arnings:					
ormation:					
Total Files Size (in bytes):			1154357		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

BODY-ATTACHABLE SANITARY NAPKIN**CROSS REFERENCE TO RELATED APPLICATIONS**

This application claims priority to Application No. 60/984,218 filed on October

5 31, 2007, the entire contents of which are incorporated by reference herein.

FIELD OF THE INVENTION

The present invention generally relates to sanitary absorbent articles and in particular to sanitary napkins that are directly attachable to the body.

10

BACKGROUND OF THE INVENTION

Externally worn, sanitary napkins are one of many kinds of feminine protection devices currently available. In use, the typical sanitary napkin is positioned in the perineal region to capture bodily discharge, e.g., menses. In order to prevent the sanitary napkin from drifting into a position that would compromise the sanitary napkin's ability to manage bodily discharges, the sanitary napkin is generally affixed to a user's undergarment, most commonly with adhesive that is applied to a garment facing surface of the sanitary napkin. The adhesive essentially joins the sanitary napkin to the user's underwear.

20

An alternative sanitary napkin design, the so-called, "body-attachable" sanitary napkin, includes a means for affixing the sanitary napkin directly to the user's body, typically using a body-contactable adhesive. For example, U.S. patent No. 6,213,993 purports to disclose a self-adhering absorbent article including a liquid-permeable cover,

an absorbent core, a liquid impermeable baffle, and a bodyside adhesive arranged on the cover for securing the article to the body.

Unfortunately, it is difficult to design a body-attachable sanitary napkin that will remain attached to the user in a manner that is comfortable to the user and sufficient to prevent leakage. Applicants have recognized that conventional body-attachable sanitary napkins do not move sufficiently with the body during either resulting in leakage and/or detachment from the body. Applicants have further recognized that conventional body-attachable sanitary napkins do not remain securely attached to the body during use, move with the body during use, yet at the same time enable the user to selectively remove the napkin in a pain free manner. As such, a need exists to overcome one or more of the above-mentioned drawbacks.

SUMMARY OF THE INVENTION

According to a first aspect of the invention, the present invention provides a body-attachable sanitary napkin a body-attachable sanitary napkin, comprising:

- 5 a fluid-pervious cover layer; a fluid-retaining layer; and a barrier layer having a body-contactable adhesive disposed on at least first portions thereof, wherein said sanitary napkin satisfies the following:

$$G/tE > 0.1 \text{ and } tGE < 2 \times 10^5 \text{ N}^2/\text{m}^2$$

wherein G is Peel Energy, t is thickness of the sanitary napkin, and E is the effective

- 0 Young's modulus of the napkin, and wherein G/tE and tGE are determined using the PEEL FORCE TEST PROCEDURE and the PEAK FORCE-20% STRETCH TEST PROCEDURE, both of which are described herein.

BRIEF DESCRIPTION OF THE DRAWINGS

Examples of embodiments of the present invention will now be described with reference to the drawings, in which:

5

FIG. 1 is a top plan view of a sanitary napkin in accordance with a first embodiment of the present invention;

)

FIG. 2 is a sectional view of the sanitary napkin of FIG. 1, taken through the transverse centerline, line 2-2' thereof;

FIG. 3 is a top plan view of a sanitary napkin of FIG. 1, showing additional features thereof;

5

FIG. 4 is a top plan view of a sanitary napkin of FIG. 1, showing yet additional features thereof;

)

FIG. 5 is cross-sectional view of a sanitary napkin sanitary napkin in accordance with a second embodiment of the present invention;

FIG. 6 is a schematic side view of a test apparatus suitable for conducting test procedures described herein on body-attachable sanitary napkins; and

FIG. 7 is a graphical depiction of stay-in-place and removal pain for inventive sanitary napkins as well as comparative examples.

DETAILED DESCRIPTION OF THE INVENTION

The present invention provides a body-attachable sanitary napkin that is generally able to accommodate the demands of moving with the body, remaining attached thereto in use, while permitting the fluid-retaining assembly to remain positioned to receive and retain bodily fluid. As such, the sanitary napkin includes, in certain embodiments, a fluid-retaining assembly that is secured to a barrier layer only along selected portions of an area of juxtaposition between the fluid-retaining assembly and the barrier. By including a fluid-retaining assembly that has reduced securement to the barrier layer, the demands that would otherwise be placed on either the barrier layer or adhesive, or both, is greatly reduced.

Applicants have further determined that a body-attachable sanitary napkin can overcome the challenge of simultaneously providing both high stay in place as well as reduced removal pain by selecting the barrier layer, selecting the body-contactable adhesive and arranging the sanitary napkin, all in a certain manner. In particular, Applicants have provided herein a sanitary napkin construction that remains securely attached to the body during use, moves with the body during use, yet also enables the user to selectively remove the napkin in a pain free manner.

The peel force values described herein are affected by both the nature of the body-contactable adhesive as well as the selection of the barrier layer. The criticality of the results of Applicant's PEEL FORCE TEST PROCEDURE as well as the combination of this criticality combined with the criticality of the results of Applicant's PEAK

FORCE-20% STRETCH TEST PROCEDURE has not previously been identified as useful parameters in the design of body-attachable sanitary napkins.

By designing the body-contactable sanitary napkin to meet the requirements above, it is possible to include a wider range of barrier materials, a wider range of adhesives, and/or a wider variety of designs than were suggested in the prior art.

Referring to **FIGS. 1-2**, there is shown a first embodiment of the present invention, a feminine sanitary napkin 10. **FIG. 1** depicts a top plan view of the sanitary napkin shown in **FIG. 1**. The sanitary napkin 10 a first transverse side 26 defining a front portion thereof and a second transverse side 28 defining a rear portion thereof. The sanitary napkin 10 also has two longitudinal sides, namely a first longitudinal side 30 and a second longitudinal side 32.

The sanitary napkin 10 has a longitudinal centerline 14 that bisects the sanitary napkin 10 in two identical halves and an imaginary transverse centerline 16 arranged perpendicular to the longitudinal centerline 14. **FIG. 2** depicts a cross-sectional view of the sanitary napkin shown in **FIG. 1**, taken through line 2-2'.

As shown in **FIGS. 1-2**, sanitary napkin 10 is of a laminate construction and comprises an extensible barrier layer 24. The extensible barrier layer 24 has a top face 33 that generally faces the body of the user and a bottom face 35 that generally faces the user's undergarment.

A fluid-retaining assembly 37 is arranged in overlapping relationship to a first portion 27 of the extensible barrier layer 24, thereby defining an area of juxtaposition 34 between the fluid-retaining assembly 37 and the extensible barrier layer 24. The first portion 27 of the extensible barrier layer 24, the fluid-retaining assembly 37, and the area

of juxtaposition 34 defined by the overlapping of these components are depicted in FIG. 1 as the “peanut-shaped,” cross-hatched region. The first portion 27 of the extensible barrier layer 24, since it is overlapped by the fluid-retaining assembly, does not include a skin-contactable surface.

The extensible barrier layer 24 further includes a second portion 29 that extends outwardly beyond the first portion. The body-contactable adhesive 31 is formed upon the top face 33 of the second portion 29 of the extensible barrier layer 24.

The extensible barrier layer 24 may also include a third portion 39. The third portion 39 is outside the area of juxtaposition 34. As such it is body-contactable. However, the third portion 39 includes no body-contactable adhesive formed thereon.

The shape of the extensible barrier layer 24 is variable and may be designed to facilitate skin contact with skin along the groin/inner thigh. Furthermore, the shape of the fluid-retaining assembly 37 is variable and may be selected to facilitate coverage of the perineal region of the user. As a percent of the total area of the extensible barrier layer 24 when laid flat (i.e., the “footprint” of the extensible barrier layer 24 – as shown in FIG. 1), the area of the fluid retaining portion 37 may be from about 10% to about 90%, preferably from about 40% to about 80%.

The shape of the second portion 29 of the extensible barrier layer 24 is also variable and may be designed to facilitate contact with the user and may be further designed for ease of manufacture. As depicted in FIG. 1, the shape of second portion 29 may include or consist essentially of one or more longitudinally-oriented stripes on either side of longitudinal centerline 14. Other configurations, e.g., one or more squares, rectangles, circles, dotted stripes, strips, swirls, or waves are also contemplated.

The fluid-retaining assembly 37 is secured to the first portion 27 of the extensible barrier layer 24 along a selected portion 36 (the outline of which is shown as a rectangularly-shaped area in phantom in FIG. 1) of the area of juxtaposition 34. Along non-selected portions 38 (depicted in FIG. 1 as that portion of the “peanut-shaped” area of juxtaposition 34 that is outside the rectangular-shaped selected portion 36), the fluid-retaining assembly 37 is not secured to the first portion 27 of the extensible barrier layer 24. By “secured” it is meant that selected portion 36 the extensible barrier layer 24 and the fluid-retaining portion 37 are either directly or indirectly connected and are designed to remain connected in use.

The selected portion 36 as a fraction of the area of juxtaposition 34 is not so low as to allow the fluid-retaining assembly 37 to move too freely and/or risk detachment from the sanitary napkin 10, yet it is not so large that motion is unnecessarily restricted. In one embodiment of the invention, the selected portion is from about 5% to about 90% of the area of juxtaposition 34, preferably from about 20% to about 80%, more preferably from about 30% to about 70%.

FIG. 3 is top plan view of the sanitary napkin of **FIG. 1**, showing additional features thereof. As shown in **FIG. 3**, the overlapping of the fluid-retaining assembly 37 with the extensible barrier layer 24 further defines a perimeter 46 of juxtaposition, an imaginary shape that bounds the fluid-retaining portion 37. The perimeter 46 of juxtaposition defines a peripheral region of juxtaposition 44, that portion of the area of juxtaposition 34 along the perimeter 46 of juxtaposition and having a constant width 48, such that the peripheral region of juxtaposition 44 accounts for 10% of the total area of juxtaposition 34. In one embodiment of the invention, at least about 50% of the

peripheral region of juxtaposition is not secured to the extensible barrier layer 24. In a preferred embodiment, greater 75% of the peripheral region of juxtaposition is not so secured.

FIG. 4 is top plan view of the sanitary napkin of **FIG. 1**, showing yet additional features thereof. As shown in **FIG. 3**, the overlapping of the fluid-retaining assembly 37 with the extensible barrier layer 24 further defines one or more segments of attachment 50, e.g., segments of the transverse centerline 16 within the area of juxtaposition 34 that are secured to the extensible barrier layer 24 (shown in phantom in **FIG. 4**) and one or more segments of unattachment 52; e.g., a segment of the transverse centerline 16 within the area of juxtaposition 34 that are not secured to the extensible barrier layer 24 (shown as a solid line in **FIG. 4**). In one embodiment, the total length of the segments of unattachment 52 are greater than about 15% of that of the total length of the segments of attachment 50. In a preferred embodiment, the length of the segment of unattachment 52 is greater than about 30% of that of the length of the segments of attachment 50. While in **FIG. 4**, the line from which the segments of attachment 50 and segments of unattachment 52 is the transverse centerline 16, the longitudinal centerline 14 or a line at any angle in between the transverse centerline 16 and the longitudinal centerline could be used to determine suitable segments of attachment of unattachment.

While **FIGs. 1, 3 and 4** depict the shape of the selected portion 36 of the area of juxtaposition 34 to be a single continuous rectangular area, other shapes for the selected portion 36 are contemplated. For example, the selected portion 36 may include one or more areas of squares, rectangles, circles, dotted stripes, strips, swirls, or waves etc. and

may include or not include the center (intersection of the longitudinal centerline 14 and transverse center line 16).

FIG. 5 depicts an alternative embodiment of the invention of a sanitary napkin 20. Sanitary napkin 20 is identical to the sanitary napkin 10 of FIGs 1-2, except that sanitary napkin 20 includes an additional fluid-impervious barrier layer 42, distinct from the extensible barrier layer 24. Additional barrier layer 42 is positioned intermediate (e.g., between) the fluid-retaining assembly 37 and the extensible barrier layer 24. As such, the additional barrier layer 42 provides additional ability to trap bodily fluids and prevent leakage of fluid outside the sanitary napkin 20. In one embodiment, the additional barrier layer 42 is sized to just accommodate the fluid-retaining assembly 37 and, as such, the additional barrier layer 42 does not extend beyond the area of juxtaposition 34 and is free of the body-contactable adhesive 31.

Barrier Layer

The extensible barrier layer 24 is generally liquid impervious. By “liquid impervious” it is meant that liquids such as menses and urine, under in-use conditions are unable to pass through. By “extensible”, it is meant that when placed under tension in the plane of the layer, the extensible barrier layer 24 can stretch (elastically) 10% or more, preferably 20% or more and essentially recover its original length. The extensible barrier layer 24 may include, for example, polymeric film such as polyethylene or polypropylene; liquid impervious (e.g., repellent-treated) non-wovens (e.g., spunbond, meltblown, or thermobonded polyolefin or polyurethane fibers that have been treated to prevent the penetration of bodily fluids therethrough; or combinations or laminates thereof. The extensible barrier layer 24 may have a basis weight from about 5 gsm to

about 20 gsm. Notable liquid pervious extensible barrier films include spunbond liquid-impervious nonwovens of polyurethane and/or polypropylene; with or without layers of meltblown fibers arranged in between.

The extensible barrier layer 24 may be breathable, i.e., permits vapor to transpire.

5 Known materials for this purpose include nonwoven materials and microporous films in which microporosity is created by, inter alia, placing the extensible barrier layer 24 in tension. Single or multiple layers of permeable films, fabrics, melt-blown materials, and combinations thereof that provide a tortuous path, and/or whose surface characteristics provide a liquid surface repellent to the penetration of liquids may also be used to provide
10 a breathable barrier layer.

Optional additional barrier layer 42, as shown in **FIG. 4** may be of similar composition and generally has similar liquid-imperviousness as described above for the extensible barrier layer 24.

15 **Body-Contactable Adhesive**

The body-contactable adhesive 31 is formed on a body-faceable side of the extensible barrier layer 24 for securing the sanitary napkin 10 to the body of a user, during use. The body-contactable adhesive 31 may be covered with removable release paper so that the body-contactable adhesive 31 is covered by the removable release paper
20 prior to use.

The body-contactable adhesive 31 may include pressure sensitive adhesive and may be applied in various suitable configurations as previously described. As used herein, the term pressure-sensitive adhesive refers to any releasable adhesive or releasable tenacious means.

The composition of the body-contactable adhesive 31 is variable, as long as the adhesive is selected such that when the sanitary napkin is tested according to the test methods described herein, *both* (1) a suitable force to effect peeling of the adhesive *and* (2) a low enough force to effect a particular 20% stretch when subject to tension across the sanitary napkin.

The body-contactable adhesive 31 used in sanitary napkin may be an adhesive based upon block copolymers such as those which may include linear or radial copolymer structures having the formula $(A-B)_x$ wherein block A is a polyvinylarene block, block B is a poly(monoalkenyl) block, x denotes the number of polymeric arms, and wherein x is an integer greater than or equal to one. Suitable block A polyvinylarenes include, but are not limited to polystyrene, polyalpha-methylstyrene, polyvinyltoluene, and combinations thereof. Suitable Block B poly(monoalkenyl) blocks include, but are not limited to conjugated diene elastomers such as for example polybutadiene or polyisoprene or most preferably hydrogenated elastomers such as ethylene-butylene or ethylene-propylene or polyisobutylene, or combinations thereof, specifically, adhesives consisting of styrene-ethylene-butylene-styrene (SEBS) block copolymer and mineral oils, paraffinic or naphthenic process oils, and optionally a suitable tackifying resins include natural and modified resins; glycerol and pentaerythritol esters of natural and modified resins; polyterpene resins; copolymers and terpolymers of natural terpenes; phenolic modified terpene resins and the hydrogenated derivatives thereof; aliphatic petroleum resins and the hydrogenated derivatives thereof; aromatic petroleum resin and the hydrogenated derivatives thereof; and aliphatic/aromatic petroleum resins and the hydrogenated derivatives thereof, and combinations thereof.

The body-contactable adhesive 31 employed in the article according to the present invention may have more than about 50% by weight of a liquid plasticizer, such as more than about 65% by weight of a liquid plasticizer. Suitable liquid plasticizers may include white oils, mineral oils, paraffinic process oils, polyethylene glycol, glycerin, polypropylene glycol, naphthenic oils, and liquid polyterpenes. The liquid plasticizer preferably has a molecular weight of less than 1000 g/mole, more preferably less than 750 g/mole and most preferably less than 500 g/mole.

The body-contactable adhesive 31 may be of the type described in 6191189USB US Patent No. 6,191,189 to Cinelli et al. In particular, the adhesive may comprise:

-)
 - from 0.5 to 20%, preferably 5% to 15%, by weight of a macromolecular polymeric substance or a mixture of such substances soluble or swellable in the below mentioned plasticiser(s). As not limiting examples such macromolecular or polymeric substances can be natural and/or synthetic such as natural gums or derivatives such as natural gums and gelatins, their derivatives and alginates;
 - 5 polyacrylics; polyvinyl alcohol; polyethylene oxide; polyvinylpyrrolidone (PVP) or polyvinylethers, their copolymers and derivatives; cellulose derivatives; Block Copolymer Thermoplastic Elastomers and preferably Styrenic Block Copolymers and more preferably the hydrogenated grades Styrol/Ethylene-Butylene/Styrol (SEBS), Styrene/Isoprene/Styrene (SIS), and
 -) Styrol/Ethylene-Propylene/Styrol (SEPS);
 - from 45 to 99.5% by weight, preferably from 51 to 99.5% by weight, of a plasticising substance or a mixture of plasticising substances, which are liquid at room temperature. As non-limiting examples the plasticiser can be water,

various alcohols (like in particular glycerol), glycols and their ethers, polyglycols, liquid polybutenes, esters such phthalates, adipates, stearates, palmitates, sebacates, or myristates, natural or synthetic oils such as vegetable oils, mineral oils, or combinations thereof;

- 5 • from 0% to 50% by weight of the composition, preferably from 0 to 600% by weight of the macromolecular polymeric substance of a tackifying resin whose main scope is to tailor the Tg especially in systems based on synthetic polymers;
- 0 • from 0 to 10% and more preferably from 0 to 5% by weight of substances for facilitating and stabilising the gel and the gel forming process both of hydrophilic or hydrophobic liquid plasticisers. These may be for oily systems, e.g. the fatty acids of C₈ to C₂₂, their metallic salts and their polyoxo-derivatives; lanolin derivatives; silica; bentonite, montmorillonite and their derivatives; polyamides, waxes or mixtures thereof.

5 The adhesive may also be of the type described in 6213993USB US Patent No. 6,213,993 to Zacharias et al. In particular the adhesive may comprise:

- 0 • a rubber-based adhesive such as styrenebutadiene, polyisobutylene, polybutadiene and polyisoprene; a water soluble adhesive such as polyvinyl alcohol, polyvinyl acetate, and methyl cellulose; a hot melt adhesive such as block copolymers of styrene-butadiene-styrene, styrene-isoprene-styrene, styrene-ethylenepropylene-styrene, styrene-ethylenebutylene-styrene and tetrablock copolymers such as styrene-ethylenepropylene-styrene-

ethylenepropylene. Incorporated with the adhesives can be suitable tackifying resins and, if appropriate, oils.

Other adhesive types here include anhydrous gels consisting of 2-hydroxyethyl methacrylate polymer, polyethylene glycol and optionally water as taught in 4303066USA U.S. Patent No. 4,303,066 and polyurethane gels, as disclosed in 4661099USA U.S. Patent No. 4,661, 099 , or silicone gels including commercial products such as Silgel 612 from Wacker Silicones (Adrian, MI) or SSA-9700 Soft Skin Adhesives Dow-Corning (Midland, MI).

Other suitable adhesive compositions, include, for example, water-based pressure-sensitive adhesives such as acrylate adhesives. Alternatively, the adhesive composition may include adhesives based on the following: emulsion or solvent-borne adhesives of natural or synthetic polyisoprene, styrene-butadiene, or polyacrylate, vinyl acetate copolymer or combinations thereof; hot melt adhesives based on suitable block copolymers - suitable block copolymers for use in the invention include linear or radial co-polymer structures having the formula $(A-B)_x$ wherein block A is a polyvinylarene block, block B is a poly(monoalkenyl) block, x denotes the number of polymeric arms, and wherein x is an integer greater than or equal to one. Suitable block A polyvinylarenes include, but are not limited to Polystyrene, Polyalpha-methylstyrene, Polyvinyltoluene, and combinations thereof. Suitable Block B poly(monoalkenyl) blocks include, but are not limited to conjugated diene elastomers such as for example polybutadiene or polyisoprene or hydrogenated elastomers such as ethylene butylene or ethylene propylene or polyisobutylene, or combinations thereof. Commercial examples

of these types of block copolymers include KRATON elastomers from Shell Chemical Company, VECTOR elastomers from Dexco, Solprene™ from Enichem Elastomers and STEREON from Firestone Tire & Rubber Co.; hot melt adhesive based on olefin polymers and copolymers where in the olefin polymer is a terpolymer of ethylene and a co-monomers, such as vinyl acetate, acrylic acid, methacrylic acid, ethyl acrylate, methyl acrylate, n-butyl acrylate vinyl silane or maleic anhydride. Commercial examples of these types of polymers include Ateva (polymers from AT plastics), Nucrel (polymers from DuPont), Escor (from Exxon Chemical).

Fluid-Retaining Assembly

Sanitary napkins of the present invention include fluid retaining assembly 37. As used herein, the term “fluid-retaining assembly” refers to any material or multiple material layers whose primary function is to absorb, store or distribute fluid especially menses that is discharged by the wearer and prevent the back flow of stored fluid towards the cover and contacting the wearer.

The fluid retaining assembly 37 may include a single layer of material or may include multiple layers (e.g., an absorbent core overlayed by a so-called “transfer,” “distribution” or “acquisition” layer). In one embodiment, fluid-retaining assembly 37 is a blend or mixture of cellulosic fibers and superabsorbent disposed in and amongst fibers of that pulp.

It is possible that the fluid-retaining assembly 37 could be integrated with the cover and/or barrier such that there is essentially only a single layer structure or a two layer structure including the function of the multiple layers described herein.

Cellulosic fibers that can be used in the fluid-retaining assembly 37 are well known in the art and include wood pulp, cotton, flax and peat moss. Wood pulp is preferred. Pulps can be obtained from mechanical or chemi-mechanical, sulfite, kraft, pulping reject materials, organic solvent pulps, etc. Both softwood and hardwood species are useful. Softwood pulps are preferred. It is not necessary to treat cellulosic fibers with chemical debonding agents, cross-linking agents and the like for use in the present material. Some portion of the pulp may be chemically treated as discussed in US 5,916,670 to improved flexibility of the product. Flexibility of the material may also be improved by mechanically working the material or tenderizing the material. The fluid-retaining assembly 37 can contain any superabsorbent polymer (SAP), which SAPs are well known in the art. For the purposes of the present invention, the term "superabsorbent polymer" (or "SAP") refers to materials which are capable of absorbing and retaining at least about 10 times their weight in body fluids under a 0.5 psi pressure. The superabsorbent polymer particles of the invention may be inorganic or organic crosslinked hydrophilic polymers, such as polyvinyl alcohols, polyethylene oxides, crosslinked starches, guar gum, xanthan gum, and the like. The particles may be in the form of a powder, grains, granules, or fibers. Preferred superabsorbent polymer particles for use in the present invention are crosslinked polyacrylates, such as the product offered by Sumitomo Seika Chemicals Co., Ltd. Of Osaka, Japan, under the designation of SA70N and products offered by Stockhausen Inc.

The fluid-retaining assembly 37 may comprise a material manufactured by using air-laying means well known in the art. In a specific example, the fluid-retaining assembly 37 is an air laid material made from cellulosic fibers, bonding materials and

components that cannot form a bond (nonbonding materials) with the other component materials.

In one specific embodiment of the invention, the absorbent system is composed of fluff pulp.

Attachment of Fluid-Retaining Assembly to Barrier Layer

In certain embodiments of the invention, the fluid retaining assembly 37 is secured to the extensible barrier layer 24 along a selected portion 36 of the area of juxtaposition 34. The securement may be made by means of construction adhesives, heat-bonding, ultrasonic bonding, radio frequency sealing, mechanical crimping, or similar techniques known to the art of joining fibrous and/or film materials for use in absorbent articles.

In one embodiment, the selected portion 36 is secured using a construction adhesive. Suitable construction adhesives include, for example, hot melt adhesives, such are those that are sufficiently pressure sensitive at elevated (application) temperatures and have sufficient cohesive and peel strength at ambient temperatures to maintain a firm bond the selected portion 36 of the barrier layer to the fluid-retaining portion 37 while the sanitary napkin is in use. The construction adhesive may include block copolymers, plasticizers and/or reinforcing or tackifying resins.

Cover Layer

The sanitary napkin 10 may include cover layer 22. Cover layer 22 may include non-woven web material, an apertured thermoplastic film (such as those described in U.S. Pat. No. 4,690,679), or combinations thereof. The cover layer 22 may be composed

of only one type of fiber, such as polyester or polypropylene or it may include a mixture of more than one fiber. The cover layer 22 may be composed of bi-component or conjugate fibers having a low melting point component and a high melting point component. The fibers may be selected from a variety of natural and synthetic materials
5 such as nylon, polyester, rayon (in combination with other fibers), cotton, acrylic fiber and the like and combinations thereof. Preferably, the cover layer 22 has a basis weight in the range of about 10 gsm to about 75 gsm.

Bi-component fibers suitable for use in cover layer 22 may be made up of a polyester layer and a polyethylene sheath. The use of appropriate bi-component materials
) results in a fusible non-woven fabric. Examples of such fusible fabrics are described in U.S. Pat. No. 4,555,430 issued Nov. 26, 1985 to Chicopee. Using a fusible fabric increases the ease with which the cover layer 22 may be mounted to the absorbent layer and/or to the barrier layer.

The cover material should preferably contain a significant amount of relatively
5 large pores or apertures. This is because the cover layer 22 is intended to take-up body fluid rapidly and transport it away from the body and the point of deposition. Therefore, the cover layer 22 contributes little to the time taken for the napkin to absorb a given quantity of liquid (penetration time).

Advantageously, the fibers which make up the layer 22 should not lose their
) physical properties when they are wetted, in other words they should not collapse or lose their resiliency when subjected to water or body fluid. The cover layer 22 may be treated to allow fluid to pass through it readily. The cover layer 22 also functions to transfer the fluid quickly to the other layers of the absorbent system 44. Thus, the cover layer 22 is

advantageously wettable, hydrophilic and porous. When composed of synthetic hydrophobic fibers such as polyester or bi-component fibers, the cover layer 22 may be treated with a surfactant to impart the desired degree of wettability.

5 The fibers of the nonwoven cover may be bonded by any of various means such as spunlacing (hydroentanglement), thermobonding, latex bonding, and the like.

The cover layer 22 may be embossed to the fluid-retaining assembly 37 in order to aid in promoting hydrophilicity by fusing the cover layer 22 to the next layer. Such fusion may be effected locally, at a plurality of sites or over the entire contact surface of cover layer 22 and absorbent system 44. Alternatively, the cover layer 22 may be
10 attached to the fluid-retaining assembly 37 by other means such as by adhesion.

Other Structures and Attributes

Sanitary napkins according to the present invention are preferably thin, preferably having a thickness of less than 4.0 mm, more preferably less than 3.0 mm, and most
5 preferably less than 2.5 mm.

Any or all of the cover, absorbent layer, transfer layer, backsheet layer, and adhesive layers may be colored. Such coloring includes, but is not limited to, white, black, red, yellow, blue, orange, green, violet, and mixtures thereof. Color may be imparted according to the present invention through dying, pigmentation, and printing.
10 Colorants used according the present invention include dyes and inorganic and organic pigments. The dyes include, but are not limited to, anthraquinone dyes (Solvent Red 111, Disperse Violet 1, Solvent Blue 56, and Solvent Green 3), Xanthene dyes (Solvent Green 4, Acid Red 52, Basic Red 1, and Solvent Orange 63), azine dyes (Jet black), and the like. Inorganic pigments include, but are not limited to, titanium dioxide (white), carbon black

(black), iron oxides (red, yellow, and brown), chromium oxide (green), ferric ammonium ferrocyanide (blue), and the like.

Organic pigments include, but are not limited to diarylide yellow AAOA (Pigment Yellow 12), diarylide yellow AAOT (Pigment Yellow 14), phthalocyanine blue (Pigment Blue 15), lithol red (Pigment Red 49:1), Red Lake C (Pigment Red), and the like.

The absorbent article may include other known materials, layers, and additives, such as, foam, net-like material, perfumes, medicaments or pharmaceutical agents, moisturizers, odor control agents, and the like. The absorbent article can optionally be embossed with decorative designs.

The absorbent article may be packaged as unwrapped absorbent articles within a carton, box or bag. The consumer withdraws the ready-to-use article as needed. The absorbent article may also be individually packaged (each absorbent article encased within an overwrap).

While overall shape of the sanitary napkin may be symmetrical as shown in the Figures, it is also contemplated herein include asymmetrical and symmetrical absorbent articles having parallel longitudinal edges, dog bone- or peanut-shaped, as well as articles having a tapered construction for use with thong-style undergarments.

The sanitary napkin of the present invention may be applied to the crotch by placing the body-contactable adhesive against the inner thigh region of the user, thereby securing the absorbent assembly against the perineal region.

Test Procedures For Sanitary Articles: Procedures for Measuring (1) Peel Force and (2) Peak Force for 20% Stretch of the Body-Attachable Sanitary Napkin

According to certain one aspect of the invention, in order to provide both reduced
5 pain as well as improved stay in place, the body-attachable sanitary napkin has a Peel
Energy, G_c and a Young's modulus, E that satisfy the following relationship:

$$G/tE > 0.1 \text{ N/m; and}$$

$$tGE < 2 \times 10^5 \text{ N}^2/\text{m}^2$$

0

G/tE is a measure of the body-faceable sanitary napkin's ability to stay in place.
It is calculated using "Peel Force," P , which is in turn determined using the PEEL
FORCE TEST PROCEDURE. tGE is a measure of the sanitary napkin's ability to be
peeled from the body with reduced pain. It is calculated using results from the PEEL
5 FORCE TEST PROCEDURE as well as the "Peak Force at 20% Stretch," F , the latter of
which is determined using the PEAK FORCE-20% STRETCH TEST PROCEDURE.
The PEEL FORCE TEST PROCEDURE and the PEAK FORCE-20% STRETCH TEST
PROCEDURE are each set forth in detail below.

"Peel Force" is determined by a test performed as follows. The PEEL FORCE
0 TEST PROCEDURE is a measure of the force required to peel an adhesive from a
standard sheet of plastic film. The apparatus necessary for the PEEL FORCE TEST
PROCEDURE includes the following parts:

(1) A force-measurement gauge and more specifically an Instron inverted tension
5 load cell. Instron Universal testing machine with load cell capable of measuring tensile

forces from 10 to 200 grams (2000 gram capacity preferred), such as an Instron machine, e.g., Instron 1122 or 1125, commercially available from Instron Engineering Corporation, Canton, Mass.

5 (2) 90 degree peel fixture such as Instron 2820-035 or 2820-036.

(3) a grip attachable to force measurement gauge and suitable for pulling 1 cm peel strip without slip or tearing (e.g., 1 ½" x 1" rubber face jaw plates)

10 (4) 2.5" by 7" pieces of double stick tape, e.g., PERMACEL available from Permacel, A Nitto Denko Company of East Brunswick, NJ

(5) Rigid plastic or metal plate for clamping in peel fixture and attaching double stick tape and napkin sections. Approximately 3" by 7".

15

(6) 1 cm wide by 12" long sections of polyolefin film (hereinafter, "film adherent"), e.g., Pliant #3471 0.7 mil white polypropylene film.

FIG. 6 depicts a schematic side view of an apparatus 60 suitable for the PEEL
20 **FORCE TEST PROCEDURE.** Body adhesive should be protected from the environment until shortly before testing by a release liner or similar cover. A sample of the body adhesive section of the napkin is cut out to form test sample 62. Test sample 62 should be at least 1 cm wide and preferably 6" in length. If no such continuous region of

body-faceable adhesive exists, then one should choose a 1 cm wide and 6" long portion that encompasses the greatest amount of body-contactable adhesive as possible. The layer of material in touch with the body adhesive is left intact but lower layers are removed so that the test sample is as flat as possible. The remaining test sample thus includes a substrate 64 and body-contactable adhesive 66. The double stick tape 68 is adhered to rigid plate 70 such that the body-faceable adhesive 66 is facing up. Any release liner is removed and the film adherent 72 is placed over the sample of body adhesive with the long end toward the screw clamp 5. A 1" square piece of release paper (if no release paper was provided with the test sample, any suitable release strip may be used) is placed at the point where the 1 cm sample turns up 90°, this will be the starting point of the test. The adherent film 72 is covered with release paper and rolled once with a 5 Lb. weight. The release film is then removed. The rigid plate 70 is firmly attached to the stage 74. The Instron grip 76 is attached to the end of the film adherent 72 with the square piece of release paper, which is in turn rigidly attached to moveable crosshead 80 of the Instron.

Tension cell 78 is allowed to warm-up 20 minutes before starting the calibration procedure. The load cell is calibrated once before any tests are done on a given day. Calibration is performed as per the manufacturers instructions, by attaching a standard 100 gram mass directly to the load cell.

The stage 74 is such that it is capable of sliding with little friction in a direction normal with respect to the crosshead 80, thus allowing the film to be peeled from the adhesive at a continuous 90 degree angle. As such it may include roller 80 in order to reduce friction. The crosshead speed is set to 10.00 In/Min.

The force measurement apparatus records the force as the film adherent 72 is peeled (pulled up) from the rigid plate to which the body adhesive is attached. The measured peel force is recorded as the time averaged force from a section of the xy recording where stable peeling occurs. As readily determined by one skilled in the art, by 5 “stable peeling” it is meant that time period of the force measurement can clearly be delineated as the onset and completion of peeling.

This average peel force, P is then be utilized to calculate Peel Energy, G_c of the body adhesive, as set forth using the calculation below:

$$10 \quad G_c = \{P^2 / (2 A E w)\} + \{P / (1 - \cos \theta) w\}$$

θ = angle relative to plane of stage along which the film is pulled = 90 degrees,

$$\text{implying } 1 - \cos \theta_{\text{peel}} = 1 - \cos 90^\circ = 1$$

P = peel force measured from the PEEL FORCE TEST PROCEDURE

15 w = width of the film adherent

E_f = elastic modulus of film adherent

A = cross sectional area of the film adherent

Peel Energy, G_c of the body adhesive is then used to calculate G_c/tE , where 20 t = thickness of the film adherent, and again, E = elastic modulus of the film adherent. It is also used to calculate tGE , described below.

“Peak Force at 20% Stretch” is determined by a test performed as follows. The PEAK FORCE-20% STRETCH TEST PROCEDURE is a measure of the force required to induced 20% strain in the sanitary napkin.

The apparatus necessary for the PEAK FORCE-20% STRETCH TEST
5 PROCEDURE includes the following parts:

1. Instron Universal testing machine with load cell capable of measuring tensile forces up to 50 pounds.
2. Two inch wide upper and lower grips capable of gripping a typical napkin
0 structure without slipping or tearing.

The PEAK FORCE-20% STRETCH TEST PROCEDURE may be performed using an apparatus similar to apparatus 60 described above with respect to the PEEL FORCE TEST PROCEDURE and FIG. 6. Release paper is removed from the body
5 adhesive strips. Talcum powder is applied on the tacky portion to eliminate tack. Two points on opposite sides of the longitudinal centerline of the napkin that are covered with body adhesive are chosen as the test points. These points may be directly opposite the longitudinal centerline from each other or one may be further to the front or back than the other (“front-to-back positioning” is at the discretion of the tester). The points, however
0 must be chosen so that each point can be centered across the width of its particular grip. The entire width of the grip will be contacting the sanitary napkin. Distance between the two points is measured and the gage length on the test machine is set to this value. Crosshead speed is set to 5.00 in/min and load limit is set to 45lb for 50 lb load cell.

The sanitary napkin is stretched to a strain of 20% (i.e., the change in length between test points as a result of stretching via the test apparatus is 20% of the original length between test points. The Peak Force at 20% Stretch in grams is then read from the test apparatus. Five Replicates are tested to determine an average Peak Force at 20%

5 Stretch for the sanitary napkin The product, $E_{nap}t$, is calculated using the formula below:

$$E_{nap}t = F/W\varepsilon$$

E_{nap} = Effective elastic modulus of napkin

10 t = thickness of the sanitary napkin

F = Peak Force at 20% Stretch, measured by the PEAK FORCE-20% STRETCH TEST

W = width of the grip over which the specimen is held

15 ε = strain induced by test procedure = 0.2

$E_{nap}t$ is multiplied by G_c , as calculated previously (from Peel Force, P that was measured previously in the PEEL FORCE TEST PROCEDURE) to determine tG_cE_{nap} , a measure of the sanitary napkin's ability to be peeled from the body with reduced pain.

20

Examples of Inventive Sanitary Napkins

Specific examples of inventive sanitary napkins are described below.

Comparative examples are also provided.

All samples, except where noted used a 30gsm multidenier nonwoven cover, unless where noted.

Inventive Sanitary Napkin, Ex. 1

5 A body-attachable sanitary napkin was made according to embodiments of the invention, in which the fluid-retaining portion was attached to the extensible barrier layer in a centrally disposed portion of a region of juxtaposition and unattached to said extensible barrier layer in other portions of the region of juxtaposition – similar to the sanitary napkin constructions shown in **FIG. 5** The area of attachment measured 25mm
0 wide by 100mm in length. The extensible barrier layer was highly extensible, ADC # 9540002, and 80 gsm spunbond polyurethane/polyethylene nonwoven, commercially available from BBA Nonwovens of Peine, Germany. The body-contactable adhesive was selected for strong ability to stay in place, NS 548B, commercially available from National Starch Corporation of Bridgewater, NJ. The body-contactable adhesive was
5 present in a basis weight of 76gsm.

Inventive Sanitary Napkin, Ex. 2

 A body-attachable sanitary napkin was made according to embodiments of the
0 invention, with a construction similar to Ex. 1. The extensible barrier layer was moderately extensible, a 30gsm thermobonded polypropylene commercially available from PGI, Inc of Dayton, NJ. The NS 548B body-contactable adhesive was present in a basis weight of 82 gsm.

Inventive Sanitary Napkin, Ex. 3

A body-attachable sanitary napkin was made according to embodiments of the invention, with a construction similar to Ex. 1. The extensible barrier layer was the highly extensible extensible ADC # 9540002. The body-contactable adhesive was selected for weaker ability to stay in place, Fuller 1407, commercially available from HB HB Fuller Co., of St. Paul, Minnesota. The body-contactable adhesive was present in a basis weight of 83 gsm.

Inventive Sanitary Napkin, Ex. 4

A body-attachable sanitary napkin was made according to embodiments of the invention, with a construction similar to Ex. 1, except that the fluid-retaining portion did not include portions that were unattached to the extensible barrier layer. The extensible barrier layer was the highly extensible ADC # 9540002. The body-contactable adhesive was the “stronger” NS 548B adhesive. The body-contactable adhesive was present in a basis weight of 83 gsm.

Inventive Sanitary Napkin, Ex. 5

A body-attachable sanitary napkin was made according to embodiments of the invention, with a construction similar to Ex. 4. The extensible barrier layer was the highly extensible ADC # 9540002. The body-contactable adhesive was the “weaker” Fuller 1407 adhesive. The body-contactable adhesive was present in a basis weight of 86 gsm.

Comparative Example, Sanitary Napkin, Comp. Ex. 1

A body-attachable sanitary napkin was made with a construction similar to Ex. 4. The extensible barrier layer was chosen to have poor extensibility, a 25gsm SMMS composite commercially available from BBA Nonwovens. The body-contactable adhesive was the “stronger” NS 548B adhesive.

Comparative Example, Sanitary Napkin, Comp. Ex. 2

A body-attachable sanitary napkin was made with a construction having a cover layer and barrier layer that extend beyond the fluid retaining layer, and the body-contactable adhesive present on the cover. Thus the sanitary napkin was similar to a conventional garment-attached sanitary napkin, but with body-contactable adhesive applied on the top side of the cover layer. The cover layer was an 80 gsm spunbond polyurethane/polyethylene nonwoven. The extensible barrier layer was the highly extensible ADC # 9540002. The body-contactable adhesive was the “stronger” NS 548B adhesive.

Comparative Example, Sanitary Napkin, Comp. Ex. 3

A body-attachable sanitary napkin was made with a construction similar to Comp. Ex. 8. The extensible barrier layer was the moderately extensible 30gsm thermobonded polypropylene. The body-contactable adhesive was the “stronger” NS 548B adhesive. The body-contactable adhesive was present in a basis weight of 83 gsm.

42

Comparative Example, Sanitary Napkin, Comp. Ex. 4

A body-attachable sanitary napkin was made according to embodiments of the invention, with a construction similar to Ex. 4. The extensible barrier layer was the poorly extensible SMMS. The body-contactable adhesive was the “weaker” Fuller 1407 adhesive. The body-contactable adhesive was present in a basis weight of 58 gsm.

The sanitary napkins suitable for use in the present invention and comparative samples were tested according to the test methods described in the “Test Procedures for Sanitary Articles” section above,

The peel force, P in grams was measured using the PEEL FORCE TEST PROCEDURE. Pliant #3471 0.7 mil white polypropylene film was used as the film adherent for the test. Peel Energy, G_c was calculated using the formula described previously. The peel force in grams from the PEEL FORCE TEST PROCEDURE was converted to units of Newtons by multiplying by a geometric conversion factor of 0.0098 N/g. For this particular film adherent, the cross sectional area of the film adherent, A was 0.000018 m (width, w , was 0.01m and thickness, t was 0.000018 m) and the elastic modulus of film adherent, E_f was $383 \times 10^6 \text{ N/m}^2$. G_c , thus calculated, had units of J/m^2 . G_c/tE , the measure of stay in place, was then calculated using the thickness of the film adherent, t and Elastic Modulus, E_f of the film adherent.

Peak Force at 20% Stretch measured using the PEAK FORCE-20% STRETCH TEST PROCEDURE. The Peak Force at 20% Stretch was converted to units of Newtons by multiplying by a geometric conversion factor of 0.0098 N/g. The width, W of the grip was 2 inches = 5.08cm. tGE , a measure of the sanitary napkin’s ability to be peeled from the body with reduced pain, thus calculated, had units of N^2/m^2 .

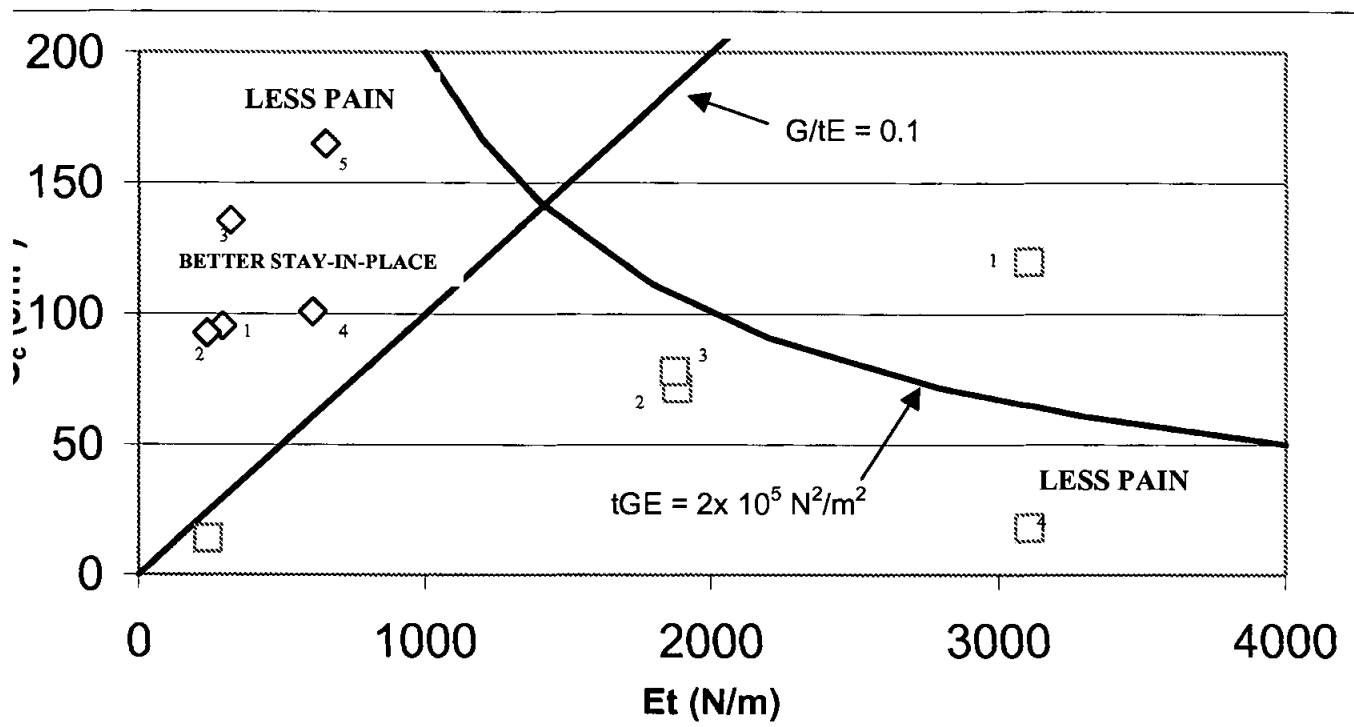
The results of which are set forth in Table 1 provided below.

Table 1

Sample	Peel Force, F (g)	Peel energy, G (J/m ²)	Peak Force @ 20% Stretch, F (g) CENTER	Peak Force @ 20% Stretch, F (g) END	Et (N/m) CENTER	Et (N/m) END	tGE (N ² /m ²)	G/Et
1	96.6	94.7	471	302	454.3	291.3	2.8E+04	0.3252111
2	93.92	92.1	519	246	500.6	237.3	2.2E+04	0.3881591
3	137.18	134.6	544	333	524.7	321.2	4.3E+04	0.4189559
4	102.11	100.1	941	629	907.7	606.7	6.1E+04	0.1650555
5	166.43	163.3	1004	678	968.4	654.0	1.1E+05	0.2496979
mp 1	121.38	119.1	4369	3219	4214.2	3104.9	3.7E+05	0.0383441
mp 2	72.27	70.9	2641	1950	2547.4	1880.9	1.3E+05	0.0376741
mp 3	79.19	77.7	2698	1940	2602.4	1871.3	1.5E+05	0.0414963
mp 4	18.32	18.0	4632	3221	4467.9	3106.9	5.6E+04	0.0057794

The results are shown graphically in FIG. 7. The particular example is matched with the data point in the Figure. Points above the line, $G/tE = 0.1$ indicate high stay-in-place. Points below the curve, $tGE = 2 \times 10^5 \text{ N}^2/\text{m}^2$ indicate lower removal pain. The points in the upper left quadrant (where Examples 1-5 fall) combine both high stay-in-place as well as lower removal pain.

FIG. 7



AS

In view of the above absorbent articles and results of test procedures provided herein, it can be seen that by sanitary napkins of the present invention remain securely attached to the body during use, move with the body during use, yet at the same time enable the user to selectively remove the napkin in a pain free manner.

5 Applications of the sanitary napkin according to the present invention for sanitary and other health care uses can be accomplished by any sanitary protection, incontinence, medical and absorbent methods and techniques as are presently or prospectively known to those skilled in the art. Thus, it is intended that the present application cover the modifications and variations of this invention provided that they come within the scope
0 of the appended claims and their equivalents.

CLAIMS

I Claim:

- 5 1. A body-attachable sanitary napkin, comprising:
- a fluid-pervious cover layer;
- a fluid-retaining assembly; and
- a barrier layer having a body-contactable adhesive disposed on at least
- first portions thereof, wherein said sanitary napkin satisfies the following:
- 0
$$G/tE > 0.1 \text{ and } tGE < 2 \times 10^5 \text{ N}^2/\text{m}^2$$
2. The body-attachable sanitary napkin of claim 1, wherein said barrier layer has a
- first portion and a second portion, said second portion having a body-attachable adhesive
- arranged thereon; and wherein said fluid-retaining assembly is arranged in overlapping
- 5 relationship to said first portion of said barrier layer thereby defining an area of
- juxtaposition between said fluid-retaining assembly and said barrier layer, and wherein
- said fluid-retaining assembly is secured to said barrier layer along a selected portion of
- said area of juxtaposition.
- 10 3. The body-attachable sanitary napkin of claim 2, wherein the selected portion of the
- area of juxtaposition has an area fraction that is from about 20% to about 80% of the area
- of juxtaposition.

4. The body-attachable sanitary napkin of claim 2, wherein the selected portion of the area of juxtaposition has an area fraction that is from about 30% to about 70% of the area of juxtaposition.
- 5 5. The body-attachable sanitary napkin of claim 2, wherein the overlapping relationship between said first portion of said barrier layer and said fluid-retaining portion further defines a peripheral region of juxtaposition, and wherein at least about 50% of the peripheral region of juxtaposition is not secured to the barrier layer.
- 0 6. The body-attachable sanitary napkin of claim 2, wherein the overlapping relationship between said first portion of said barrier layer and said fluid-retaining portion further defines a segment of unattachment and a segment of attachment, and wherein the length of the segment of unattachment 52 is greater than about 15% of that of the length of the segments of attachment.
- 5 7. The body-attachable sanitary napkin of claim 2, further comprising an additional barrier layer positioned intermediate the fluid-retaining assembly and the extensible barrier layer.
- 10 8. The body-attachable sanitary napkin of claim 7, wherein the additional barrier layer does not extend beyond the area of juxtaposition.

9 The body-attachable sanitary napkin of claim 7, wherein the additional barrier layer is free of body-contactable adhesive.

10. The body-attachable sanitary napkin of claim 2, wherein said extensible barrier
5 further comprises a third portion having a body-contactable surface, wherein the third portion is free of body-contactable adhesive.

ABSTRACT

A body-attachable sanitary napkin including a fluid-pervious cover layer, a fluid-retaining assembly; and a barrier layer having a body-contactable adhesive disposed on at least first portions thereof. The sanitary napkin according to the invention remains

5 securely attached to the body during use, moves with the body during use, yet at the same time enables the user to selectively remove the napkin in a pain free manner.

Please type a plus sign (+) inside this box ☐

PTO/SB/01 (10-00)

Approved for use through 10/31/2002. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

DECLARATION AND POWER OF ATTORNEY FOR UTILITY OR DESIGN PATENT APPLICATION (37 CFR 1.63) ☒ Declaration Submitted with Initial Filing ☐ Declaration Submitted after Initial Filing (Surcharge (37 CFR 1.16(e)) required)	Attorney Docket Number	PPC-5287-USNP1	
	First Named Inventor	Leonard G. Rosenfeld	
	<i>COMPLETE IF KNOWN</i>		
	Application Number	Unassigned	
	Filing Date	Herewith	
	Group Art Unit	Unassigned	
	Examiner Name	Unassigned	

As a below named inventor, I hereby declare that:

My residence, mailing address, and citizenship are as stated below next to my name.
I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

BODY-ATTACHABLE SANITARY NAPKIN
(Title of the Invention)

the specification of which

☒ is attached hereto

OR

☐ was filed on (MM/DD/YYYY) as United States Application Number or PCT International Application Number and was amended on (MM/DD/YYYY)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate, or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or any PCT international application having a filing date before that of the application on which priority is claimed.

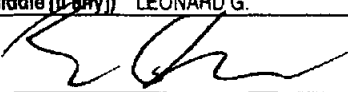
Prior Foreign Application Number(s)	Country	Foreign Filing Date (MM/DD/YYYY)	Priority Not Claimed	Certified Copy Attached? YES NO
			☐ ☐ ☐ ☐	☐ YES ☐ NO ☐ ☐ ☐ ☐ ☐ ☐

☐ Additional foreign application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto:

61

DECLARATION - Utility or Design Patent Application		
I hereby claim the benefit under 35 U.S.C. 119(e) of any United States provisional application(s) listed below.		
Application Number(s)	Filing Date (MM/DD/YYYY)	☐ Additional provisional application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto.
60/984,218	10/31/2007	
I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, § 1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:		
Application Serial No.	Filing Date	Status
		Patented Patented Patented
I hereby appoint:		
☒ Practitioners at Customer Number 000027777 --		Place Customer Number Bar Code Label Here
AND		
☐ Practitioner(s) named below: <u>Name</u> <u>Registration Number</u>		
as my/our attorney(s) or agent(s) to prosecute the application identified above, and to transact all business in the United States Patent and Trademark Office connected therewith.		
Address all telephone calls to Paul J. Higgins at telephone number (732) 524-1728.		
Direct all correspondence to: Customer Number ☒ or Bar Code Label 000027777 OR ☐ Correspondence address below		
Name:		
Address:		
Address:		
City:	State:	ZIP
Country	Telephone:	Fax:

52

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.			
NAME OF SOLE OR FIRST INVENTOR:		☐ A petition has been filed for this unsigned inventor	
Given Name (first and middle (if any)) LEONARD G.		Family Name or Surname ROSENFELD	
Inventor's Signature 		Date 12/14/2007	
Residence: City	Yardley	State	PA
Country	USA		
Citizenship	USA		
Mailing Address 1260 Madison Drive			
City	Yardley	State	PA
ZIP	19067		Country
USA			
I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.			
NAME OF SECOND INVENTOR:		☐ A petition has been filed for this unsigned inventor	
Given Name (first and middle (if any))		Family Name or Surname	
Inventor's Signature		Date	
Residence: City		State	
Country			
Citizenship			
Mailing Address			
City		State	
ZIP			Country
I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.			
NAME OF THIRD INVENTOR:		☐ A petition has been filed for this unsigned inventor	
Given Name (first and middle (if any))		Family Name or Surname	
Inventor's Signature		Date	
Residence: City		State	
Country			
Citizenship			
Mailing Address			
City		State	
ZIP			Country

53

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

AUTHORIZATION TO PERMIT ACCESS TO APPLICATION BY PARTICIPATING OFFICES Send completed form to: Commissioner for Patents P.O. Box 1450, Alexandria, VA 22313-1450	COMPLETE IF KNOWN	
	Application Number	Unassigned
	Filing Date	December 18, 2007
	First Named Inventor	Leonard G. Rosenfeld
	Attorney Docket Number	PPC-5287-USNP1
	Title (Required)	BODY-ATTACHABLE SANITARY NAPKIN

The undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), and any other intellectual property offices in which a foreign application claiming priority to the above-identified application is filed access to the above-identified patent application. See 37 CFR 1.14(c) and (h).

In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the application-as-filed with respect to: 1) the above-identified application, 2) any foreign application to which the above-identified application claims priority under 35 USC 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the above-identified US application, and 3) any U.S. application from which benefit is sought in the above-identified application.

This written authorization should be submitted prior to the filing of a subsequent foreign application, in which priority is claimed to the above-identified patent application, with any intellectual property office e.g., the EPO or JPO).

No fee will be charged under 37 CFR 1.19(b)(1) for providing a participating intellectual property office with an electronic copy of the above-identified application.

This form must be signed by an authorized party in accordance with 37 CFR 1.14(c).

_____/Paul J. Higgins/_____ Signature	December 18, 2007 _____ Date
_____ Printed or Typed Name	_____ Telephone Number
_____ Title	_____ Registration Number, if applicable

This collection of information is required by 37 CFR 1.14(h). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process an application). Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 6 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

SA

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

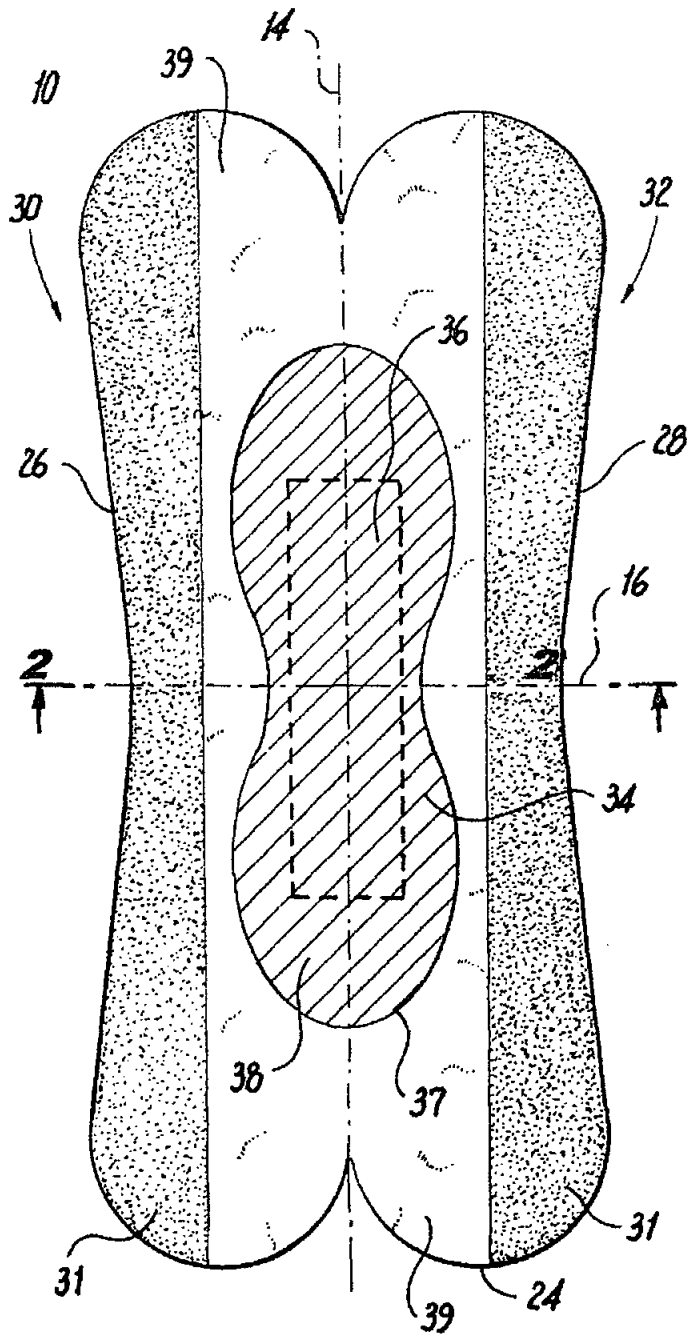


Fig. 1

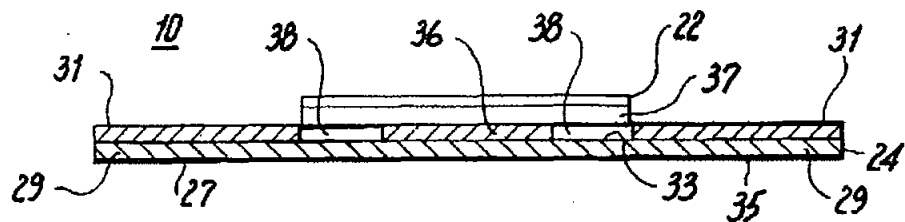


Fig. 2

50

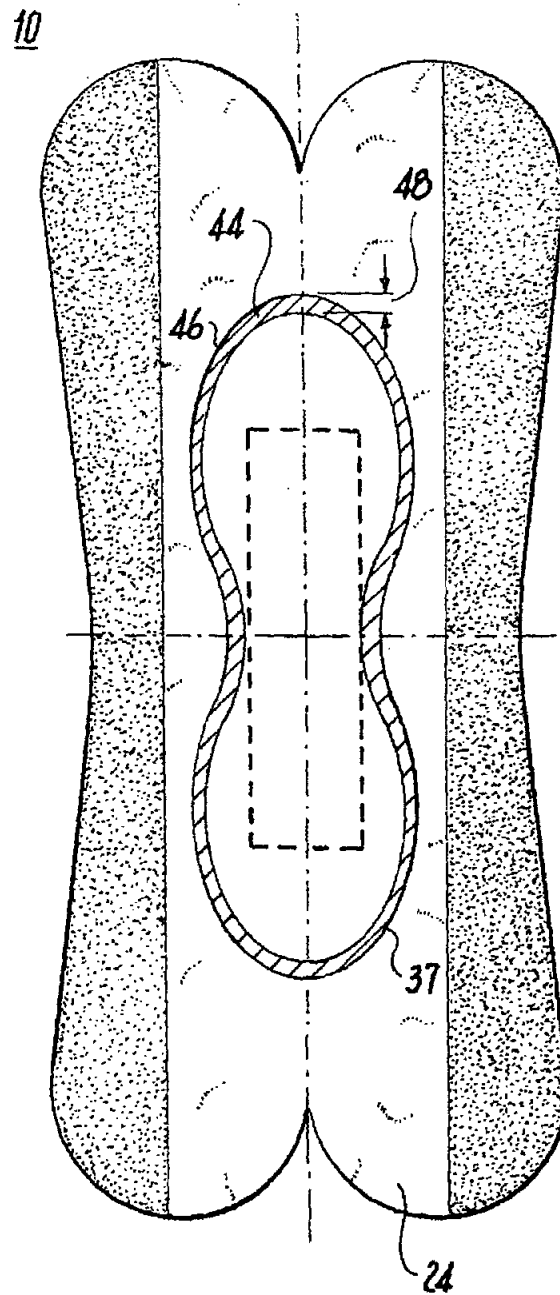


Fig. 3

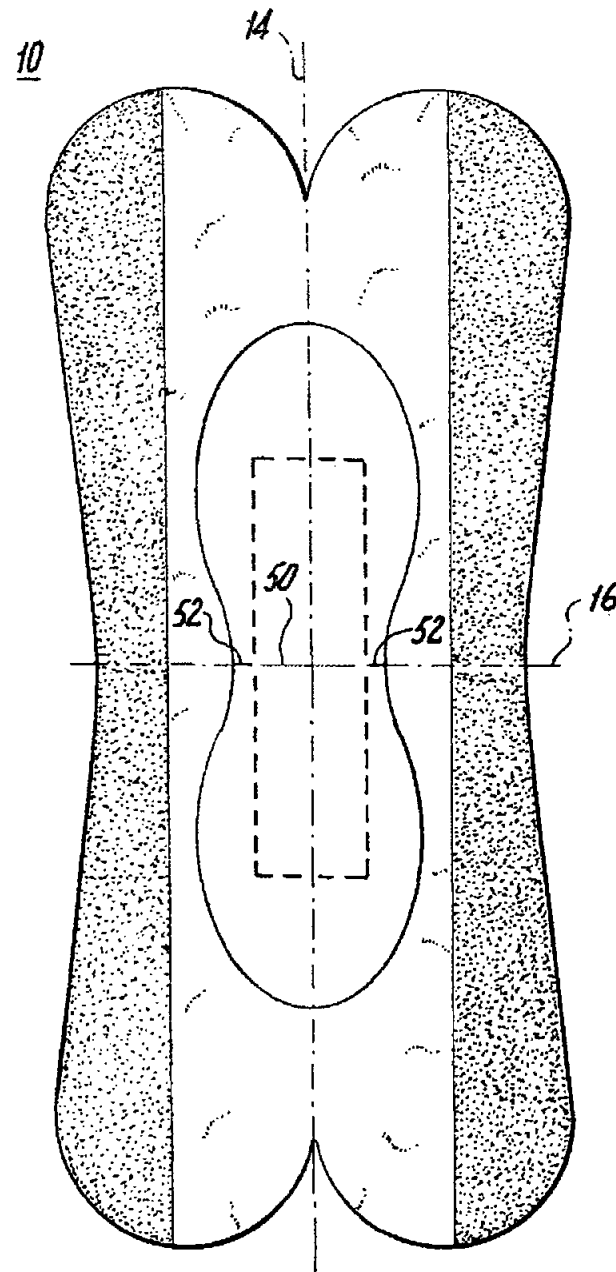


Fig. 4

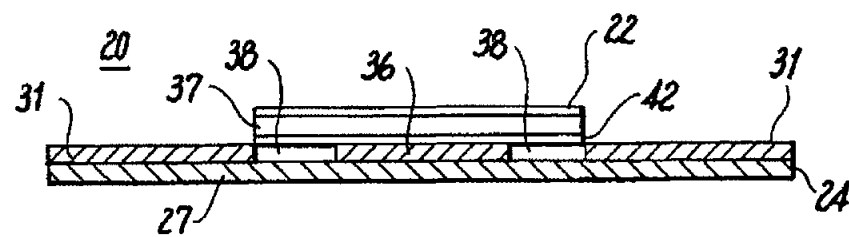


Fig. 5

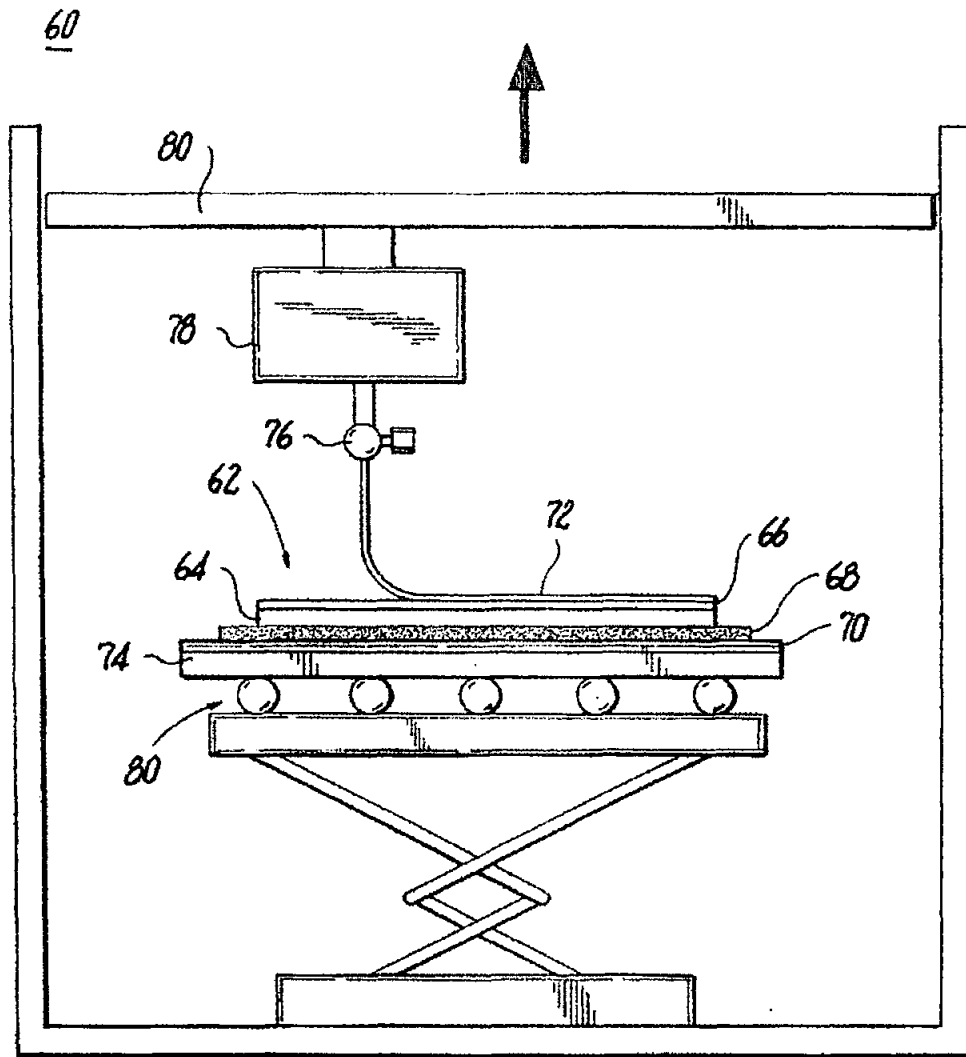


Fig. 6

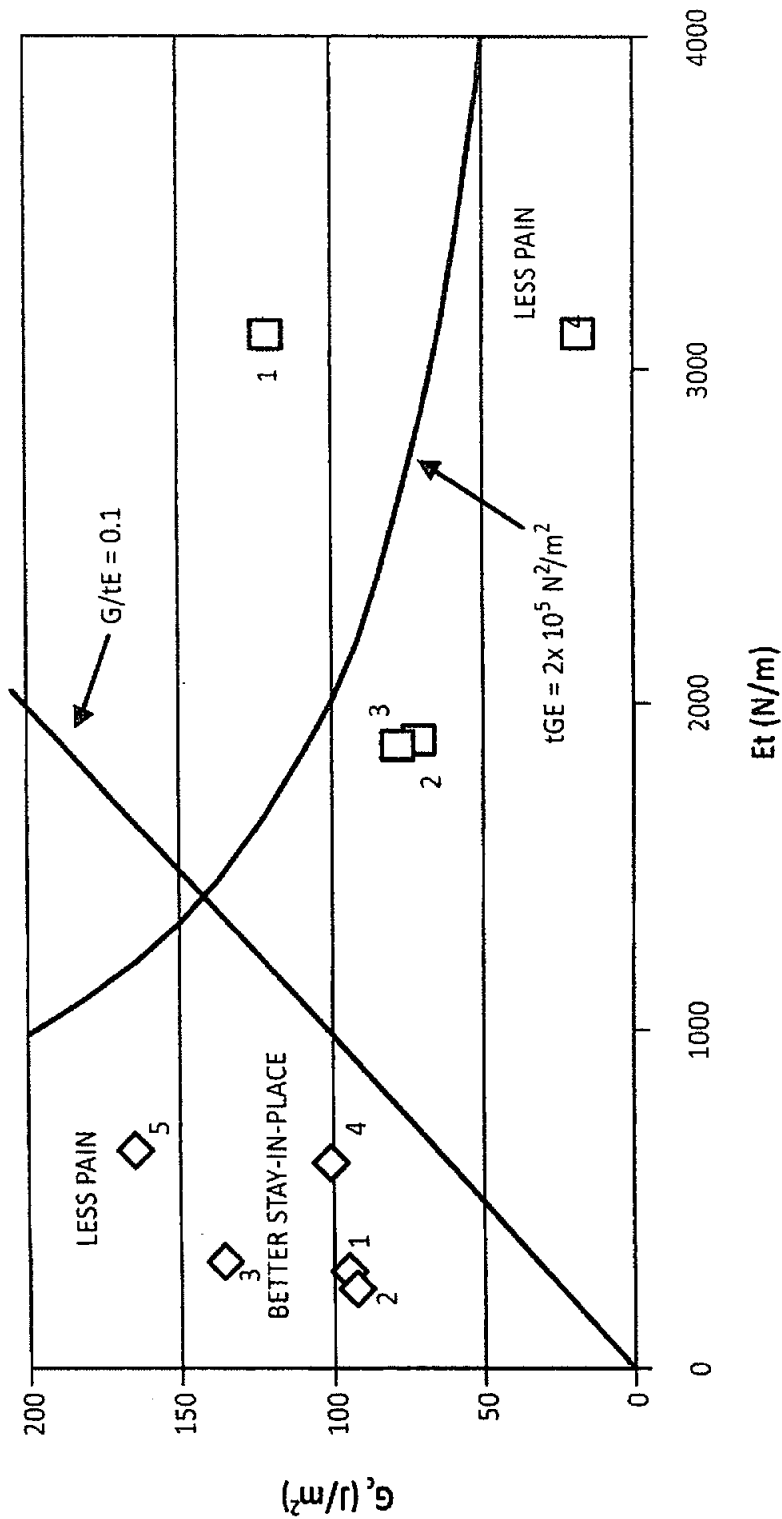


Fig. 7

ESTADOS UNIDOS DE AMÉRICA
A TODOS AQUELLOS A QUIENES EL PRESENTE LLEGUE:

DEPARTAMENTO DE COMERCIO DE LOS ESTADOS UNIDOS
Oficina de Patentes y Marcas de los Estados Unidos

Noviembre 3, 2008

Por medio del presente se certifica que adjunto se encuentra una copia de los archivos de la Oficina de Patentes y Marcas de los Estados Unidos de aquellos papeles de la solicitud de patente abajo identificada, la cual cumplió con los requisitos para que se le otorgara una fecha de presentación bajo 35 USC 111.

Número de Solicitud: 60/984,218
Fecha de Presentación: Octubre 31, 2007

El código del país y el número de su solicitud de prioridad para ser usado en presentación en el extranjero bajo la Convención de Paris, es US60/984,218

Por la autoridad del
Comisionado de Patentes y Marcas

(fdo) P. SWAIN
Oficial Certificador
Sello oficial de la Oficina de Patentes y Marcas de los
Estados Unidos de América.

Reivindico:

5 1. Una toalla sanitaria adherible al cuerpo, que comprende

una capa de cubierta permeable a fluido;

una capa que retiene fluido; y

0

una capa de barrera que tiene un adhesivo conectable
dispuesto sobre por lo menos primeras porciones de ésta
en donde dicha toalla sanitaria satisface lo siguiente

5

$$G/tE > 0.1 \text{ N/m}; \text{ y } tGE < 2 \times 10^5 \text{ N}^2/\text{M}^2$$

2. La toalla sanitaria adherible al cuerpo de la
reivindicación 1, en donde dicha capa de barrera tiene
una primera porción y una segunda porción, dicha segunda

0

porción tiene un adhesivo adherible al cuerpo dispuesto
allí; y en donde dicho ensamble de retención de fluidos
está dispuesto en relación traslapante con dicha primera
porción de dicha capa de barrera definiendo por lo tanto

un área de yuxtaposición entre dicho ensamble de
retención de fluidos y dicha capa de barrera; y en donde
dicho ensamble de retención de fluido se asegura a dicha
capa de barrera a lo largo de una porción seleccionada

5

3. La toalla sanitaria adherible al cuerpo de la reivindicación 2, en donde la porción seleccionada del área de yuxtaposición tiene una fracción de área que es
5 de aproximadamente 20% a aproximada 80% del área de yuxtaposición.

4. La toalla sanitaria adherible al cuerpo de la reivindicación 2, en donde la porción seleccionada del
10 área de yuxtaposición tiene una fracción de área que es de aproximadamente 30% a aproximada 70% del área de yuxtaposición.

5. La toalla sanitaria adherible al cuerpo de la reivindicación 2, en donde la relación traslapante entre
15 dicha primera porción de dicha capa de barrera y dicha porción de retención de fluidos define adicionalmente un región periférica de yuxtaposición, y en donde por lo menos aproximadamente 50% de la región periférica de
20 yuxtaposición no se asegura a la capa de barrera.

6. La toalla sanitaria adherible al cuerpo de la reivindicación 2, en donde la relación traslapante entre
dicha primera porción de dicha capa de barrera y dicha
25 porción de retención de fluidos define adicionalmente un segmentos de no adhesión y un segmento de adhesión, y donde la longitud del segmento de no adhesión 52 es

mayor de aproximadamente 15% de aquel de la longitud de los segmentos de adhesión.

7. La toalla sanitaria adherible al cuerpo de la reivindicación 2, que comprende adicionalmente una capa de barrera adicional posicionada intermedia a ensamble de retención de fluido y la capa de barrera extensible.

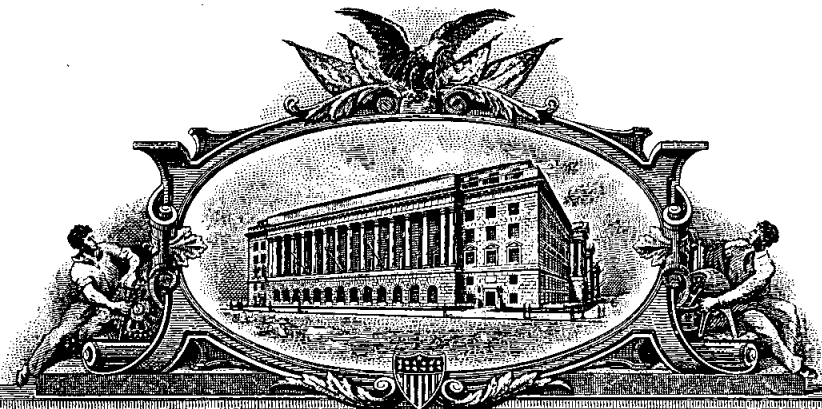
8. La toalla sanitaria adherible al cuerpo de la reivindicación 7, en donde la capa de barrera adicional no se extiende más allá del área de yuxtaposición.

9. La toalla sanitaria adherible al cuerpo de la reivindicación 7, en donde la capa de barrera adicional está libre de adhesivo para estar en contacto con el cuerpo.

10. La toalla sanitaria adherible al cuerpo de la reivindicación 2, en donde dicha barrera extensible comprende adicionalmente una tercera porción que tiene una superficie para contacto con el cuerpo, en donde la tercera porción está libre de adhesivo para contacto con el cuerpo.

P-1714

PA 1726859



THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

November 03, 2008

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: 60/984,218

FILING DATE: October 31, 2007

THE COUNTRY CODE AND NUMBER OF YOUR PRIORITY APPLICATION, TO BE USED FOR FILING ABROAD UNDER THE PARIS CONVENTION, IS US60/984,218

By Authority of the
Under Secretary of Commerce for Intellectual Property
and Director of the United States Patent and Trademark Office



P. SWAIN
Certifying Officer

Electronic Acknowledgement Receipt

EFS ID:	2406712
Application Number:	60984218
International Application Number:	
Confirmation Number:	1745
Title of Invention:	BODY-ATTACHABLE SANITARY NAPKIN
First Named Inventor/Applicant Name:	LEONARD G. ROSENFELD
Customer Number:	27777
Filer:	Paul J. Higgins./CARMEN CAFRO
Filer Authorized By:	Paul J. Higgins.
Attorney Docket Number:	PPC5287-USPSP1
Receipt Date:	31-OCT-2007
Filing Date:	
Time Stamp:	16:58:18
Application Type:	Provisional

Payment information:

Received with Payment	yes
Amount was successfully received in RAM	\$210
Confirmation Number	2892
Account	100750

Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:
Charge any Additional Fees required under 37 C.F.R. Section 1.16 and 1.17

Signature:

Document Number	Document Description	File Name	File Size(Bytes) /Message Digest	Multi Part /.zip	Pages (if appl.)
1	Provisional Cover Sheet (SB16)	PPC5287USPSP1_PROVISIONAL_COVER_SHEET.pdf	301687	no	3
			73424785645948109bc3959d0642ebc6bb7af556		
Warnings:					
Information:					
2	Drawings-only black and white line drawings	5287dra1.pdf	73723	no	6
			c6b0f5816d7a2a81c24b12065123b5b9379108fb		
Warnings:					
Information:					
3		5287spe1.pdf	1055654	yes	40
			5a0127c04e5f99c16dc8d017185995e89c1d4841		
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Specification		1	36	
	Claims		37	39	
	Abstract		40	40	
Warnings:					
Information:					
4	Fee Worksheet (PTO-06)	fee-info.pdf	8129	no	2
			49b38ea85ddc9aa126c107d9c15e403c291c993c		
Warnings:					
Information:					
Total Files Size (in bytes):			1439193		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

BODY-ATTACHABLE SANITARY NAPKIN**FIELD OF THE INVENTION**

The present invention generally relates to sanitary absorbent articles and in particular to sanitary napkins that are directly attachable to the body.

BACKGROUND OF THE INVENTION

Externally worn, sanitary napkins are one of many kinds of feminine protection devices currently available. In use, the typical sanitary napkin is positioned in the perineal region to capture bodily discharge, e.g., menses. In order to prevent the sanitary napkin from drifting into a position that would compromise the sanitary napkin's ability to manage bodily discharges, the sanitary napkin is generally affixed to a user's undergarment, most commonly with adhesive that is applied to a garment facing surface of the sanitary napkin. The adhesive essentially joins the sanitary napkin to the user's underwear.

An alternative sanitary napkin design, the so-called, "body-attachable" sanitary napkin, includes a means for affixing the sanitary napkin directly to the user's body, typically using a body-contactable adhesive. For example, U.S. patent No. 6,213,993 purports to disclose a self-adhering absorbent article including a liquid-permeable cover, an absorbent core, a liquid impermeable baffle, and a bodyside adhesive arranged on the cover for securing the article to the body.

Unfortunately, it is difficult to design a body-attachable sanitary napkin that will remain attached to the user in a manner that is comfortable to the user and sufficient to

prevent leakage. Applicants have recognized that conventional body-attachable sanitary napkins do not move sufficiently with the body during either resulting in leakage and/or detachment from the body. Applicants have further recognized that conventional body-attachable sanitary napkins do not remain securely attached to the body during use, move with the body during use, yet at the same time enable the user to selectively remove the napkin in a pain free manner. As such, a need exists to overcome one or more of the above-mentioned drawbacks.

SUMMARY OF THE INVENTION

According to a first aspect of the invention, the present invention provides a body-attachable sanitary napkin a body-attachable sanitary napkin, comprising:
a fluid-pervious cover layer; a fluid-retaining layer; and a barrier layer having a body-contactable adhesive disposed on at least first portions thereof, wherein said sanitary napkin satisfies the following:

$$G/tE > 0.1 \text{ and } tGE < 2 \times 10^5 \text{ N}^2/\text{m}^2$$

wherein G is Peel Energy, t is thickness of the sanitary napkin, and E is the effective Young's modulus of the napkin, and wherein G/tE and tGE are determined using the PEEL FORCE TEST PROCEDURE and the PEAK FORCE-20% STRETCH TEST PROCEDURE, both of which are described herein.

BRIEF DESCRIPTION OF THE DRAWINGS

Examples of embodiments of the present invention will now be described with reference to the drawings, in which:

FIG. 1 is a top plan view of a sanitary napkin in accordance with a first embodiment of the present invention;

FIG. 2 is a sectional view of the sanitary napkin of FIG. 1, taken through the transverse centerline, line 2-2' thereof;

FIG. 3 is a top plan view of a sanitary napkin of FIG. 1, showing additional features thereof;

FIG. 4 is a top plan view of a sanitary napkin of FIG. 1, showing yet additional features thereof;

FIG. 5 is cross-sectional view of a sanitary napkin sanitary napkin in accordance with a second embodiment of the present invention;

5 **FIG. 6** is a schematic side view of a test apparatus suitable for conducting test procedures described herein on body-attachable sanitary napkins; and

72

FIG. 7 is a graphical depiction of stay-in-place and removal pain for inventive sanitary napkins as well as comparative examples.

DETAILED DESCRIPTION OF THE INVENTION

The present invention provides a body-attachable sanitary napkin that is generally able to accommodate the demands of moving with the body, remaining attached thereto in use, while permitting the fluid-retaining assembly to remain positioned to receive and retain bodily fluid. As such, the sanitary napkin includes, in certain embodiments, a fluid-retaining assembly that is secured to a barrier layer only along selected portions of an area of juxtaposition between the fluid-retaining assembly and the barrier. By including a fluid-retaining assembly that has reduced securement to the barrier layer, the demands that would otherwise be placed on either the barrier layer or adhesive, or both, is greatly reduced.

Applicants have further determined that a body-attachable sanitary napkin can overcome the challenge of simultaneously providing both high stay in place as well as reduced removal pain by selecting the barrier layer, selecting the body-contactable adhesive and arranging the sanitary napkin, all in a certain manner. In particular, Applicants have provided herein a sanitary napkin construction that remains securely attached to the body during use, moves with the body during use, yet also enables the user to selectively remove the napkin in a pain free manner.

The peel force values described herein are affected by both the nature of the body-contactable adhesive as well as the selection of the barrier layer. The criticality of the results of Applicant's PEEL FORCE TEST PROCEDURE as well as the combination of this criticality combined with the criticality of the results of Applicant's PEAK

5 FORCE-20% STRETCH TEST PROCEDURE has not previously been identified as
useful parameters in the design of body-attachable sanitary napkins.

By designing the body-contactable sanitary napkin to meet the requirements
above, it is possible to include a wider range of barrier materials, a wider range of
adhesives, and/or a wider variety of designs than were suggested in the prior art.

10 Referring to **FIGS. 1-2**, there is shown a first embodiment of the present
invention, a feminine sanitary napkin 10. **FIG. 1** depicts a top plan view of the sanitary
napkin shown in **FIG. 1**. The sanitary napkin 10 a first transverse side 26 defining a
front portion thereof and a second transverse side 28 defining a rear portion thereof. The
sanitary napkin 10 also has two longitudinal sides, namely a first longitudinal side 30 and
15 a second longitudinal side 32.

The sanitary napkin 10 has a longitudinal centerline 14 that bisects the sanitary
napkin 10 in two identical halves and an imaginary transverse centerline 16 arranged
perpendicular to the longitudinal centerline 14. **FIG. 2** depicts a cross-sectional view of
the sanitary napkin shown in **FIG. 1**, taken through line 2-2'.

20 As shown in **FIGS. 1-2**, sanitary napkin 10 is of a laminate construction and
comprises an extensible barrier layer 24. The extensible barrier layer 24 has a top face 33
that generally faces the body of the user and a bottom face 35 that generally faces the
user's undergarment.

A fluid-retaining assembly 37 is arranged in overlapping relationship to a first
25 portion 27 of the extensible barrier layer 24, thereby defining an area of juxtaposition 34
between the fluid-retaining assembly 37 and the extensible barrier layer 24. The first
portion 27 of the extensible barrier layer 24, the fluid-retaining assembly 37, and the area

of juxtaposition 34 defined by the overlapping of these components are depicted in FIG. 1 as the "peanut-shaped," cross-hatched region. The first portion 27 of the extensible barrier layer 24, since it is overlapped by the fluid-retaining assembly, does not include a skin-contactable surface.

The extensible barrier layer 24 further includes a second portion 29 that extends outwardly beyond the first portion. The body-contactable adhesive 31 is formed upon the top face 33 of the second portion 29 of the extensible barrier layer 24.

The extensible barrier layer 24 may also include a third portion 39. The third portion 39 is outside the area of juxtaposition 34. As such it is body-contactable. However, the third portion 39 includes no body-contactable adhesive formed thereon.

The shape of the extensible barrier layer 24 is variable and may be designed to facilitate skin contact with skin along the groin/inner thigh. Furthermore, the shape of the fluid-retaining assembly 37 is variable and may be selected to facilitate coverage of the perineal region of the user. As a percent of the total area of the extensible barrier layer 24 when laid flat (i.e., the "footprint" of the extensible barrier layer 24 – as shown in FIG. 1), the area of the fluid retaining portion 37 may be from about 10% to about 90%, preferably from about 40% to about 80%.

The shape of the second portion 29 of the extensible barrier layer 24 is also variable and may be designed to facilitate contact with the user and may be further designed for ease of manufacture. As depicted in FIG. 1, the shape of second portion 29 may include or consist essentially of one or more longitudinally-oriented stripes on either side of longitudinal centerline 14. Other configurations, e.g., one or more squares, rectangles, circles, dotted stripes, strips, swirls, or waves are also contemplated.

X6

5 The fluid-retaining assembly 37 is secured to the first portion 27 of the extensible barrier layer 24 along a selected portion 36 (the outline of which is shown as a rectangularly-shaped area in phantom in FIG. 1) of the area of juxtaposition 34. Along non-selected portions 38 (depicted in FIG. 1 as that portion of the “peanut-shaped” area of juxtaposition 34 that is outside the rectangular-shaped selected portion 36), the fluid-
10 retaining assembly 37 is not secured to the first portion 27 of the extensible barrier layer 24. By “secured” it is meant that selected portion 36 the extensible barrier layer 24 and the fluid-retaining portion 37 are either directly or indirectly connected and are designed to remain connected in use.

 The selected portion 36 as a fraction of the area of juxtaposition 34 is not so low
15 as to allow the fluid-retaining assembly 37 to move too freely and/or risk detachment from the sanitary napkin 10, yet it is not so large that motion is unnecessarily restricted. In one embodiment of the invention, the selected portion is from about 5% to about 90% of the area of juxtaposition 34, preferably from about 20% to about 80%, more preferably from about 30% to about 70%.

20 **FIG. 3** is top plan view of the sanitary napkin of **FIG. 1**, showing additional features thereof. As shown in **FIG. 3**, the overlapping of the fluid-retaining assembly 37 with the extensible barrier layer 24 further defines a perimeter 46 of juxtaposition, an imaginary shape that bounds the fluid-retaining portion 37. The perimeter 46 of juxtaposition defines a peripheral region of juxtaposition 44, that portion of the area of
25 juxtaposition 34 along the perimeter 46 of juxtaposition and having a constant width 48, such that the peripheral region of juxtaposition 44 accounts for 10% of the total area of juxtaposition 34. In one embodiment of the invention, at least about 50% of the

77

peripheral region of juxtaposition is not secured to the extensible barrier layer 24. In a preferred embodiment, greater 75% of the peripheral region of juxtaposition is not so secured.

FIG. 4 is top plan view of the sanitary napkin of **FIG. 1**, showing yet additional features thereof. As shown in **FIG. 3**, the overlapping of the fluid-retaining assembly 37 with the extensible barrier layer 24 further defines one or more segments of attachment 50, e.g., segments of the transverse centerline 16 within the area of juxtaposition 34 that are secured to the extensible barrier layer 24 (shown in phantom in **FIG. 4**) and one or more segments of unattachment 52; e.g., a segment of the transverse centerline 16 within the area of juxtaposition 34 that are not secured to the extensible barrier layer 24 (shown as a solid line in **FIG. 4**). In one embodiment, the total length of the segments of unattachment 52 are greater than about 15% of that of the total length of the segments of attachment 50. In a preferred embodiment, the length of the segment of unattachment 52 is greater than about 30% of that of the length of the segments of attachment 50. While in **FIG. 4**, the line from which the segments of attachment 50 and segments of unattachment 52 is the transverse centerline 16, the longitudinal centerline 14 or a line at any angle in between the transverse centerline 16 and the longitudinal centerline could be used to determine suitable segments of attachment of unattachment.

While **FIGs. 1, 3 and 4** depict the shape of the selected portion 36 of the area of juxtaposition 34 to be a single continuous rectangular area, other shapes for the selected portion 36 are contemplated. For example the selected portion 36 may include one or more areas of squares, rectangles, circles, dotted stripes, strips, swirls, or waves etc. and

5 may include or not include the center (intersection of the longitudinal centerline 14 and transverse center line 16).

FIG. 5 depicts an alternative embodiment of the invention of a sanitary napkin 20. Sanitary napkin 20 is identical to the sanitary napkin 10 of FIGs 1-2, except that sanitary napkin 20 includes an additional fluid-impervious barrier layer 42, distinct from
0 the extensible barrier layer 24. Additional barrier layer 42 is positioned intermediate (e.g., between) the fluid-retaining assembly 37 and the extensible barrier layer 24. As such, the additional barrier layer 42 provides additional ability to trap bodily fluids and prevent leakage of fluid outside the sanitary napkin 20. In one embodiment, the additional barrier layer 42 is sized to just accommodate the fluid-retaining assembly 37
5 and, as such, the additional barrier layer 42 does not extend beyond the area of juxtaposition 34 and is free of the body-contactable adhesive 31.

Barrier Layer

10 The extensible barrier layer 24 is generally liquid impervious. By “liquid impervious” it is meant that liquids such as menses and urine, under in-use conditions are unable to pass through. By “extensible”, it is meant that when placed under tension in the plane of the layer, the extensible barrier layer 24 can stretch (elastically) 10% or more, preferably 20% or more and essentially recover its original length. The extensible barrier
25 layer 24 may include, for example, polymeric film such as polyethylene or polypropylene; liquid impervious (e.g., repellent-treated) non-wovens (e.g., spunbond, meltblown, or thermobonded polyolefin or polyurethane fibers that have been treated to prevent the penetration of bodily fluids therethrough; or combinations or laminates thereof. The extensible barrier layer 24 may have a basis weight from about 5 gsm to

about 20 gsm. Notable liquid pervious extensible barrier films include spunbond liquid-impervious nonwovens of polyurethane and/or polypropylene; with or without layers of meltblown fibers arranged in between.

The extensible barrier layer 24 may be breathable, i.e., permits vapor to transpire. Known materials for this purpose include nonwoven materials and microporous films in which microporosity is created by, inter alia, placing the extensible barrier layer 24 in tension. Single or multiple layers of permeable films, fabrics, melt-blown materials, and combinations thereof that provide a tortuous path, and/or whose surface characteristics provide a liquid surface repellent to the penetration of liquids may also be used to provide a breathable barrier layer.

Optional additional barrier layer 42, as shown in **FIG. 4** may be of similar composition and generally has similar liquid-imperviousness as described above for the extensible barrier layer 24.

Body-Contactable Adhesive

The body-contactable adhesive 31 is formed on a body-faceable side of the extensible barrier layer 24 for securing the sanitary napkin 10 to the body of a user, during use. The body-contactable adhesive 31 may be covered with removable release paper so that the body-contactable adhesive 31 is covered by the removable release paper prior to use.

The body-contactable adhesive 31 may include pressure sensitive adhesive and may be applied in various suitable configurations as previously described. As used

herein, the term pressure-sensitive adhesive refers to any releasable adhesive or releasable tenacious means.

The composition of the body-contactable adhesive 31 is variable, as long as the adhesive is selected such that when the sanitary napkin is tested according to the test methods described herein, *both* (1) a suitable force to effect peeling of the adhesive *and* (2) a low enough force to effect a particular 20% stretch when subject to tension across the sanitary napkin.

The body-contactable adhesive 31 used in sanitary napkin may be an adhesive based upon block copolymers such as those which may include linear or radial copolymer structures having the formula $(A-B)_x$ wherein block A is a polyvinylarene block, block B is a poly(monoalkenyl) block, x denotes the number of polymeric arms, and wherein x is an integer greater than or equal to one. Suitable block A polyvinylarenes include, but are not limited to polystyrene, polyalpha-methylstyrene, polyvinyltoluene, and combinations thereof. Suitable Block B poly(monoalkenyl) blocks include, but are not limited to conjugated diene elastomers such as for example polybutadiene or polyisoprene or most preferably hydrogenated elastomers such as ethylene-butylene or ethylene-propylene or polyisobutylene, or combinations thereof, specifically, adhesives consisting of styrene-ethylene-butylene-styrene (SEBS) block copolymer and mineral oils, paraffinic or naphthenic process oils, and optionally a suitable tackifying resins include natural and modified resins; glycerol and pentaerythritol esters of natural and modified resins; polyterpene resins; copolymers and terpolymers of natural terpenes; phenolic modified terpene resins and the hydrogenated derivatives thereof; aliphatic petroleum resins and the hydrogenated derivatives thereof; aromatic petroleum resin and

the hydrogenated derivatives thereof; and aliphatic/aromatic petroleum resins and the hydrogenated derivatives thereof, and combinations thereof.

The body-contactable adhesive 31 employed in the article according to the present invention may have more than about 50% by weight of a liquid plasticizer, such as more than about 65% by weight of a liquid plasticizer. Suitable liquid plasticizers may include white oils, mineral oils, paraffinic process oils, polyethylene glycol, glycerin, polypropylene glycol, naphthenic oils, and liquid polyterpenes. The liquid plasticizer preferably has a molecular weight of less than 1000 g/mole, more preferably less than 750 g/mole and most preferably less than 500 g/mole.

The body-contactable adhesive 31 may be of the type described in 6191189USB

US Patent No. 6,191,189 to Cinelli et al. In particular, the adhesive may comprise:

- from 0.5 to 20%, preferably 5% to 15%, by weight of a macromolecular polymeric substance or a mixture of such substances soluble or swellable in the below mentioned plasticiser(s). As not limiting examples such macromolecular or polymeric substances can be natural and/or synthetic such as natural gums or derivatives such as natural gums and gelatins, their derivatives and alginates; polyacrylics; polyvinyl alcohol; polyethylene oxide; polyvinylpyrrolidone (PVP) or polyvinylethers, their copolymers and derivatives; cellulose derivatives; Block Copolymer Thermoplastic Elastomers and preferably Styrenic Block Copolymers and more preferably the hydrogenated grades Styrol/Ethylene-Butylene/Styrol (SEBS), Styrene/Isoprene/Styrene (SIS), and Styrol/Ethylene-Propylene/Styrol (SEPS);

- from 45 to 99.5% by weight, preferably from 51 to 99.5% by weight, of a plasticising substance or a mixture of plasticising substances, which are liquid at room temperature. As non-limiting examples the plasticiser can be water, various alcohols (like in particular glycerol), glycols and their ethers, polyglycols, liquid polybutenes, esters such phthalates, adipates, stearates, palmitates, sebacates, or myristates, natural or synthetic oils such as vegetable oils, mineral oils, or combinations thereof;
- from 0% to 50% by weight of the composition, preferably from 0 to 600% by weight of the macromolecular polymeric substance of a tackifying resin whose main scope is to tailor the Tg especially in systems based on synthetic polymers;
- from 0 to 10% and more preferably from 0 to 5% by weight of substances for facilitating and stabilising the gel and the gel forming process both of hydrophilic or hydrophobic liquid plasticisers. These may be for oily systems, e.g. the fatty acids of C₈ to C₂₂, their metallic salts and their polyoxo-derivatives; lanolin derivatives; silica; bentonite, montmorillonite and their derivatives; polyamides, waxes or mixtures thereof.

The adhesive may also be of the type described in 6213993USB US Patent No.

6,213,993 to Zacharias et al. In particular the adhesive may comprise:

- a rubber-based adhesive such as styrenebutadiene, polyisobutylene, polybutadiene and polyisoprene; a water soluble adhesive such as polyvinyl alcohol, polyvinyl acetate, and methyl cellulose; a hot melt adhesive such as

5 block copolymers of styrene-butadiene-styrene, styrene-isoprene-styrene, styrene-ethylenepropylene-styrene, styrene-ethylenebutylene-styrene and tetrablock copolymers such as styrene-ethylenepropylene-styrene-ethylenepropylene. Incorporated with the adhesives can be suitable tackifying resins and, if appropriate, oils.

10 Other adhesive types here include anhydrous gels consisting of 2-hydroxyethyl methacrylate polymer, polyethylene glycol and optionally water as taught in 4303066USA U.S. Patent No. 4,303,066 and polyurethane gels, as disclosed in 4661099USA U.S. Patent No. 4,661, 099 , or silicone gels including commercial products such as Silgel 612 from Wacker Silicones (Adrian, MI) or SSA-9700 Soft
15 Skin Adhesives Dow-Corning (Midland, MI).

Other suitable adhesive compositions, include, for example, water-based pressure-sensitive adhesives such as acrylate adhesives. Alternatively, the adhesive composition may include adhesives based on the following: emulsion or solvent-borne adhesives of
20 natural or synthetic polyisoprene, styrene-butadiene, or polyacrylate, vinyl acetate copolymer or combinations thereof; hot melt adhesives based on suitable block copolymers - suitable block copolymers for use in the invention include linear or radial co-polymer structures having the formula (A-B)_x wherein block A is a polyvinylarene block, block B is a poly(monoalkenyl) block, x denotes the number of polymeric arms,
25 and wherein x is an integer greater than or equal to one. Suitable block A polyvinylarenes include, but are not limited to Polystyrene, Polyalpha-methylstyrene, Polyvinyltoluene, and combinations thereof. Suitable Block B poly(monoalkenyl) blocks

5 include, but are not limited to conjugated diene elastomers such as for example polybutadiene or polyisoprene or hydrogenated elastomers such as ethylene butylene or ethylene propylene or polyisobutylene, or combinations thereof. Commercial examples of these types of block copolymers include KRATON elastomers from Shell Chemical Company, VECTOR elastomers from Dexco, Solprene™ from Enichem Elastomers
10 and STEREON from Firestone Tire & Rubber Co.; hot melt adhesive based on olefin polymers and copolymers where in the olefin polymer is a terpolymer of ethylene and a co-monomers, such as vinyl acetate, acrylic acid, methacrylic acid, ethyl acrylate, methyl acrylate, n-butyl acrylate vinyl silane or maleic anhydride. Commercial examples of these types of polymers include Ateva (polymers from AT plastics), Nucrel (polymers
15 from DuPont), Escor (from Exxon Chemical).

Fluid-Retaining Assembly

Sanitary napkins of the present invention include fluid retaining assembly 37. As used herein the term "fluid-retaining assembly" refers to any material or multiple material
20 layers whose primary function is to absorb, store or distribute fluid especially menses that is discharged by the wearer and prevent the back flow of stored fluid towards the cover and contacting the wearer.

3 The fluid retaining assembly 37 may include a single layer of material or may include multiple layers (e.g., an absorbent core overlaid by a so-called "transfer,"
25 "distribution" or "acquisition" layer). In one embodiment, fluid-retaining assembly 37 is a blend or mixture of cellulosic fibers and superabsorbent disposed in and amongst fibers of that pulp.

5 It is possible that the fluid-retaining assembly 37 could be integrated with the cover and/or barrier such that there is essentially only a single layer structure or a two layer structure including the function of the multiple layers described herein.

 Cellulosic fibers that can be used in the fluid-retaining assembly 37 are well known in the art and include wood pulp, cotton, flax and peat moss. Wood pulp is preferred. Pulps can be obtained from mechanical or chemi-mechanical, sulfite, kraft, 10 pulping reject materials, organic solvent pulps, etc. Both softwood and hardwood species are useful. Softwood pulps are preferred. It is not necessary to treat cellulosic fibers with chemical debonding agents, cross-linking agents and the like for use in the present material. Some portion of the pulp may be chemically treated as discussed in US 15 5,916,670 to improved flexibility of the product. Flexibility of the material may also be improved by mechanically working the material or tenderizing the material. The fluid-retaining assembly 37 can contain any superabsorbent polymer (SAP), which SAPs are well known in the art. For the purposes of the present invention, the term "superabsorbent polymer" (or "SAP") refers to materials which are capable of absorbing and retaining at 20 least about 10 times their weight in body fluids under a 0.5 psi pressure. The superabsorbent polymer particles of the invention may be inorganic or organic crosslinked hydrophilic polymers, such as polyvinyl alcohols, polyethylene oxides, crosslinked starches, guar gum, xanthan gum, and the like. The particles may be in the form of a powder, grains, granules, or fibers. Preferred superabsorbent polymer particles 25 for use in the present invention are crosslinked polyacrylates, such as the product offered by Sumitomo Seika Chemicals Co., Ltd. Of Osaka, Japan, under the designation of SA70N and products offered by Stockhausen Inc.

5 The fluid-retaining assembly 37 may comprise a material manufactured by using air-laying means well known in the art. In a specific example, the fluid-retaining assembly 37 is an air laid material made from cellulosic fibers, bonding materials and components that cannot form a bond (nonbonding materials) with the other component materials.

10 In one specific embodiment of the invention, the absorbent system is composed of fluff pulp.

Attachment of Fluid-Retaining Assembly to Barrier Layer

 In certain embodiments of the invention, the fluid retaining assembly 37 is
15 secured to the extensible barrier layer 24 along a selected portion 36 of the area of juxtaposition 34. The securement may be made by means of construction adhesives, heat-bonding, ultrasonic bonding, radio frequency sealing, mechanical crimping, or similar techniques known to the art of joining fibrous and/or film materials for use in absorbent articles.

20 In one embodiment, the selected portion 36 is secured using a construction adhesive. Suitable construction adhesives include, for example, hot melt adhesives, such are those that are sufficiently pressure sensitive at elevated (application) temperatures and have sufficient cohesive and peel strength at ambient temperatures to maintain a firm bond the selected portion 36 of the barrier layer to the fluid-retaining portion 37 while the
25 sanitary napkin is in use. The construction adhesive may include block copolymers, plasticizers and/or reinforcing or tackifying resins.

Cover Layer

The sanitary napkin 10 may include cover layer 22. Cover layer 22 may include non-woven web material, an apertured thermoplastic film (such as those described in U.S. Pat. No. 4,690,679), or combinations thereof. The cover layer 22 may be composed of only one type of fiber, such as polyester or polypropylene or it may include a mixture of more than one fiber. The cover layer 22 may be composed of bi-component or conjugate fibers having a low melting point component and a high melting point component. The fibers may be selected from a variety of natural and synthetic materials such as nylon, polyester, rayon (in combination with other fibers), cotton, acrylic fiber and the like and combinations thereof. Preferably, the cover layer 22 has a basis weight in the range of about 10 gsm to about 75 gsm.

Bi-component fibers suitable for use in cover layer 22 may be made up of a polyester layer and a polyethylene sheath. The use of appropriate bi-component materials results in a fusible non-woven fabric. Examples of such fusible fabrics are described in U.S. Pat. No. 4,555,430 issued Nov. 26, 1985 to Chicopee. Using a fusible fabric increases the ease with which the cover layer 22 may be mounted to the absorbent layer and/or to the barrier layer.

The cover material should preferably contain a significant amount of relatively large pores or apertures. This is because the cover layer 22 is intended to take-up body fluid rapidly and transport it away from the body and the point of deposition. Therefore, the cover layer 22 contributes little to the time taken for the napkin to absorb a given quantity of liquid (penetration time).

5 Advantageously, the fibers which make up the layer 22 should not lose their physical properties when they are wetted, in other words they should not collapse or lose their resiliency when subjected to water or body fluid. The cover layer 22 may be treated to allow fluid to pass through it readily. The cover layer 22 also functions to transfer the fluid quickly to the other layers of the absorbent system 44. Thus, the cover layer 22 is
10 advantageously wettable, hydrophilic and porous. When composed of synthetic hydrophobic fibers such as polyester or bi-component fibers, the cover layer 22 may be treated with a surfactant to impart the desired degree of wettability.

 The fibers of the nonwoven cover may be bonded by any of various means such as spunlacing (hydroentanglement), thermobonding, latex bonding, and the like.

15 The cover layer 22 may be embossed to the fluid-retaining assembly 37 in order to aid in promoting hydrophilicity by fusing the cover layer 22 to the next layer. Such fusion may be effected locally, at a plurality of sites or over the entire contact surface of cover layer 22 and absorbent system 44. Alternatively, the cover layer 22 may be attached to the fluid-retaining assembly 37 by other means such as by adhesion.

20 **Other Structures and Attributes**

 Sanitary napkins according to the present invention are preferably thin, preferably having a thickness of less than 4.0 mm, more preferably less than 3.0 mm, and most preferably less than 2.5 mm.

25 Any or all of the cover, absorbent layer, transfer layer, backsheet layer, and adhesive layers may be colored. Such coloring includes, but is not limited to, white, black, red, yellow, blue, orange, green, violet, and mixtures thereof. Color may be imparted according to the present invention through dyeing, pigmentation, and printing.

5 Colorants used according the present invention include dyes and inorganic and organic pigments. The dyes include, but are not limited to, anthraquinone dyes (Solvent Red 111, Disperse Violet 1, Solvent Blue 56, and Solvent Green 3), Xanthene dyes (Solvent Green 4, Acid Red 52, Basic Red 1, and Solvent Orange 63), azine dyes (Jet black), and the like. Inorganic pigments include, but are not limited to, titanium dioxide (white), carbon black
10 (black), iron oxides (red, yellow, and brown), chromium oxide (green), ferric ammonium ferrocyanide (blue), and the like.

Organic pigments include, but are not limited to diarylide yellow AAOA (Pigment Yellow 12), diarylide yellow AAOT (Pigment Yellow 14), phthalocyanine blue (Pigment Blue 15), lithol red (Pigment Red 49:1), Red Lake C (Pigment Red), and the
15 like.

The absorbent article may include other known materials, layers, and additives, such as, foam, net-like material, perfumes, medicaments or pharmaceutical agents, moisturizers, odor control agents, and the like. The absorbent article can optionally be embossed with decorative designs.

20 The absorbent article may be packaged as unwrapped absorbent articles within a carton, box or bag. The consumer withdraws the ready-to-use article as needed. The absorbent article may also be individually packaged (each absorbent article encased within an overwrap).

While overall shape of the sanitary napkin may be symmetrical as shown in the
25 Figures, it is also contemplated herein include asymmetrical and symmetrical absorbent articles having parallel longitudinal edges, dog bone- or peanut-shaped, as well as articles having a tapered construction for use with thong-style undergarments.

5 The sanitary napkin of the present invention may be applied to the crotch by placing the body-contactable adhesive against the inner thigh region of the user, thereby securing the absorbent assembly against the perineal region.

10 **Test Procedures For Sanitary Articles: Procedures for Measuring (1) Peel Force and (2) Peak Force for 20% Stretch of the Body-Attachable Sanitary Napkin**

 According to certain one aspect of the invention, in order to provide both reduced pain as well as improved stay in place, the body-attachable sanitary napkin has a Peel Energy, G_c and a Young's modulus, E that satisfy the following relationship:

15

$$G/tE > 0.1 \text{ N/m; and}$$

$$tGE < 2 \times 10^5 \text{ N}^2/\text{m}^2$$

G/tE is a measure of the body-faeceable sanitary napkin's ability to stay in place.

20 It is calculated using "Peel Force," P , which is in turn determined using the PEEL FORCE TEST PROCEDURE. tGE is a measure of the sanitary napkin's ability to be peeled from the body with reduced pain. It is calculated using results from the PEEL FORCE TEST PROCEDURE as well as the "Peak Force at 20% Stretch," F , the latter of which is determined using the PEAK FORCE-20% STRETCH TEST PROCEDURE.

25 The PEEL FORCE TEST PROCEDURE and the PEAK FORCE-20% STRETCH TEST PROCEDURE are each set forth in detail below.

 "Peel Force" is determined by a test performed as follows. The PEEL FORCE TEST PROCEDURE is a measure of the force required to peel an adhesive from a

al

5 standard sheet of plastic film. The apparatus necessary for the PEEL FORCE TEST
PROCEDURE includes the following parts:

(1) A force-measurement gauge and more specifically an Instron inverted tension
load cell. Instron Universal testing machine with load cell capable of measuring tensile
10 forces from 10 to 200 grams (2000 gram capacity preferred), such as an Instron machine,
e.g., Instron 1122 or 1125, commercially available from Instron Engineering Corporation,
Canton, Mass.

(2) 90 degree peel fixture such as Instron 2820-035 or 2820-036.
15

(3) a grip attachable to force measurement gauge and suitable for pulling 1 cm
peel strip without slip or tearing (e.g., 1 ½" x 1" rubber face jaw plates)

(4) 2.5" by 7" pieces of double stick tape, e.g., PERMACEL available from
20 Permacel, A Nitto Denko Company of East Brunswick, NJ

(5) Rigid plastic or metal plate for clamping in peel fixture and attaching double
stick tape and napkin sections. Approximately 3" by 7".

25 (6) 1 cm wide by 12" long sections of polyolefin film (hereinafter, "film
adherent"), e.g., Pliant #3471 0.7 mil white polypropylene film.

5 **FIG. 6** depicts a schematic side view of an apparatus 60 suitable for the PEEL
FORCE TEST PROCEDURE. Body adhesive should be protected from the
environment until shortly before testing by a release liner or similar cover. A sample of
the body adhesive section of the napkin is cut out to form test sample 62. Test sample 62
should be at least 1 cm wide and preferably 6" in length. If no such continuous region of
10 body-faceable adhesive exists, then one should choose a 1 cm wide and 6" long portion
that encompasses the greatest amount of body-contactable adhesive as possible. The
layer of material in touch with the body adhesive is left intact but lower layers are
removed so that the test sample is as flat as possible. The remaining test sample thus
includes a substrate 64 and body-contactable adhesive 66. The double stick tape 68 is
15 adhered to rigid plate 70 such that the body-faceable adhesive 66 is facing up. Any
release liner is removed and the film adherent 72 is placed over the sample of body
adhesive with the long end toward the screw clamp 5. A 1" square piece of release paper
(if no release paper was provided with the test sample, any suitable release strip may be
used) is placed at the point where the 1 cm sample turns up 90°, this will be the starting
20 point of the test. The adherent film 72 is covered with release paper and rolled once with
a 5 Lb. weight. The release film is then removed. The rigid plate 70 is firmly attached to
the stage 74. The instron grip 76 is attached to the end of the film adherent 72 with the
square piece of release paper, which is in turn rigidly attached to moveable crosshead
80 of the Instron.

25 Tension cell 78 is allowed to warm-up 20 minutes before starting the calibration
procedure. The load cell is calibrated once before any tests are done on a given day.

- 5 Calibration is performed as per the manufacturers instructions, by attaching a standard 100 gram mass directly to the load cell.

The stage 74 is such that it capable of sliding with little friction in a direction normal with respect to the crosshead 80, thus allowing the film to be peeled from the adhesive at a continuous 90 degree angle. As such it may include roller 80 in order to
10 reduce friction. The crosshead speed is set to 10.00 In/Min.

The force measurement apparatus records the force as the film adherent 72 is peeled (pulled up) from the rigid plate to which the body adhesive is attached. The measured peel force is recorded as the time averaged force from a section of the xy recording where stable peeling occurs. As readily determined by one skilled in the art, by
15 "stable peeling" it is meant that time period of the force measurement can clearly be delineated as the onset and completion of peeling.

This average peel force, P is then be utilized to calculate Peel Energy, G_c of the body adhesive, as set forth using the calculation below:

20
$$G_c = \{P^2 / (2 A E w)\} + \{P / (1 - \cos \theta) w\}$$

θ = angle relative to plane of stage along which the film is pulled = 90 degrees,

implying $1 - \cos \theta_{\text{peel}} = 1 - \cos 90^\circ = 1$

P = peel force measured from the PEEL FORCE TEST PROCEDURE

25 w = width of the film adherent

E_f = elastic modulus of film adherent

A = cross sectional area of the film adherent

5

Peel Energy, G_c of the body adhesive is then used to calculate G_c/tE , where t =thickness of the film adherent, and again, E = elastic modulus of the film adherent. It is also used to calculate tGE , described below.

10 "Peak Force at 20% Stretch" is determined by a test performed as follows. The PEAK FORCE-20% STRETCH TEST PROCEDURE is a measure of the force required to induced 20% strain in the sanitary napkin.

The apparatus necessary for the PEAK FORCE-20% STRETCH TEST PROCEDURE includes the following parts:

- 15 1. Instron Universal testing machine with load cell capable of measuring tensile forces up to 50 pounds.
2. Two inch wide upper and lower grips capable of gripping a typical napkin structure without slipping or tearing.

20

The PEAK FORCE-20% STRETCH TEST PROCEDURE may be performed using an apparatus similar to apparatus 60 described above with respect to the PEEL FORCE TEST PROCEDURE and FIG. 6. Release paper is removed from the body adhesive strips. Talcum powder is applied on the tacky portion to eliminate tack. Two points on opposite sides of the longitudinal centerline of the napkin that are covered with body adhesive are chosen as the test points. These points may be directly opposite the longitudinal centerline from each other or one may be further to the front or back than the

25

5 other ("front-to-back positioning" is at the discretion of the tester). The points, however must be chosen so that each point can be centered across the width of its particular grip. The entire width of the grip will be contacting the sanitary napkin. Distance between the two points is measured and the gage length on the test machine is set to this value. Crosshead speed is set to 5.00 in/min and load limit is set to 45lb for 50 lb load cell.

10 The sanitary napkin is stretched to a strain of 20% (i.e., the change in length between test points as a result of stretching via the test apparatus is 20% of the original length between test points. The Peak Force at 20% Stretch in grams is then read from the test apparatus. Five Replicates are tested to determine an average Peak Force at 20% Stretch for the sanitary napkin. The product, E_{nap} , is calculated using the formula below:

15

$$E_{nap} = F/W\epsilon$$

E_{nap} = Effective elastic modulus of napkin

t = thickness of the sanitary napkin

20 F = Peak Force at 20% Stretch, measured by the PEAK FORCE-20% STRETCH

TEST

W = width of the grip over which the specimen is held

ϵ = strain induced by test procedure = 0.2

25

5 E_{nap} is multiplied by G_c , as calculated previously (from Peel Force, P that was measured previously in the PEEL FORCE TEST PROCEDURE) to determine tG_cE_{nap} , a measure of the sanitary napkin's ability to be peeled from the body with reduced pain.

Examples of Inventive Sanitary Napkins

10 Specific examples of inventive sanitary napkins are described below.
Comparative examples are also provided.

All samples, except where noted used a 30gsm multidenier nonwoven cover, unless where noted.

Inventive Sanitary Napkin, Ex. 1

15 A body-attachable sanitary napkin was made according to embodiments of the invention, in which the fluid-retaining portion was attached to the extensible barrier layer in a centrally disposed portion of a region of juxtaposition and unattached to said
20 extensible barrier layer in other portions of the region of juxtaposition – similar to the sanitary napkin constructions shown in **FIG. 5** The extensible barrier layer was highly extensible, ADC # 9540002, and 80 gsm spunbond polyurethane/polyethylene nonwoven, commercially available from BBA Nonwovens of Peine, Germany. The body-
25 contactable adhesive was selected for strong ability to stay in place, NS 548B, commercially available from National Starch Corporation of Bridgewater, NJ. The body-
contactable adhesive was present in a basis weight of 76gsm.

5 Inventive Sanitary Napkin, Ex. 2

A body-attachable sanitary napkin was made according to embodiments of the invention, with a construction similar to Ex. 1. The extensible barrier layer was moderately extensible, a 30gsm thermobonded polypropylene commercially available from PGI, Inc of Dayton, NJ. The NS 548B body-contactable adhesive was present in a
10 basis weight of 82 gsm.

Inventive Sanitary Napkin, Ex. 3

A body-attachable sanitary napkin was made according to embodiments of the invention, with a construction similar to Ex. 1. The extensible barrier layer was the
15 highly extensible extensible ADC # 9540002. The body-contactable adhesive was selected for weaker ability to stay in place, Fuller 1407, commercially available from HB HB Fuller Co., of St. Paul, Minnesota. The body-contactable adhesive was present in a basis weight of 83 gsm.

20 Inventive Sanitary Napkin, Ex. 4

A body-attachable sanitary napkin was made according to embodiments of the invention, with a construction similar to Ex. 1, except that the fluid-retaining portion did not include portions that were unattached to the extensible barrier layer. The extensible barrier layer was the highly extensible ADC # 9540002. The body-contactable adhesive
25 was the "stronger" NS 548B adhesive. The body-contactable adhesive was present in a basis weight of 83 gsm.

5 Inventive Sanitary Napkin, Ex. 5

A body-attachable sanitary napkin was made according to embodiments of the invention, with a construction similar to Ex. 4. The extensible barrier layer was the highly extensible ADC # 9540002. The body-contactable adhesive was the “weaker” Fuller 1407 adhesive. The body-contactable adhesive was present in a basis weight of 86
10 gsm.

Comparative Example, Sanitary Napkin, Comp. Ex 1

A body-attachable sanitary napkin was made with a construction similar to Ex. 4. The extensible barrier layer was chosen to have poor extensibility, a 25gsm SMMS
15 composite commercially available from BBA Nonwovens. The body-contactable adhesive was the “stronger” NS 548B adhesive.

Comparative Example, Sanitary Napkin, Comp. Ex. 2

A body-attachable sanitary napkin was made with a construction having a cover
20 layer and barrier layer that extend beyond the fluid retaining layer, and the body-contactable adhesive present on the cover. Thus the sanitary napkin was similar to a conventional garment-attached sanitary napkin, but with body-contactable adhesive applied on the top side of the cover layer. The cover layer was an 80 gsm spunbond polyurethane/polyethylene nonwoven. The extensible barrier layer was the highly
25 extensible ADC # 9540002. The body-contactable adhesive was the “stronger” NS 548B adhesive.

5 Comparative Example, Sanitary Napkin, Comp. Ex. 3

A body-attachable sanitary napkin was made with a construction similar to Comp. Ex. 8. The extensible barrier layer was the moderately extensible 30gsm thermobonded polypropylene. The body-contactable adhesive was the "stronger" NS 548B adhesive. The body-contactable adhesive was present in a basis weight of 83 gsm.

10

Comparative Example, Sanitary Napkin, Comp. Ex. 4

A body-attachable sanitary napkin was made according to embodiments of the invention, with a construction similar to Ex. 4. The extensible barrier layer was the poorly extensible SMMS. The body-contactable adhesive was the "weaker" Fuller 1407 adhesive. The body-contactable adhesive was present in a basis weight of 58 gsm.

15

The sanitary napkins suitable for use in the present invention and comparative samples were tested according to the test methods described in the "Test Procedures for Sanitary Articles" section above,

The peel force, P in grams was measured using the PEEL FORCE TEST

20 PROCEDURE. Pliant #3471 0.7 mil white polypropylene film was used as the film adherent for the test. Peel Energy, G_c was calculated using the formula described previously. The peel force in grams from the PEEL FORCE TEST PROCEDURE was converted to units of Newtons by multiplying by a geometric conversion factor of 0.0098 N/g. For this particular film adherent, the cross sectional area of the film adherent, A was
25 0.000018 m (width, w, was 0.01m and thickness, t was 0.000018 m) and the elastic modulus of film adherent, E_f was $383 \times 10^6 \text{ N/m}^2$. G_c , thus calculated, had units of J/m^2 .

- 5 G/tE , the measure of stay in place, was then calculated using the thickness of the film adherent, t and Elastic Modulus, E_f of the film adherent.

Peak Force at 20% Stretch measured using the PEAK FORCE-20% STRETCH TEST PROCEDURE. The Peak Force at 20% Stretch was converted to units of Newtons by multiplying by a geometric conversion factor of 0.0098 N/g. The width, W of the grip was 2 inches = 5.08cm. tGE , a measure of the sanitary napkin's ability to be peeled from the body with reduced pain, thus calculated, had units of N^2/m^2 .

The results of which are set forth in Table 1 provided below.

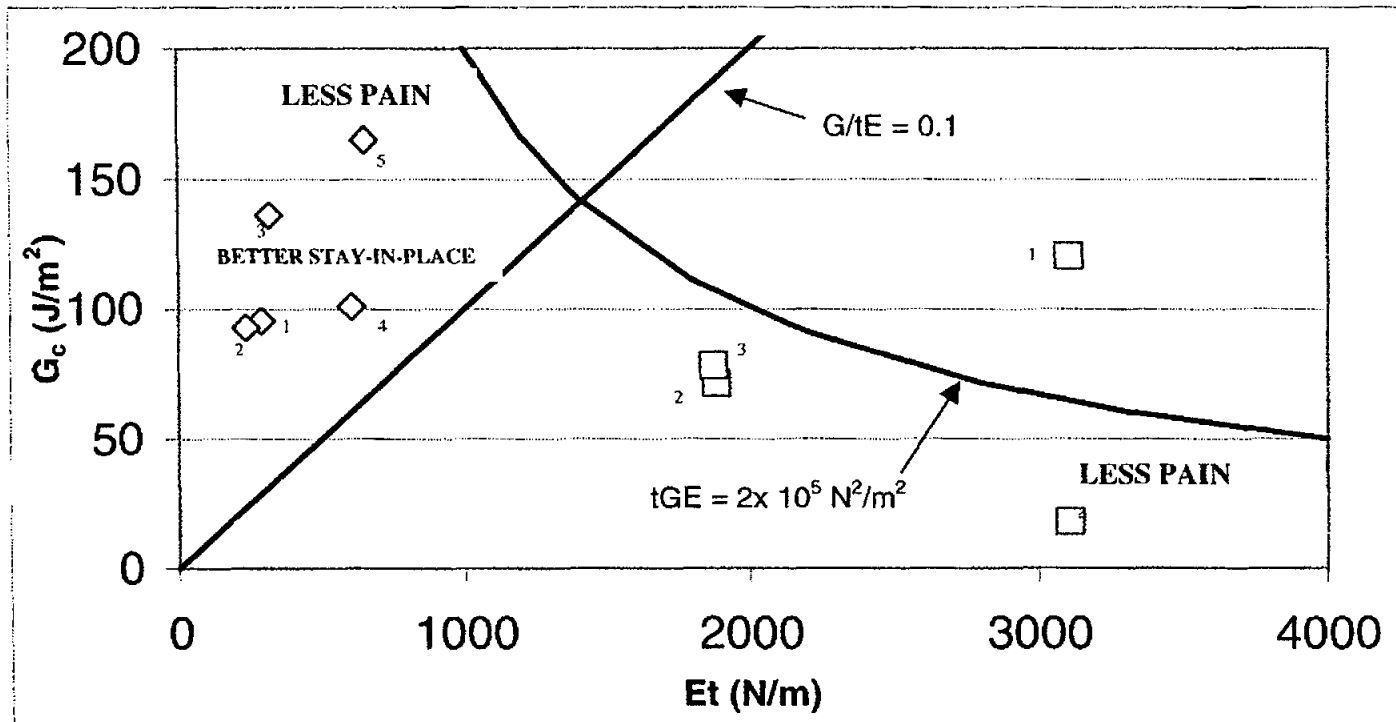
Table 1

Sample	Peel Force, F (g)	Peel energy, G (J/m ²)	Peak Force @ 20% Stretch, F (g) CENTER	Peak Force @ 20% Stretch, F (g) END	Et (N/m) CENTER	Et (N/m) END	tGE (N ² /m ²)	G/Et
Ex. 1	96.6	94.7	471	302	454.3	291.3	2.8E+04	0.3252111
Ex. 2	93.92	92.1	519	246	500.6	237.3	2.2E+04	0.3881591
Ex. 3	137.18	134.6	544	333	524.7	321.2	4.3E+04	0.4189559
Ex. 4	102.11	100.1	941	629	907.7	606.7	6.1E+04	0.1650555
Ex. 5	166.43	163.3	1004	678	968.4	654.0	1.1E+05	0.2496979
Comp Ex. 1	121.38	119.1	4369	3219	4214.2	3104.9	3.7E+05	0.0383441
Comp Ex. 2	72.27	70.9	2641	1950	2547.4	1880.9	1.3E+05	0.0376741
Comp Ex. 3	79.19	77.7	2698	1940	2602.4	1871.3	1.5E+05	0.0414963
Comp Ex. 4	18.32	18.0	4632	3221	4467.9	3106.9	5.6E+04	0.0057794

5 The results are shown graphically in **FIG. 7**. The particular example is matched with the data point in the Figure. Points above the line, $G/tE = 0.1$ indicate high stay-in-place. Points below the curve, $tGE = 2 \times 10^5 \text{ N}^2/\text{m}^2$ indicate lower removal pain. The points in the upper left quadrant (where Examples 1-5 fall) combine both high stay-in-place as well as lower removal pain.

10

FIG. 7



In view of the above absorbent articles and results of test procedures provided herein, it can be seen that by sanitary napkins of the present invention remain securely attached to the body during use, move with the body during use, yet at the same time enable the user to selectively remove the napkin in a pain free manner.

Applications of the sanitary napkin according to the present invention for sanitary and other health care uses can be accomplished by any sanitary protection, incontinence, medical and absorbent methods and techniques as are presently or prospectively known to those skilled in the art. Thus, it is intended that the present application cover the modifications and variations of this invention provided that they come within the scope of the appended claims and their equivalents.

5

CLAIMS

I Claim:

1. A body-attachable sanitary napkin, comprising:

- 10 a fluid-pervious cover layer;
a fluid-retaining assembly; and
a barrier layer having a body-contactable adhesive disposed on at least
first portions thereof, wherein said sanitary napkin satisfies the following:

$$G/tE > 0.1 \text{ and } tGE < 2 \times 10^5 \text{ N}^2/\text{m}^2$$

15

2. The body-attachable sanitary napkin of claim 1, wherein said barrier layer has a first portion and a second portion, said second portion having a body-attachable adhesive arranged thereon; and wherein said fluid-retaining assembly is arranged in overlapping relationship to said first portion of said barrier layer thereby defining an area of
20 juxtaposition between said fluid-retaining assembly and said barrier layer, and wherein said fluid-retaining assembly is secured to said barrier layer along a selected portion of said area of juxtaposition.

3. The body-attachable sanitary napkin of claim 2, wherein the selected portion of the
25 area of juxtaposition has an area fraction that is from about 20% to about 80% of the area of juxtaposition.

5 4. The body-attachable sanitary napkin of claim 2, wherein the selected portion of the
area of juxtaposition has an area fraction that is from about 30% to about 70% of the area
of juxtaposition.

5. The body-attachable sanitary napkin of claim 2, wherein the overlapping relationship
10 between said first portion of said barrier layer and said fluid-retaining portion further
defines a peripheral region of juxtaposition, and wherein at least about 50% of the
peripheral region of juxtaposition is not secured to the barrier layer.

6. The body-attachable sanitary napkin of claim 2, wherein the overlapping relationship
15 between said first portion of said barrier layer and said fluid-retaining portion further
defines a segment of unattachment and a segment of attachment, and wherein the length
of the segment of unattachment 52 is greater than about 15% of that of the length of the
segments of attachment.

20 7. The body-attachable sanitary napkin of claim 2, further comprising an additional
barrier layer positioned intermediate the fluid-retaining assembly and the extensible
barrier layer.

8. The body-attachable sanitary napkin of claim 7, wherein the additional barrier layer
25 does not extend beyond the area of juxtaposition.

- 5 9. The body-attachable sanitary napkin of claim 7, wherein the additional barrier layer is
free of body-contactable adhesive.
10. The body-attachable sanitary napkin of claim 2, wherein said extensible barrier
further comprises a third portion having a body-contactable surface, wherein the third
0 portion is free of body-contactable adhesive.

5

ABSTRACT

A body-attachable sanitary napkin including a fluid-pervious cover layer, a fluid-retaining assembly; and a barrier layer having a body-contactable adhesive disposed on at least first portions thereof. The sanitary napkin according to the invention remains securely attached to the body during use, moves with the body during use, yet at the same time enables the user to selectively remove the napkin in a pain free manner.

10

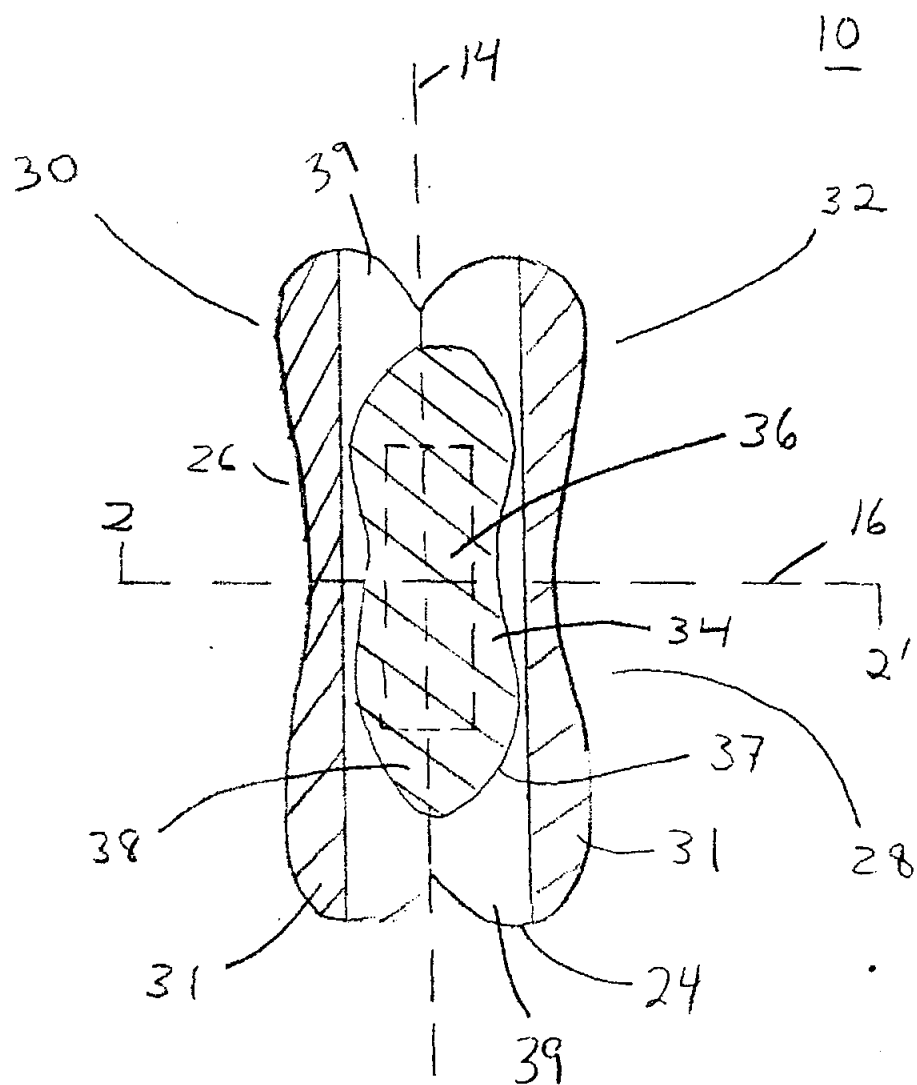


FIG. 1

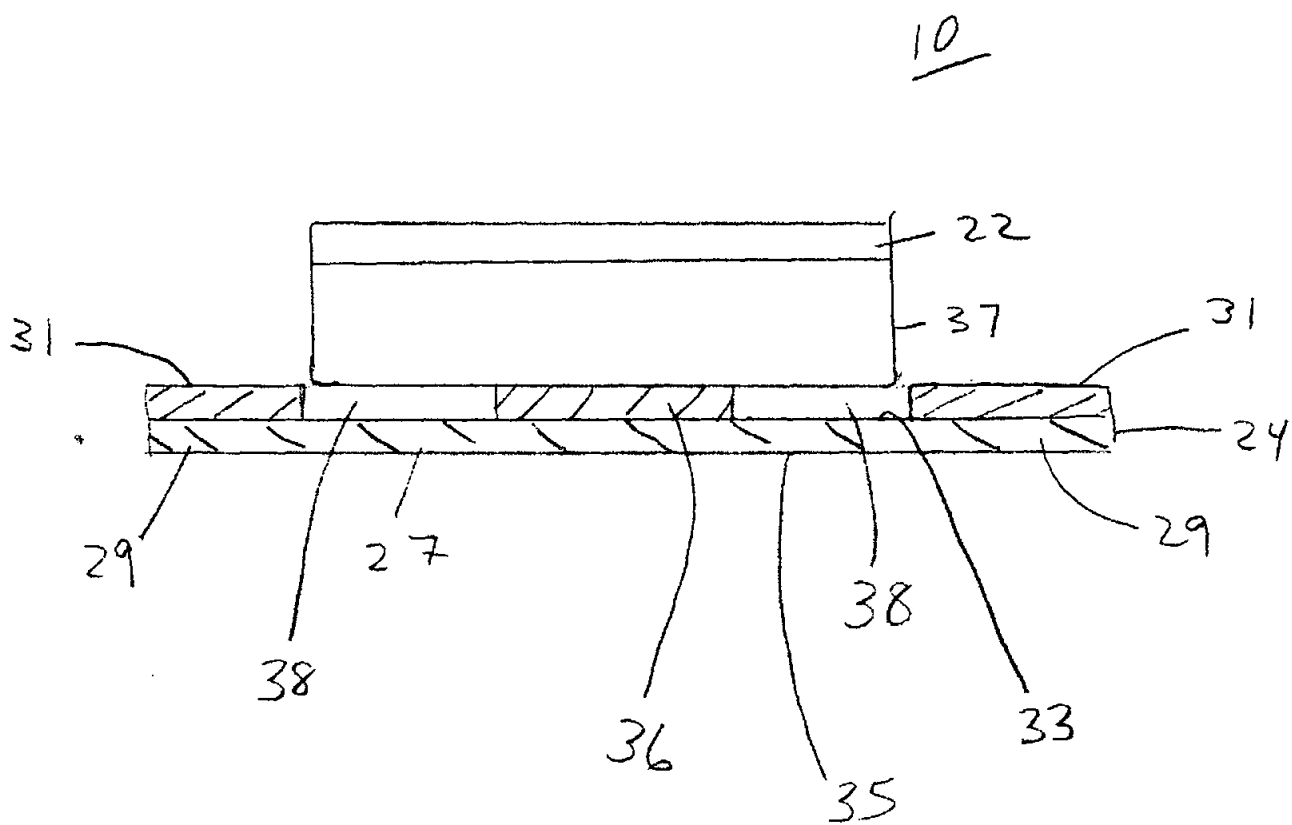


FIG. 2

10

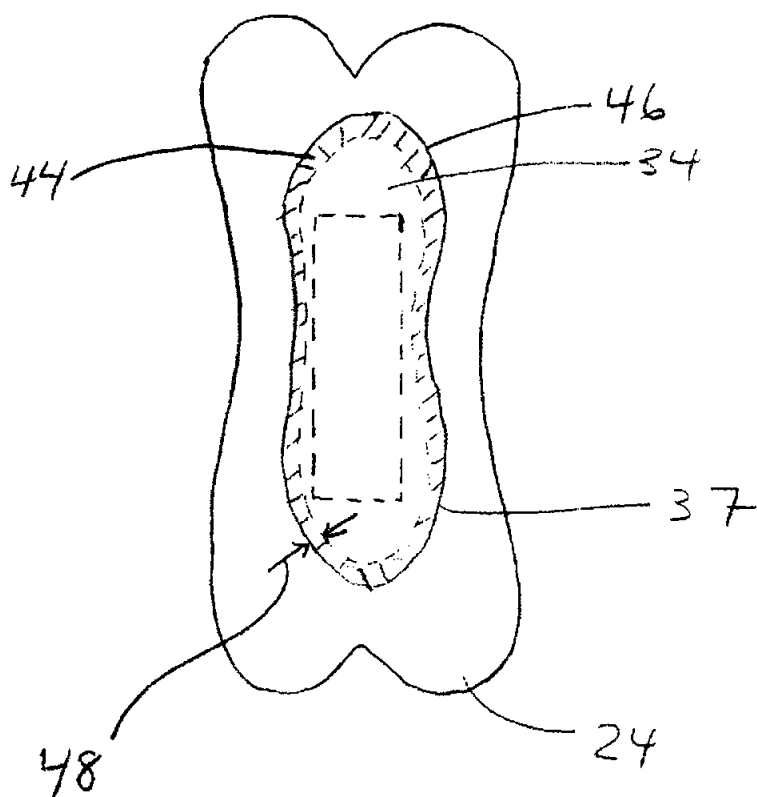


FIG. 3

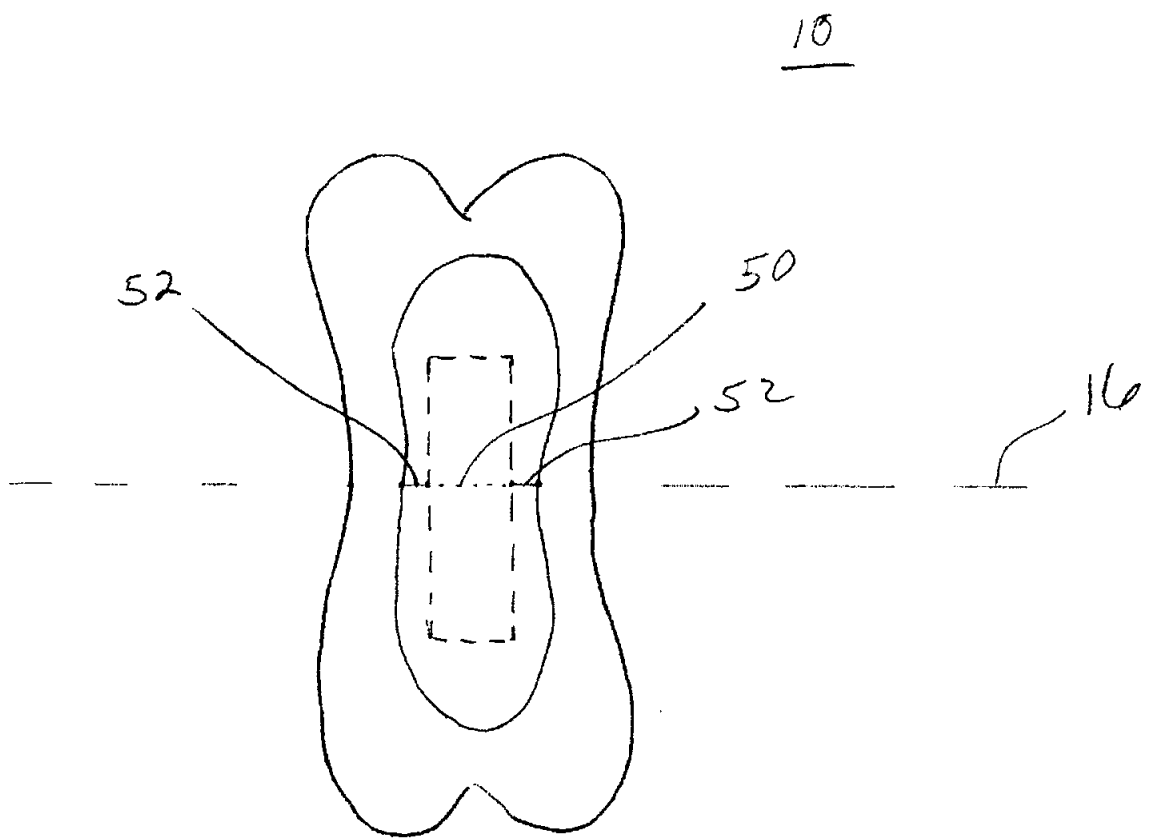


FIG. 4

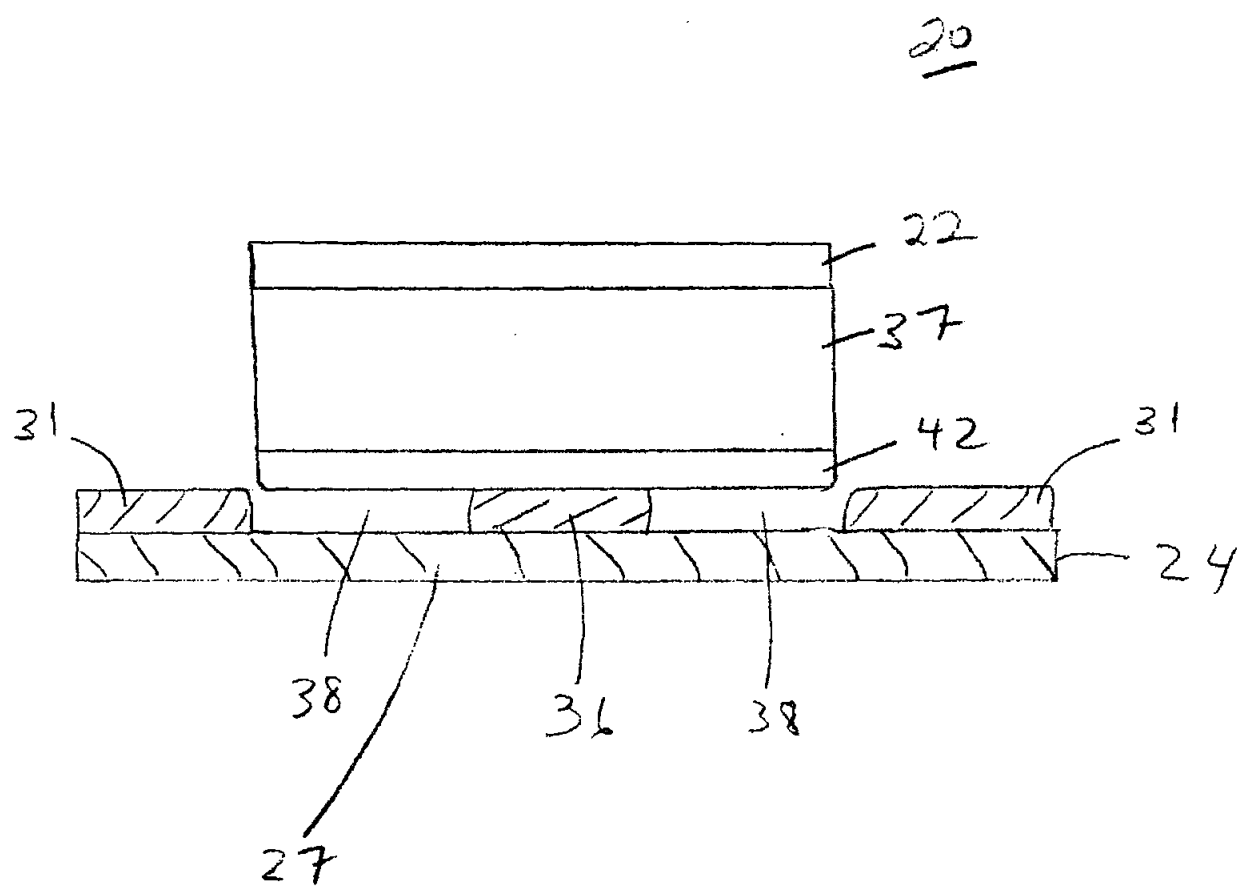


FIG. 5

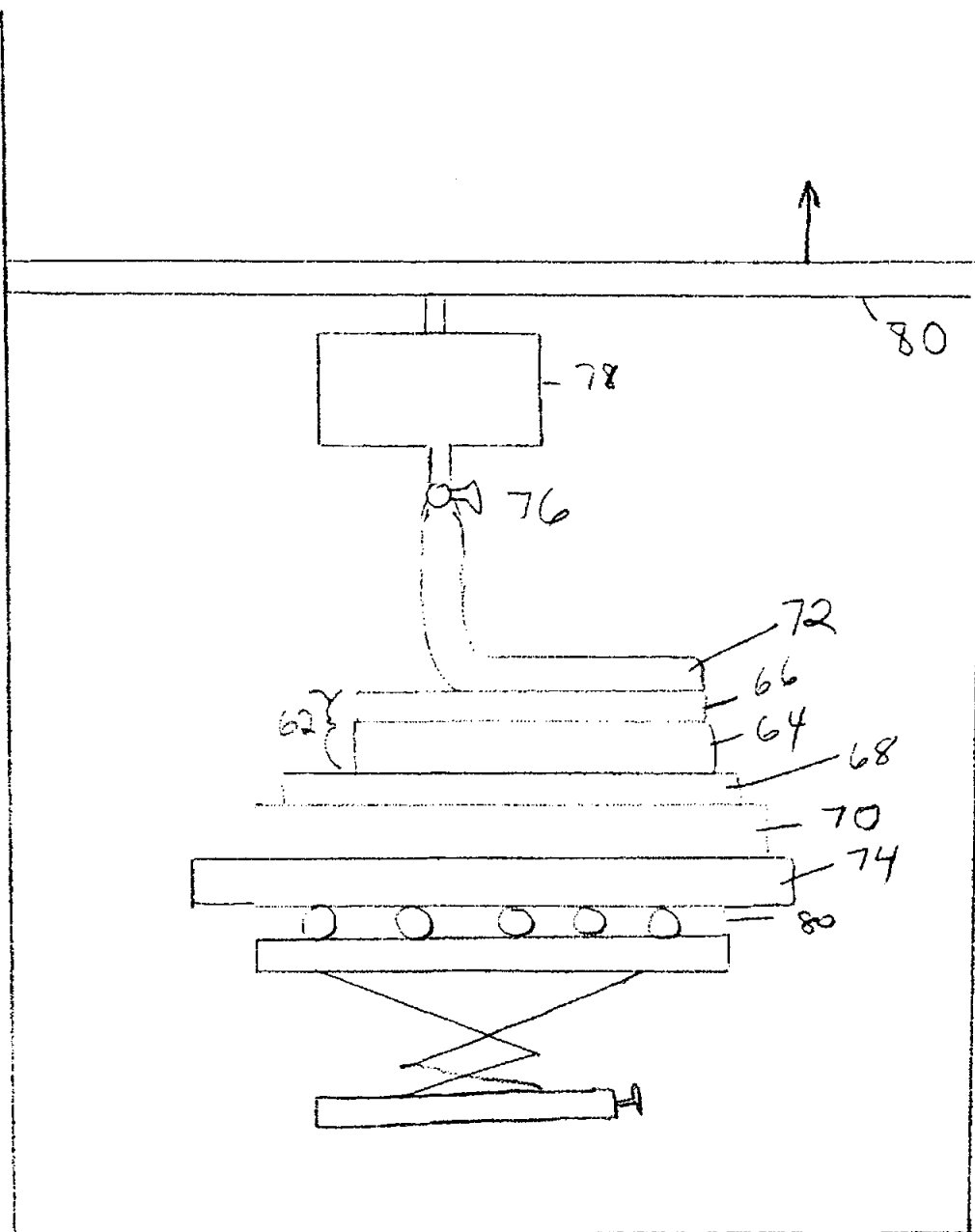


FIG. 6

REPUBLICA DE COLOMBIA
SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

Bogotá,
2020

Doctor(a)
ESCOBAR URIBE JIMENA
Apoderado(a) y/o Representante de
MC NEIL - P P C, INC.

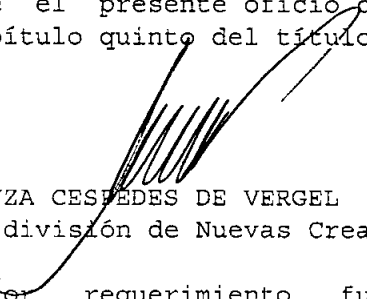
REFERENCIA	Radicación No. 8 116816
	Trámite 2
	Evento 1
	Actuación 430
	Oficio No. Nº 1 5 2 9 6

Como resultado del examen de forma, realizado con fundamento en el artículo 38 de la Decisión 486 de la Comisión de la Comunidad Andina, se le comunica que:

1. La solicitud no contiene la copia del documento en que consta la cesión del derecho a la patente del inventor al solicitante o a su causante, conforme a lo establecido por el artículo 26 literal k) de la Decisión 486 de la Comisión de la Comunidad Andina. Cuando se trate de documentos otorgados en el extranjero, estos deberán legalizarse de conformidad con lo dispuesto por los artículos 259 y 260 del Código de Procedimiento Civil. Cuando se trate de las declaraciones a que hace referencia la Regla 4.17 ii) del Tratado de Cooperación en Materia de Patentes PCT., el alcance de las tales declaraciones se determinará según indiquen claramente una cesión de derechos del inventor al solicitante o su causante, de conformidad con lo dispuesto en el numeral 5.2.15 del Capítulo Quinto, Título X de la Circular Única de Superintendencia de Industria y Comercio.

En cumplimiento del artículo 39 de la Decisión 486, se le requiere para que dentro del término de dos (2) meses siguientes a la fecha de notificación del presente oficio, complete los requisitos anteriormente enunciados. En caso de no dar cumplimiento al presente requerimiento, la solicitud se considerará abandonada y perderá su prelación.

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


ALIX CARMENZA CESPEDES DE VERGEL
Jefe de la división de Nuevas Creaciones

El anterior requerimiento fue notificado por fijación en lista de fecha 04 DIC. 2008
jfernand