

Brigard & Castro
Abogados

Apartado 3892

Cra 7 16 56
Bogotá Colombia S A

Tel Conm 3802200
Tel./Fax (57 1) 2827976
(57 1) 3802700

E Mail bricas@brigardycastro.com.co

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO
Radicacion 00073836 / 00000005 Folios 2
Fecha (AMB) 2002-10-11 17:36:10
Tramite 1 000 PATENTES D 1 REGISTRO/ 538 PETICION
Dependencia 2100 DIVISION DE NUEVAS CREACIONES

AS 82 977

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

REF Expediente No 00 073 836 solicitud de Patente a nombre de
KIMBERLY – CLARK WORLDWIDE, INC

RAMIRO CASTRO DUQUE, vecino de Bogotá, portador de la tarjeta profesional No 1003 del Consejo Superior de la Judicatura, obrando como apoderado de la Sociedad KIMBERLY – CLARK WORLDWIDE, INC, según lo acredita el documento de poder protocolizado en la Secretaría General bajo el No 17397, de acuerdo con el Artículo 44 de la Decisión 486 de la Comisión de la Comunidad Andina, me permito solicitar que se examine si la invención contenida en la solicitud en referencia es patentable

De acuerdo con lo anterior, me permito anexar el recibo oficial de caja No 02-67,149 por valor de \$318 000

Señor Superintendente,


RAMIRO CASTRO DUQUE
C C No 170 322 de Bogotá
Código 340
T P No 1003 del C S J
Cra 7 No 16-56 Piso 9

Octubre 10, 2002
CPB/hsr

Industria y Comercio

SUPERINTENDENCIA

NIT : 800176089-2

RECIBO OFICIAL DE CAJA 02 - 67,149
FECHA OCTUBRE 7 DE 2002

Radicación 00073636 00000005 Folios 2
Fecha (AMD) 2002-10-11 17:36:10
Trámite 002 PATENTES D 1 REGISTRO/ 538 PETICION
Dependencia: 0003 DIVISION DE NUEVAS CREACIONES

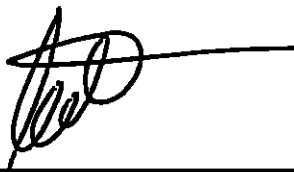
***** CONSIGNACION *****

DEPOSITANTE	TIPO PAGO	BANCO	CUENTA	No PAGO	FECHA PGO	Vr PAGO
BRIGARD & CASTRO LTDA	CONSIGNACION	BANCO POPULAR	050-00110-6	1325047	07/10/2002	1,695 000 00
BRIGARD & CASTRO LTDA	CONSIGNACION	BANCO POPULAR	050-00110-6	1325048	07/10/2002	10,540,000 00

***** CONCEPTO *****

CANT	CONCEPTO	TOTAL CONCEPTO
1	50005-01-01 SOLICITUDES	
	05 EXAMEN DE PATENTABILIDAD DE INVEN	318,000 00
	TOTAL :	\$ 318,000 00

SON TRESCIENTOS DIEZ Y OCHO MIL PESOS

RESPONSABLE 

RECIBO DE CAJA APLICADO AL EXPEDIENTE No _____

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

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO
DIVISIÓN DE NUEVAS CREACIONES

2020

Bogotá, D. C., 22 de Julio de 2005

Doctor

RAMIRO CASTRO DUQUE

Representante **KIMBERLY – CLARK WORLDWIDE, INC**

ASUNTO

Radicación No **00-73836**
Trámite **002**
Evento **001**
Actuación **430**
Oficio
Folios **052**

* **06547**

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

1) Documentos estudiados

- a) Para el presente estudio se tendrán en cuenta el capítulo descriptivo, comprendido en los folios 5 a 184 y 510 de la solicitud en estudio
- b) Para el presente estudio se tendrán en cuenta los dibujos comprendidos en los folios 206 a 251 de la solicitud en estudio
- c) Para el presente estudio se tendrá en cuenta el capítulo reivindicatorio que comprende 77 reivindicaciones en los folios 524 a 533 de la solicitud en estudio. Se aceptan las modificaciones realizadas por el solicitante a este capítulo ya que no implican ampliación de la solicitud inicial, conforme lo establece el artículo 34 de la Decisión 486
- d) Conforme lo establece los artículos 9, 10 y 11 de la decisión 486 de la Comisión de la Comunidad Andina, la presente solicitud en estudio fue presentada el 28 de septiembre de 2000, y en el momento de la radicación **SI** se reclama prioridad de la primera solicitud presentada en Estados Unidos US 09/411259

2) Objeto de la invención

- a) Las reivindicaciones 1 a 77 de la solicitud en estudio se refieren a
 - i) 1 - Un artículo absorbente que tiene dos lados longitudinales y una zona de objetivo, que comprende a) una hoja inferior impermeable al líquido, b) una hoja superior permeable al líquido unida a la hoja inferior, y c) un núcleo absorbente colocado entre la hoja superior y la hoja inferior, el núcleo absorbente comprende un miembro absorbente exterior, un miembro absorbente central asociado operativamente con un miembro

que se eleva central, y una barrera de transmisión colocada entre el miembro absorbente exterior y el miembro absorbente central, el miembro absorbente exterior tiene un ancho en la zona de objetivo mayor que el ancho del miembro absorbente central en la zona de objetivo, por lo que la compresión lateral del núcleo absorbente desde los lados longitudinales hace que el miembro que se eleva central deflexione el miembro absorbente central hacia afuera de la hoja inferior

ii) 50 - Un artículo absorbente

iii) 57 - Un artículo absorbente

iv) 61 - Un método para producir un artículo absorbente que tiene un miembro absorbente central, el método comprende a) preparar un miembro absorbente exterior, en donde el miembro absorbente exterior tiene un hueco central, b) disponer una barrera de transmisión sobre el miembro absorbente exterior, c) colocar un miembro absorbente central en el hueco central y sobre una parte de la barrera de transmisión, d) colocar un miembro que se eleva central debajo del miembro absorbente central, e) colocar una hoja inferior abajo del miembro que se eleva central y abajo del miembro absorbente exterior; f) colocar una hoja superior arriba del miembro absorbente central y del miembro absorbente exterior; y g) unir la hoja superior a la hoja inferior

v) 65 - Un método

vi) 74 - Un método

b) Los anteriores productos y procedimientos buscan proporcionar artículos absorbentes mejorados

c) Según la Clasificación Internacional de Patentes, la codificación para esta solicitud corresponde a A 61 F 13/15

3) Claridad de la Solicitud

a) El artículo 30 de la Decisión 486 de la Comisión de la Comunidad Andina establece que

"Las reivindicaciones definirán la materia que se desea proteger mediante la patente. Deben ser claras y concisas y estar enteramente sustentadas por la descripción. Las reivindicaciones podrán ser independientes o dependientes. Una reivindicación será independiente cuando defina la materia que se desea proteger sin referencia a otra reivindicación anterior. Una reivindicación será dependiente cuando defina la materia que se desea proteger refiriéndose a una reivindicación anterior. Una reivindicación será dependiente cuando defina la materia que se desea proteger refiriéndose a una reivindicación anterior. Una reivindicación que se refiera a dos o más reivindicaciones anteriores se considerará reivindicación dependiente múltiple."

El capítulo reivindicatorio no es claro toda vez que no se precisa la materia sobre la cual se solicita protección. Como se explicará en el punto 4), la presente solicitud no posee unidad de invención, por lo que no está definida la materia sobre la cual se solicita protección.

De acuerdo a lo anterior, el capítulo reivindicatorio no cumple con el requisito de claridad de acuerdo a lo establecido en el Art 30 de la Decisión 486.

4) Evaluación de la Unidad de Invención

El artículo 25 de la Decisión 486 de la Comisión de la Comunidad Andina establece:

"La solicitud de patente sólo podrá comprender una invención o un grupo de invenciones relacionadas entre sí, de manera que conformen un único concepto inventivo"

La presente solicitud carece de unidad de invención toda vez que configura **TRES ARTÍCULOS ABSORBENTES DIFERENTES Y TRES MÉTODOS DIFERENTES**. La definición de la materia que caracteriza a cada una de las reivindicaciones independientes es muy diferente entre sí. Esto permite afirmar que no existe unidad de invención pues se puede hablar de SEIS OBJETOS diferentes. Todo el problema radica en configurar varias reivindicaciones independientes con materia diferente. El solicitante debe establecer una sola reivindicación independiente dirigida al producto en la forma más simple de la solicitud de invención y una sola reivindicación independiente dirigida al proceso de fabricación de dicho producto. Partiendo de allí establecer reivindicaciones dependientes que amplíen esa forma más simple hasta su forma más compleja.

De acuerdo a lo anterior, la presente solicitud no cumple con el requisito de unidad de invención de acuerdo al Art 25 de la Decisión 486.

5) Determinación del Estado de la Técnica

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

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

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

Consultadas las bases de datos y los archivos con que cuenta la entidad, especialmente bajo las clasificaciones A 61 F 13/15 y las más cercanas a ellas,

se encontró que antes del 1 de octubre de 1999 (fecha para determinar el estado de la técnica) habían sido publicados los documentos que se enumeran en la siguiente tabla los cuales se relacionan con artículos absorbentes desechables

De acuerdo con lo establecido en el artículo 16 se determinó el estado de la técnica y se encontró el siguiente antecedente

Nº	Documento	Título	Fecha de Publicación
D1	EP 0 768 070	Compound disposable absorbent article with a hump forming element	1997 04 16
D2	EP 0 815 817	Disposable absorbent article having a decoupled absorbent structure and being capable of shelf shaping in use	1998 01 07
D3	US 5846230	Absorbent article with means for directional fluid distribution	1998 12 08

6) Evaluación de los requisitos de patentabilidad

El artículo 14 de la Decisión 486 de la Comisión de la Comunidad Andina establece

"Los Países Miembros otorgarán patentes para las invenciones, sean de producto o procedimiento, en todos los campos de la tecnología, siempre que sean nuevas tengan nivel inventivo y sean susceptibles de aplicación industrial"

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

a) Evaluación de la novedad y el del Nivel Inventivo

El art 16 de la Decisión 486 de la Comisión de la Comunidad Andina establece

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

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

El art 18 de la Decisión 486 de la Comisión de la Comunidad Andina establece

"Se considerara que una invención tiene nivel inventivo, si para una persona del oficio normalmente versada en el arte en la materia tecnica correspondiente, esa invención no hubiese resultado obvia ni se hubiese derivado de manera evidente del estado de la técnica"

- i) El documento **D1 (EP 0 768 070)** contempla un artículo absorbente que en esencia guarda las mismas características de la presente solicitud un artículo absorbente que tiene dos lados longitudinales y una zona de objetivo, que comprende a) una hoja inferior impermeable al líquido, b) una hoja superior permeable al líquido unida a la hoja inferior, y c) un núcleo absorbente colocado entre la hoja superior y la hoja inferior, el núcleo absorbente comprende un miembro absorbente exterior, un miembro absorbente central asociado operativamente con un miembro que se eleva central, y una barrera de transmisión colocada entre el miembro absorbente exterior y el miembro absorbente central, el miembro absorbente exterior tiene un ancho en la zona de objetivo mayor que el ancho del miembro absorbente central en la zona de objetivo, por lo que la compresión lateral del núcleo absorbente desde los lados longitudinales hace que el miembro que se eleva central deflexione el miembro absorbente central hacia afuera de la hoja inferior El método de fabricación no se encuentra explícito en la anterioridad, pero, para una persona experta en la materia resulta evidente llegar a dicho método partiendo del artículo a fabricar y los conocimientos medios del arte
- ii) Para **D2 EP 0 815 817** y **D3 US 5846230** sucede lo mismo que se describe para D1 Guardan las mismas características de la presente solicitud para el artículo absorbente y el método resulta evidente

b) Resumen

En conclusión los requisitos de patentabilidad de la presente solicitud se podrían ver afectados así

Nº	Documento	Reivindicaciones afectadas	Requisito que afecta
D1	EP 0 768 070	1 - 77	Novedad
			Nivel inventivo
D2	EP 0 815 817	1 - 77	Novedad
			Nivel inventivo
D3	US 5846230	1 - 77	Novedad
			Nivel inventivo

7) Notificación

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

Notifíquese el presente oficio conforme a lo dispuesto por el numeral 5.2, literal e) del capítulo quinto del título primero de la Circular Unica N° 10 de 2001


ALIX CARMENZA CÉSPEDES DE VERGEL
Jefe División de Nuevas Creaciones

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

04 AGO 2005

Concepto Técnico N°	EXAMINADOR TÉCNICO	EXAMINADOR JURÍDICO
1063	Código No 202003	Código No

544
515

(12) EUROPEAN PATENT APPLICATION

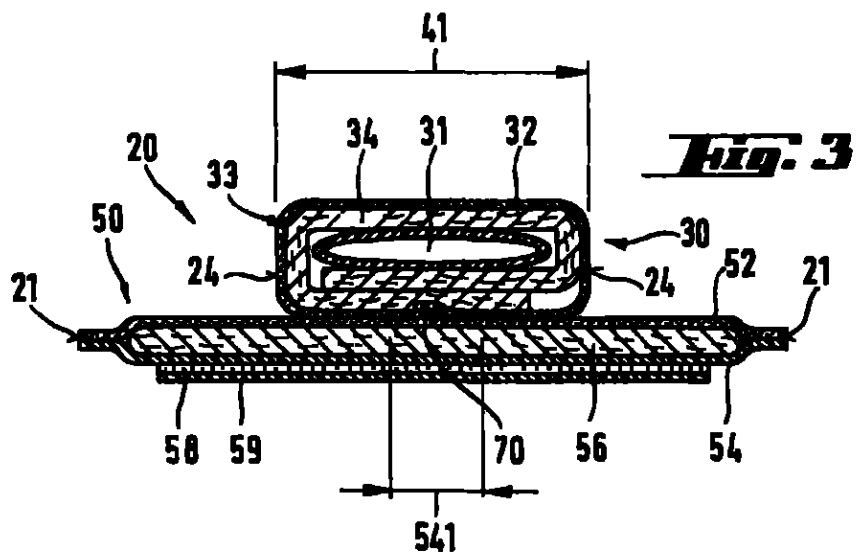
(43) Date of publication 16.04.1997 Bulletin 1997/16 (51) Int. Cl.⁶ A61F 13/00, A61F 13/15
(21) Application number 95116270.0
(22) Date of filing 16.10.1995

(84) Designated Contracting States AT BE CH DE DK ES FR GB GR IE IT LI LU NL PT SE	Plumley, Julian Ashton D-74589 Satteldorf 1 (DE)
(71) Applicant: THE PROCTER & GAMBLE COMPANY Cincinnati, Ohio 45202 (US)	(74) Representative Hirsch, Uwe Thomas et al Procter & Gamble European Service GmbH, Bulzbacher Strasse 40-60 65824 Schwalbach am Taunus (DE)
(72) Inventors: Wierbacher, Stefan Alois D-60526 Frankfurt (DE)	

(54) Compound disposable absorbent article with a hump-forming element

(57) A compound disposable absorbent article for wearing adjacent a body discharge area having a body facing surface, a garment facing surface, a longitudinal axis, a lateral axis, a primary absorbent member with a length and a width and a secondary absorbent member with a length and a width. The primary absorbent member and the secondary absorbent member have their length each parallel to the longitudinal axis. The secondary absorbent member is closer to the garment fac-

ing surface than the primary absorbent member. The primary absorbent member is affixed to the secondary absorbent member by joining means. The width of the secondary absorbent member is preferably equal or greater than the width of the primary absorbent member. The article further comprises a yielding fluid bubble to raise the body facing surface towards the discharge area.



EP 0 768 070 A1

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Description

FIELD OF THE INVENTION

The present invention relates to compound disposable absorbent articles. Disposable absorbent articles are considered to be absorbent devices designed to be worn externally of the body by a user and to receive fluids discharged from the body. In particular the present invention relates to compound disposable absorbent sanitary napkins, catamenials, incontinence inserts and pantliners comprising a fluid bubble to raise the body facing surface of the article towards the wearer especially in the area of liquid discharge. The fluid bubble is filled with gas such that it yields to external pressures in order to maintain a comfortable fit of the absorbent article.

BACKGROUND OF THE INVENTION

In their simplest form disposable absorbent articles comprise an absorbent element (sometimes referred to as an absorbent core) interposed between a pervious body-contacting element (sometimes referred to as a topsheet or an overwrap) and an impervious protective barrier (sometimes referred to as a backsheet). The absorbent element is of course, intended to receive and contain the fluids discharged from the body. The body-contacting element is intended to provide more or less comfortable and dry-feeling contact with body surfaces while allowing free passage of fluids therethrough into the absorbent element. The protective barrier is intended to prevent the fluids which are expelled or which escape from the absorbent element from soiling the user's garments.

In addition to the three functional elements mentioned above, disposable absorbent articles are generally provided with means for supporting the device adjacent the user's crotch area, even as the user moves, where it can most effectively perform its intended function. Typically, absorbent articles as sanitary napkins are provided with an adhesive attachment means for securing the device to the inner crotch area of the user's undergarments.

While previously known absorbent articles do perform their intended function each conventional design suffers from certain deficiencies in one or more of absorbency of body fluids, protection of the user's garments from soiling and/or physical comfort to the user.

With respect to disposable sanitary napkins at least two general classes presently exist. One such class is identified as being intended for the absorption of medium to high menstrual flows. These sanitary napkins offer a relatively high absorptive capacity. Absorptive capacity is commonly achieved by providing the sanitary napkin with a relatively thick and bulky absorbent member. While having a relatively high absorptive capacity, the bulkiness of the absorbent member may cause a certain degree of wearing discomfort.

A second class of sanitary napkins are intended for light or low menstrual flows and are commonly referred to as pantliners or pantishields. Sanitary napkins of this class as a group, are thinner somewhat more flexible and generally more comfortable than those of the first class. However sanitary napkins of the second class typically lack the absorptive capacity of sanitary napkins of the first class.

One attempt to provide the benefits of the previously described two classes of sanitary napkins into a single compound sanitary napkin is disclosed in U.S. Patent No. 4,425,130. This compound sanitary napkin comprises a primary menstrual pad and a panty protector joined to one another at their corresponding ends in such a manner that the two constituents are free to move relative to one another along essentially their entire common length. The primary menstrual pad is intended to absorb the bulk of the bodily fluids discharged by the user while the panty protector is intended to protect the user's garments from soiling. In use the relative freedom of movement between the primary menstrual pad and the panty protector serves to maintain the primary menstrual pad adjacent the user's crotch region while the panty protector remains associated with the user's undergarment. While the relative freedom of movement between the primary menstrual pad and the panty protector serves to maintain the primary menstrual pad near the user's crotch region this freedom of movement may lead to a lack of stability if the primary menstrual pad moves laterally beyond the side edges of the panty protector providing an opportunity for soiling the user's undergarment.

Moreover the bulky primary menstrual pad though capable of providing a close body contact, is not sufficiently flexible to mold and conform to the anatomy of the user and therefore may cause discomfort.

Another attempt to combine the benefits of the previously described two classes of absorbent articles is disclosed in US application 08/294,683 filed on 19 August 1994 and assigned to Mayer et al. The self adapting compound sanitary napkin described in this application comprises a primary absorbent member having a length and a width and a secondary absorbent member having a length and a width. The primary absorbent member and the secondary absorbent member have a common length. The primary absorbent member includes an absorbent core and a fluid pervious topsheet superimposed on said absorbent core. The secondary absorbent member includes a fluid pervious topsheet, a fluid impervious backsheet joined to said topsheet and an absorbent element positioned between the topsheet and the backsheet. The primary absorbent member is affixed to the secondary absorbent member by union means. The width of the secondary absorbent member is preferably at least 1.5 times the width of the primary absorbent member.

While this type of design is effective in that it arranges most of the absorbent material along the centre-line of the pad where it can absorb promptly the bulk

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of bodily fluids discharged by the user it still can have the disadvantage of a poor fit to the anatomy. In an attempt to solve this problem the primary absorbent member may be made bulky enough to stay in intimate contact with the body of the user or alternatively, a resilient member may be optionally comprised within the primary absorbent member itself. The resilient member may be constituted by e.g. a fibrous material or by a hollow and resilient structure.

In any case the structures described above can have the disadvantage of being uncomfortable to the user since they are not capable of molding and conforming effectively to the anatomy of the user.

SUMMARY OF THE INVENTION

The present invention relates to a compound disposable absorbent article for wearing adjacent a body discharge area. The compound disposable absorbent article has a body facing surface, a garment facing surface, a longitudinal axis and a lateral axis, a primary absorbent member having a length and a width and a secondary absorbent member having a length and a width. The primary absorbent member and the secondary absorbent members have their length each parallel to the longitudinal axis. The secondary absorbent member is closer to the garment facing surface than the primary absorbent member. The primary absorbent member is affixed to the secondary absorbent member by joining means, and the width of the secondary absorbent member is preferably equal or greater than the maximum width of the primary absorbent member. The compound disposable absorbent article further comprises a yielding fluid bubble, preferably an air bubble, to raise the body facing surface towards the discharge area.

BRIEF DESCRIPTION OF THE DRAWINGS

While the specification concludes with claims particularly pointing out and distinctly claiming the present invention, it is believed that the present invention will be better understood from the following description in conjunction with the following drawings:

FIG. 1 is a top plan view of one embodiment of a compound sanitary napkin according to the present invention.

FIG. 2 is a cross-sectional view of the compound sanitary napkin shown in FIG. 1 as taken along section line 2-2.

FIG. 3 is a cross-sectional view of the compound sanitary napkin shown in FIGS. 1 and 2 as taken along section line 3-3 of FIG. 2.

FIGS. 3A is a cross-sectional view of another embodiment of compound sanitary napkin of the present invention.

FIG. 4 is a top plan view of another embodiment of a compound sanitary napkin of the present inven-

tion.

FIG. 5 is a top plan view of another embodiment of a compound sanitary napkin of the present invention.

FIG. 6 is a cross-sectional view of another embodiment of a compound sanitary napkin of the present invention.

FIG. 7 is a cross-sectional view of another embodiment of a compound sanitary napkin of the present invention.

FIG. 8 is a cross-sectional view of another embodiment of a compound sanitary napkin of the present invention.

FIG. 9 is a cross-sectional view of another embodiment of a compound sanitary napkin of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

This invention is of a compound disposable absorbent article which exhibits absorbency for bodily fluids, the protection of the user's garments from soiling, and improved physical comfort to the user. The compound disposable absorbent article is described below by reference to a sanitary napkin or catamenial. The term "sanitary napkin" as used herein refers to an article which is worn by females adjacent to the pudendal region and which is intended to absorb and contain the various exudates which are discharged from the body (e.g. blood, menses, and urine) and which is intended to be discarded after a single use.

The term "compound sanitary napkin" as used herein refers to a sanitary napkin comprised of separate constituents joined to one another to form a unitary structure.

The terms "joined" or "affixed" as used herein encompasses configurations whereby a first member is directly connected to a second member and configurations whereby a first member is indirectly connected to a second member by connecting the first member to intermediate members which in turn are connected to the second member.

Interlabial devices which reside partially within and partially external of the wearer's vestibule are also within the scope of this invention. As used herein, the term "pudendal" refers to the externally visible female genitalia and is limited to the labia majora, the labia minora, the clitoris, and the vestibule.

In FIGS. 1-3, one preferred embodiment of a compound sanitary napkin 20 of the present invention is shown. As can be seen in FIGS. 1-3, the compound sanitary napkin 20 comprises a primary absorbent member 30, a secondary absorbent member 50 affixed together by joining means 70 and a fluid bubble 31 comprised within the primary absorbent member 30.

The compound sanitary napkin has two surfaces, a body contacting or facing surface and a garment facing or contacting surface. The primary and secondary absorbent members each have corresponding body fac-

ing and garment facing surfaces. In use, the secondary absorbent member 50 is intended to stay closer to the garment facing surface of the sanitary napkin 20 than the primary absorbent member 30 which in turn is in direct contact with the anatomy of the user. The compound sanitary napkin 20 has two axes, a longitudinal axis and a transverse axis. The term "longitudinal" as used herein refers to a line, axis or direction in the plane of the compound sanitary napkin that is generally aligned with (e.g. approximately parallel to) a vertical plane which bisects a standing wearer into left and right body halves when the compound sanitary napkin is worn. The terms "transverse" or "lateral" as used herein, are interchangeable, and refer to a line, axis, or direction which lies within the plane of the compound sanitary napkin that is generally perpendicular to the longitudinal direction.

The primary absorbent member 30 has side edges 24 and end edges 25 which together form the periphery 26 of the primary absorbent member. The secondary absorbent member 50 has side edges 21 and end edges 22 which together form the periphery 23 of the secondary absorbent member and the compound sanitary napkin 20. The compound sanitary napkin 30 has a first end region 27, a central region 28, and a second end region 29.

The primary absorbent member 30 is that constituent of the compound sanitary napkin 20 intended to first receive the bodily fluids discharged by the user. The primary absorbent member 30 comprises an absorbent means 33, such as absorbent core 34 and a liquid permeable topsheet or coverstock 32 superimposed on the absorbent core 34. In the embodiment of Fig. 1 to 3 the primary absorbent member 30 further comprises a fluid bubble 31, typically an air bubble, positioned within the absorbent core 34.

The topsheet 32 is compliant, soft feeling, and non-irritating to the wearer's skin. Further, the topsheet 32 is liquid pervious, permitting liquid to readily penetrate through its thickness. A suitable topsheet 32 may be manufactured from a wide range of materials such as woven and nonwoven materials, polymeric materials such as apertured formed thermoplastic films, apertured plastic films, and hydroformed thermoplastic films, porous foams, reticulated foams, reticulated thermoplastic films, and thermoplastic scrims. Suitable woven and nonwoven materials can be comprised of natural fibers (e.g. wood or cotton fibers), synthetic fibers (e.g. polymeric fibers such as polyester, polypropylene, or polyethylene fibers), or from a combination of natural and synthetic fibers.

A preferred topsheet comprises an apertured formed film. Apertured formed films are preferred for the topsheet because they are pervious to body exudates and yet non-absorbent and have a reduced tendency to allow liquids to pass back through and rewet the wearer's skin. Thus, the surface of the formed film which is in contact with the body remains dry, thereby reducing body soiling and creating a more comfortable feel for the

wearer.

Suitable formed films are described in U.S. Pat. No. 3,929,135, issued to Thompson on December 30, 1975; U.S. Pat. No. 4,324,246, issued to Mullane, et al. on April 13, 1982; U.S. Pat. No. 4,342,314, issued to Radel et al. on August 3, 1982; U.S. Pat. No. 4,463,045, issued to Ahr et al. on July 31, 1984; and U.S. Pat. No. 5,006,394, issued to Baird on April 9, 1991. The preferred topsheet for the primary absorbent member of the present invention is a formed film described in one or more of the above patents and marketed on sanitary napkins by The Procter & Gamble Company of Cincinnati, Ohio as "DRI WEAVE".

In a preferred embodiment of the present invention, the body or exposed surface of the formed film topsheet is hydrophilic so as to help liquid transfer through the topsheet faster than if the body surface was not hydrophilic so as to diminish the likelihood that menstrual fluid will flow off the topsheet rather than flowing into and being absorbed by the absorbent core.

The topsheet 32 may be associated with the absorbent core 34 in any suitable manner. Suitable manners include, but are not limited to, associating the topsheet 32 with the absorbent core 34 with adhesives such as by spray-gluing or applying lines or spots of adhesives between the topsheet 32 and the absorbent core 34.

Alternatively, or additionally, the topsheet 32 may be associated with the absorbent core 34 by entangling the fibers of the absorbent core 34 with the topsheet 32 by fusing the topsheet 32 to the absorbent core 34 with a plurality of discrete individual fusion bonds.

To insure proper fluid transfer between the topsheet 32 and the absorbent core 34, it is preferred that the topsheet be substantially continuously secured to the underlying absorbent core 34 throughout their common interface. By substantially continuously securing the topsheet 32 to the underlying absorbent core 34, the topsheet 32 will have a reduced tendency to separate from the absorbent core 34 during use. Separation of the absorbent core from the topsheet 32 may inhibit fluid transfer from the topsheet 32 into the underlying absorbent core 34.

The absorbent core 34 may be any absorbent means which is generally compressible, conformable, resilient, non-irritating to the wearer's skin and capable of absorbing and containing body exudates. The absorbent core 34 may be manufactured from a wide variety of liquid absorbent materials commonly used in disposable sanitary napkins, and other disposable absorbent articles. Examples of suitable absorbent materials include comminuted wood pulp (which is generally referred to as airlaid), creped cellulose wadding, modified cross-linked cellulose fibers (such as those described in U.S. Patent No. 5,217,445 issued to Young et al. on June 8, 1993), capillary channel fibers (that is, fibers having intra-fiber capillary channels such as those described in U.S. Patent No. 5,200,248 issued to Thompson et al. on April 6, 1993), absorbent foams

(such as those described in U.S. Patent No. 5,260 345, issued to DesMarais, et al on November 9 1993 and U.S. Patent No. 5,268,244 issued to DesMarais et al on December 7 1993) thermally bonded airlay materials (such as those material described in U.S. Patent Application Serial No. 08/141 158, entitled "Catamenial Absorbent Structures Having Thermally Bonded Layers For Improved Handling of Menstrual Fluids and Their Use in Catamenial Pads Having Improved Fit and Comfort" filed in the name of Richards, et al on October 21 1993 (P&G Case 5051)) absorbent sponges, synthetic staple fibers, polymeric fibers, hydrogel-forming polymer gelling agents, peat moss, or any equivalent materials or combinations of materials. Suitable absorbent cores comprising foams are described in European Applications 0 598 833 0 598 823 and 0 598 834.

The total absorbent capacity of the absorbent core 34 together with the absorbent capacity of the secondary absorbent member should be compatible with the intended exudate loading for the compound sanitary napkin 20. Further the absorbent capacity of the absorbent core 34 may be varied to accommodate wearers ranging in the expected amount of exudate fluid volume. For instance a different absorbent capacity may be utilized for compound sanitary napkins intended for day time use as compared with those intended for night time use, or for compound sanitary napkins intended for use by teenage females as compared with those intended by more mature women.

Materials selected for use as the absorbent core 34 are preferably compliant, soft, comfortable, compressible and resilient to enhance body fit and comfort of the primary absorbent member. Preferably the absorbent core 34 is compressible such that the primary absorbent member will deform under relatively small forces that are experienced during normal use. In addition to being compressible, the materials of the absorbent core 34 need to be flexible and conformable such that the primary absorbent member is able to provide improved fit into and around the labia and perineum by following the fluid bubble 31. The ability to follow the topography of the yielding fluid bubble 31 will provide intimate contact with the exposed genitalia of the female user. Intimate contact with the exposed female genitalia helps provide better fluid transfer from the user into the primary absorbent member without allowing fluid to bypass and/or run-off the primary absorbent member. While these characteristics of the absorbent core 34 allow for improved fit, they also improve the product to be both soft and comfortable for the wearer.

In the embodiment illustrated in FIGS. 2 and 3 the absorbent core 34 is comprised of an absorbent layer made of a thermally bonded airlay material longitudinally folded twice on itself in order to comprise the fluid bubble 31 internally.

The fluid bubble can comprise essentially any fluid e.g. a gel, which is capable of providing the yielding effect. preferably the fluid is a gas and most preferably it is air. The skin of the bubble 31 can be made from any

material which provides a sustainable internal amount of fluid over the expected product lifetime from manufacturing of the absorbent product to the disposal thereof. The material used for the skin of the bubble should be soft and compliant in order to allow the deformation or yielding of the bubble. Typical materials can be those also used for impervious backsheet of the secondary absorbent member 50 described hereinafter as well as polyethylene terephthalate film and aluminum film or mixtures and laminates of these materials.

The fluid bubble is typically longer along the longitudinal axis than wide along the lateral axis. Furthermore the bubble may have a variety of shapes which are typically symmetrical to the longitudinal axis but asymmetrical to the lateral axis. The function of the bubble may also be provided by a plurality of smaller individual bubbles which in combination provide the desired shape. In particular 2 or 3 bubbles may be used instead of a single bubble in order to raise the body facing surface of the compound sanitary napkin and to provide folding lines between the bubbles.

In one preferred embodiment shown in FIGS. 1 to 3 the fluid bubble 31 is comprised entirely within the primary absorbent member 30 but in any case it is preferred that the fluid bubble or the plurality of smaller bubbles does not extend beyond the periphery 26 of the primary absorbent member 30. As illustrated in FIGS. 1 and 2 the fluid bubble 31 is about the same length as the primary absorbent member 30 however it is quite possible for the fluid bubble 31 to be shorter than the primary absorbent member 30 and still work effectively. It is preferred that the fluid bubble 31 is positioned so that, in use, it corresponds to the discharge area of the user a fluid bubble that is shorter than the primary absorbent member might extend, for example, substantially along the central region 28 of the sanitary napkin.

The fluid bubble 31 is typically filled such that the filling volume is substantially below its maximum filling volume in order to provide a wobbly, flexible and easily deformable outer surface. This ability to deform, also referred to as yielding provides the desired exceptional ability to adapt the surface topography of the bubble and the overlying absorbent means 33 and topsheet 32 to the topography of the individual wearer of a sanitary napkin according to the present invention. By filling the bubble no more than 90%, preferably no more than 80% of the maximum volume of the bubble it is possible to ensure that even under the temperature changes common during the wearing of such a product the fluid bubble will continue to be yielding such that it adapts the product to the wearer's topography.

As an alternative the material forming the skin of the fluid bubble at least on its body facing side may be elastic in order to provide the fluid bubble with the desired yielding characteristic. The filling of the bubble in this case can exceed 100 % or even 150 % of the unstretched bubble volume.

Referring now to FIG. 3A, there is shown a cross-sectional view taken along the transverse axis of

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another embodiment of a compound sanitary napkin of the present invention. In this embodiment, the absorbent core 34 is preferably comprised of airlaid. The airlaid absorbent core is manufactured in a generically oval shape to provide the primary absorbent member 30 with a generally oval shape. The fluid bubble 31 is comprised within the airlaid absorbent core 34. While the core 34 shown in FIGS. 3 and 3A has a generally rectangular or oval cross-section, the absorbent core may be manufactured in a wide variety of shapes such as circular, triangular, square, pentagonal, U-shaped, Z-folded, etc.

Optionally, the primary absorbent member 30 can comprise a fluid barrier 35. The fluid barrier 35 tends to contain absorbed fluids within the absorbent core 34 and can be constructed from materials having the same properties as the liquid impervious backsheet on the secondary absorbent member 50 described hereinafter.

Optionally, the primary absorbent member 30 may comprise an acquisition layer 46 positioned between the topsheet 32 and the absorbent core 34. The acquisition layer 46 may serve several functions including improving wicking of exudates over and into the absorbent core 34. By improving the wicking of exudates, the acquisition layer provides a more even distribution of the exudates throughout the absorbent core 34. The acquisition layer 46 may be comprised of several different materials including nonwoven or woven webs of synthetic fibers including polyester, polypropylene, or polyethylene, natural fibers including cotton or cellulose blends of such fibers or any equivalent materials or combinations of materials. Examples of sanitary napkins having an acquisition layer and a topsheet are more fully described in U.S. Pat. No. 4,950,284 issued to Osborn and U.S. Pat. Application Serial No. 07/810,774, Absorbent Article Having Fused Layers filed December 17, 1991 in the names of Cree, et al. In a preferred embodiment, the acquisition layer 46 may be joined with the topsheet by any of the conventional means for joining webs together, most preferably by fusion bonds as is more fully described in the above-referenced Cree application.

While the primary absorbent member can be generally of any cross-sectional shape in its unstressed condition, it is preferably rectangular or oval in cross-section. The length 40 and the width 41 of the primary absorbent member 30 can be of any convenient dimension. The primary absorbent member 30 is preferably from about 2 to 35 cm long, more preferably from about 10 to 35 cm long, and most preferably from about 20 to 35 cm long. A particularly preferred primary absorbent member 30 has a length of about 24 cm.

One major function of the primary absorbent member 30 is to absorb and contain bodily fluids. It works in combination with the fluid bubble 31 that raises the body facing surface of the primary absorbent member 30 towards the discharge area of the user and, at the same time, due to its yielding capability, is able to deform and to adapt the surface topography of the primary absorbent member 30 to the topography of the wearer. In addition,

the primary absorbent member 30 is preferably sized and shaped such that it will fit within the labia. Accordingly, the width and/or diameter of the primary absorbent member should be sized such that it will reside at least partially within the labia. That is, a portion of the primary absorbent member will preferably fit within the labia during use. Since the exposed female genitalia, including the labia, are generally referred to as soft body tissue, it is important that the materials comprising and the primary absorbent member be comfortable and relatively soft such that they are non-irritating and/or uncomfortable for the user.

The primary absorbent member 30 is preferably from about 0.5 to 5 cm wide, more preferably from about 0.5 to about 4 cm wide, and most preferably from about 0.5 to about 3 cm wide. It has been found that a primary absorbent member having a width between 1.5 and 2.5 cm, preferably about 1.5 cm, is able to comfortably fit within at least a portion of the labial groove of most women.

Referring to FIGS. 1, 3A, the second necessary constituent of the compound sanitary napkin of the present invention is the secondary absorbent member 50. The secondary absorbent member 50 preferably comprises a liquid permeable topsheet 52, a liquid impervious backsheet 54 joined with the topsheet 52, and an absorbent element 56 positioned between the topsheet 52 and the backsheet 54.

The topsheet 52 can be any fluid pervious material commonly used in sanitary napkins, disposable diapers, and the like. It can be any of the materials described above as being useful in the topsheet 32 of the primary absorbent member 30. The absorbent element 56 can be any absorbent material commonly used in sanitary napkins, disposable diapers, and the like. It can be any of the materials described above as being useful in the absorbent core 34 of the primary absorbent member 30.

As a practical matter, most of the bodily fluids are absorbed by and are contained within the absorbent core 34 of the primary absorbent member. One major function of the secondary absorbent member 50 is to protect the user's garments from soiling by absorbed fluids which may be expelled from the primary absorbent member or which may inadvertently bypass the primary absorbent member. Because the absorbent element 56 of the secondary absorbent member 50 performs a different function from that of the absorbent core 34, the absorbent element 56 can be, and most preferably is, thinner and less bulky than the absorbent core 34.

Optionally, the secondary absorbent member may be manufactured without an absorbent element. Since most if not all of the bodily fluids are preferably absorbed by and are contained within the absorbent core of the primary absorbent member, the secondary absorbent member 50 need only to protect the user's garments from soiling by relatively small amounts of fluids. Accordingly, an absorbent element may not be necessary to contain the fluids within the secondary

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absorbent member in order to prevent them from soiling the user's garments.

The backsheet 54 is impervious to liquids (e.g. menses and/or urine) and is preferably manufactured from a thin plastic film although other flexible liquid impervious materials may also be used. In use, the backsheet 54 is interposed between the absorbent element 56 and the user's undergarments. The function of the backsheet 54 is to prevent exudates which may be expelled from or which inadvertently bypass the primary absorbent element and exudates absorbed and contained in the absorbent element 56 from contacting and soiling the user's undergarments. The backsheet 54 may thus comprise a woven or nonwoven material polymeric films such as thermoplastic films of polyethylene or polypropylene, semi-permeable films which provide breathability but prevent liquid transport, or composite materials such as a film-coated nonwoven material. Preferably, the backsheet is a polyethylene film having a thickness of from about 0.012 mm (0.5 mil) to about 0.015 mm (2.0 mil). The backsheet is preferably embossed and/or matte finished to provide a more clothlike appearance. Further the backsheet may permit vapors to escape from the absorbent element 56 (i.e. breathable) while still preventing exudates from passing through the backsheet.

Preferably, the secondary absorbent member 50 is provided with a support means or attachment means, such as adhesive attachment means 58. The adhesive attachment means 58 provides a means for securing the compound sanitary napkin 20 in the crotch portion of the user's undergarment or panty. The adhesive is typically covered with a removable release liner 59 in order to keep the adhesive from drying out or adhering to a surface other than the crotch portion of the panty prior to use. Any commercially available release liners commonly used for such purposes can be utilized herein. The compound sanitary napkin 20 of the present invention is used by removing the release liner 59 and thereafter placing the sanitary napkin in a panty so that the adhesive 58 contacts the panty. The adhesive 58 maintains the sanitary napkin in its position within the panty during use.

As shown in FIGS. 1-3, the secondary absorbent member can be of generally rectangular shape. Other suitable shapes include but are not limited to oval, hour glass, dog-bone, asymmetric, etc.

Referring to FIG. 1 the secondary absorbent member 50 preferably has a length 60 and a width 61. The secondary absorbent member is preferably from about 20 to 40 cm long, more preferably from about 25 to 35 cm long, and most preferably is about 30 cm long.

While it can be of generally any cross-section in its unstressed condition, the secondary absorbent member is preferably rectangular in cross-section. The secondary absorbent member is preferably from about 5 to 15 cm in width, more preferably from about 5 to 10 cm in width, and most preferably from about 5 to 8 cm in width. The thickness of the secondary absorbent mem-

ber 50 as shown in cross-section in FIGS. 2 and 3 is generally somewhat less than its width.

Preferably the secondary absorbent member will be thin and have a caliper of less than about 3.0 millimeters, more preferably less than about 2.6 millimeters, more preferably less than about 2.2 millimeters, and most preferably less than about 2.0 millimeters.

Optionally, the secondary absorbent member 50 may have two flaps 19 each of which are adjacent to and extend laterally from the side edge of the absorbent core, as shown in FIG. 4. The flaps 19 are configured to drape over the edges of the wearer's panties in the crotch region so that the flaps are disposed between the edges of the wearer's panties and the wearer's thighs. The flaps serve at least two purposes. First, the flaps help serve to prevent soiling of the wearer's body and panties by menstrual fluid, preferably by forming a double wall barrier along the edges of the panty. Second the flaps are preferably provided with attachment means on their garment facing surface so that the flaps can be folded back under the panty and attached to the garment facing side of the panty. In this way, the flaps serve to keep the sanitary napkin properly positioned in the panty.

In a preferred embodiment, the flaps are comprised of the topsheet, absorbent element, and backsheet. Further the flaps are preferably unitary to the laminae of the secondary absorbent element. In other words, the topsheet, absorbent element and backsheet simply extend laterally outward to form the flaps. However the flaps need not be unitary with the secondary absorbent member but can be separate elements which are affixed to the secondary absorbent member. Further the flaps can be comprised of a single substrate or other laminae configurations. It is recommended however that the flaps have a liquid impervious backsheet to prevent exudates which reach the flaps from soiling the edges of the wearer's panties.

A number of sanitary napkins having flaps suitable or adaptable for use with the secondary absorbent member 50 of the compound sanitary napkin 20 of the present invention are disclosed in U.S. Pat. No. 4,887,478 issued to Van Tilburg on Aug. 18, 1987; U.S. Pat. No. 4,589,878 issued to Van Tilburg on May 20, 1988; and U.S. Pat. No. 4,608,047 issued to Mattingly on Aug. 26, 1988.

Optionally the secondary absorbent member may comprise components that naturally wrap the sides of a wearer's panties. A sanitary napkin having components that naturally wrap the sides of a wearer's panties suitable for use with the secondary absorbent member of the compound sanitary napkin 20 of the present invention are disclosed in U.S. Patent Application Serial No. 08/098,121 (P&G Case 4961) entitled "Absorbent Article Having Panty Covering Components that Naturally Wrap the Sides of Panties" filed July 22, 1993, in the names of Lavash et al. and U.S. Patent Application Serial No. 08/277,733 (P&G Case 5354) entitled "Absorbent Articles Having Undergarment Covering

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Components with Zones of Extensibility" filed July 20 1994, in the names of Weinberger et al

Preferably, the minimum width of the secondary absorbent member is at least 1.5 times the maximum width of the primary absorbent member. More preferably, the minimum width of the secondary absorbent member is at least 2 times the maximum width of said primary absorbent member. Most preferably, the minimum width of the secondary absorbent member is in the range from about 3 to about 6 times the maximum width of the primary absorbent member.

Preferably the secondary absorbent member is about the same length as the primary absorbent member while the compound sanitary napkin is in an unstressed condition. However it is quite possible for the secondary absorbent member to be longer than the primary absorbent member and still function effectively.

The individual components of the primary absorbent member 30 and the secondary absorbent member 50 may be comprised of components that are extensible or elastically stretchable in the longitudinal and/or lateral direction when the compound sanitary napkin is worn.

Referring now to FIG. 1 it can be seen that the primary absorbent member 30 and the secondary absorbent member 50 have their length each parallel and in fact corresponding, to the longitudinal axis of the sanitary napkin 20.

To form the compound sanitary napkin of the present invention, the primary absorbent member and the secondary absorbent member are affixed by joining means generally indicated as 70 in FIGS. 2, 3 and 3A. The precise nature of the joining means is immaterial so long as the joining means selected serves to join the primary absorbent member and the secondary absorbent member into the compound sanitary napkin of the present invention with sufficient tenacity that the primary absorbent member and the secondary absorbent member are not disconnected during use. Joining means such as adhesive attachment with well known hot melt and pressure sensitive adhesives are quite satisfactory. If the nature of the components selected to construct the constituents of the compound sanitary napkin so permit, heat welding, ultrasonic welding or a combination of both heat and ultrasonic welding can be used.

The primary absorbent member 30 may be affixed to the secondary absorbent member by joining means in such a manner that the affixed length is at least 25% of the length of the primary absorbent member 30, preferably the affixed length is at least 50% of the length of the primary absorbent member 30, more preferably 75%, even more preferably, the primary absorbent member 30 is affixed to the secondary absorbent member 50 by joining means 70 extending along substantially the entire length of the primary absorbent member 30.

The primary absorbent member 30 has a width 41. The compound sanitary napkin has a joining means

width 541. The joining means width 541 is less than the width 41 of the primary absorbent member 30. Preferably, the joining means width 541 is less than 75% of the width of the primary absorbent member 30. More preferably the joining means width 541 is less than 50% of the width of the primary absorbent member 30. Most preferably, the joining means width 541 is less than 25% of the width of the primary absorbent member 30.

Preferably the primary absorbent member exhibits a "stationary resistance" sufficient enough to provide enhanced performance. As used herein the term "stationary resistance" refers to the resistance exhibited by the primary absorbent member to forces applied to the primary absorbent member within the central region such that the side edges of the primary absorbent member do not extend beyond the side edges of the secondary absorbent member. In other words, the stationary resistance describes the relative movement of the primary absorbent member compared to the secondary absorbent member. It is preferred that the side edges of the primary absorbent member do not extend beyond the side edges of the secondary absorbent member even under typically in use forces. By keeping the side edges of the primary absorbent member within the side edges of the secondary absorbent member under typically in use forces, the opportunity for fluid to bypass or be expelled from the primary absorbent member and onto a surface other than the secondary absorbent member for example the user's skin or undergarments is substantially reduced.

Referring now to FIG. 5 there is shown another preferred embodiment of a compound sanitary napkin 20 of the present invention. The primary absorbent member 30 has a length 40 that is less than the length 60 of the secondary absorbent member 50. The fluid bubble 31 will have accordingly a length not greater than the length of the primary absorbent member 30. Any other element of this embodiment is similar to what has been already described referring to FIGS. 1 to 3.

In FIG. 3 it can be seen that topsheet 32 completely encases the absorbent core 34 of the primary absorbent member 30. In this embodiment, the topsheet 32 for the primary absorbent member 30 is separate and distinct from the topsheet 52 for the secondary absorbent member 50.

Optionally, the topsheet for the primary absorbent member 30 and the secondary absorbent member 50 may be made of a single web of material such as topsheet 100 as seen in FIG. 6. In this embodiment topsheet 100 is used for the topsheet on both the primary absorbent member 30 and the secondary absorbent member 50. In the embodiment of FIG. 6 the topsheet 100 can serve as a joining means 70 connecting the primary absorbent member and the secondary absorbent member together. The compound sanitary napkin may also include additional joining means to connect the primary absorbent member to the secondary absorbent member. The joining means width 541 is less than the width 41 of the primary absorbent member 30.

In FIG. 7 a further embodiment of the present invention is shown in which the fluid bubble 31 is comprised between the primary absorbent member 30 and the secondary absorbent member 50 of the sanitary napkin 20. In this case the joining means 70 that affix the primary absorbent member 30 to the secondary absorbent member 50 may also comprise the fluid bubble 31 which is preferably affixed to the secondary absorbent member 30 along its entire length. If the fluid bubble 31 has the same length of the primary absorbent member 30. Otherwise if the fluid bubble 30 is shorter than the primary absorbent member 31 and extends for example substantially along the central region of the sanitary napkin the primary absorbent member 31 may be joined at its ends directly to the secondary absorbent member 50 while being fully partially or not at all affixed to the fluid bubble 31.

FIG. 8 shows another preferred embodiment of the present invention in which the fluid bubble 31 is comprised within the secondary absorbent member 50 more precisely between the topsheet 52 and the absorbent element 56 of the secondary absorbent member 50. Alternatively, the fluid bubble 31 can also be provided within the absorbent core 58 of the secondary absorbent member 50 or between backsheet 54 and absorbent core 56 of the secondary absorbent member 50.

Referring now to FIG. 9 there is shown another preferred embodiment of the present invention. The primary absorbent member 131 and the secondary absorbent member 150 are integrally made from a single absorbent element 156 by means of two Z-shaped folds 160 parallel to the longitudinal axis of the sanitary napkin 20. topsheet 200 is used for the topsheet on both the primary absorbent member 130 and the secondary absorbent member 150. In the embodiment of FIG. 9 the absorbent element 156 and the topsheet 200 can serve as joining means 70 connecting the primary absorbent member 130 and the secondary absorbent member 150 together. As shown in FIG. 9 the fluid bubble 31 can be encased by the upper part of the 2-fold of the absorbent element 156.

Claims

1. A compound disposable absorbent article for wearing adjacent a body discharge area, said article having a body facing surface, a garment facing surface, a longitudinal axis and a lateral axis, a primary absorbent member having a length and a width and a secondary absorbent member having a length and a width, said primary absorbent member and said secondary absorbent member having their length each parallel to said longitudinal axis, said secondary absorbent member being closer to said garment facing surface than said primary absorbent member, said primary absorbent member being affixed to said secondary absorbent member by joining means, characterized in that said article further comprises a yielding fluid bubble to raise said body facing surface towards said discharge area.
2. A compound disposable absorbent article according to claim 1, characterized in that said fluid bubble is a gas bubble, and preferably an air bubble.
3. A compound disposable absorbent article according to any preceding claim, characterized in that said fluid bubble is longer along said longitudinal axis than along said lateral axis and does not extend beyond the periphery of said primary absorbent member.
4. A compound disposable absorbent article according to any preceding claim, characterized in that said fluid bubble is positioned within said secondary absorbent member.
5. A compound disposable absorbent article according to any preceding claim, characterized in that said fluid bubble is positioned within said primary absorbent member.
6. A compound disposable absorbent article according to any preceding claim, characterized in that said width of said secondary absorbent member is equal or greater than said width of said primary absorbent member.
7. A compound disposable absorbent article according to any preceding claim, characterized in that the minimum width of said secondary absorbent member is at least 1.5 times, and preferably from 3 to 8 times, the maximum width of said primary absorbent member.
8. A compound disposable absorbent article according to any preceding claim, characterized in that the maximum width of said primary absorbent member is less than 3 centimetres.
9. A compound disposable absorbent article according to any preceding claim, characterized in that said primary absorbent member is affixed to said secondary absorbent member by joining means and the affixed length is at least 25% of said length of said primary absorbent member along said longitudinal axis, preferably is at least 50% and most preferably said joining means extend substantially continuously along said length of said primary absorbent member.
10. A compound disposable absorbent article according to any preceding claim, characterized in that said primary absorbent member and said secondary absorbent member are integrally made from a single absorbent element, preferably by means of two Z-shaped folds parallel to said longitudinal axis.

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of said article.

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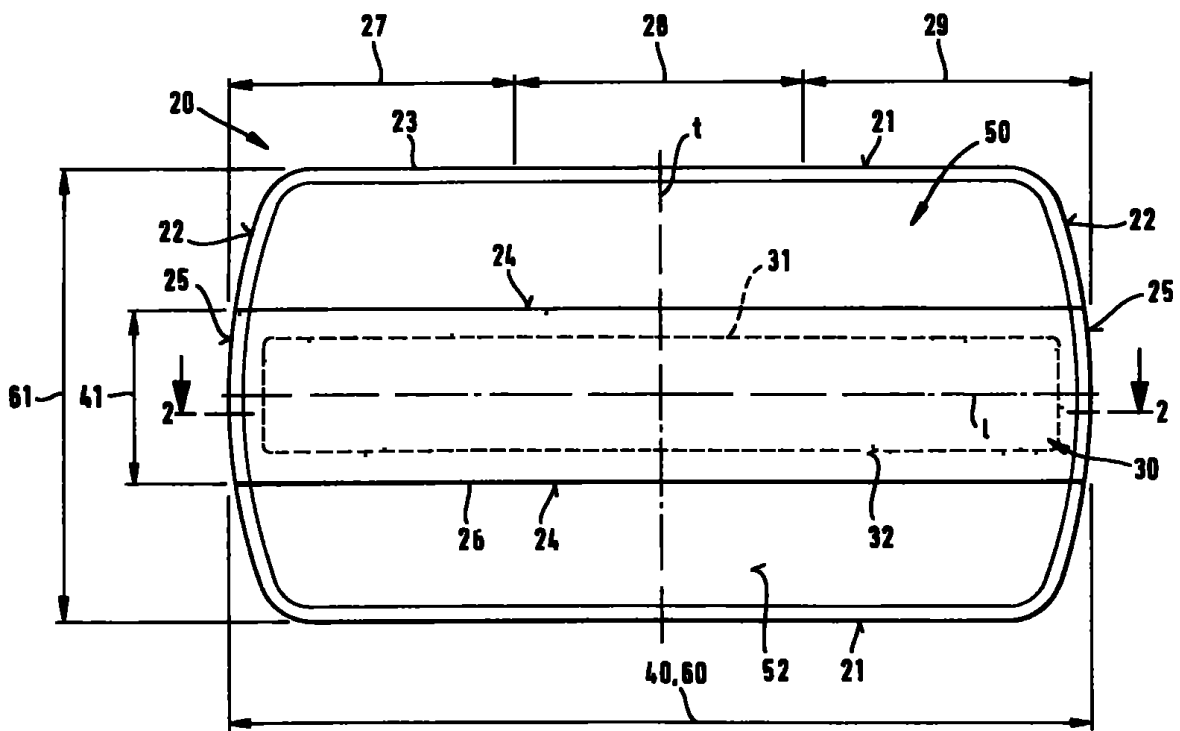


Fig. 1

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Fig. 2

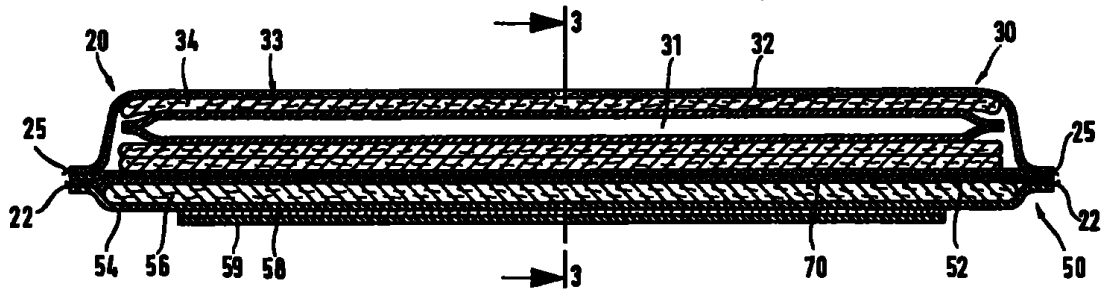


Fig. 3

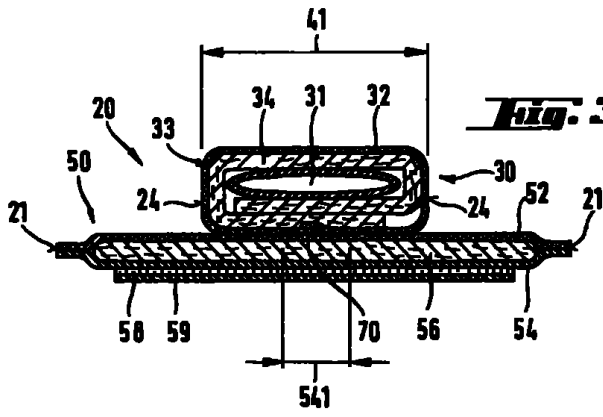
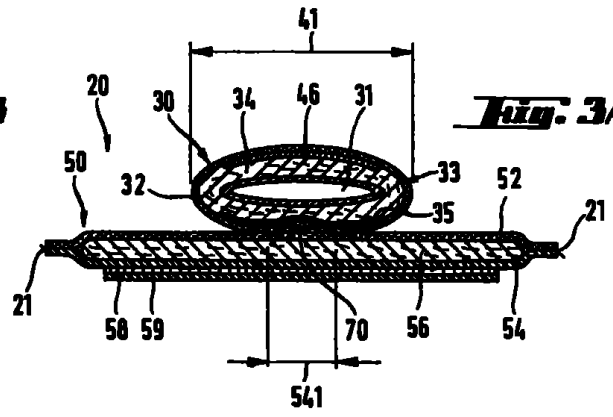
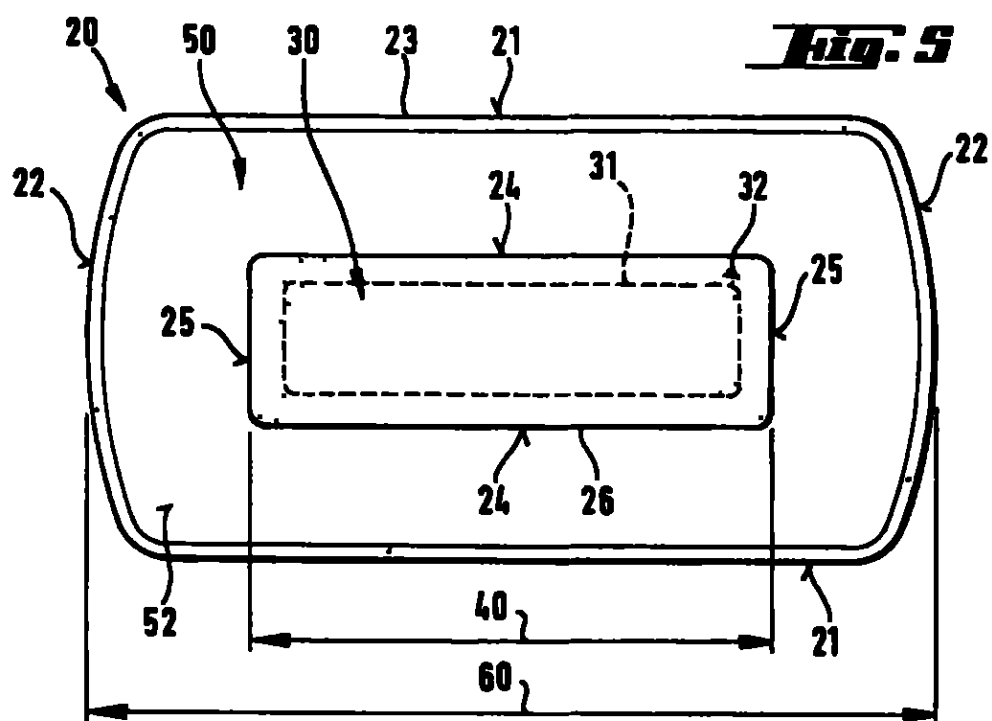
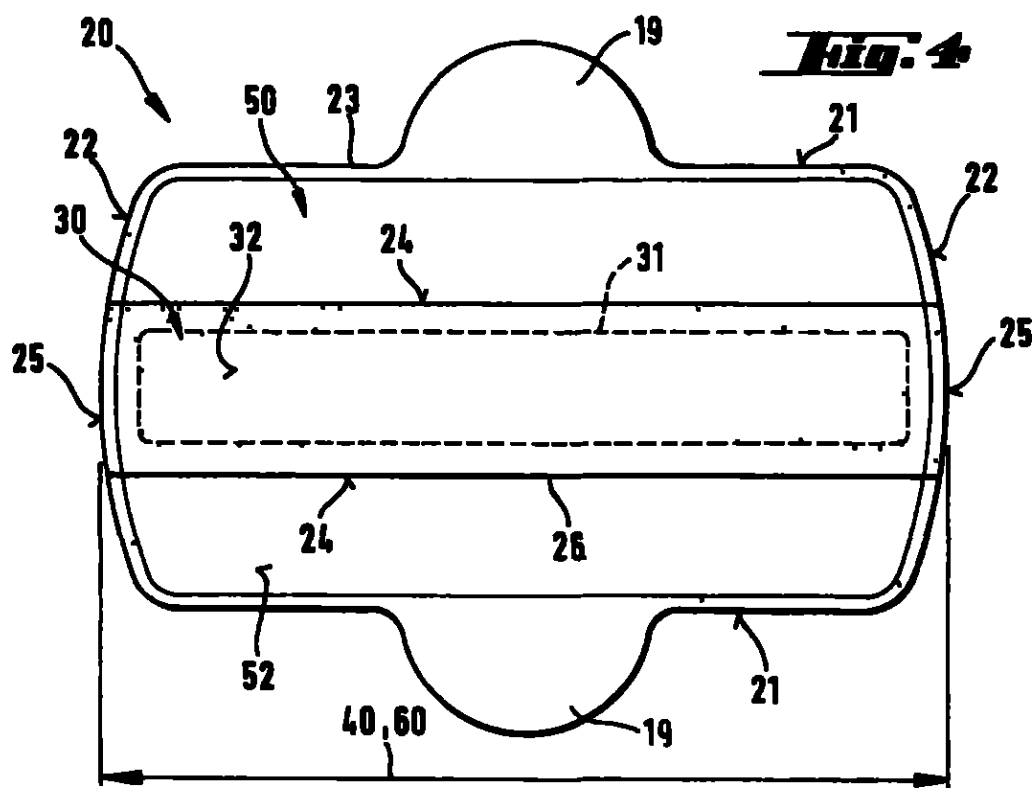


Fig. 3A



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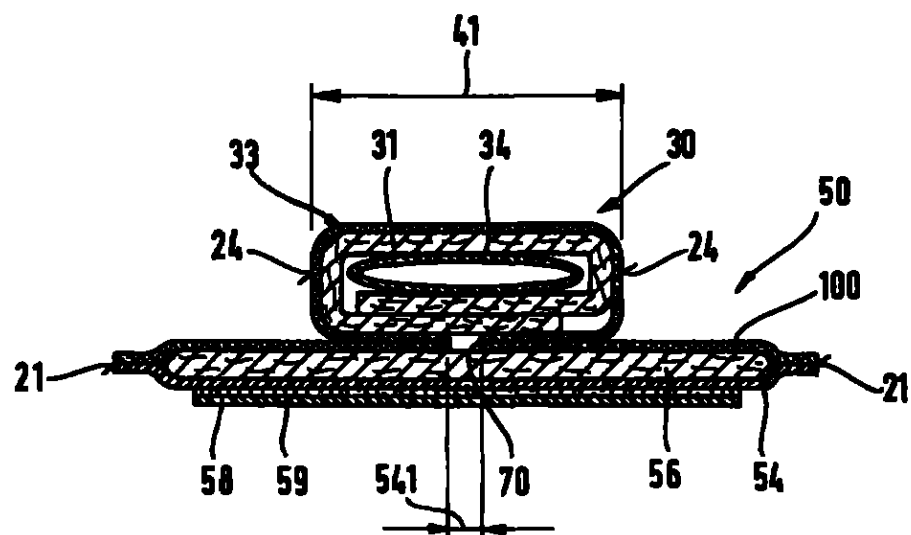


Fig. 6

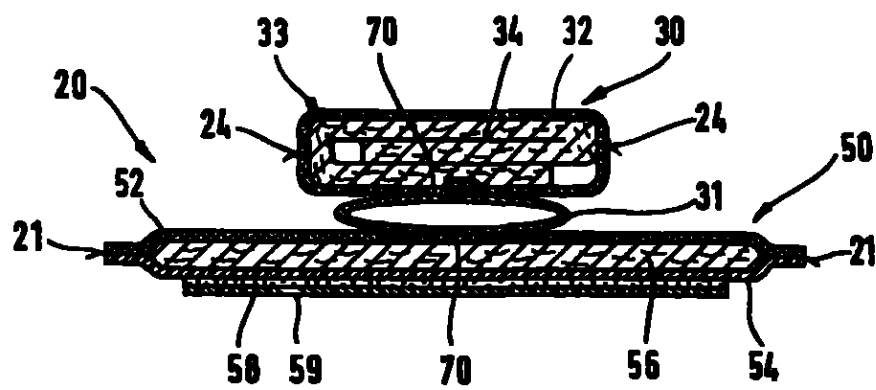


Fig. 7

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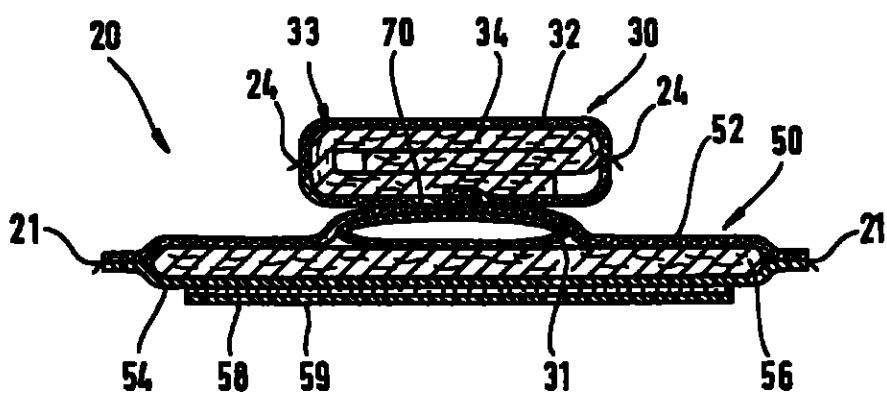


Fig. 8

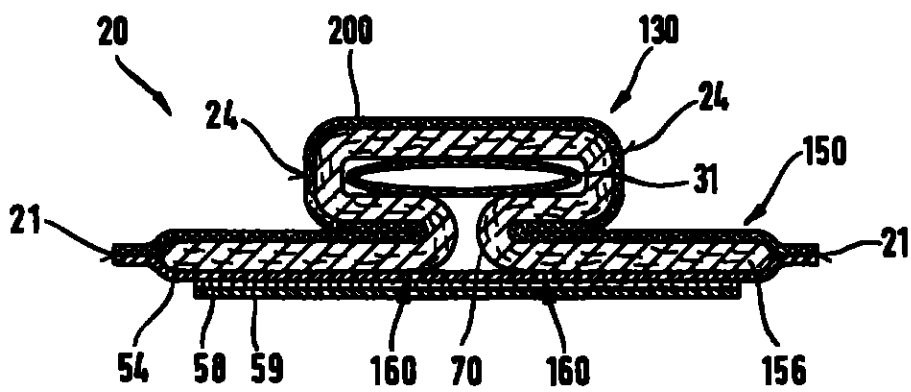


Fig. 9



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A61F 13/15

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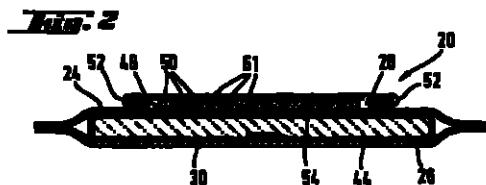
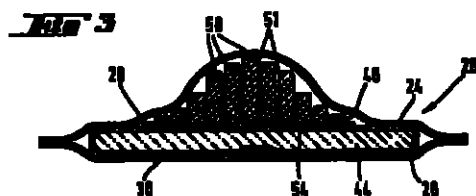
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(71) Applicant THE PROCTER & GAMBLE COMPANY Cincinnati, Ohio 45202 (US)	(74) Representative Hirsch, Uwe Thomas et al Procter & Gamble European Service GmbH, Sutzbacher Strasse 40-60 65824 Schwalbach am Taunus (DE)
(72) Inventors Carlucci, Giovanni 66100 Chieti (IT)	

(54) Disposable absorbent article having a decoupled absorbent structure and being capable of self-shaping in use

(57) A disposable absorbent article which is substantially flat prior to use for wearing adjacent a body discharge area having a body facing surface and a garment facing surface. The disposable absorbent article comprises a liquid pervious topsheet, a backsheet, and an absorbent core intermediate the topsheet and the backsheet. The absorbent core has a body facing surface and a garment facing surface and comprises an expanding layer for expanding the article into a three-dimensional structure while being worn by a user. The expanding layer is activated by body fluids, and comprises a number of smaller elements that are decoupled from one another and are planar.



EP 0 815 817 A1

Description

FIELD OF THE INVENTION

The present invention relates to disposable absorbent articles. Disposable absorbent articles are considered to be absorbent devices designed to be worn externally of the body by a user and to receive fluids discharged from the body. In particular the present invention relates to substantially flat disposable absorbent sanitary napkins, catamenials, incontinence inserts, pantliners and diapers comprising an expanding layer for expanding the article into a tridimensional structure while being worn by a user. The expanding layer comprises a number of smaller elements that are decoupled from one another and that are also coplanar the expanding layer is activated by body fluids and provides the article with a self-shaping capability during the use.

BACKGROUND OF THE INVENTION

In their basic form disposable absorbent articles comprise an absorbent core interposed between a pervious body-contacting element (alternatively referred to as a topsheet or an overwrap) and an impervious protective barrier (alternatively referred to as a backsheet). The absorbent element is, of course intended to receive and contain the fluids discharged from the body. The body-contacting element is intended to provide comfortable and dry-feeling contact with body surfaces while allowing free passage of fluids therethrough into the absorbent element. The protective barrier is intended to prevent the fluids which are expelled or which escape from the absorbent element from soiling the user's garments.

In addition to the three functional elements mentioned above, disposable absorbent articles are generally provided with means for supporting the device adjacent the user's crotch area, even as the user moves, where it can most effectively perform its intended function. Typically, absorbent articles as sanitary napkins are provided with an adhesive attachment means for securing the device to the inner crotch area of the user's undergarments.

Improved fluid interception can occur if the absorbent article is in close contact with the body of the wearer.

While previously known absorbent articles do perform their intended function, each conventional design can be further improved in one or more of absorbency of body fluids, protection of the user's garments from soiling and/or physical comfort to the user.

With respect to disposable sanitary napkins several attempts have been made in the art to improve body contact with the wearer and hence absorb fluids upon discharge and thereby minimize soiling by providing a sanitary napkin having an anatomically shaped configuration particularly including those that are raised

upwardly or humped in their medial portions so as to be near or in contact with the pudendal region when worn.

On female users these sanitary napkins attempt to contact and absorb menses immediately as it leaves the vestibule.

Some articles have also been described in which an anatomically shaped configuration is provided during the wearing time, with the advantage of a better fit to the anatomy.

U.S. Patent No. 3,736,931 discloses a sanitary napkin having an outer non-compressed layer of fluid absorbent material and an inner core of highly compressed fluid absorbent material which is at least partially enclosed therein. The napkin preferably is V-shaped in cross section and is arch-shaped in its longitudinal direction by die compression. When the napkin is worn the fluid directs first into the inner compressed layer so as to cause it to swell and to expand the outer non-compressed layer in all directions, thereby adjusting itself to each wearer.

The sanitary napkin expands upon fluid absorption and may adjust itself to the user's anatomy, but since it is not flat prior to use it may be cumbersome to package and to handle; moreover the expansion takes place mainly in lateral direction, so achieving an effective seal against the inner side of the thighs and at both sides of the vaginal orifice; therefore the structure is neither capable of forming a convex upward configuration nor it brings the absorbent element in direct contact with the point of release of the fluid.

According to U.S. Patent No. 3,512,530 a sanitary napkin is described in which a compressed regenerated cellulose sponge layer is combined to a larger fibrous cellulose layer to form a multiple ply absorbent core. The compressed regenerated cellulose sponge layer is positioned over the fibrous layer and it is typically centered about it; it is intended as the primary absorbent element of the sanitary napkin while the fibrous layer acts as a secondary or back up absorber.

The sanitary napkin may be therefore very thin prior to use, as compared to other sanitary products having the same absorbent capacity.

Although the compressed regenerated cellulose sponge layer is capable of expanding in Z-direction upon fluid absorption the structure described is not particularly suitable to provide an effective body contact with the wearer's anatomy and might cause discomfort to the user due to the characteristics of the compressed regenerated cellulose sponge material particularly when it is dry.

Moreover when the expansion of the compressed regenerated cellulose sponge layer starts from the point that is first reached by the fluid it is restrained by the surrounding, still dry regions of the sponge layer at least until they have received liquid by capillary diffusion through the material itself. This may not allow an effective swelling particularly under absorption of relatively small amounts of fluid due to the restraining effect of

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the remaining portions of the material not yet reached by the fluid

The compressed regenerated cellulose layer may also be rather stiff in its dry state if a higher density which is particularly useful for a rapid absorption and diffusion of the fluid is to be provided to overcome this problem

EP Patent 293 208 B1 describes the use of multiple layers of compressed regenerated cellulose sponge sheets in a sanitary napkin as the sole absorbent material instead of the usual cellulose pulp absorbent core in order to obtain an absorbent article of improved strength and shape retainability in wet conditions, as compared to traditional absorbent articles with fluff cores that tend to be broken or to form lumps in use.

The sheets are provided with slits in order to enhance their flexibility, with a better comfort for the user and to increase the fluid absorbing area.

The sanitary napkin described in EP patent 293 208 B1 has a structure that is not specifically intended to provide a self shaping capability during the use taking advantage of the swelling of the absorbent material but rather a better strength when wetted than articles using conventional fluff-based absorbent cores, and a better flexibility and absorbency rate as compared to articles using the same compressed regenerated cellulose sponge material

The slits comprised in the sheets do not solve the problem of the restraining effect against the swelling of the area that has already received the fluid performed by the surrounding material not yet reached by the fluid

In European application EP95106724 6, filed on 29 April 1996 an absorbent article is described which comprises a layer for expanding the article into a tridimensional structure while being worn by a user the expanding layer is activated by body fluids and comprises incisions on at least its body facing surface or its garment facing surface that are arranged in a closed array of intersecting lines.

The incisions provide the expanding layer with the capability of achieving a high degree of swelling even in localized areas and upon activation by small amounts of fluid and increase the flexibility of the layer. The performance of the expanding layer can be improved in terms of acquisition and transmission of the body fluids, especially in the case of sudden gushes, and in terms of a further reduction in stiffness in order to achieve an even better flexibility of the absorbent article. Moreover a further improvement has been found when an expanding layer is provided with adapted fluid acquisition/transmission capabilities in various zones of the expanding layer itself in combination with a high degree of swelling

It is an object of the present invention to provide an absorbent article capable of providing an anatomically shaped configuration for a closer body contact which is achieved during the use upon activation by absorbed body fluids, while it is comfortable for the wearer easy

to produce and to package, and capable of achieving a high degree of swelling even in localized areas and upon activation by small amounts of fluid combined with the capability of a rapid acquisition and transmission of body fluids, particularly when sudden gushes of fluid are possible and/or viscous fluids like menses are to be managed and with an increased flexibility

SUMMARY OF THE INVENTION

The present invention relates to disposable absorbent articles for wearing adjacent a body discharge area which are substantially flat prior to use. The substantially flat disposable absorbent article has a longitudinal centreline and a lateral centreline orthogonal thereto that define longitudinal and lateral directions respectively and a Z-direction which is orthogonal to both of them. The disposable absorbent article comprises a liquid pervious topsheet, a backsheet joined to said topsheet, and an absorbent core intermediate the topsheet and the backsheet. The term "substantially flat" as used herein refers to articles which have their main extension in one plane in contrast to being shaped. The absorbent core comprises an expanding layer for expanding the article into a tridimensional structure while being worn by a user wherein the expanding layer is activated by body fluids the expanding layer is delimited by a periphery and has a body facing surface and a garment facing surface and comprises a number of smaller elements that are decoupled from one another and are further coplanar

BRIEF DESCRIPTION OF THE DRAWINGS

While the specification concludes with claims particularly pointing out and distinctly claiming the present invention it is believed that the present invention will be better understood from the following description in conjunction with the following drawings

FIG. 1 is a top plan view of one embodiment of a sanitary napkin according to the present invention, FIG. 2 is a cross-sectional view of the sanitary napkin shown in FIG. 1 as taken along a section line corresponding to the transverse centreline A-A

FIG. 3 is a cross-sectional view similar to that of FIG. 2 showing the sanitary napkin expanded into a tridimensional structure after activation during wear

FIG. 4 shows an alternate embodiment of the expanding layer for an absorbent article according to the present invention

FIG. 5 is a cross-sectional view of another embodiment of a sanitary napkin according to the present invention

FIG. 6 is a cross-sectional view similar to that of FIG. 2 showing the sanitary napkin of FIG. 5 expanded in a tridimensional structure after activa

tion during wear

DETAILED DESCRIPTION OF THE INVENTION

This invention relates to a disposable absorbent article which exhibits absorbency for bodily fluids, the protection of the user's garments from soiling, improved physical comfort to the user and which is easy to produce and to package. The disposable absorbent article is described below by reference to a sanitary napkin or catamenial. The term "sanitary napkin" as used herein refers to an article which is worn by females adjacent to the pudendal region and which is intended to absorb and contain the various body fluids which are discharged from the body (e.g. vaginal discharges, menses, and/or urine) and which is intended to be discarded after a single use. The disposable absorbent article is substantially flat prior to use.

The term "substantially flat" as used herein refers to articles that have their main extension in one plane in contrast to being shaped. In a preferred embodiment a substantially flat article will have an absorbent core of constant thickness or at least, will have an absorbent core that is not shaped in a direction which is orthogonal to the absorbent core itself. This does not exclude a general curvature of the absorbent core. It will be apparent to the man skilled in the art to which extent products can deviate from absolute flat shape and still benefit from the during the use shaping according to the present invention.

Sanitary napkins with longitudinal side cuffs, which may be optionally elasticated, and sanitary napkins with a moderate curvature are therefore within the scope of the present invention provided that their absorbent core is not shaped prior to use in a direction that is orthogonal to the absorbent core itself.

The term "use" as used herein refers to the period of time that starts when the absorbent article is actually put in contact with the anatomy of the user.

The terms "joined" or "affixed" as used herein encompasses configurations whereby a first member is directly connected to a second member and configurations whereby a first member is indirectly connected to a second member by connecting the first member to intermediate members which in turn are connected to the second member.

The term "decoupled" as used herein, refers to smaller elements that together constitute a larger element, while being distinct from one another even though they can be in contact; all the smaller elements, or at least part of them, can be joined or affixed to a common substrate to be held together while still being decoupled provided they are not substantially joined or affixed to one another.

The term "coplanar" as used herein refers to decoupled elements that are on the same surface, which same surface is substantially flat in the sense explained above.

Interlabial devices which reside partially within and partially external of the wearer's vestibule are also within the scope of this invention. As used herein the term "pudendal" refers to the externally visible female genitalia and is limited to the labia majora, the labia minora, the clitoris and the vestibule.

In FIGS. 1 and 2 one preferred embodiment of a sanitary napkin 20 of the present invention is shown. Fig. 1 is a plan view of the sanitary napkin 20 of the present invention in its flat-out state prior to use with portions of the structure being cut-away to more clearly show the construction of the sanitary napkin 20 and with the portion of the sanitary napkin 20 which faces or contacts the wearer oriented towards the viewer. As shown in FIGS. 1 and 2, the sanitary napkin 20 preferably comprises a liquid pervious topsheet 24, a liquid impervious backsheet 26 joined to the topsheet 24, and an absorbent core 28 intermediate the topsheet 24 and the backsheet 26. The absorbent core 28 comprises an expanding layer 48 for expanding the sanitary napkin into a tridimensional structure while being worn by a user.

In a preferred embodiment of the present invention illustrated in FIGS. 1 to 3, the absorbent core 28 comprises the expanding layer 48 and a separate, substantially non expanding absorbent element 44 joined together and in face to face relationship to each other, the expanding layer 48 being positioned between the topsheet 24 and the absorbent element 44.

The absorbent element 44 and the expanding layer 48 may be associated in any suitable manner to form the absorbent core 28. Suitable manners include, but are not limited to, associating the absorbent element 44 and the expanding layer 48 with adhesives such as by spray-gluing or by applying lines or spots of adhesive between them. Alternatively or additionally the association between the layers may be achieved by fibre entanglement or by a plurality of discrete fusion bonds.

Alternatively the expanding layer 48 may constitute the entire absorbent core 28.

The absorbent capacity of the absorbent core 28 should be compatible with the intended body fluid loading for the sanitary napkin 20. Further the overall absorbent capacity of the absorbent core 28 may be varied to accommodate wearers ranging in the expected amount of body fluid volume. For instance, a different absorbent capacity may be utilized for sanitary napkins intended for day time use as compared with those intended for night time use, or for sanitary napkins intended for use by teenage females as compared with those intended by more mature women.

The sanitary napkin 20 has two surfaces, a body contacting or facing surface and a garment facing or contacting surface. The absorbent core 28 has corresponding body facing and garment facing surfaces. The sanitary napkin 20 has two centerlines, a longitudinal centerline O-O and a transverse centerline A-A orthogonal thereto. The term "longitudinal" as used herein

refers to a line, axis or direction in the plane of the sanitary napkin 20 that is generally aligned with (e.g. approximately parallel to) a vertical plane which bisects a standing wearer into left and right body halves when the sanitary napkin 20 is worn. The terms "transverse" or "lateral" as used herein are interchangeable, and refer to a line, axis, or direction which lies within the plane of the sanitary napkin 20 and is generally perpendicular to the longitudinal direction. The Z-direction is orthogonal to both the longitudinal and lateral directions of the sanitary napkin 20 and extends outwardly from the plane of the sanitary napkin 20 which is defined by the longitudinal centreline O-O and the lateral centreline A-A. The term "longitudinally oriented" refers to a direction ± 45 degrees of the longitudinal direction in the plane of the sanitary napkin 20; the term "laterally oriented" refers similarly to any other direction in the plane of the sanitary napkin 20.

The long edges of the sanitary napkin 20 which are aligned with the longitudinal centreline O-O, are the longitudinal side margins of the sanitary napkin 20. The ends of the sanitary napkin 20 joining the longitudinal side margins are the transverse ends of the sanitary napkin 20. Collectively the longitudinal side margins and transverse ends of the sanitary napkin 20 define its periphery. Similarly, the absorbent core 28 of the sanitary napkin 20 have a periphery defined by alternatively disposed longitudinal side margins and transverse ends.

Tridimensional structures of the sanitary napkin 20 are those in which the sanitary napkin structure is caused to expand at least partially, in the Z-direction in order to more closely conform to the user's anatomy. Said expansion preferably takes place in a direction that goes from the garment facing surface towards the body facing surface of the sanitary napkin 20. Particularly preferred are tridimensional structures with a convex upward configuration that are inclusive of, but not limited to, inverted U-shapes or inverted V-shapes, with convex upward configuration being meant a structure of the sanitary napkin that is convex on its body facing surface. With these configurations the cross-sectional contour of the central portion of the sanitary napkin more closely matches the labia of the typical wearer.

The topsheet 24 is compliant, soft feeling, and non-irritating to the wearer's skin. Further, the topsheet 24 is liquid pervious, permitting liquid to readily penetrate through its thickness. A suitable topsheet 24 may be manufactured from a wide range of materials such as woven and nonwoven materials, polymeric materials such as apertured formed thermoplastic films, apertured plastic films, and hydroformed thermoplastic films, porous foams, reticulated foams, reticulated thermoplastic films, and thermoplastic scrim. Suitable woven and nonwoven materials can be comprised of natural fibres (e.g. wood or cotton fibres), synthetic fibres (e.g. polymeric fibres such as polyester, polypropylene, or polyethylene fibres), or from a combination of natural

and synthetic fibres.

A preferred topsheet comprises an apertured formed film. Apertured formed films are preferred for the topsheet because they are pervious to body fluids and yet non-absorbent and have a reduced tendency to allow liquids to pass back through and rewet the wearer's skin. Thus, the surface of the formed film which is in contact with the body remains dry, thereby reducing body soiling and creating a more comfortable feel for the wearer.

Suitable formed films are described in U.S. Pat. No. 3,929,135, issued to Thompson on December 30, 1975; U.S. Pat. No. 4,324,248, issued to Mullane, et al on April 13, 1982; U.S. Pat. No. 4,342,314, issued to Radel et al on August 3, 1982; U.S. Pat. No. 4,463,045, issued to Ahr et al on July 31, 1984; and U.S. Pat. No. 5,006,394 issued to Baird on April 9, 1991. A preferred topsheet for the absorbent article of the present invention is a formed film described in one or more of the above patents and marketed on sanitary napkins by The Procter & Gamble Company of Cincinnati, Ohio as "DRI WEAVE".

In a preferred embodiment of the present invention the body or exposed surface of the formed film topsheet is hydrophilic so as to help liquid transfer through the topsheet faster than if the body surface were not hydrophilic so as to diminish the likelihood that menstrual fluid will flow off the topsheet rather than flowing into and being absorbed by the absorbent core.

The topsheet of the present invention is preferably capable of expanding as the sanitary napkin 20 expands in a tridimensional structure upon absorption of body fluids. This may be achieved when the topsheet is made of a material that is intrinsically extensible under the forces exerted by the expanding layer 46. In a preferred embodiment illustrated in FIGS. 1 and 2 the topsheet 24 is provided with two pleats or folds 52 symmetrically positioned at both sides of the longitudinal centreline O-O and substantially parallel to it. As shown in FIG. 2 the topsheet 24 in each pleat or fold 52 is folded twice on itself toward the longitudinal side margins of the sanitary napkin 20. A single pleat or fold or alternatively more than two folds may be also comprised in the topsheet 24 without departing from the scope of the present invention; the pleats or folds may be generally longitudinally or laterally oriented.

The backsheet 26 is impervious to liquids (e.g., menses and/or urine) and is preferably manufactured from a thin plastic film, although other flexible liquid impervious materials can also be used. In use, the backsheet 26 is interposed between the absorbent core 28 and the user's undergarments. The function of the backsheet 26 is to prevent exudates which may be expelled from or which inadvertently bypass the absorbent core 28 from contacting and soiling the user's undergarments. The backsheet 26 can thus comprise a woven or nonwoven material, polymeric films such as thermoplastic films of polyethylene or polypropylene, or

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composite materials such as a film-coated nonwoven material. Preferably, the backsheet is a polyethylene film having a thickness of from about 0.012 mm to about 0.015 mm. The backsheet 26 is preferably embossed and/or matte finished to provide a more clothlike appearance.

In a preferred embodiment of the present invention the sanitary napkin 20 is also provided with a party fastening means, not shown in the figures for clarity which provides means to attach the article to an undergarment. For example the party fastening means may comprise a mechanical fastener such as hook and loop fasteners such as marketed under the tradename VELCRO, snaps or holders. Alternatively, the sanitary napkin 20 is fastened to the undergarment by means of party fastening adhesive on the backsheet 26. The party fastening adhesive provides a means for securing the sanitary napkin 20 to the party and preferably a means for securing the sanitary napkin 20 when soiled to the fold and wrap package for convenient disposal. Typically at least a portion of the garment facing surface of the backsheet 26 is coated with adhesive to form the party fastening adhesive. Any adhesive or glue used in the art for such purposes can be used for the party fastening adhesive herein. Pressure sensitive adhesives are most preferred. Suitable adhesives include Century A-305-IV manufactured by the Century Adhesives Corporation of Columbus, Ohio, and Instant LOK 34-2823 manufactured by the National Starch and Chemical Company of Bridgewater New Jersey 3 Sigma 3153 manufactured by 3 Sigma and Fuller H-22382P manufactured by the H B Fuller Co.

The party fastening adhesive is typically applied to the backsheet by slot coating or spraying in various distribution patterns, such as e.g. continuous or discontinuous strips, intermittent dots, random pattern spirals.

The party fastening adhesive is typically covered with a removable release paper or film in order to prevent the adhesive from drying out or adhering to another surface other than the party prior to use. Any commercially available release paper or film may be used. Suitable examples include BL 30MG-A SILOX EVO and BL 30 MG-A SILOX 4 P/O available from Akrosil Corporation.

If present, as illustrated in FIGS. 1 to 3, the substantially non expanding absorbent element 44 of the absorbent core 28 may be any absorbent means which is generally compressible, resilient, non-irritating to the wearer's skin and capable of absorbing and containing body fluids. The absorbent element 44 may be manufactured from a wide variety of liquid absorbent materials commonly used in disposable sanitary napkins, and other disposable absorbent articles. Examples of suitable absorbent materials include comminuted wood pulp (which is generally referred to as airlaid), creped cellulose wadding, modified cross-linked cellulose fibres (such as those described in U.S. Patent No. 5,217,445 issued to Young et al. on June 8, 1993) capillary chan-

nel fibres (that is, fibres having intrafibre capillary channels such as those described in U.S. Patent No. 5,200,248 issued to Thompson, et al. on April 6, 1993) absorbent foams (such as those described in U.S. Patent No. 5,260,345, issued to DeMarais, et al. on November 9, 1993 and U.S. Patent No. 5,268,244 issued to DeMarais, et al. on December 7, 1993) thermally bonded airlaid materials (such as those material described in U.S. Patent Application Serial No. 08/141,158, entitled "Catamenial Absorbent Structures Having Thermally Bonded Layers For Improved Handling of Menstrual Fluids and Their Use in Catamenial Pads Having Improved Fit and Comfort" filed in the name of Richards, et al. on October 21, 1993 (P&G Case 5051)), absorbent sponges, synthetic staple fibres, polymeric fibres, hydrogel-forming polymer gelling agents, peat moss, or any equivalent materials or combinations of materials. Suitable absorbent cores comprising foams are described in European Applications 0 596 833, 0 596 823 and 0 596 834.

In the embodiment illustrated in FIGS. 1 to 3, the absorbent element 44 of the absorbent core 28 comprises an absorbent layer 30 made of a thermally bonded airlaid material longitudinally folded twice on itself and comprising particles of absorbent gelling material therebetween which are not shown for clarity.

As shown in FIGS. 1 and 2, the absorbent core 28 comprises an expanding layer 46 for expanding the sanitary napkin 20 into the desired tridimensional structure while the sanitary napkin 20 is being worn. In an embodiment illustrated in FIGS. 1 to 3, the expansion and the final shaping of the sanitary napkin 20 into the tridimensional structure is provided by the swelling substantially in Z-direction of the material that constitutes the expanding layer 46 and that is activated during wear by the absorption of body fluids.

The expanding layer 46 may comprise any material that is capable of such swelling in order to shape the sanitary napkin 20 into the desired tridimensional structure.

After the absorption of body fluids and the subsequent swelling, the material of the expanding layer 46 must be soft, compliant, conformable and resilient. It must be compressible such that it will deform under the relatively small forces that are experienced during normal use. In addition to be compressible, the material of the expanding layer 46 must be flexible and conformable after swelling so it can provide improved fit through the topsheet 24 into and around the wearer's labia and perineum when the tridimensional structure is formed during the wearing time. The ability to follow the topography of the anatomy will provide intimate contact with the exposed genitalia of the female user. This helps provide better fluid transfer from the user into the expanding layer 46. While these characteristics of the expanding layer 46 allow for improved fit, they also cause the product to be both soft and comfortable for the wearer.

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It is preferred that the expanding layer 46 forms at least part of the body facing surface of the absorbent core 28. In the embodiment illustrated in FIGS. 1 and 2 the expanding layer 46 is positioned over the absorbent element 44, in face to face relationship with it. It is rectangular and preferably narrower and shorter than the absorbent element 44, as illustrated in FIG. 1 being centered about both the longitudinal and transverse centrelines O-O and A-A. As an alternative, different shapes are also possible for the expanding layer 46 e.g. an hourglass shape.

The expanding layer 46 of the absorbent core 28 has a body facing surface and a garment facing surface and comprises a number of smaller elements 50 that are decoupled that is, are distinct from one another and that together form the expanding layer 46. The smaller elements 50 are each capable of expanding substantially in Z-direction upon activation by body fluids and are coplanar since they lie on a same surface that in the embodiment illustrated in FIGS. 1 to 3 is parallel to the body facing surface of the absorbent core 28 and is substantially flat prior to use.

The expanding layer 46 also comprises a body facing surface and a garment facing surface, defined as the two surfaces, typically parallel to one another and respectively facing the user's body and the user's garment when the absorbent article is being worn that comprise within them the smaller elements 50 constituting the expanding layer 46.

Smaller elements 50 can be made in any regular or irregular shape typically they comprise at least one flat face that is parallel to at least one of the body facing surface or of the garment facing surface of the expanding layer 46. A preferred shape is the parallelepipedal shape with two square bases being parallel to both the body facing surface and the garment facing surface of the expanding layer 46, as illustrated in FIGS. 1 and 2, but alternate shapes are also possible e.g. smaller elements 50 with cubic shape or cylindrical shape having circular or oval bases, as well as smaller elements 50 having the shape of a cone or of a pyramid or of a truncated cone or truncated pyramid. In the two latter cases the two faces of the smaller elements 50 being parallel to the body facing surface and to the garment facing surface respectively of the expanding layer 46 have different surface areas.

The smaller elements 50 that constitute the expanding layer 46 can all have the same shape, or alternatively different shapes.

Each smaller element 50 has at least one flat face that is parallel to at least one of the body facing surface or of the garment facing surface of the expanding layer 46 with a surface area that is greater than 0.2 mm² preferably with a surface area comprised between 0.2 mm² and 100 mm². As used herein the term "surface area" related to each smaller element 50 refers to the surface area as previously defined. The surface area can be the same for all the smaller ele-

ments 50 that constitute the expanding layer 46 or alternatively, smaller elements having different surface areas can be comprised in different zones of the expanding layer 46, e.g. smaller elements of smaller surface area can be comprised in the portion of the expanding layer 46 which is intended to receive the fluid first; this can be the central portion of the expanding layer 46.

The smaller elements 50 can comprise void spaces 51 between them, as shown in FIGS. 1 to 3, or alternatively can be in contact to one another provided that they are decoupled the void spaces 51 can have the same size on the whole extent of the expanding layer 46, as illustrated in FIG. 1 or their size can vary in different zones of the expanding layer 46.

The expanding layer 46 is delimited by a periphery 53 that corresponds to the shortest closed boundary line that surrounds all the smaller elements 50 of the expanding layer 46. In the embodiment illustrated in FIG. 1 the periphery 53 is rectangular and comprises alternatively disposed longitudinal side margins and transverse ends that are parallel to the corresponding elements of the periphery of the absorbent core 28.

The smaller elements 50 can be joined or otherwise affixed to a substrate in order to be held together provided they are still decoupled from one another or alternatively, they can be laminated between two substrates. All the smaller elements 50 or only part of them can be joined to the substrate the substrate can be a separate element or can comprise one of the elements that constitute the sanitary napkin 20 the smaller elements 50 can be joined to the substrate by means of one of the methods known in the art, e.g. by gluing. The substrate can form preferably the garment facing surface of the expanding layer 46.

Alternatively, the substrate can be constituted by a net, for example a polypropylene net of suitable thickness, with the smaller elements 50 inserted within the spaces delimited by the wires of the net.

In the embodiment illustrated in FIGS. 1 to 3 all the smaller elements 50 that constitute the expanding layer 46 are joined at their garment facing surface to a substrate 54 that can have about the same shape and size of the area delimited within the periphery 53 of the expanding layer 46 as actually shown in FIGS. 1 to 3, the substrate 54 is slightly wider and longer than this area.

The substrate 54 can be any nonwoven material capable of diffusing the fluid received through the expanding layer 46 and of distributing it more evenly on the garment facing surface of the expanding layer 46 e.g. a hydrophilic nonwoven or tissue layer. The substrate 54 can be particularly useful in combination with an expanding layer 46 comprising void spaces 51 in case of release of sudden gushes of fluid the extra fluid that is not immediately absorbed within the expanding layer 46 is received by the substrate 54 directly through the void spaces 51 and is therefore distributed on the

garment facing surface of the expanding layer 46.

Alternatively, in an embodiment not illustrated and similar to that shown in FIGS. 1 to 3 the substrate can comprise the body facing surface of the substantially non expanding absorbent element 44 of the absorbent core 28, to which the smaller elements 50 of the expanding elements 48 can be directly joined with one of the methods known in the art, e.g. by gluing.

The smaller elements 50 forming the expanding layer 46 can be disposed at random or arranged in a repetitive pattern. preferred patterns for the smaller elements 50 may be squared array patterns, as illustrated in FIG. 1 or alternatively a triangular array pattern.

The void spaces 51 comprised among the smaller elements 50 can have a constant width throughout the whole surface of the expanding layer 46, as illustrated in FIG. 1 or alternatively, they can have different widths in different portions of the expanding layer 46, e.g. void spaces 51 of larger width may be comprised in the portion of the expanding layer 46 which is intended to receive the fluid first. The width of the void spaces 51 can be such that the smaller elements 50 cover from 20% to 100% of the total body facing surface of the expanding layer 48 comprised within the periphery 53 of the expanding layer 46. preferably, the smaller elements 50 cover from 35% to 80%, and most preferably from 55% to 85% of the total body facing surface of the expanding layer 48 comprised within the periphery 53.

The smaller elements 50 that constitute the expanding element 48 are completely free of expanding in Z-direction independently from one another without being restrained by the surrounding zones of the expanding layer 48 not yet reached by the fluid. This allows a much higher swelling of localized zones of the expanding layer 48 upon absorption of very limited amounts of fluid, as may happen when the first drops of body fluid are received by the expanding layer 48.

The stiffness of the expanding layer 48 is moreover very low and this leads to a higher flexibility of the expanding layer 48, and therefore to a sanitary napkin 20 that is more comfortable to the user.

FIGS. 2 and 3 show the sanitary napkin 20 before and after expansion of the expanding layer 46 respectively.

FIG. 2 shows the sanitary napkin 20 before the first fluid absorption with the expanding layer 46 prior to swelling. FIG. 3 shows the sanitary napkin 20 expanded into a tridimensional structure after activation of the expanding layer 46 upon absorption of a first amount of body fluid in its central zone which directly involves only the five central smaller elements 50 of the expanding layer 48, in the section shown in the figure. The first release of fluid is rapidly acquired within the void spaces 51 comprised among the smaller elements 50 first reached by the fluid: the void spaces 51 provide the expanding layer 48 with a path for initial fluid acquisition and with a broader surface area available for the fluid absorption and distribution within the expanding layer

46, so allowing a quick and effective swelling. The void spaces 51 provide the expanding layer 48, even after its swelling with a larger void volume available for the acquisition of further releases of fluid and with a direct path through the expanding layer 46 for the fluid transmission to the substantially non expanding absorbent element 44.

Upon absorption of this first amount of body fluid the five central elements 50 of the expanding layer 48 are capable of swelling in Z-direction completely independently of the surrounding distinct smaller elements not yet reached by the fluid, without being restrained by them. The zone of the expanding layer 48 that first receives the fluid may therefore swell more than if it were not formed by decoupled smaller elements 50 distinct from one another.

The absorption of the fluid within the expanding layer 46 is promoted by the void spaces 51 that increase the surface area available for the fluid acquisition and distribution and provide a preferential path for the diffusion of the fluid within the expanding layer 46 itself. This allows a higher acquisition speed of viscous body fluids as menses and vaginal discharges and provides an effective management of sudden gushes of fluid.

In case of release of particularly heavy fluid gushes the void spaces 51 create a straight path for sending directly into the substantially non expanding absorbent element 44 of the absorbent core 28, through the non-woven of the substrate 54 at least that portion of the fluid that may not be completely acquired within the expanding layer 46.

The dimensions of the smaller elements 50 expressed in terms of the surface area of the smaller elements 50 and the width of the void spaces 51 can be constant throughout the entire extension of the expanding layer 48, as illustrated in FIG. 1 or alternatively, different widths of the void spaces 51 and/or different surface areas of the smaller elements 50 can be adopted in different portions of the expanding layer 46. Smaller surface areas of the smaller elements 50 generally provide a higher swelling upon activation by even very small amounts of fluid, while larger void spaces 51 increase the capability of the expanding layer 48 of acquiring sudden gushes of fluid and of transmitting the excess fluid through the thickness of the expanding layer 46. narrower void spaces 51 on the other hand increase the capability of the expanding layer 46 of diffusing fluid far from the point that is first reached by the fluid.

The right balance among all these different features can be easily defined by the man skilled in the art.

The expanding layer 46 can also comprise smaller elements having a surface area that is larger than the highest preferred value of 100 mm². FIG. 4 shows an expanding layer 48 that comprises two end portions 55, each formed by a single smaller element 50 having a larger size corresponding to about one third of the total surface area comprised within the periphery 53 and a

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central portion 56 that comprises smaller elements 50 each having a surface area comprised in the preferred range.

Smaller elements 50 can comprise slits on their body facing surface and/or on their garment facing surface they can also comprise incisions as those described in European application EP 96106724.6 and/or apertures as those described in European application EP 96106723.8, both applications filed on 29 April 1996

In a preferred embodiment of the present invention the expanding layer 46 comprises a sheet of compressed regenerated cellulose sponge.

The regenerated cellulose sponge that preferably constitutes the expanding layer 46 is a material that is known in the art examples of suitable materials are described in U.S. Patent No. 3 954,483 in French Patent Application FR A-2,203,827 and in European Patent EP-B-0 283 208. The regenerated cellulose sponge is a sponge of a material containing a cellulose skeleton. Examples of such sponges include, in addition to sponges consisting of cellulose itself sponges consisting of a cellulose derivative as viscose, a cellulose ether and a cellulose ester and sponges consisting of mixtures of those materials.

By way of example only, a regenerated cellulose sponge may be prepared from a mixture of a viscose solution with reinforcing fibres and a porogenic compound e.g. crystals of sodium sulphate decahydrate or of another alkali metal salt with a high content of crystallized water the final pore dimension being related to that of the salt crystals. The viscose solution may be extruded through an extrusion die of the desired section then let coagulate. The material is washed with water after regeneration in order to eliminate the salt and other possible soluble compounds, then it is dried and if necessary compressed to the desired density.

The compressed regenerated cellulose sponge has a network structure that contains air bubbles created by the elimination of the sodium sulphate crystals.

The compressed regenerated cellulose sponge material is available in various forms, e.g. in layers or sheets of different densities, thicknesses and basis weights dry densities values for the compressed material used for the expanding layer 46 of the present invention are from 0.1 g/cc to 1 g/cc, while thicknesses may range from 0.2 mm to 5 mm.

The swelling upon liquid absorption of the compressed regenerated cellulose sponge material that forms the expanding layer 46 takes place substantially in the direction of the compression and restores the pore size of the regenerated sponge before the compression. It creates a void volume that does not collapse in wet conditions and therefore enables the material to rapidly acquire further releases of fluid and to transmit them to the underlying absorbent element 44 of the absorbent core 28.

In the embodiment illustrated in FIGS. 1 to 3 the

total absorbent capacity of the sanitary napkin 20 is provided for by an absorbent core 28 that comprises and expanding layer 46 comprising smaller elements 50 made of a sheet of compressed regenerated cellulose sponge, and a substantially non expanding absorbent element 44.

In a preferred embodiment of the present invention which is illustrated in FIGS. 1 and 2 the absorbent core 28 comprises a substantially non expanding absorbent element 44 and an expanding layer 46 constituted by smaller elements 50 of compressed regenerated cellulose sponge with a dry density of 0.5 g/cc and a thickness of 2 mm arranged in a squared array and with a parallelepipedal shape having square bases with a 4 mm side the surface area of each smaller element 50 as previously defined, is therefore 16 mm² all the smaller elements 50 comprised in the expanding layer 46 are compressed in Z-direction the expanding layer 46 is delimited by a periphery 53 that is rectangular and comprises alternately disposed longitudinal side margins and transverse ends being 124 mm long and 29 mm long respectively the void spaces 51 have a constant width of 1 mm and therefore the total surface area of the smaller elements 50 constitutes about 87% of the body facing surface of the expanding layer 46 comprised within the periphery 53 of the expanding layer 46. The smaller elements 50 are joined by gluing at their garment facing surfaces to a substrate having the same shape and dimensions of the periphery 53 of the expanding layer 46 made of a hydrophilic thermal bonded polypropylene nonwoven layer with a basis weight of 20 g/m². The expanding layer 46 is positioned on the body facing side of the absorbent element 44 in face to face relationship with it, both being centered about both longitudinal and transverse centrelines O-O and A-A of the sanitary napkin 20. The absorbent element 44 of the absorbent core 28 is 207 mm long and 64 mm wide. Suitable sheets of compressed regenerated cellulose sponge may be those produced by Spon-tex France.

The compressed regenerated cellulose sponge that preferably constitutes the expanding layer 46 is capable of absorbing body fluids quickly with a large increase in its volume, generally from about 2 to 20 times, and usually from 5 to 15 times its volume at the time of the compression. The volume increase substantially corresponds to a swelling in the direction of the compression that is in the Z-direction in the sanitary napkin 20.

The sanitary napkin 20 is produced and packaged as a conventional flat product, as illustrated in FIGS. 1 and 2. After the sanitary napkin 20 has been worn as soon as the absorbed body fluids come in contact with the expanding layer 46, this will begin to swell in Z-direction increasing its thickness, as can be seen in FIG. 3. The topsheet 24 follows the swelling of the expanding layer 46 by straightening out the pleats or folds 52 therefore increasing its width without restraining the

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swelling

The swelling of the compressed regenerated cellulose sponge sheet that constitutes the expanding layer 46 takes place only upon activation by the absorbed fluid that is only during the use of the sanitary napkin 20 and in close contact with the user's anatomy the formation of the tridimensional structure can therefore achieve a much better fit with the anatomy of the user. Moreover the swelling of the compressed regenerated cellulose sponge sheet 46 may start where it is actually reached by the fluid first; the formation of the tridimensional structure may also fit therefore the different possible ways in which the body fluids may be released by various users.

The decoupled smaller elements 50 that constitute the expanding layer 46 make it possible a higher and localized swelling of the smaller elements 50 that are actually reached by the body fluid without the restraining effect of the surrounding still dry portions of the expanding layer 46 this allows the expanding layer 46 to conform more effectively to the user's anatomy, even upon activation by very small amounts of body fluid.

The void spaces 51 allow a more effective management of sudden gushes of fluid and a better diffusion of fluid within the expanding layer 46 therefore promoting a higher and more rapid swelling even under absorption of small amounts of viscous body fluids.

The expanding layer 46 has moreover a very high flexibility, even in its dry state before the activation by absorbed body fluids, and therefore the sanitary napkin 20 is more comfortable for the wearer.

The expanding topsheet 24 also provides a comfortable contact with the user's anatomy without restraining the expansion of the sanitary napkin 20 into the desired tridimensional structure upon activation by body fluids.

The sanitary napkin of the present invention is flat prior to use, and may be therefore manufactured and packaged more easily than a conventional elasticated or pre-formed article. Since the tridimensional structure is formed only during the use, the sanitary napkin of the present invention is also easier to wear.

In an alternate embodiment of the present invention, the sanitary napkin 20 may have two flaps (not shown) each of which are adjacent to and extend laterally from the side edge of the absorbent core. The flaps are configured to drape over the edges of the wearer's panties in the crotch region so that the flaps are disposed between the edges of the wearer's panties and the wearer's thighs. The flaps serve at least two purposes. First, the flaps help serve to prevent soiling of the wearer's body and panties by menstrual fluid preferably by forming a double wall barrier along the edges of the panty. Second the flaps are preferably provided with attachment means on their garment facing surface so that the flaps can be folded back under the panty and attached to the garment facing side of the panty. In this way the flaps serve to keep the sanitary napkin properly

positioned in the panty.

The flaps may be constructed of various materials including materials used for the topsheet 24, backsheet 26, combinations thereof, and may be a laminate having tissue in the centre. Further the flaps may be a separate element attached to the main body of the sanitary napkin 20 or can comprise extensions of the topsheet 24 and/or backsheet 26. It is recommended however that the flaps have a liquid impervious backsheet to prevent body fluids which reach the flaps from soiling the edges of the wearer's panties.

Preferred flaps that are suitable or adaptable to the sanitary napkin 20 of the present invention are disclosed in U.S. Pat. No. 4,687,478 issued to Van Tilburg on Aug. 18, 1987; U.S. Pat. No. 4,589,878 issued to Van Tilburg on May 20, 1986 and U.S. Pat. No. 4,608,047 issued to Mattingly on Aug. 26, 1986.

Optionally the sanitary napkin 20 may comprise components that naturally wrap the sides of a wearer's panties. Sanitary napkins having components that naturally wrap the sides of a wearer's panties suitable for use with the sanitary napkin 20 of the present invention are disclosed in U.S. Patent Application Serial No. 08/096 121 entitled "Absorbent Article having Panty Covering Components that Naturally Wrap the Sides of Panties" filed July 22, 1993 in the names of Lavash et al and U.S. Patent Application Serial No. 08/277733 entitled "Absorbent Articles Having Undergarment Covering Components with Zones of Extensibility" filed July 20, 1994, in the names of Weinberger et al.

The expanding layer 46 for expanding the sanitary napkin 20 into a tridimensional structure during wear can be comprised in the sanitary napkin 20 in any other suitable position and/or orientation in order to get the desired tridimensional structure, in particular it can form at least part of the garment facing surface of the absorbent core 28.

An optional component that can be included in the sanitary napkin 20 of the present invention is an odour control means, any suitable odour control means can be incorporated in the sanitary napkin of the present invention in any desired form according to the techniques well known in the art.

In an alternate embodiment illustrated in FIG. 5 a sanitary napkin 20 similar to that illustrated in FIGS. 1 and 2 further comprises an acquisition layer or secondary topsheet 29 positioned between the topsheet 24 and the absorbent core 28. Preferably the acquisition layer 29 does not completely overlie the absorbent core 28, in the embodiment illustrated in FIG. 5 the acquisition layer 29 does not cover the expanding layer 46 that is therefore capable of receiving the body fluids directly through the topsheet 24. As illustrated in FIG. 5 the acquisition layer 29 has a discontinuous surface comprising a window which is slightly longer and wider than the expanding layer 46 therefore the acquisition layer 29 is actually comprised between the topsheet 24 and the absorbent element 44 of the absorbent core 28.

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Alternate configurations may also be possible e.g. the acquisition layer 29 may comprise two narrow strips longitudinally oriented and positioned over the absorbent element 44 of the absorbent core 28 at both sides of the expanding layer 46. Alternatively, the acquisition layer 29 can be comprised between the absorbent core 28 and the backsheet 26 further the acquisition layer 29 can be comprised between the expanding layer 46 and the absorbent element 44 in an embodiment similar to that illustrated in FIG. 2.

The acquisition layer 29 may serve several functions including improving wicking of body fluids that directly reach the acquisition layer 29 over and into the absorbent core 28. In the embodiment illustrated in FIG. 5 the acquisition layer 29 may also receive fluid that may escape laterally from the expanding layer 46 and direct it into the absorbent element 44 of the absorbent core 28. By improving wicking of body fluids, the acquisition layer 29 provides a more even distribution of the body fluids throughout the absorbent core 28.

The acquisition layer 29 preferably comprises materials that are capable of acquiring liquid very fast, and subsequently release it to contiguous layers with substantially no retention capacity.

The acquisition layer 29 may be comprised of several different materials including nonwoven or woven webs of synthetic fibres including polyester polypropylene, or polyethylene natural fibres including cotton or cellulose blends of such fibres or any equivalent materials or combinations of materials. Examples of sanitary napkins having an acquisition layer and a topsheet are more fully described in U.S. Pat. No. 4,950,264 issued to Osborn and U.S. Pat. Application Serial No. 07/810 774 "Absorbent Article Having Fused Layers" filed December 17 1991 in the names of Cree, et al.

The topsheet 24, the acquisition layer 29 and the absorbent core 28 may also be associated in any suitable manner in order to insure proper fluid transfer between them. In a further alternative embodiment that is not illustrated the acquisition layer 29 may be interposed between the topsheet 24 and the underlying absorbent core 28 comprising the expanding layer 46 the acquisition layer 29 must be left free to follow the expansion of the expanding layer 46 upon absorption of liquid without restraining its swelling.

In the embodiment illustrated in FIG. 5 the expanding layer 46 comprises smaller elements 50 arranged in the same way shown in FIG. 1 they are however directly joined to the body facing surface of the substantially non expanding absorbent element 44, which therefore constitutes the common substrate of the smaller elements 50.

As illustrated in FIG. 5 the pleats or folds 52 are positioned at both sides of the longitudinal centreline O-O and substantially parallel to it, but in each pleat or fold 52 the topsheet 24 is folded twice on itself toward the longitudinal centreline O-O of the sanitary napkin 20. During the swelling of the expanding layer 46 upon fluid

absorption the straightening out of the pleats or folds 52 forms a sort of longitudinally oriented side cuffs 47 that provide a better seal against side leakage, as illustrated in FIG. 6 the side cuffs 47 may still be present when the swelling of the expanding layer 46 is completed if the overall width of the topsheet 24 is slightly higher than that which would be necessary to follow the complete swelling of the expanding layer 46.

An even further embodiment not illustrated that can be particularly advantageous in combination with an expanding layer 46 with void spaces 51 can comprise an acquisition layer 29 of the same dimension of the expanding layer 46 positioned adjacent to the garment facing surface of the expanding layer 46, the acquisition layer 29 could be e.g. comprised between the expanding layer 46 and the absorbent element 44 in an embodiment similar to that illustrated in FIG. 2. The acquisition layer in this case does not acquire fluid first, but rather receives extra fluid through the void spaces 51 in the expanding layer 46 and therefore is capable of distributing it more evenly on the garment facing surface of the expanding layer 46.

Although the disposable absorbent article of the present invention has been described with reference to a sanitary napkin it can be used beneficially in the context of other disposable absorbent articles such as panty liners, incontinence articles and diapers. The disposable absorbent article may thus also have all those features and parts which are typical for products in the context of their intended use.

Claims

1. A disposable absorbent article for wearing adjacent a body discharge area, said article having a longitudinal centreline and a lateral centreline orthogonal to said longitudinal centreline and defining longitudinal and lateral directions respectively, said article further having a Z-direction which is orthogonal to both said longitudinal and said lateral directions, said article comprising a liquid pervious topsheet, a backsheet joined to said topsheet, and an absorbent core intermediate said topsheet and said backsheet, said absorbent core having a body facing surface and comprising an expanding layer that is capable of expanding said article into a three-dimensional structure while being worn by a user said expanding layer being activated by body fluids, said expanding layer being delimited by a periphery and having a body facing surface and a garment facing surface, said absorbent article being characterized in that said expanding layer comprises a number of smaller elements being decoupled from one another said smaller elements further being coplanar.
2. A disposable absorbent article according to claim 1 characterized in that each of said smaller elements

upon activation by body fluids expands substantially in said Z-direction to provide said disposable absorbent article with said tridimensional structure.

3. A disposable absorbent article according to any preceding claim, characterized in that said smaller elements have at least one flat face that is parallel to at least one of said body facing surface or of said garment facing surface of said expanding layer 5
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4. A disposable absorbent article according to any preceding claim characterized in that said at least one flat face has a surface area that is greater than 0.2 mm^2 preferably from 0.2 mm^2 to 100 mm^2 15
5. A disposable absorbent article according to any preceding claim characterized in that said smaller elements cover from 20% to 100% of the total body facing surface of said expanding layer within said periphery. 20
6. A disposable absorbent article according to any preceding claim characterized in that said smaller elements of said expanding layer are joined to a substrate, or laminated between two substrates. 25
7. A disposable absorbent article according to claim 6, characterized in that said substrate forms said garment facing surface of said expanding layer 30
8. A disposable absorbent article according to any preceding claim, characterized in that said smaller elements of said expanding layer are arranged in a repetitive pattern. 35
9. A disposable absorbent article according to any preceding claim characterized in that said expanding layer forms at least part of said body facing surface of said absorbent core 40
10. A disposable absorbent article according to any preceding claim, characterized in that said smaller elements of said expanding layer comprise compressed regenerated cellulose sponge material having a dry density of $0.1\text{--}1 \text{ g/cc}$. 45

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Fig. 1

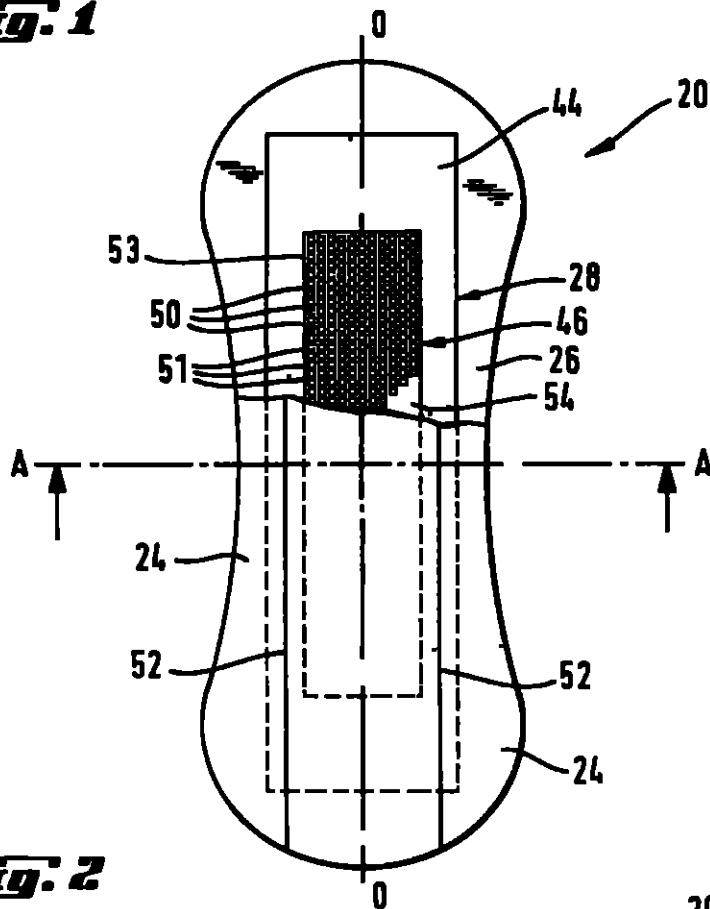


Fig. 2

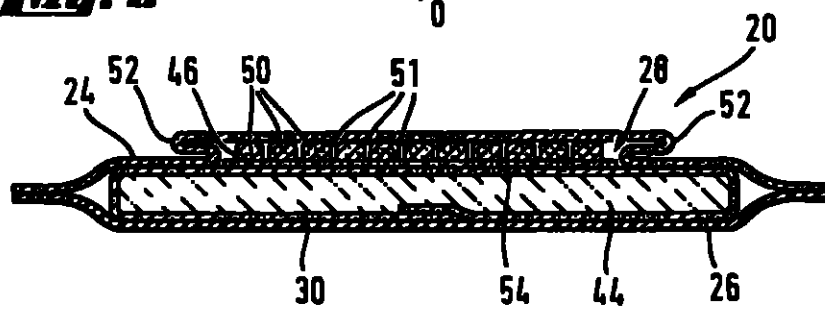
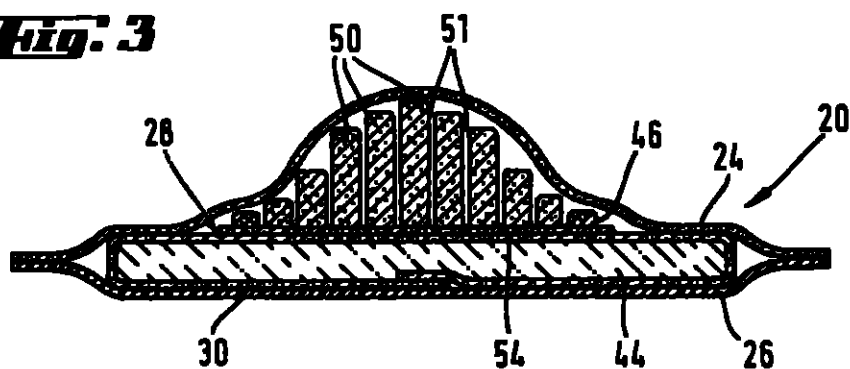


Fig. 3



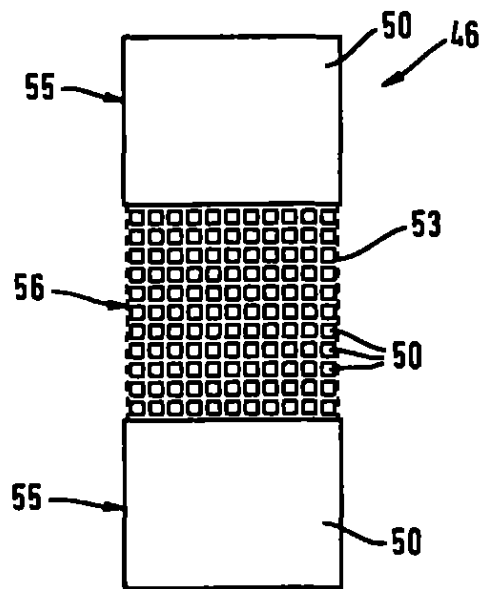


Fig. 4

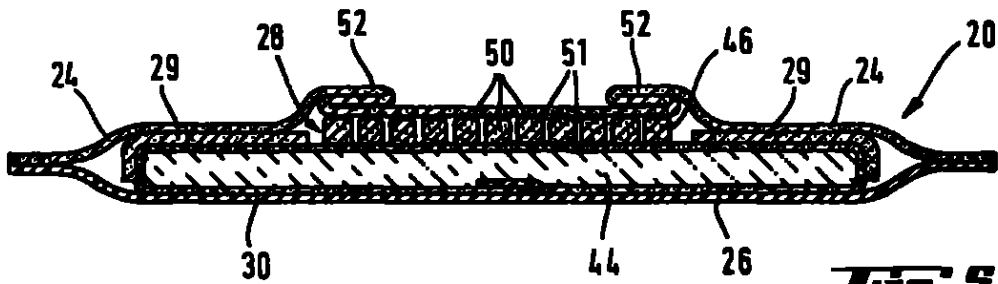


Fig. 5

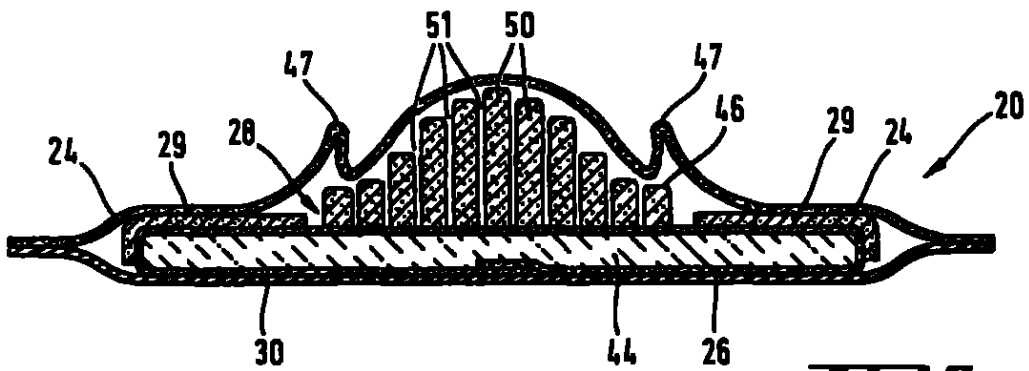


Fig. 6



US005846230A

United States Patent [19]

[11] Patent Number 5,846,230

Osborn, III et al

[45] Date of Patent *Dec. 8, 1998

[54] ABSORBENT ARTICLE WITH MEANS FOR DIRECTIONAL FLUID DISTRIBUTION

[75] Inventors: Thomas Ward Osborn, III Cincinnati
Deborah Catherine Schmitz, Waco
Chester James William Cree-Melliss
Noel Elder both of Cincinnati all of Ohio[73] Assignee: The Procter & Gamble Co.
Cincinnati, Ohio

[*] Notice: The term of this patent shall not extend beyond the expiration date of Pat. No. 5,647,862

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WO 93/11727 6/1993 WIPOPrimary Examiner—Robert A. Clarke
Attorney, Agent, or Firm—Jeffrey V. Bamher, Steven W. Miller, Jacobus C. Ramer

[21] Appl. No. 886,831

[22] Filed Jul. 1, 1997

Related U.S. Application Data

[63] Continuation of Ser. No. 513,601, Aug. 10, 1995 Pat. No. 5,647,862, which is a continuation of Ser. No. 340,013, Nov. 15, 1994, which is a continuation of Ser. No. 83,425, Jun. 28, 1993.

[51] Int. Cl. — — — — — A61F 13/15
[52] U.S. Cl. — — — — — 604/378 607/187
[58] Field of Search — — — — — 604/378 387
604/885 1

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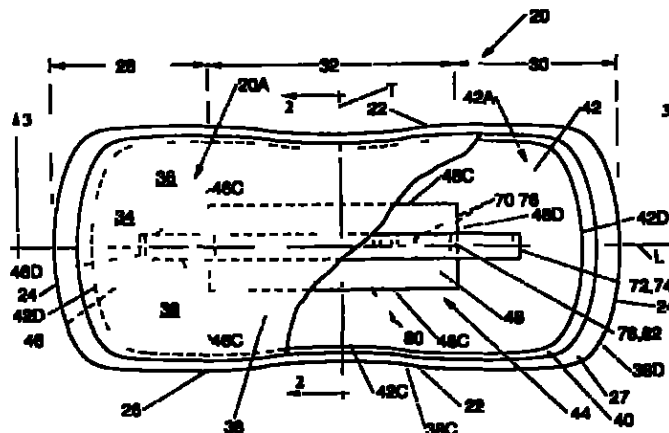
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[57] ABSTRACT

An absorbent article such as a generally thin flexible sanitary napkin with a topsheet backsheet and absorbent core is provided. The absorbent article has a means for directional fluid distribution such as a fluid directing strip positioned between the topsheet and absorbent core and an absorbent strip positioned between the topsheet and fluid directing strip. The relationships between the sizes of the fluid directing strip and the absorbent strip are such that the width of the fluid directing strip is greater than that of the absorbent strip and the length of the absorbent strip is greater than that of the fluid directing strip, so that bodily exudates may be directed toward the ends of the absorbent core even when the sanitary napkin assumes a body conforming shape or is otherwise distorted during use.

20 Claims, 4 Drawing Sheets



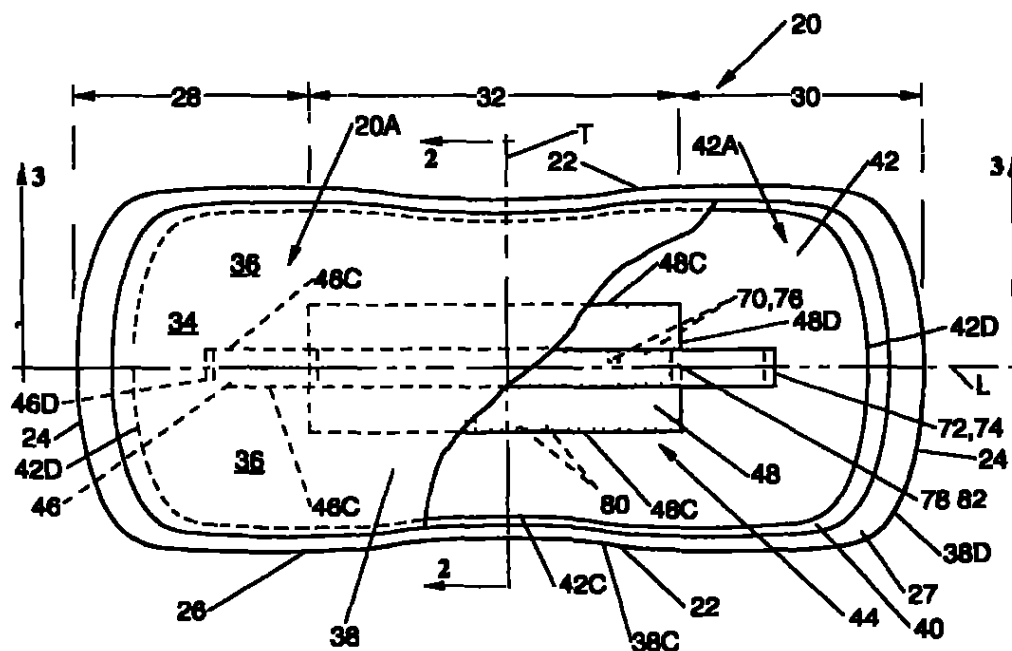


Fig 1

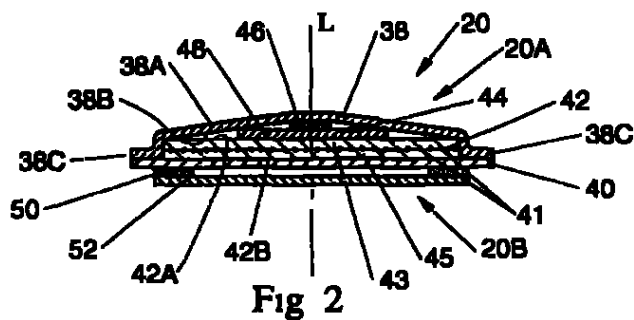


Fig 2

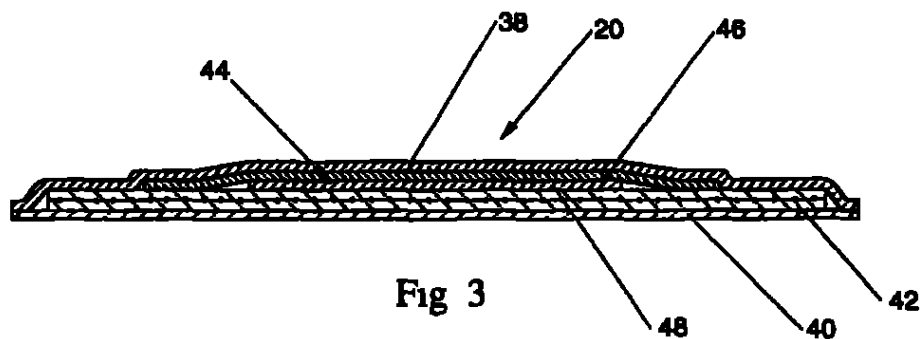


Fig 3

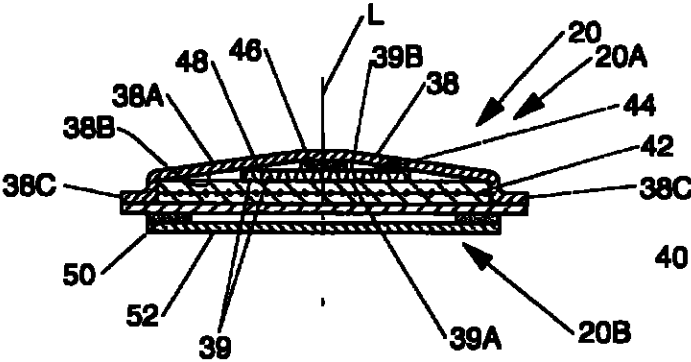


Fig 4

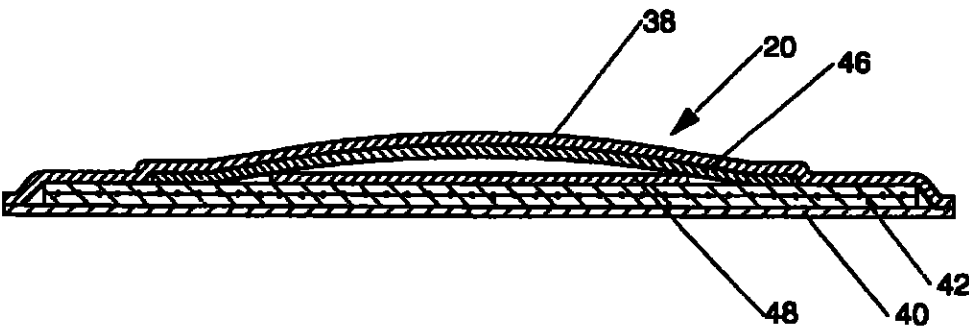


Fig 5

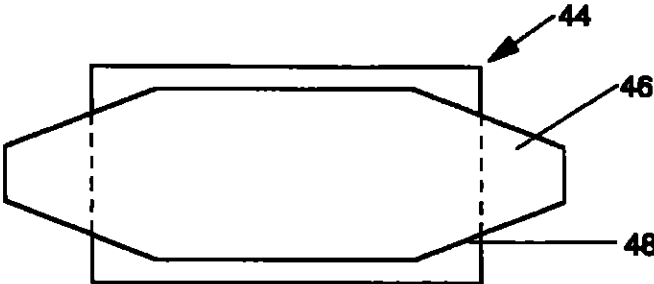


Fig 6

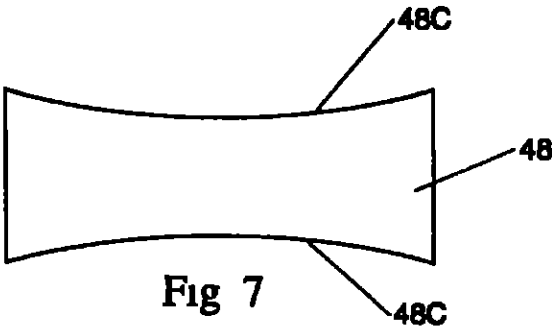
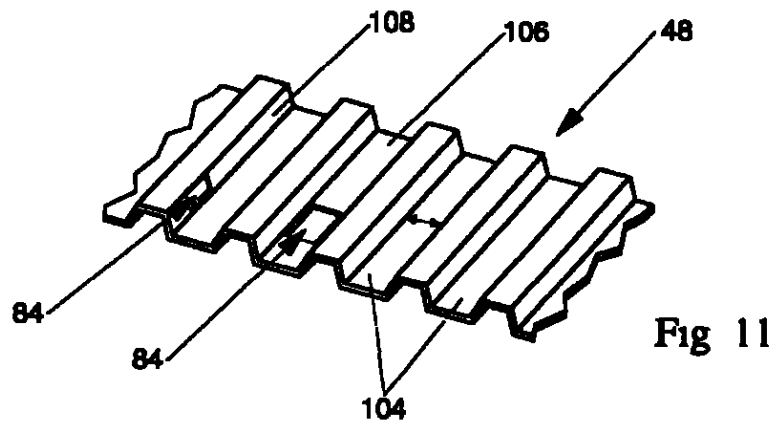
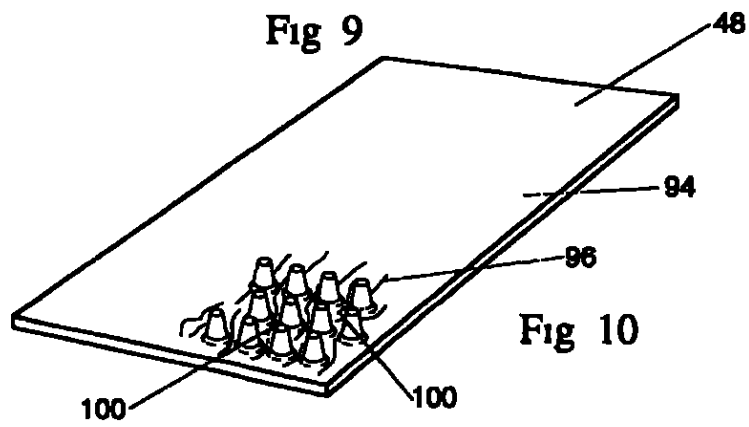
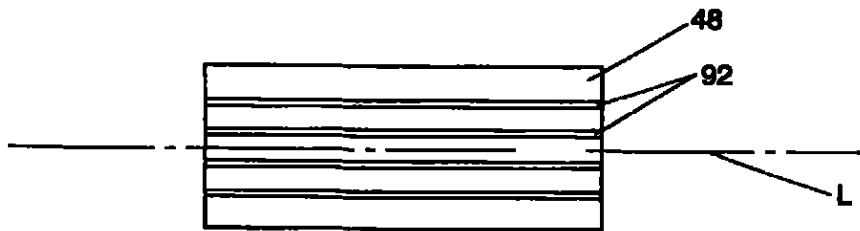
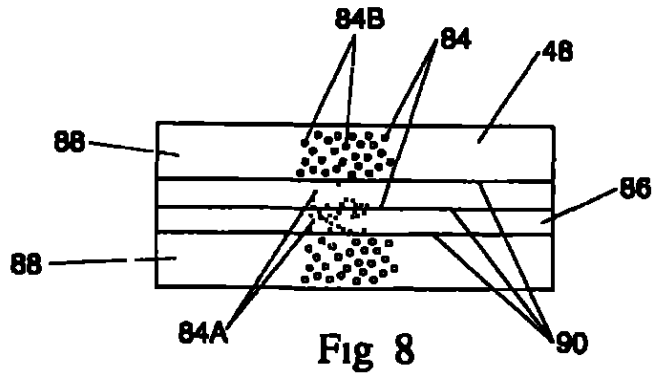


Fig 7



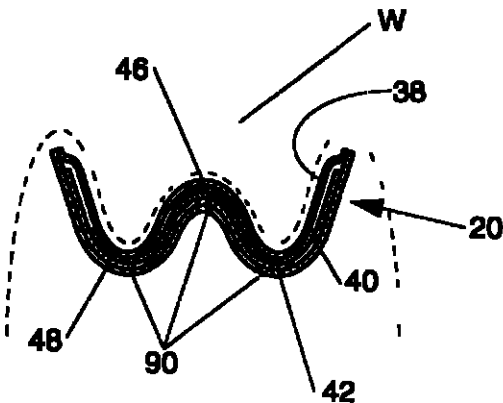


Fig 12

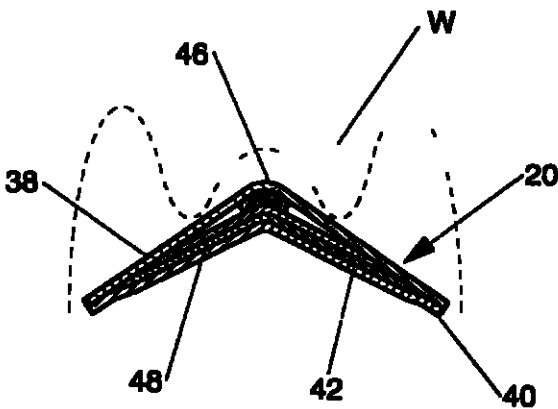


Fig 13

ABSORBENT ARTICLE WITH MEANS FOR DIRECTIONAL FLUID DISTRIBUTION

This is a continuation of application Ser. No. 08/513,600, filed on Aug. 10, 1995 now U.S. Pat. No. 5,647,862, which is a continuation of application Ser. No. 08/340,013, filed on Nov. 15, 1994 which is a continuation of application Ser. No. 08/083,425 filed on Jun. 28, 1993.

FIELD OF THE INVENTION

The present invention relates to absorbent articles, particularly sanitary napkins. More particularly the present invention relates to a generally thin flexible sanitary napkin with a means for directional fluid distribution.

BACKGROUND OF THE INVENTION

Absorbent articles, such as sanitary napkins, panty liners, and incontinence pads that are designed to absorb and retain liquids and other discharges from the human body and to prevent body and clothing soiling, having various different constructions are well known.

The current tendency has been to develop absorbent articles such as sanitary napkins which are increasingly thinner and conform better to the body. Recently efforts have been directed to developing thinner sanitary napkins which have the capacity to absorb and contain medium to high menstrual discharges. Previously such discharges could only be handled by relatively thick sanitary napkins. Examples of thin sanitary napkins having capacities great enough to handle medium to high menstrual flows are disclosed in U.S. Pat. Nos. 4,950,264 and 5,009,653, issued to Osborn on Aug. 21, 1990 and Apr. 23, 1991 respectively.

One of the main objectives in developing absorbent articles is to utilize the entire capacity of the absorbent article. The utilization of the capacity for absorption of menses and other bodily exudates in the thin sanitary napkins described in the Osborn references is achieved at least in part by the presence of a "wipe acquisition sheet" that distributes the exudates more evenly over the underlying absorbent core. In general, products that are not provided with a structure like the wipe acquisition sheet described in the aforementioned patents, typically distribute liquids in a circular pattern, resulting in liquids reaching the longitudinal side edges of the absorbent article before the end regions of the absorbent article are utilized. When liquids come near the longitudinal side edges of the absorbent article, the chance for leakage from the sides of the product increases, despite available absorbent capacity in the end regions of the absorbent article.

In the past a number of efforts have been made to direct exudates in an attempt to utilize more of the absorbent capacity of an absorbent article. A number of these efforts have used absorbent means or densification of absorbent means. Some of such efforts are described in U.S. Pat. No. 4,678,453 issued Jul. 7, 1987 to Holtman and U.S. Pat. No. 4,624,666 issued Nov. 25, 1986 to DeRossett et al. Absorbent articles which use absorbent means to direct fluid flow however are typically subject to the disadvantage that the absorbent means will tend to become saturated and interfere with its fluid directing capabilities.

Another series of patents teaches the use of baffles, barriers, and transfer members for liquid transport. For instance U.S. Pat. 4,029,101 issued Jun. 14, 1977 to Chesky et al. discloses using an elongated baffle near the base of the pad. U.S. Pat. No. 3,736,931 issued Jun. 5, 1973 to Glassman discloses using a moisture impervious layer in the pad.

However in both of these examples, liquids may wick laterally before reaching the baffle or the moisture impervious layer. This may tend to cause side failure (or side leakage), particularly when the pad bunches during wear. In such cases, the barrier or transfer member may be disturbed by the bunching of the pad and body fluids may circumvent the barrier or transfer member and flow directly toward the longitudinal side edges of the product.

Thus, a need exists for an absorbent article such as a sanitary napkin that has an improved means for directional fluid distribution that distributes bodily exudates so that the exudates will not reach the longitudinal side edges of the absorbent article before reaching the end regions of the article.

It is, therefore, an object of the present invention to provide an absorbent article such as a sanitary napkin with a means for enabling the entire absorbent capacity of the sanitary napkin to be utilized before liquids reach the longitudinal side edges of the napkin.

It is another object of the present invention to provide a generally thin, flexible sanitary napkin that conforms to the wearer's body.

SUMMARY OF THE INVENTION

The present invention is directed to an absorbent article, such as a sanitary napkin. More preferably the present invention is directed to a generally thin flexible sanitary napkin with a means for directional fluid distribution.

The sanitary napkin of the present invention has a longitudinal centerline, a transverse centerline, a body-facing surface and a garment facing surface. The sanitary napkin comprises a liquid pervious topsheet, a liquid impervious backsheet joined to the topsheet, an absorbent core positioned between the topsheet and backsheet, and a means for directional fluid distribution. The means for directional fluid distribution can in one embodiment comprise a liquid impervious or semi-pervious fluid directing strip positioned between the absorbent core and the topsheet and a liquid transporting structure such as an absorbent strip positioned between the fluid directing strip and the topsheet. The width of the absorbent strip is preferably less than the width of the fluid directing strip. The length of the absorbent strip is preferably greater than or equal to the length of the fluid directing strip so that it is capable of wicking liquids over the fluid directing strip toward the ends of the core.

There are a non-limiting number of embodiments of the means for directional fluid distribution. In one embodiment the fluid directing strip comprises a hydrophobic film such as a polyethylene film. The fluid directing strip in this embodiment may be apertured or non-apertured. In another embodiment the absorbent strip and the fluid directing strip can be replaced by a single component which serves the function of both strips. In other embodiments, the fluid directing strip may have a plurality of longitudinally oriented channels formed therein. In another embodiment the fluid directing strip can be comprised of a hydrophobic structure such as a film which has a hydrophilic component dispersed therein. The hydrophilic portion provides a bucket-like structure that has to be filled up before overflowing to the hydrophilic portion of the fluid directing strip. In still other embodiments, the fluid directing strip may comprise a structure such as a plastic film that has a plurality of troughs formed therein.

The sanitary napkin preferably has a caliper less than or equal to about 4 millimeters and is flexible enough to conform to the wearer's body. The components of the means

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for directional fluid distribution are sufficiently flexible and joined in such a way that they maintain the desired relationship with each other during wear, particularly when the sanitary napkin is laterally compressed. The sanitary napkin in different embodiments may be predisposed to bend so that it assumes a "W"-shaped cross-section or other suitable cross-sectional configuration when worn.

BRIEF DESCRIPTION OF THE DRAWINGS

While the specification concludes with claims particularly pointing out and distinctly claiming the subject matter which is regarded as forming the present invention, it is believed that the invention will be better understood from the following description taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a top plan view of a preferred sanitary napkin embodiment of the present invention shown with a portion of the topsheet removed to show the underlying means for directional fluid distribution.

FIG. 2 is an enlarged cross-sectional view of the preferred sanitary napkin embodiment shown in FIG. 1 taken along line 2-2 of FIG. 1.

FIG. 3 is a cross-sectional view of the preferred sanitary napkin embodiment shown in FIG. 1 taken along line 3-3.

FIG. 4 is an enlarged cross-sectional view of a sanitary napkin taken from an angle similar to that of FIG. 2 which has a fluid directing strip that comprises an apertured film with tapered capillaries which is inverted so that the bottom openings of the capillaries face the topsheet of the sanitary napkin.

FIG. 5 is a cross-sectional view of a sanitary napkin taken from an angle similar to that of FIG. 3 in which the absorbent strip is attached only at its ends so it can "decouple" from the absorbent core.

FIG. 6 is a plan view of a means for directional fluid distribution that comprises a diamond-shaped absorbent strip and a rectangular fluid directing strip.

FIG. 7 is a plan view of a fluid directing strip that has concave longitudinal side edges.

FIG. 8 is a plan view of a fluid directing strip that comprises film which has zones provided with apertures of different sizes.

FIG. 9 is a plan view of a fluid directing strip that comprises foam which has longitudinally-oriented embossed lines formed therein.

FIG. 10 is a perspective view of a fluid directing strip that comprises a flexible, hydrophobic three dimensional apertured formed film with a hydrophilic component dispersed thereon (only a portion of the apertures are shown).

FIG. 11 is an enlarged perspective view of a fluid directing component that comprises a plastic film formed with a plurality of troughs therein.

FIG. 12 is a simplified schematic cross-sectional view which shows how the sanitary napkin preferably fits adjacent to the wearer's body in a "W" shape.

FIG. 13 is a simplified schematic cross-sectional view which shows how the sanitary napkin preferably fits adjacent to the wearer's body in an inverted "V" shape.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

1. General Characteristics of the Absorbent Article

FIG. 1 shows a particularly preferred embodiment of the disposable absorbent article of the present invention: sanitary napkin 20.

The term "absorbent articles" as used herein, refers to devices which absorb and contain body exudates, and, more specifically, refers to devices which are placed against or in proximity to the body of the wearer to absorb and contain the various exudates discharged from the body. The term "disposable" as used herein to describe absorbent articles which are not intended to be laundered or otherwise restored or reused as an absorbent article (i.e., they are intended to be discarded after a single use and, preferably, to be recycled, composted or otherwise disposed of in an environmentally compatible manner).

The term "sanitary napkin" as used herein refers to an absorbent article which is worn by females adjacent to the pudendal region, generally external to the urogenital region and which is intended to absorb and contain menstrual fluids and other vaginal discharges from the wearer's body (e.g., blood, menses, and urine). It should be understood, however, that the present invention is also applicable to other feminine hygienic or catamenial pads such as panty liners, or other absorbent articles such as incontinence pads, and the like.

The sanitary napkin 20 has two surfaces, a body contacting surface or "body surface" 20A and a garment surface 20B. The sanitary napkin 20 is shown in FIG. 1 as viewed from its body surface 20A. The body surface 20A is intended to be worn adjacent to the body of the wearer while the garment surface 20B is on the opposite side and is intended to be placed adjacent to the wearer's undergarments when the sanitary napkin 20 is worn.

The sanitary napkin 20 has two centerlines, a longitudinal centerline L and a transverse centerline T. The terms "longitudinal" and "transverse" are defined in U.S. Pat. No. 5,007,906 entitled "Decoupled Sanitary Napkin" issued to Osburn et al. on Apr. 16, 1991. (The term "lateral" is used herein interchangeably with the term "transverse".) The sanitary napkin 20 has a longitudinal dimension or length that runs in the general direction of the longitudinal centerline L, and a (typically shorter) transverse dimension or width that runs in the general direction of the transverse centerline T.

The sanitary napkin 20 has a periphery 26 which is defined by the outer edges of the sanitary napkin 20 in which the longitudinal edges (or "side edges") are designated 22 and the end edges (or "ends") are designated 24, and the corners of the sanitary napkin are designated 27. The sanitary napkin has two end regions, which are designated first end region 28 and second end region 30. A central region 32 is disposed between the end regions 28 and 30. The end regions 28 and 30 extend outwardly from the edges of the central region 32 about 1/4 to about 1/2 of the length of the sanitary napkin. A detailed description of the central region 32 and the two end regions 28 and 30 is contained in U.S. Pat. No. 4,690,680 issued to Higgins on Sep. 1, 1987.

FIG. 2 shows that the sanitary napkin 20 preferably comprises a liquid pervious topsheet 38, a liquid impervious backsheet 40, an absorbent core 42 positioned between the topsheet 38 and backsheet 40, and a means for directional fluid distribution (or means for directional liquid distribution) 44 positioned between the topsheet 38 and the absorbent core 42. The means for directional fluid distribution 44 shown in FIGS. 1 and 2 comprises a liquid transporting component such as an absorbent strip 46 positioned between the topsheet 38 and the absorbent core 42, and a liquid directing component such as a liquid impervious fluid directing strip 48 positioned between absorbent strip 46 and the absorbent core 42.

2 The Individual Components of the Sanitary Napkin

A The Topsheet

Examining the components of the sanitary napkin in more detail with continuing reference to FIGS 1 and 2 the topsheet 38 is the component which is oriented towards and contacts the body of the wearer and receives bodily discharges.

The topsheet 38 is liquid pervious and should be flexible and non-irritating to the skin. As used herein the term "flexible" and refers to materials which are compliant and readily conform to the shape of the body or respond by easily deforming in the presence of external forces. The topsheet 38 should exhibit good strikethrough and low rewet characteristics, permitting bodily discharges to rapidly penetrate the thickness of the topsheet 38 and move into the absorbent strip 46 and sequentially into the absorbent core 42 but not flow back through the topsheet 38 to the skin of the wearer. Preferably, the topsheet 38 is not noisy to provide discretion for the wearer. The topsheet 38 should be sanitary clean in appearance and somewhat opaque to hide bodily discharges collected in and absorbed by the absorbent strip 46 and absorbent core 42.

FIG 2 shows that the topsheet 38 has two sides (or faces or surfaces), including a body-facing side 38A and a garment facing side (or core facing side) 38B. The body facing side 38A of the topsheet 38 generally forms at least a portion of the body-contacting surface ("body surface") 20A of the sanitary napkin 20. The topsheet 38 has, as shown in FIG 1, two longitudinal edges 38C and two end edges 38D.

(A similar numbering system can be used for the other components of the sanitary napkin. That is, the side of the component facing the wearer's body can be designated by the number of the component and a reference letter "A". The side of the component facing the wearer's undergarments can be designated by the number of the component and the letter "B". The side and end edges can be designated by the number of the component and the reference letters "C" and "D" respectively.)

A suitable topsheet 38 may be manufactured from a wide range of materials such as woven and nonwoven materials, polymeric materials such as apertured formed thermoplastic films, apertured plastic films, and hydroformed thermoplastic films, porous foams, reticulated foams, reticulated thermoplastic films, and thermoplastic scrims. Suitable woven and nonwoven materials can be comprised of natural fibers (e.g., wood or cotton fibers), synthetic fibers (e.g., polymeric fibers such as polyester, polypropylene or polyethylene fibers) or from a combination of natural and synthetic fibers.

A preferred topsheet 38 comprises an apertured formed film. Apertured formed films are preferred for the topsheet because they are pervious to body exudates and yet non-absorbent and have a reduced tendency to allow liquids to pass back through and rewet the wearer's skin. Thus, the surface of the formed film which is in contact with the body remains dry thereby reducing body soiling and creating a more comfortable feel for the wearer.

Suitable formed films are described in U.S. Pat. No. 3,929,135 issued to Thompson on Dec. 30, 1975; U.S. Pat. No. 4,324,246 issued to Mullana, et al. on Apr. 13, 1982; U.S. Pat. No. 4,342,314 issued to Radcliff et al. on Aug. 3, 1982; U.S. Pat. No. 4,463,045 issued to Ahir et al. on Jul. 31, 1984; U.S. Pat. No. 4,629,643 issued to Curro et al. on Dec. 16, 1986; and U.S. Pat. No. 5,006,394 issued to Baird on Apr. 9, 1991. The preferred topsheet for the present inven-

tion is the formed film described in one or more of the above patents and marketed on sanitary napkins by The Procter & Gamble Company as "DRI WEAVE".

The topsheet 38 has a plurality of apertures to permit liquids deposited thereon to pass through to the core 42. An apertured polyolefinic film topsheet 38 having about 5 to about 60 percent open area, typically about 25 percent open area and a thickness of about 0.01 to about 0.05 millimeters prior to aperturing and about 0.42 to about 0.51 millimeters after aperturing is suitable. A particularly suitable topsheet 38 may be made in accordance with U.S. Pat. No. 4,342,314 issued Aug. 3, 1982 to Radcliff et al. and U.S. Pat. No. 4,463,045 issued Jul. 31, 1984 to Ahir et al. A topsheet 38 made of model X-3265 or model P1552 apertured formed film sold by Tredegar Corporation of Terre Haute, Ind. has been found to work well.

Preferably the topsheet 38 is sprayed or otherwise treated with a surfactant to enhance liquid penetration to the absorbent strip 46 and underlying absorbent core 42. Suitable methods for treating the topsheet with a surfactant are described in U.S. Pat. Nos. 4,950,264 and 5,009,653 issued to Osborn. The surfactant is typically nonionic and should be non-irritating to the skin. A surfactant density of about 0.01 milligrams per square centimeter of topsheet 38 area is suitable. A suitable surfactant is sold by Glyco Chemical Inc. of Greenwich, Conn. as Pegospense 200 ML.

B The Absorbent Core

The absorbent core 42 is one of the means for collecting and containing bodily discharges, particularly menses, deposited thereon or which otherwise traverse through the liquid permeable topsheet 38.

The absorbent core 42 may be manufactured in a wide variety of sizes and shapes (e.g., rectangular, oval, hourglass, dog bone, asymmetrical, etc.). The absorbent core 42 has a body surface 42A, a garment surface 42B, side edges 42C and end edges 42D. The core 42 is preferably conformable and non-irritating to the skin. The absorbent core 42 of the preferred sanitary napkin 20 shown in FIGS 1-3 comprises a modified hourglass-shaped laminate comprising two layers of tissue, upper layer 43 and lower layer 45 with absorbent gelling material particles 41 sandwiched between the tissue layers. The absorbent core 42 can in other embodiments, be made of a number of other suitable materials.

Suitable materials for the absorbent core 42 include but are not limited to comminuted wood pulp which is generally referred to as airlaid, creped cellulose wadding, tissue including tissue wraps and tissue laminates, synthetic fibers especially polymeric fibers, such as crimped polyester fibers, meltblown polymers including cotton, chemically stiffened, modified or cross-linked cellulosic fibers, fibers having intra fiber capillary channels preferably on their exterior surfaces (capillary channel fibers), peat moss, absorbent foams, absorbent sponges, superabsorbent hydrogel forming polymeric gelling agents, or any equivalent materials or combination of materials, or mixtures of these materials.

Polymeric gelling agents are particularly preferred absorbent materials for use in the absorbent core 42. Polymeric gelling agents are those materials which upon contact with fluids (i.e., liquids) such as water or body fluids, imbibe such fluids and thereby form hydrogels. In this manner fluid discharged into the absorbent core 42 can be acquired and held by the polymeric gelling agent, thereby providing the absorbent articles described herein with enhanced absorbent

capacity and/or improved fluid retention performance. Suitable absorbent gelling materials are described in U.S. Pat. No. 32,649 issued Apr. 19, 1988 to Brandt et al. and U.S. Pat. No. 5,102,597 issued to Roe, et al. on Apr. 7, 1992. A suitable laminate of absorbent gelling materials and tissue may be purchased from Grain Processing Corporation of Muscatine, Iowa under Model Number L535.

Suitable cross-linked cellulose fibers for the absorbent core are described in U.S. Pat. No. 4,888,093, issued Dec. 19, 1989 to Cook et al., U.S. Pat. No. 4,822,543 issued Apr. 18, 1989 to Dean et al., U.S. Pat. No. 4,889,595 issued Dec. 26, 1989 to Schoygen et al., U.S. Pat. No. 4,898,642 issued Feb. 6, 1990 to Moore, et al., U.S. Pat. No. 4,935,022 issued Jun. 19, 1990 to Lash et al., and U.S. Pat. No. 5,183,707 issued Feb. 2, 1993 to Herron et al., U.S. Pat. No. 5,217,445 issued Jun. 8, 1993 to Young, et al. in EPO Patent Application Publication No. 0 427 316 A2 and 0 427 317 A2 published in the name of Herron et al. on May 15, 1991 and in EPO Patent Application Publication No. 0 429 112 A2 published in the name of Herron et al. on May 29, 1991.

Capillary channel fibers are described in the following patent applications which were filed on Jul. 23, 1991: U.S. patent application Ser. No. 07/724,404 filed in the names of Thompson et al. and U.S. patent application Ser. No. 07/734,392 filed in the names of Thompson et al. (combined in PCT Publication No. WO 93/01779 published Feb. 4, 1993), and in U.S. patent application Ser. No. 07/734,405 filed in the names of Buenger et al. (PCT Publication No. WO 93/02251 published Feb. 4, 1993). These patent applications may be referred to collectively as the "Capillary Channel Fiber" patent applications. Suitable capillary channel fibers are also described in P.C.I. International Patent Publication No. WO 92/01407 and P.C.I. Publication No. WO 93/02235 published in the Phillips, et al. on Feb. 4, 1993 and assigned to Eastman Kodak Company and in U.S. Pat. No. 5,200,248 issued to Thompson, et al. on Apr. 6, 1993. Suitable capillary channel fibers are those designated SW173 available from Eastman Chemical Company.

Suitable foam materials are described in U.S. Pat. No. 5,147,345 entitled "High Efficiency Absorbent Articles for Incontinence Management" issued to Young, et al. on Sep. 15, 1992, U.S. Pat. No. 5,198,472 entitled "Process for Preparing Emulsions That are Polymerizable to Absorbent Foam Materials" issued to DesMarais, et al. on Mar. 30, 1993 and in P.C.I. Publication No. WO 93/04113 entitled "Method for Hydrophilizing Absorbent Foam Materials" published in the name of DesMarais on Mar. 4, 1993.

The configuration and construction of the absorbent core 42 may be varied (e.g., the absorbent core may have varying caliper zones, for example, the core may be profiled so as to be thicker in the center, hydrophilic gradients, superabsorbent gradients, or lower density and lower average basis weight acquisition zones, or it may comprise one or more layers or structures). The total absorbent capacity of the absorbent core 42 should, however, be compatible with the design loading and the intended use of the sanitary napkin 20. Further, the size and absorbent capacity of the absorbent core 42 may be varied to accommodate different uses such as incontinence pads, pantliners, regular sanitary napkins or overnight sanitary napkins.

Some examples of absorbent structures that can be used as the absorbent core in the sanitary napkin of the present invention are described in U.S. Pat. No. 4,578,068 entitled "Absorbent Laminate Structure" issued to Kramer et al. on Mar. 25, 1986, U.S. Pat. No. 4,640,810 entitled "System for Producing an Air-laid Web" issued to Laursen, et al. Feb. 3,

1987 (or air-laid structures made by different processes) U.S. Pat. Nos. 4,950,264 and 5,009,653 entitled "Thin Flexible Sanitary Napkin" issued to Osborn on Aug. 21, 1990 and Apr. 23, 1991, U.S. Pat. No. 4,610,678 entitled "High Density Absorbent Structures" issued to Weisman et al. on Sep. 9, 1986, U.S. Pat. No. 4,834,735 entitled "High Density Absorbent Members Having Lower Density and Lower Basis Weight Acquisition Zones" issued to Alemany et al. on May 30, 1989, European Patent Application No. 0 198 683 published Oct. 22, 1986 in the name of Duenk, et al., and in U.S. patent application Ser. No. 07/810,774 and its continuation-in-part, Ser. No. 07/944,764 both entitled "Absorbent Article Having Fused Layers" filed in the name of Cree et al. on Dec. 17, 1991 and Sep. 14, 1992 respectively.

C. The Means for Directional Fluid Distribution

The means for directional fluid distribution 44, as shown in FIGS. 1-3, is positioned between the topsheet 38 and absorbent core 42. The means for directional fluid distribution is intended to preferentially distribute bodily exudates toward the ends of the sanitary napkin. The exudates are preferably distributed so that exudates will not reach the longitudinal side edges of the sanitary napkin at least until exudates are transported so as to substantially use any available absorbent capacity in the end regions of the absorbent core of the sanitary napkin.

The means for directional fluid distribution 44 is preferably centered along the longitudinal centerline of the sanitary napkin. The means for directional fluid distribution 44 can also either be centered along the transverse centerline or it can be offset from the transverse centerline (that is, positioned forward or rearward of the transverse centerline). If the means for directional fluid distribution 44 is offset from the transverse centerline, it is preferably positioned so that it at least partially lies in the central region 32 of the sanitary napkin 20.

The means for directional fluid distribution 44 comprises (1) a liquid transporting component such as an absorbent strip 46 positioned between the topsheet 38 and the absorbent core 42, and (2) a fluid directing component (i.e., a liquid directing component) such as a liquid impervious fluid directing strip 48 positioned between absorbent strip 46 and the absorbent core 42.

(1) the Liquid Transporting Component

The liquid transporting component absorbent strip 46 is intended to collect bodily discharges, particularly senses, deposited thereon or which otherwise traverse through the topsheet 38 and transport these bodily discharges to the underlying fluid directing strip 48 and toward the ends 420 of the absorbent core 42. The absorbent strip 46 can also be used to draw some of these bodily discharges away from the topsheet 38 and absorb some of such discharges.

The absorbent strip 46 shown in FIG. 1 is a rectangular strip that has dimensions that are narrower in width and longer in length than the fluid directing strip 48 (described below). The dimensions of the absorbent strip 46 can vary between certain limits. The preferred dimensions range from between about 0.4-0.5 inches (about 1 cm) and about 1.75 inches (about 4-4.4 cm) in width and between about 2.75 inches (about 7 cm) and about 6 inches (about 15 cm) in length. The dimensions can, however, be less than or greater than these preferred dimensions as long as the relationship between the sizes and boundaries of the absorbent strip, the fluid directing strip and the absorbent core described herein are maintained.

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The absorbent strip 46 is preferably conformable and nonirritating to the skin. Suitable materials for the absorbent strip 46 include but are not limited to any of these materials used in the absorbent core such as tissue paper, creped cellulose wadding, cross-linked cellulose fibers, capillary channel fibers, absorbent frame synthetic staple fibers, polymeric fibers, superabsorbent hydrogel forming polymer gelling agents in particulate or fibrous form or as laminates, peat moss, or any equivalent materials or combination of materials.

The terms "strip" and "layer" as used herein are not limited to single unfolded sheets. These terms are also intended to include but not be limited to folded sheets, multiple strips of material, loose or bonded fibers, multiple layers or laminates of such material, or other variations and combinations of such structures.

The absorbent strip 46 may be joined to the topsheet 38 (or it may be joined to any optional secondary topsheet or other optional layer positioned between the topsheet 38 and the absorbent strip 46). Alternatively, the absorbent strip 46 may be unattached to the topsheet. Preferably, however, the absorbent strip 46 is in close contact with or attached to the topsheet 38 or other overlying component. This will facilitate the transport of bodily exudates through the topsheet 38 (i.e., will draw exudates through the topsheet) due to the higher capillarity of the absorbent strip 46. The absorbent strip 46 can be joined to the overlying component in any suitable manner including but not limited to by adhesives, heat and/or pressure bonds, meltblowing, ultrasonic bonds extruding it onto the overlying component or any of the other manners described in Section 2G below.

Preferably, if the absorbent strip 46 is joined to the topsheet 38, it is intermittently joined to the topsheet 38 by topsheet/liquid transporting component bonds 70 located along the longitudinal side margins of the absorbent strip near the side edges 46C of the absorbent strip 46 (several examples of these bonds are shown in FIG. 1). This type of attachment provides a structure in which the bonds between the absorbent strip 46 and the topsheet 38 will not interfere with the transfer of liquids through the topsheet 38 to the absorbent strip 46. It also provides the absorbent strip 46 with greater flexibility than if, for example, the absorbent strip were bonded to the topsheet over its entire surface by adhesives. This greater flexibility provides the sanitary napkin with enhanced conformability to the wearer's body. In other embodiments (which are also shown in FIG. 1), the absorbent strip 46 can be attached to the topsheet 38 near the ends 46D of the absorbent strip 46 by topsheet/liquid transporting component end bonds 72. In a particularly preferred embodiment, the absorbent strip 46 is integrally formed onto the underside of the topsheet 38 or other overlying component.

The absorbent strip 46 may also be attached to the underlying components of the sanitary napkin. For instance, the ends 46D of the absorbent strip 46 can be attached to the absorbent core 38 by liquid transporting component/core end bonds 74. In these alternative embodiments, if the absorbent strip 46 is unattached to an underlying component between its ends, as shown in FIG. 5, the portion of the absorbent strip 46 between the areas at its ends where it is bonded can move apart from or "decouple from" the underlying component during wear to come into more intimate contact with the wearer's body. In a variation of this alternative embodiment, the absorbent strip 46 and fluid directing strip 48 can be secured to each other and the fluid directing strip 48 unattached to the underlying component (such as the absorbent core) so both the absorbent strip 46

and fluid directing strip 48 or at least portions thereof can decouple from the absorbent core 42.

(2) The Fluid Directing Component

The fluid (that is, liquid) directing component 48, as shown in FIGS. 1-3, is a structure that is positioned between the absorbent core 42 and the absorbent strip 46.

The purpose of the fluid directing component 48 is to direct bodily fluids (i.e., liquids) such as blood, menses and urine received from the absorbent strip 46 towards the ends 42D of the absorbent core 42. The fluid directing component 48 can direct bodily discharges laterally but it preferably does not direct such discharges all the way to the side edges 42C of the absorbent core. The fluid directing component 48 can also transport some of the bodily discharges through its thickness to the underlying absorbent core 42 (if the fluid directing component 48 is semi-pervious).

A particularly preferred fluid directing component is the fluid directing strip 48 shown in FIG. 1. The fluid directing strip 48 is a thin, flexible, liquid resistant, preferably liquid impervious strip of material, such as polyolefinic film. The fluid directing component 48 can, however, be an element of many other materials and configurations, including non-woven materials, and is not limited to thin strips of film or other material.

The fluid directing strip 48, as shown in FIG. 1, has a rectangular configuration. FIG. 1 shows a preferred embodiment in which the width of the fluid directing strip 48 is greater than the width of the absorbent strip 46 and the length of the fluid directing strip 48 is less than the length of the absorbent strip 46. The dimensions of the absorbent core 42 are greater than those of both the absorbent strip 46 and the fluid directing strip 48. The preferred dimensions of the fluid directing strip 48 can range from between about 0.3 cm to about 0.7 cm wider than the absorbent strip 46 and between about 0.3 cm and 2 cm shorter than the absorbent strip 46. The dimensions can, as in the case of the absorbent strip, be less than or greater than these preferred dimensions as long as the relationship between the sizes and boundaries of the absorbent strip, the fluid directing strip and the absorbent core described herein are maintained.

The fluid directing strip 48 can be impervious to liquid bodily exudates, or semi-pervious (or, in other words, semi-impervious). If the fluid directing strip 48 is semi-pervious, its degree of perviousness should be sufficiently limited that the fluid directing strip is still capable of carrying out its function of directing liquids toward the ends of the sanitary napkin. The fluid directing strip 48 can be provided with a degree of perviousness in a number of ways. The fluid directing strip 48 can, for instance, be made of a semi-pervious material. Alternatively, the fluid directing strip 48 can be comprised of a normally impervious material such as a polyethylene film that is provided with apertures. The apertures should be either of such a size or such a limited distribution that liquids are not able to proceed immediately through the fluid directing strip without being directed toward the ends of the core 42.

The fluid directing strip 48 can comprise any material suitable for the above purposes. For instance, the fluid directing strip 48 can comprise a polyolefinic film (e.g., polyethylene) that is apertured or non-apertured or even an adhesive film that could be used to secure some of the components of the sanitary napkin together (such as to secure the absorbent strip 46 to the absorbent core 42). The fluid directing strip 48 can comprise a material similar to those materials used for the topsheet 38 or the backsheet 40.

If the fluid directing strip 48 is comprised of a material similar to those used in the topsheet 38, however it should typically be provided with fewer apertures or smaller apertures than would customarily be used in a topsheet. This will enable the fluid directing strip 48 to transport liquids along its surface rather than solely through its thickness. In addition as shown in FIG. 4, the fluid directing strip 48 can comprise a material similar to one of those used for the topsheet that is provided with tapered capillaries 39 (to prevent rewet) which is then turned upside down for use as the fluid directing strip 48 so that the smaller bottom openings 39B of the capillaries face the topsheet 38.

The fluid directing strip 48 and the absorbent strip 46 can either be formed into an integral structure joined to each other or be unattached. If the absorbent strip 46 and the fluid directing strip 48 are joined together they can be joined in any suitable manner. The absorbent strip 46 and the fluid directing strip 48 can be affixed by any of the means described herein which are used to secure the components of the sanitary napkin. The absorbent strip 46 and the fluid directing strip 48 may for example be laminated together by adhesives if the fluid directing strip comprises an adhesive film or they may be thermally bonded if the fluid directing strip comprises a thermoplastic film. If the absorbent strip 46 and the fluid directing strip 48 are laminated together they can be laminated together either before or during the assembly of the components of the sanitary napkin.

Preferably if the absorbent strip 46 is joined to the fluid directing strip 48 it is intermittently joined to the fluid directing strip 48 by liquid transporting component/fluid directing component bonds 76 located along the longitudinal side margins of the absorbent strip 46 near the longitudinal side edges 46C of the absorbent strip 46. This enhances the flexibility of these components and provides a structure in which the bonds between the two components will not interfere with the transfer of liquids from the absorbent strip 46 to the fluid directing strip 48. In other embodiments, the absorbent strip 46 can be attached to the fluid directing strip 48 near the ends of the fluid directing strip 48D by liquid transporting component/fluid directing component end bonds 78.

The fluid directing strip 48 can also be formed into an integral structure with the absorbent core 42 or the fluid directing strip and the absorbent core can be joined to each other or these two components can be unattached. If the fluid directing strip 48 is joined to the core 42, the fluid directing strip 48 can be joined to the core 42 by any of the means used to secure the components of the sanitary napkin described herein. Preferably if the fluid directing strip 48 is joined to the core 42, it is intermittently joined to the core by fluid directing component/core side bonds 80 along the longitudinal side margins of the fluid directing strip 48 to enhance the flexibility of the sanitary napkin. Additionally or alternatively the ends of the fluid directing strip 46 can also be attached to the absorbent core 42 by fluid directing component/core end bonds 82.

The relationship between the sizes and boundaries of the fluid directing strip 48 and the absorbent strip 46 provides the advantage that the longitudinal sides 48C of the fluid directing strip 48 extend beyond the longitudinal sides 46C of the absorbent strip 46 and the end edges 48D of the absorbent strip 46 extend beyond the end edges 48D of the fluid directing strip 48. This forces the liquid in the absorbent strip 46 to wick and be distributed to the ends of the absorbent core 42. Prior attempts did not have components with these relationships and were subject to liquids reaching the longitudinal side edges before the ends of the sanitary

napkin 20. These problems were particularly evident when the prior sanitary napkins were distorted during wear.

The relationship between the component parts of the means for directional fluid distribution of the present invention is intended to remain the same even when the sanitary napkin is subjected to pressures which tend to distort the napkin during wear. The sanitary napkin will, thus, preferably continue to preferentially direct liquids toward the ends of the core even when subjected to these forces.

(3) Alternative Embodiments of the Means for Directional Fluid Distribution

There are numerous possible alternative embodiments of the means for directional fluid distribution 44 described herein. For example, the shapes of the absorbent strip 46 and the fluid directing strip 48 can be varied in other embodiments. The shape of these components may be used to provide the sanitary napkin with certain fluid directing properties or to provide the sanitary napkin with particular functional, perceptual or aesthetic characteristics.

For example, in the preferred embodiment described above, the fluid directing strip 48 is both wider and shorter than the absorbent strip 46. In this preferred embodiment both ends of the absorbent strip 46 extend beyond the ends of the fluid directing strip 48. Some of the benefits of the means for directional fluid distribution of the present invention will, however, still be achieved even if the absorbent strip 46 extends at least to, and preferably, beyond only one end of the fluid directing strip 48. The absorbent strip 46 can have one end that extends beyond the end of the fluid directing strip 48 to allow the absorbent strip 46 to preferentially transport liquids to at least one end of the sanitary napkin. This arrangement can even be present when the length of the absorbent strip 46 is less than the length of the fluid directing strip 48 if the absorbent strip 46 is offset from the transverse centerline more toward one end of the fluid directing strip 48 than the other. Thus, the absorbent strip 46 may extend at least to and preferably beyond at least one end edge of the fluid directing strip 48.

The same applies to the relationship between the widths of the two components of the means for directional fluid distribution 44. That is, some of the benefits of the means for directional fluid distribution of the present invention will still be achieved even if the fluid directing strip 48 extends laterally outward to, and preferably beyond only one longitudinal side edge of the absorbent strip 46. The fluid directing strip may extend beyond one longitudinal side edge of the absorbent strip 46 even when the absorbent strip 46 is wider than the fluid directing strip 48 if the fluid directing strip is offset from the longitudinal centerline more toward one side of the absorbent strip 46 than the other.

In another example, as shown in FIG. 6, the absorbent strip 46 can comprise a diamond-shaped polygon. The absorbent strip 46 shown in FIG. 6 can be used to attempt to create essentially a single point introduction of liquids into the absorbent core 42 at the ends of the absorbent strip 46. This may be used in an attempt to acquire more control over the distribution of exudates and thus, the soiling pattern in the sanitary napkin.

FIG. 7 shows an example of a fluid directing strip 48 having concave longitudinal side edges. A fluid directing strip 48 having this shape can be used for improved wearer comfort (such as to provide room for the wearer's thighs) allowing controlled bending of the sanitary napkin at these longitudinal edges while preventing bunching of the sanitary napkin.

FIG 8 shows that in other alternative embodiments, the aperturing of the fluid directing strip 48 may also be used to provide the sanitary napkin with specific fluid directing properties. For example as shown in FIG 8, the fluid directing strip 48 may have different regions that are provided with apertures of different sizes. The fluid directing strip 48 shown in FIG 8 has a central region 86 that may correspond to the location of the overlying absorbent strip 46 and side regions 88 that lie laterally outboard of the side edges 46C of the absorbent strip 46. The central region 86 can be provided with smaller apertures 84A (or fewer apertures per area) than the side regions 88 of the fluid directing strip. Such a structure can be used to vary the distribution of liquids to different portions of the absorbent core 42. In alternative embodiments the apertures 84 in the fluid directing strip 48 may be of numerous different shapes.

FIG 8 also shows that the fluid directing strip 48 may be provided with bending axes 90 to assist the means for directional fluid distribution 44 in assuming certain configurations when the sanitary napkin 20 is worn. The bending axes 90 may be formed by fold lines, score lines, densification lines, stitching, lines, or any other means known in the art for providing an absorbent article with bending axes.

FIG 9 shows that the fluid directing strip 48 may additionally be embossed or otherwise provided with channels 92 for directing liquids in a particular direction, such as toward the ends of the absorbent core. In one preferred embodiment, the fluid directing strip 48 comprises a soft foam piece that is embossed with a plurality of longitudinal channels 92. Additionally or alternatively the fibers or other structural elements comprising the absorbent strip 46 or the fluid directing strip 48 may be oriented in a particular manner (such as in the longitudinal direction) to facilitate wicking of liquids in the longitudinal direction.

FIG 10 shows another preferred embodiment of the fluid directing strip 48. The fluid directing strip 48 is a hydrophobic structure such as a flexible hydrophobic formed film structure 94 preferably a three dimensional apertured film with a hydrophilic component 96 such as fibers or a surfactant dispersed thereon. The hydrophobic formed film structure 94 provides an interconnecting network 100 comprising a plurality of bucket line structures that have to be filled up before overflowing to the core or before liquids flow toward the ends of the absorbent core.

FIG 11 shows that in still another alternative embodiment, the fluid directing component 48 may comprise a structure such as a plastic film formed with a plurality of troughs 104 therein. Preferably the bases 106 of the troughs 104 are less than or equal to about 100 mils (about 2.54 mm) wide to assist in the flow of menses. The structure shown in FIG 11 can be provided with apertures 84 on the sides 108 of the troughs 104, the bases 106 of the troughs, or both. The cross-sectional shape of the troughs 104 is not limited to the shape shown in FIG 11. The cross-section of the troughs 104 can be of any suitable configuration. The structure shown in FIG 11 can also be used to provide the sanitary napkin with bending axes and/or a degree of resilience, or lateral stability or both.

In one especially preferred alternative embodiment (which will be discussed with reference to FIG 1) the absorbent strip 46 comprises a low density material to provide the liquid transporting component with greater acquisition capabilities. The term "low density" as used herein refers to materials having a density less than or equal to about 0.1 g/cc and more preferably less than or equal to the following amounts: 0.09 g/cc, 0.08 g/cc, 0.07 g/cc, 0.06

g/cc, and 0.05 g/cc. Such low density materials will, however typically sacrifice liquid distribution capabilities in comparison to higher density materials because of their lower capillarity. Materials having such low densities are typically most beneficial when they have relatively high capillarity. This preferred embodiment is able to function however even when low caliber low density materials are used for the absorbent strip to make thin or "ultra-thin" product because the liquid distribution function of the means for directional fluid distribution can be separately handled by the fluid directing strip 48.

In alternative embodiments of this especially preferred embodiment the absorbent strip 46 need not be used with a liquid impervious fluid directing strip 48. For instance, the absorbent strip can be used in conjunction with a fluid directing strip 48 having a higher density. Any suitable combination of these components can be used provided there is a density differential between the absorbent strip 46 and the fluid directing strip 48. This allows a liquid pervious strip to be used for the fluid directing strip 48. Such a combination has the advantage that it will preferentially distribute liquid exudates toward the ends of the absorbent core with the fluid directing strip 48 only causing limited interference with the penetration of exudates into the core.

In other alternative embodiments, the absorbent strip 46 and fluid directing strip 48 can be replaced by a means for directional fluid distribution 44 that comprises a single component. In such an alternative embodiment the liquid transporting component and fluid directing component are integral components (i.e. portions or features) of a single component means for directional fluid distribution 44 (rather than two separate components).

Several non-limiting examples of such single component means for directional fluid distribution are described below. The single component means for directional fluid distribution can be similar in appearance to any of the means for directional fluid distribution shown in the drawings. However the single component will typically comprise a structure in the form of a single layer with different regions that serve the various functions of the means for directional fluid distribution rather than in the form of a separate liquid transporting component placed on top of a liquid directing component.

The single component means for directional fluid distribution 44 can for example comprise a perforated film like one of the films specified as being useful as a topsheet. This perforated film is rendered hydrophilic by the incorporation of a surfactant (e.g. 1% Bry 76 formerly available from ICI Americas Company of Wilmington Del.) and oriented with the cones (i.e. capillaries) facing toward the topsheet similar to the arrangement shown in FIG 4. This will provide an impervious or semi-pervious component that is capable of transporting liquids on its surface. In variations of this embodiment selected portions of the means for directional fluid distribution 44 can be rendered more or less hydrophilic than other portions thereof. For example a central strip of the film similar to the central region 86 of the fluid directing strip shown in FIG 8 can be made more hydrophilic than the regions laterally outboard of the central region side regions 88 by applying a surfactant thereon to wick liquids along this central region.

In another preferred single component embodiment the functions of both the absorbent strip and fluid directing strip can be carried out by a porous fibrous structure (or fibrous web) in which the finish on the fibers is varied to provide at least two regions of different hydrophilicity. These regions

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preferably comprise a first region such as a fluid directing region and an adjacent second, non-fluid directing (or less hydrophilic), region. These respective regions can be regions of a nonwoven material that have configurations resembling the central region 86 and the side regions 88 shown in FIG. 8, without the different sized apertures (or these regions could resemble various other structures shown herein).

The term "hydrophilic" as used herein describes surfaces which are wetted by the liquid in question. The wetting of materials is generally defined in terms of contact angles and the surface tension of the liquids and solids involved. These properties are discussed in greater detail in The American Chemical Society Publication entitled "Contact Angle Wettability and Adhesion" edited by Robert F. Gould and copyrighted in 1964 and in the following TRI/Princeton Publications edited by Dr. H. G. Heilweil, Publication Number 459 entitled "A Microtechnique for Determining Surface Tension" published in April 1992 and in Publication Number 468 entitled "Determining Contact Angles Within Porous Networks" published in January 1993 which are incorporated by reference herein.

The fibrous material can be a single layer fibrous web that has been produced using known processes. Typically such processes could be carded or spunbond nonwoven processes, or a combination thereof. The fibrous structure preferably has average wet pore radii between about 40 microns and about 180 microns. A suitable method for determining pore size of fibrous structures is described in TRI/Princeton of Princeton, NJ Publication Number 464 entitled "Automated Determination of Pore Volume Distributions and Related Properties" edited by Dr. H. G. Heilweil published in September 1992 which publication is incorporated by reference herein. The fibers of such material preferably have a denier of between about 0.1 and about 6 dpf. The fibrous structure can be made of natural or synthetic fibers.

In a fibrous structure that is made with synthetic fibers, the different regions can be provided by rendering the contact angle (specifically the advancing contact angle) of the layer about 86 degrees to about 89 degrees in the overall structure except in the region used for directing liquids. In the region used for directing fluids, the material is subjected to another hydrophilic treatment (such as by treating it with additional surfactant) to further reduce the advancing contact angle to as low as 55 degrees. One way to achieve this is by coating the fibers of the material in the fluid directing region with a semi-durable hydrophilic surfactant such as Silwet available from ICI (Middlesbrough, U.K.).

If a cellulose base material is chosen for this latter single component execution, the starting material typically has a contact angle of between about 30 degrees and about 55 degrees. The distinct regions are preferably created in the cellulose material by coating the non fluid directing area with a partially hydrophobic surfactant that raises the advancing contact angle of the non fluid directing region to about 80-89 degrees. A suitable surfactant for use in such an embodiment is SCOTCHBAN L12053 available from 3M of Minneapolis, Minn.

It should be understood however that this embodiment of the present invention is not limited to structures having the particular contact angles within the distinct regions described above. This is particularly true since the effect of the contact angle is dependent upon the liquid in issue. This embodiment of the present invention will function if there is a difference in hydrophilicity between the liquid directing

region and the non liquid directing region(s). This difference in hydrophilicity is preferably established so that (1) the advancing contact angle of the liquid directing region is less than or equal to 89 degrees, and, (2) the advancing contact angle of the non liquid directing region(s) is greater than or equal to 10 degrees more than the advancing contact angle of the liquid directing region.

The function of these structures can be described in the following manner with reference to the regions of the structure shown in FIG. 8. In this embodiment the central fluid directing region 86 has a lower contact angle than the adjacent side regions 88. The difference in contact angles between these regions will reduce the tendency for liquids to flow laterally from the central region 86 into the side regions 88. This will facilitate the flow of liquids in the longitudinal direction through the fluid directing region 86 since the liquids will not have anywhere else to move. The liquids can flow on the surface of the central fluid directing region 86 or between the surfaces of fluid directing region (i.e. through the thickness of the fluid directing region). Another place liquids can flow in the central fluid directing region 86 is along any basal interface below the central fluid directing region 86 and the material or layer that lies beneath the central fluid directing region.

E. The Backsheet

The backsheet 40 prevents the exudates absorbed and contained in the absorbent core 42 from wetting articles which contact the sanitary napkin 20 such as pants, pajamas and undergarments. The backsheet 40 is impervious to liquids (e.g. menses and/or urine). The backsheet 40 is preferably manufactured from a thin plastic film although other flexible liquid impervious materials may also be used.

The backsheet 40 may comprise a woven or nonwoven material polymeric films such as thermoplastic films of polyethylene or polypropylene or composite materials such as a film-coated nonwoven material. Preferably the backsheet 40 is a polyethylene film having a thickness of from about 0.012 mm (0.5 mil) to about 0.051 mm (2.0 mils). Exemplary polyethylene films are manufactured by Clopay Corporation of Cincinnati, Ohio under the designation P18-0401 and by Iredagar Film Products of Terre Haute Ind., under the designation XP-39385.

The backsheet 40 is preferably embossed and/or matte finished to provide a more clothlike appearance. Further the backsheet 40 may permit vapors to escape from the absorbent core 42 (i.e. the backsheet 40 may be breathable) while still preventing exudates from passing through the backsheet 40. Flushable or biodegradable backsheets can also be used e.g. such as with the pantliner devices described herein.

F. Fasteners for Attaching the Sanitary Napkin to the Wearer's Panties

The outwardly-oriented face of the backsheet 40 may as shown in FIG. 2, further comprise a means for attaching the sanitary napkin 20 to the undergarment of the wearer (such as a fastener) 40.

Fasteners comprising adhesives have been found to work well for this purpose. Any adhesive or glue used in the art for such purposes can be used, with pressure-sensitive adhesives being preferred. Suitable adhesives are Century A 305 IV manufactured by the Century Adhesives Corporation, Instant Lock 34 2823 manufactured by the National Starch Company, 3 Sigma 3153 manufactured by 3 Sigma and Fuller H 2238ZP manufactured by the H. B. Fuller Co. Suitable adhesive fasteners are also described in U.S. Pat. No. 4,917,697.

The fastener 50 can be in many possible configurations depending on the characteristics desired for the sanitary napkin FIG 2 shows one preferred arrangement which utilizes two longitudinally oriented strips of adhesive one on each side of the longitudinal centerline 1. Particularly suitable fastener configurations are shown in PCT International Patent Publication No. WO 92/04000 entitled "Shape and Adhesive Fastening Means for an Absorbent Article" published in the name of Papa et al on Mar 19 1992 and in the Capillary Channel Fiber patent applications, the Curved Bun patent applications, and the Stretchable Absorbent Article patent application described in greater detail in Section 2H below.

In addition other types of fasteners can be used instead of or in addition to adhesives. These other types of fasteners are preferably arranged in patterns similar to those in the patent publications referred to above. Such fasteners include but are not limited to conventional VELCRO hook material the fasteners described in U.S. Pat. No. 4,946,527 issued to Bettrell on Aug. 7 1990; U.S. Pat. Nos. 5,058,247 and 5,116,563 issued to Thomas, et al on Oct 22 1991 and May 26, 1992, respectively and EPO Patent Application Publication No. 0 381 087 published Aug. 8 1990, or high coefficient of friction foams and other high coefficient of friction materials in the same category as those described in U.S. Pat. No. 4,166,464 issued to Korpman U.S. Pat. No. 4,834,739 issued to Linker III et al and U.S. Pat. No. 5,011,480 issued to Gossens, et al.

Before the sanitary napkin 20 is placed in use if an adhesive fastener is used the adhesive is typically covered with a removable cover strip or release liner 52 in order to keep the adhesive from sticking to a surface other than the crotch portion of the panty prior to use. Suitable release liners are also described in the above-referenced U.S. Pat. No. 4,917,697. Any commercially available release liners commonly used for such purposes can be utilized herein. Non-limiting examples of suitable release liners are BI-30MG A Silox E1/D and BI-30MG A Silox 4P/D both of which are manufactured by the Akrosil Corporation.

In one particularly preferred embodiment the adhesive fastener 50 is protected with a wrapper that not only covers the adhesive but also provides both an individually packaged sanitary napkin and a container for disposing the sanitary napkin after use such as is described in U.S. Pat. No. 4,556,146 issued to Swanson, et al on Dec 3 1985.

The sanitary napkin 20 of the present invention is used by removing any release liner 52 and thereafter placing the sanitary napkin 20 in a panty so that the adhesive (or other fastener) 50 contacts the panty and maintains the sanitary napkin in position within the panty during use.

G Assembly of the Components of the Sanitary Napkin

The components of the sanitary napkin such as the topsheet, the backsheet, the absorbent core, and any other components, may be assembled in a variety of well known configurations (including so called "tube" products or side flap products).

The components of the sanitary napkin are preferably assembled in a "sandwich" configuration with the topsheet, backsheet, and absorbent core each comprising a layer and the absorbent core positioned between the topsheet and backsheet. The topsheet 30 and the backsheet 40 are preferably peripherally joined using known techniques. The topsheet 30 and backsheet 40 can be joined either entirely peripherally so that the entire perimeter of the sanitary

napkin 20 is circumscribed by the joiner of the components, or these two components can be only partially peripherally joined at the perimeter.

The components of the sanitary napkin 20 can be secured together by adhesives, stitching, heat and/or pressure bonds, dynamic mechanical bonds, ultrasonic bonds, intermingling or entanglement of the fibers or other structural elements comprising the components of the sanitary napkin such as by meltblowing the fibers comprising one component onto another component, extruding one component onto another or by any other means known in the art. Suitable means for attaching the components of the sanitary napkin are described in the patent applications described above filed in the name of Creu, et al.

H Alternative Embodiments and Optional Features

The sanitary napkin 20 may also be provided with a pair of flaps, each of which are adjacent to and extend laterally outward from a side edge of the main body portion of the sanitary napkin (The main body portion is the portion of the sanitary napkin without the flaps). The flaps are preferably configured to drape over the edges of the wearer's panties in the crotch region so that they are disposed between the wearer's panties and the wearer's thighs.

Such flaps can serve at least two purposes. First, the flaps help to prevent soiling of the wearer's body and panties by menstrual fluid. Second, the flaps are preferably provided with attachment means on their garment surface so that the flaps can be folded back under the panty and attached to the garment-facing side of the panty. In this way the flaps serve to keep the sanitary napkin 20 properly positioned in the panty. Alternatively, the flaps may be attached to each other on the underside of the panty by the attachment means with or without also being affixed to the panty.

A number of sanitary napkins having flaps suitable or adaptable for use with the sanitary napkin 20 of the present invention are known. Such flaps are disclosed in U.S. Pat. No. 4,285,343 entitled "Sanitary Napkin" issued to McNair on Aug. 25 1981; U.S. Pat. No. 4,589,876 entitled "Sanitary Napkin" issued to Van Tilburg on May 20 1986; U.S. Pat. No. 4,608,047 entitled "Sanitary Napkin Attachment Means" issued to Mattingly on Aug. 26 1986; U.S. Pat. No. 4,687,478 entitled "Shaped Sanitary Napkin With Flaps" issued to Van Tilburg on Aug. 18 1987 and in Reexamination Patent B1 4,589,876 issued Apr. 27 1993. Some particularly preferred types of flaps are described in the following U.S. patent applications: Ser. No. 07/769,891 entitled "Absorbent Article Having Flaps and Zones of Differential Extensibility" filed in the name of Lavash, et al on Oct 1 1991 (PCT Publication No. WO 93/06805 published Apr. 15, 1993); and in Ser. No. 07/906,593 entitled "Absorbent Article Having Unitary Release Material" filed in the name of Lavash et al and Ser. No. 07/906,629 entitled "Absorbent Article Having Flocked Flaps" filed in the name of Osborn et al both filed Jun. 30, 1992.

While preferred sanitary napkin embodiments of the present invention have been described, numerous other sanitary napkin embodiments are disclosed in the literature. These could also be provided with the means for directional fluid distribution of the present invention. Several such sanitary napkins are disclosed in U.S. Pat. No. 4,425,130, "Compound Sanitary Napkin" issued to DesMarais on Jan. 10, 1984; U.S. Pat. No. 4,321,924, "Bordered Disposable Absorbent Article" issued to Ahl on Mar. 30, 1982, the aforementioned U.S. Pat. No. 4,950,264 issued to Osborn on Aug. 21 1990; U.S. Pat. No. 5,007,906 entitled "Decoupled

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Sanitary Napkin" issued to Osborn, et al on Apr 16 1991 the aforementioned U.S. Pat No 5,009,653 issued to Osborn on Apr 23, 1991 U.S. Pat No 4,917,697 entitled "Sanitary Napkin Having Flaps and Stress Relief Means" issued to Osborn et al on Apr 17 1990, U.S. Pat No 5,171,302 entitled "Absorbent Article With Central Hinge" issued to Buell on Dec 15 1992 U.S. Pat No 5,197,959 entitled "Absorbent Article" issued to Buell on Mar 30 1993 and in U.S. patent application Ser No 07/605,583 entitled, "Sanitary Napkin Having Components Capable of Separation in Uses" filed in the name of Vlascher et al on Oct 29 1990 (PCT Publication No WO 92/07537 published May 14, 1992) U.S. patent application Ser No 07/630,451 entitled "Sanitary Napkin Having Transversely Segmented Core" filed in the name of Osborn et al on Dec 19 1990 (PCT Publication No 92 WO/10984, published Jul 9 1992) U.S. patent application Ser No 07/707,233 entitled "Sanitary Napkin Having Laterally Extensible Means for Attachment to the Undergarment of the Wearer" filed May 21 1991 in the name of Osborn et al (EPO Application No 90202826 5) and in U.S. patent application Ser No 07/874,872 entitled "Generally Thin Flexible Sanitary Napkin Having Stiffened Center" filed in the name of Osborn on Apr 28 1992

The sanitary napkin described herein can be comprised one or more extensible components. In one preferred embodiment, most or all of the components are extensible to provide a degree of extensibility (on the order of 15%-40%) to the absorbent article. This extensibility may provide better in use fit and comfort. In a particularly preferred alternative embodiment the sanitary napkin 20 is comprised of components that are extensible (preferably capable of stretching), particularly in the longitudinal direction when the sanitary napkin is worn. Suitable extensible absorbent articles are described in U.S. patent application Ser No 07/915,133 entitled "Stretchable Absorbent Articles" filed in the name of Osborn, et al. on Jul 23, 1992 (PCT Publication No WO 93/01785 published Feb 4 1993).

In addition other sanitary napkins that may be provided with the means for directional fluid distribution of the present invention are described in the following pending U.S. Patent Applications which were filed on Jul 23 1992 U.S. patent application Ser No 07/915,202, entitled "Curved Shaped Absorbent Article" filed in the name of Theresa L. Johnson, et al. (PCT Publication No WO 93/01781) U.S. patent application Ser No. 07/915,285 entitled "Absorbent Article Having Resilient Center" filed in the name of Thomas W. Osborn et al. (PCT Publication No WO 93/01782), U.S. patent application Ser No 07/915,201 entitled "Absorbent Article Fastener Pattern" filed in the name of Robb E. Olsen, et al. (PCT Publication No WO 93/01783), and U.S. patent application Ser No 07/915,134, entitled "Method of Making Curved Shaped Absorbent Article" filed in the name of Letha M. Hines, et al. (PCT Publication No 10 93/01784)

The terms "panty liner" or "pantiliner" refer to absorbent articles that are less bulky than sanitary napkins which are generally worn by women between their menstrual periods. Suitable absorbent articles in the form of pantliners which could be provided with the means for directional fluid distribution of the present invention are disclosed in U.S. Pat No 4,738,676 entitled "Pantiliner" issued to Osborn on Apr 19 1988

The term "incontinence article" refers to pads, undergarments (pads held in place by a suspension system of some type such as a belt or the like) inserts for absorbent articles, capacity boosters for absorbent articles, briefs, bed pads, and

the like, regardless of whether they are worn by adults or other incontinent persons. Suitable incontinence articles that can be provided with the means for directional fluid distribution described herein are disclosed in U.S. Pat No 4,253,461 issued to Strickland, et al on Mar 3, 1981 U.S. Pat Nos. 4,597,760 and 4,597,761 issued to Buell, U.S. Pat No 4,704,115 U.S. Pat No 4,909,802 issued to Abr, et al. U.S. Pat No 4,964,860 issued to Gripeon, et al on Oct 23, 1990 and in U.S. patent application Ser NOS. 07/637,090 and 07/637,571 filed respectively by Noel, et al and Feist et al on Jan 3, 1991 (PCT Publication No WO 92/11830 entitled "Absorbent Article Having Rapid Acquiring, Multiple Layer Absorbent Core" published in the name of Noel et al and PCT Publication No WO 92/11831 entitled "Absorbent Article Having Rapid Acquiring, Wrapped Multiple Layer Absorbent Body" published in the name of Feist et al both published on Jul 23, 1992).

The focus of the present invention is on absorbent articles that are intended to be worn in the crotch region of the wearer's undergarments. However the features of the present invention could also be used in absorbent articles such as diapers. Diapers are absorbent articles worn by infants and incontinent persons that are fastened about the waist of the wearer. Suitable diapers that can be provided with the means for directional fluid distribution of the present invention are disclosed in U.S. Pat No 3,860,003 issued to Buell on Jan 14, 1975 and U.S. Pat No. 5,151,092 issued to Buell et al on Sep 29 1992

1 Flexibility of the Sanitary Napkin and Configurations the Sanitary Napkin May Take When Worn

The components of the means for directional fluid distribution 44 have the specific relationships between their lengths and widths described herein, and are sufficiently flexible and joined in such a way that they maintain the desired relationships with each other during wear particularly when the sanitary napkin 20 is laterally compressed FIGS 1, 12 and 13 show how this is accomplished

FIG 1 shows that the absorbent strip 46 and the fluid directing strip 48 lie along the longitudinal centerline of the sanitary napkin 20. The absorbent strip 46 and the fluid directing strip 48, being additional layers, provide the sanitary napkin with a stiffened region along the longitudinal centerline of the sanitary napkin 20 (i.e. a longitudinal central region 34). The longitudinal central region 34, in other words, is stiffer than the surrounding longitudinal side regions 36

The flexibility of the various regions of the sanitary napkin is expressed in terms of flexure-resistance. The flexibility is measured according to the Circular Bend Procedure (described in greater detail below). The longitudinal central region 34 preferably has a flexure-resistance of up to less than or equal to about 1,000 grams, more preferably less than or equal to about 700 grams, even more preferably less than or equal to about 500 grams, and most preferably less than or equal to about 400 grams. The surrounding longitudinal side regions 36 preferably have flexure resistances that are less than that of the longitudinal central region 34 and less than or equal to about 700 grams, more preferably less than or equal to about 600 grams, more preferably less than or equal to about 500 grams, more preferably less than or equal to about 400 grams, more preferably less than or equal to about 300 grams, and most preferably less than or equal to about 250 grams. The flexure-resistance of the longitudinal side regions 36 may also be any of those figures

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specified for the sanitary napkin described in U.S. Pat. No. 5,009,653 issued to Osborn.

The flexure-resistance of the different regions of the sanitary napkin is measured as peak bending stiffness. Peak bending stiffness is determined by a test which is modeled after the ASTM D 4032-82 Circular Bend Procedure. The ASTM procedure is modified for use herein. The Circular Bend Procedure as modified and used for the purposes of the present invention is hereinafter simply referred to as the "Circular Bend Procedure." One version of the Circular Bend Procedure is described in U.S. Pat. No. 5,009,653 issued to Osborn. The Circular Bend Procedure is a simultaneous multi-directional deformation of a material in which one face of a specimen becomes concave and the other face becomes convex. The Circular Bend Procedure gives a force value related to flexure resistance, simultaneously averaging stiffness in all directions.

In the case of the present invention when carrying out the Circular Bend Procedure, rather than using one set of samples taken from the sanitary napkins as described in U.S. Pat. No. 5,009,653, separate samples are taken from longitudinal central region 34 and from the longitudinal side regions 36 of the sanitary napkins. The samples are tested and averaged separately so a flexure-resistance value is obtained for the longitudinal central region 34, and a separate value is obtained for the surrounding regions 36.

APPARATUS

The apparatus necessary for the CIRCULAR BEND PROCEDURE is a modified Circular Bend Stiffness Tester having the following parts.

A smooth polished steel plate platform which is 102.0x102.0x6.35 millimeters having an 18.75 millimeter diameter orifice. The lap edge of the orifice should be at a 45 degree angle to a depth of 4.75 millimeters.

A plunger having an overall length of 72.2 millimeters, a diameter of 6.25 millimeters, a ball nose having a radius of 2.97 millimeters and a needle-point extending 0.88 millimeter therefrom having a 0.33 millimeter base diameter and a point having a radius of less than 0.5 millimeter. The plunger being mounted concentric with the orifice and having equal clearance on all sides. Note that the needle-point is merely to prevent lateral movement of the test specimen during testing. Therefore, if the needle-point significantly adversely affects the test specimen (for example punctures an inflatable structure), then the needle-point should not be used. The bottom of the plunger should be set well above the top of the orifice plate. From this position, the downward stroke of the ball nose is to the exact bottom of the plate orifice.

A force-measurement gauge and more specifically an Instron inverted compression load cell. The load cell has a load range of from about 0.0 to about 2000.0 grams.

An actuator and more specifically the Instron Model No. 1122 having an inverted compression load cell. The Instron 1122 is made by the Instron Engineering Corporation, Canton, Mass.

NUMBER AND PREPARATION OF SPECIMENS

In order to perform the procedure for this test as explained below, five representative sanitary napkins are necessary. From one of the five napkins to be tested, some number "Y" of 37.5x37.5 millimeter test specimens are cut. At least one specimen is cut from the portion of the sanitary napkin containing any means for directional liquid distribution (such as along the longitudinal centerline of the sanitary napkin), and at least one specimen is cut from the adjacent regions of the sanitary napkin that are outboard of any means for directional liquid distribution. If due to the plan view

shape of this region to be tested, it is not possible to cut a square 37.5x37.5 mm specimen, any other 1,400 square millimeter size specimen may be used, provided the specimen adequately covers the orifice in the test platform to properly carry out the test.

Specimens having portions in which a topsheet is joined directly to a barrier sheet or which are a laminate of a topsheet and a barrier sheet, should also not be tested. The reason that these specimens are not tested is due to the realization that prior art napkins exist in which a topsheet is joined to a barrier sheet beyond the edges of an absorbent core in the periphery of the napkin, such portions of which are highly flexible. The present invention is more concerned with the flexibility of the significant absorbent portions of the sanitary napkin. If any of the significant absorbent portions of the sanitary napkin meet the parameters set forth in the appended claims for the particular regions, then the sanitary napkin falls within the scope of the appended claims. A number of different specimens should be tested from each sanitary napkin. In particular, the structurally least flexible portions in the center of the sanitary napkin should be tested as the longitudinal central region. The most flexible portions of the sanitary napkin should be tested when samples of the longitudinal side regions of the napkin are measured.

The test specimens should not be folded, bent, or compressed by the test person, and the handling of specimens must be kept to a minimum and to the edges to avoid affecting flexural resistance properties. From the four remaining sanitary napkins, an equal number "Y" of specimens, identical to the specimens cut from the first napkin, are cut. Thus, the test person should have "Y" number of sets of five identical specimens.

PROCEDURE

The procedure for the CIRCULAR BEND PROCEDURE is as follows. The specimens are conditioned by leaving them in a room which is $21 \pm 1^\circ \text{C}$ and $50 \pm 2\%$ relative humidity for a period of two hours. The test plate is leveled. The plunger speed is set at 50.0 centimeters per minute per full stroke length. A specimen is centered on the orifice platform below the plunger such that the body surface 20A of the specimen is facing the plunger and the garment surface 20B of the specimen is facing the platform with the release paper removed from any adhesive on the garment surface of the specimen and the adhesive sprinkled with corn starch to eliminate the adhesive tack. The indicator zero is checked and adjusted, if necessary. The plunger is actuated. Touching the specimen during the testing should be avoided. The maximum force reading to the nearest gram is recorded. The above steps are repeated until all five of the identical specimens have been tested.

CALCULATIONS

The peak bending stiffness for each specimen is the maximum force reading for that specimen. Each set of five identical specimens is tested and the five values received for that set are averaged. Thus, the test person now has an average value for each of the "Y" identical sets of specimens tested. If any of the significant absorbent portions of the sanitary napkin have a longitudinal central region and surrounding regions with average for each identical specimen with the requisite flexure-resistance, then the napkin satisfies the parameters of this test.

FIGS. 12 and 13 are simplified schematic cross-sectional views which show two possible configurations that the sanitary napkin 20 of the present invention may take when worn. The means for directional fluid distribution 44 provides the sanitary napkin 20 with a stiffer longitudinal

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central region 34 that may bend as indicated but does not "rope" or distort in such an amount as to interfere with the fluid directing function of the means for directional fluid distribution 44.

FIG. 12 shows an embodiment in which the sanitary napkin fits adjacent to the wearer's body (particularly the menses of the upper portions of the wearer's thighs and the wearer's labia majora) in a "W" shape. (The wearer's body is designated "W" in the drawings.) FIG. 12 also shows how the optional bending axes 90 provided in the sanitary napkin 20 can be used to assist the sanitary napkin in assuming the desired in-use cross-sectional configuration. If the fluid directing strip 48 comprises a thin strip of film, it is typically flexible enough that the sanitary napkin can assume such a configuration even without providing the fluid directing strip 48 with such bending axes, however.

FIG. 13 shows an embodiment in which the sanitary napkin fits adjacent to the wearer's body (particularly the menses of the upper portions of the wearer's thighs and the wearer's labia majora) in an inverted "V" shape.

In alternative embodiments, the sanitary napkin 20 of the present invention may assume any of the other different configurations in the above-referenced U.S. patent application Ser. No. 07/832,797 entitled "Sanitary Napkin With Stiffened Center" filed in the name of Osborn on Jan. 22, 1994.

The disclosures of all patents, patent applications (and any patents which issue thereon, as well as any corresponding published foreign patent applications), and publications mentioned throughout this patent application are hereby incorporated by reference herein. It is expressly not admitted, however, that any of the documents incorporated by reference herein teach or disclose the present invention. It is also expressly not admitted that any of the commercially available materials or products described herein teach or disclose the present invention.

While particular embodiments of the present invention have been illustrated and described, it would be obvious to those skilled in the art that various other changes and modifications can be made without departing from the spirit and scope of the invention.

What is claimed is:

1. A sanitary napkin comprising:

a liquid pervious topsheet;

a liquid impervious backsheet joined to said topsheet,

an absorbent core having a length, a width, and a pair of end edges positioned between said topsheet and said backsheet,

a liquid transporting component positioned between said topsheet and said absorbent core, said liquid transporting component having a length, a width, a pair of side edges, and a pair of end edges wherein the length of said liquid transporting component is less than the length of said absorbent core; and

a liquid directing component for directing liquid exudates toward the end edges of said absorbent core by controlling the flow of the liquid exudates being transported by said liquid transporting component into said absorbent core, said liquid directing component being positioned between said liquid transporting component and said absorbent core, said liquid directing component having a length, a width, a pair of side edges, and a pair of end edges, wherein

at least one of the end edges of said liquid transporting component extends beyond the one of the end edges of said liquid directing component so that said liquid transporting component transports liquid exudates beyond the end edges of said liquid directing component.

2. The sanitary napkin of claim 1 wherein said liquid transporting component comprises a strip of absorbent material.

3. The sanitary napkin of claim 1 wherein said liquid transporting component comprises a laminate of two tissue layers with absorbent gelling material therebetween.

4. The sanitary napkin of claim 1 wherein both ends of said liquid transporting component extend beyond the ends of said liquid directing component and said liquid transporting component is joined to the underlying absorbent core only at the ends of said liquid transporting component and is unattached to any underlying element between said ends to provide an unattached portion of said liquid transporting component that is capable of separating from said absorbent core when said sanitary napkin is worn.

5. The sanitary napkin of claim 1 wherein said liquid directing component is hydrophilic.

6. The sanitary napkin of claim 1 wherein said liquid directing component is hydrophobic.

7. The sanitary napkin of claim 1 wherein said liquid directing component comprises a liquid impervious structure.

8. The sanitary napkin of claim 7 wherein said liquid directing component comprises a strip of film.

9. The sanitary napkin of claim 1 wherein said sanitary napkin has a longitudinal centerline that extends in a longitudinal direction and said liquid directing component comprises a structure with a plurality of liquid directing channels extending in the longitudinal direction formed therein.

10. The sanitary napkin of claim 9 wherein said liquid directing component comprises a piece of foam.

11. The sanitary napkin of claim 9 wherein said liquid directing component comprises a strip of material having liquid directing channels with trapezoidal cross-sections.

12. The sanitary napkin of claim 11 wherein said trapezoidal-shaped channels have a base and walls, and at least one of said base and said walls have apertures provided therein.

13. The sanitary napkin of claim 1 wherein said liquid directing component comprises a semi liquid impervious structure.

14. The sanitary napkin of claim 13 wherein said liquid directing component comprises an apertured film.

15. The sanitary napkin of claim 1 wherein both end edges of said liquid transporting component extend beyond the end edges of the liquid directing component.

16. The sanitary napkin of claim 1 wherein at least one side edge of said liquid directing component extends laterally outward beyond one of the side edges of the liquid transporting component.

17. The sanitary napkin of claim 1 wherein the width of said liquid transporting component is between about 1 cm and about 4 cm and the length of said liquid transporting component is between about 7 cm and about 15 cm.

18. The sanitary napkin of claim 1 wherein the width of said liquid directing component is between about 0.3 cm to about 0.7 cm wider than said liquid transporting component and the length of said liquid directing component is between about 0.3 cm to about 2 cm shorter than said liquid transporting component.

19. The sanitary napkin of claim 1 wherein said liquid directing component has curved concave inward side edges.

20. The sanitary napkin of claim 1 wherein said liquid transporting component and said liquid directing component comprise two separate elements.

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SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

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RADICACIÓN 0-73030

EDICTO No 18002

LA SECRETARÍA GENERAL AD-HOC HACE SABER.

Que esta Superintendencia profirió Resolución No 31674 de 28-NOV-2005 Que el contenido de la parte resolutive es como sigue El Superintendente de Industria y Comercio

RESUELVE

ARTICULO PRIMERO- Negar el privilegio de patente de invención para la solicitud correspondiente a "ARTICULO ABSORBENTE DE LLENADO CENTRAL CON UNA BARRERA DE TRANSMISION Y UN MIEMBRO CENTRAL QUE SE ELEVA Y METODO DE PRODUCCION"

Remio Castro: Carrera 13 No. 27-69 Pisos 2, 5, 7 y 10
Bogotá D.C. - Colombia

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

NOTIFÍQUESE Y CUMPLASE

Dada en Bogotá D.C. a los 28 DE NOV. 2005

EL SUPERINTENDENTE DE INDUSTRIA Y COMERCIO


JAIR RUBIO ESCOBAR

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

Secretaría General Ad-Hoc 14-DIC-2005 Este edicto se desfiló hoy 27-DIC-2005 a las cinco (5 00 p.m.)
Secretaría General Ad-Hoc
EDICTO No 18002