

Industria y Comercio
SUPERINTENDENCIA

SUPERINTENDENCIA DE PROPIEDAD INTELECTUAL
Radicación : 01097691 / 0002665 Folios: 72
Fecha (MM): 2003-11-07 15:44:17
Tramite : 002 PATENTES D 1 REGISTRO/ 400 OPOSICION
Dependencia: 2020 DIVISION DE NUEVAS CREACIONES

FORMULARIO UNICO DE OPOSICION
2000-12

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OPOSICION A:

☒ Patente de Invención	☐ Marca Colectiva
☐ Patente de Modelo de Utilidad	☐ Marca de Certificación
☐ Diseño de Industrial	☐ Lema Comercial
☐ Esquema de Trazado para Circuitos Integrados	
☐ Marcas de Productos o Servicios	

SOLICITUD PUBLICADA

Número del expediente :	01-097691
Solicitante:	GRUPO P.I. MABE S.A. DE C.V.
Apoderado:	DILIA MARIA RODRIGUEZ D'ALEMAN
Título de la nueva creación o denominación del signo:	TOALLA FEMENINA PARA NIÑAS
Gaceta:	531 de Fecha 29 de agosto de 2003

3 **OPOSICION PRESENTADA POR:**

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	Teléfono : 3107055 - 3105066	C.C. No. 80.421.942 de
	E-mail: mjaramillo@gomezpinzon.com	Usaquén
		TP No. 74.555del C.S.J.

4 FUNDAMENTOS DE LA OPOSICION:

Causal : Ver siguiente página.
Justificación: Falta de novedad

Señora Jefe de la
DIVISIÓN DE NUEVAS CREACIONES
Superintendencia de Industria y Comercio
E. S. D.

Referencia: Expediente N° 01.097.691
Asunto: Oposición a la solicitud de registro de la Patente de Invención denominada "TOALLA FEMENINA PARA NIÑAS".
Solicitante: GRUPO P.I. MABE, S.A. DE C.V.
Oposición de: PRODUCTOS FAMILIA S.A.

**Publicada en la Gaceta de la Propiedad Industrial
N° 531 del 26 de agosto de 2003. N° Publicación: 531**

MAURICIO JARAMILLO CAMPUZANO, mayor de edad, identificado con la Cédula de Ciudadanía No. 80.421.942 de Usaquén, abogado con tarjeta profesional N° 74.555, en mi condición de apoderado de la sociedad PRODUCTOS FAMILIA S.A. en adelante FAMILIA sociedad conformada con base en las leyes de la República de Colombia domiciliada en Medellín, Colombia, atentamente manifiesto que presento oposición a la concesión del la solicitud de registro de la Patente de Invención denominada "TOALLA FEMENINA PARA NIÑAS", solicitada por la GRUPO P.I. MABE, S.A. DE C.V., y pido a Usted declarar fundada esta oposición y en consecuencia negar el registro de la Patente solicitada.

2. INTERÉS PARA ACTUAR

Conforme lo dispuesto en el artículo 42 de la Decisión 486 de la Comisión del Acuerdo de Cartagena, en concordancia con las leyes vigentes, solicito a ese Despacho se sirva reconocer a mi representada, la sociedad FAMILIA como parte interesada en este asunto por cuanto la decisión que se ha de proferir, afecta de manera directa sus intereses, en la medida que es un partícipe activo del mercado de las toallas femeninas, a través de la línea de productos Nosotras.

A mi representada le asiste además el derecho a presentar oposición a la solicitud de registro de la Patente en referencia, ya que las causales que invoca como fundamento de su petición tienen por finalidad velar no sólo por sus propios intereses sino también por los del público consumidor para proteger a los medios comerciales y al público consumidor.

3. SON HECHOS DE ESTA ACCIÓN

3.1. La sociedad GRUPO P.I. MABE, S.A. DE C.V., solicitó el día 15 de noviembre de 2001, el registro de la Patente de invención denominada "TOALLA FEMENINA PARA NIÑAS", solicitud Colombiana que reivindica prioridad con base en la solicitud Mexicana MX 011277 del 16 de noviembre de 2000, solicitud que apareció publicada en la Gaceta de la Propiedad Industrial N° 531 del 29 de agosto de 2003, en la página 322, bajo el NP 531, así:

Expediente No:	1 97691	Sec.Evento 0						
Fecha de radicación	15/11/2001							
Tipo de evento	REGISTRO/DEPOSITO/CONCESION							
Tipo de solicitud PATENTE DE INVENCION	TOALLA FEMENINA PARA NIÑAS							
Sector	(IQ)							
Solicitante	GRUPO P.I. MABE, S.A. DE C.V. MX 5							
Clasificacion	A 61 F 13 15							
Inventor(es)	ALBERTO CARLOS CORONA CARLOS CANALES ESPINOSA DE LOS MONTEROS LUCIA SANCHEZ FERNANDEZ LUCIA ROJAS OROPEZA							
Apoderado	RODRIGUEZ D'ALEMAN DILIA MARIA							
Publicación	<table border="1"> <tr> <td>Número</td> <td>Fecha</td> <td>Np</td> </tr> <tr> <td>531</td> <td>29/08/2003</td> <td>531</td> </tr> </table>		Número	Fecha	Np	531	29/08/2003	531
Número	Fecha	Np						
531	29/08/2003	531						
Certificado	0							
Vigencia	De [] hasta []							
Prioridad	MX 011277 16/11/2000 R							

- 3.2. Que la solicitud de Patente de Invención, reivindica, como novedoso, de altura inventiva y de aplicación industrial una Toalla Femenina para niñas que comprende una capa superior permeable; una capa inferior impermeable; una matriz absorbente entre capas superior e inferior y adhesivo para fijar a la prenda, caracterizado por que la matriz es al menos alrededor entre 15% y 20 % más corta que una matriz absorbente convencional; que el ancho de la matriz tiene alrededor de 5 a 7.5cm preferiblemente 6cm en la parte más ancha y de 4 a 5.5cm en su la parte más angosta; que la absorción total mínima es alrededor de 70gr de fluido corporal; y, la absorción es 130% mayor que la capacidad de un panti protector.
- 3.3. FAMILIA., es titular en Colombia de varias Nuevas Creaciones relacionadas con toallas higiénicas femeninas. Así mismo, mi poderdante ha comercializado y actualmente comercializa toallas higiénicas.
- 3.4. Que el estado del arte internacional, revela con anterioridad a la solicitud pretendida, múltiples conformaciones y dimensiones similares para toallas femeninas según la solicitud, sobre las cuales podemos resaltar:
- 3.4.1. La patente de Norteamérica US5'248.309 de Serbiak y otros, con fecha de publicación del 28 de septiembre de 1993, revela una toalla con una capa superior permeable; una capa inferior impermeable; una matriz absorbente entre capas superior e inferior y adhesivo para fijar a la prenda, en donde dicha toalla femenina comprende medidas entre 150mm (15cm) y 320mm (32cm) de largo por 60mm (6cm) a 120mm (12cm) de ancho, en donde la matriz absorbente se extiende al menos entre el 50% y 75% de la longitud de la toalla con dimensiones entre 50,8mm (5,08cm) y 12,7mm (1,27cm) de ancho (ver columna 4 líneas 35 en adelante). Así mismo, que la capacidad de absorción está entre 20

y 50 g para una toalla sanitaria convencional y entre 1 y 15 g para una panti protector (ver columna 1 líneas 40 a 51). De hecho esta patente anterior revela que la toalla tiene capacidad de recibir mínimo 30 g de fluido corporal.

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3.4.2. La patente de Norteamérica US5'609.588 de Dipalma y otros, con fecha de publicación del 11 de marzo de 1997, revela, reafirmando lo que indica el estado de la técnica a la fecha de esta patente, a partir de la columna 2 línea 59, una toalla con una capa superior permeable; una capa inferior impermeable; una matriz absorbente entre capas superior e inferior y adhesivo para fijar a la prenda, con medidas específicas a partir de la columna 4 línea 28, con base en las figuras 1, 2 y 3, donde afirma que dicha toalla femenina comprende medidas entre 150mm (15cm) y 320mm (32cm) de largo por 60mm (6cm) a 120mm (12cm) de ancho con esquinas redondeadas. Que la matriz absorbente esta posicionada de manera central respecto al conjunto de la toalla y que se extiende al menos entre el 50% y 75% de la longitud de la toalla y con dimensiones entre 63,5mm (6,35cm) y 12,7mm (1,27cm) de ancho. Así mismo, como se afirma en la columna 1 línea 37, la capacidad de absorción está entre 20 y 50 g para una toalla sanitaria convencional y entre 1 y 15 g para una panti protector. De hecho en la patente anterior se revela que la toalla tiene capacidad de recibir por lo menos 30 g de fluido corporal (columna 5 líneas 37 a 45).

3.4.3. La patente de Norteamérica US4'950.264 de Osborn y otros, de agosto 21 del 1990, en la columna 1 línea 49 en adelante, elabora un estudio de toallas de alto, medio y bajo nivel de absorción dependiendo del uso y se refiere a patentes anteriores para sustentar sus afirmaciones.

3.5. Que por consiguiente, respecto a la solicitud pretendida se tiene que:

3.5.1. CARECE DE NOVEDAD:

Según la decisión 486 de la Comunidad Andina de Naciones, Artículo 16.- *"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."*

A la fecha de prioridad, 16 de noviembre de 2000, ya era conocido, pues era parte del arte anterior, la materia sobre la cual busca protección en el capítulo reivindicatorio.

Veamos, se reivindica una **Toalla Femenina para niñas** que comprende una capa superior permeable; una capa inferior impermeable; una matriz absorbente entre capas superior e inferior y adhesivo para fijar a la prenda, caracterizado por que:

- la matriz es al menos alrededor entre 15% y 20 % más corta que una matriz absorbente convencional;

Respecto a ello, con anterioridad es conocido, que las toallas higiénicas femeninas varían en tamaño respecto a la necesidad o capacidad de absorción en el uso, tal y como se revela en la patente US4'950.264 de Osborn. Que el hecho que la matriz se reduzca un 15% y 20% que una matriz convencional, además de ser relativo, pues existen variedad de tamaños convencionales dependiendo del uso o necesidad (ver US4'950.264), pues ya era revelado en el estado de la técnica en la patente US5'248.309 de Serbiak y la patente US5'609.588 de Dipalma, que una matriz

absorbente de una toalla puede variar en tamaño desde 50% al 75% de la longitud total de la toalla. Por lo tanto, el arte de disminuir el tamaño de la matriz absorbente no indica que es un salto novedoso. 65

- que el ancho de la matriz tiene alrededor de 5 a 7,5cm preferiblemente 6cm en la parte más ancha y de 4 a 5,5cm en su la parte más angosta;

Las patentes US5'248.309 de Serbiak y US5'609.588 de Dipalma, revelan que para el año de 1990, había desarrollos de toallas donde la matriz puede tener anchuras entre 6,35cm y 1,27cm en promedio. Por lo tanto, es claro que una dimensión preferible de 6cm de ancho para la matriz absorbente, no es, desde ningún punto de vista, novedoso.

- que la absorción total mínima es alrededor de 70gr de fluido corporal;

Para esta caracterización, las patentes US5'248.309 de Serbiak y US5'609.588 de Dipalma, revelan con anterioridad, que las toallas tienen capacidad de recibir por lo menos 30 g de fluido corporal. En pocas palabras que la capacidad de absorción, de una toalla del estado de la técnica para 1990 era de mínimo 30 g de fluido corporal. De hecho, en la técnica ya se revelaba con anterioridad en la patente US4'950.264 de Osborn varios estudios de absorción para las toallas. Adicionalmente, el hecho que una toalla tenga mayor o menor absorción que otra, es una característica de los medios de absorción, no de la toalla como tal, pues la técnica revela medios superabsorbentes de diferentes aplicaciones, entre ellas para toallas higiénicas. Por lo tanto, lo que indica esta característica de la toalla femenina para niñas, no es novedosa.

- y, la absorción es 130% mayor que la capacidad de un panti protector.

Como se observa en las patentes US5'248.309 de Serbiak y US5'609.588 de Dipalma, un panti protector puede tener una capacidad de absorción entre 1 y 15 g de fluidos corporales. Por lo tanto lo que aquí se pretende es una capacidad de absorción entre 1,3 y 34,5 g de fluido corporal, que en esencia es la capacidad de absorción de una toalla del arte anterior, pues en la patentes de Serbiak y de Dipalma se revelan capacidades entre 1 y 50 g de fluido corporal. En consecuencia, esta caracterización tampoco es novedosa.

3.5.2. CARENIA DE ALTURA INVENTIVA.

Según la Decisión 486 de la Comunidad Andina de Naciones, Artículo 18.- "Se considerará que una invención tiene nivel inventivo, si para una persona del oficio normalmente versada en la materia técnica correspondiente, esa invención no hubiese resultado obvia ni se hubiese derivado de manera evidente del estado de la técnica."

A la fecha de prioridad, 16 de noviembre de 2000, en combinación y a partir del arte anterior revelado en los documentos de patente US5'248.309 de Serbiak, US5'609.588 de Dipalma y la patente US4'950.264 de Osborn, es posible deducir una Toalla Femenina para niñas que comprende una capa superior permeable; una capa inferior impermeable; una matriz absorbente entre capas superior e inferior y adhesivo para fijar a la prenda, caracterizado por que la matriz es al menos alrededor entre 15% y 20 % más corta que una matriz absorbente convencional; que el ancho de la matriz tiene alrededor de 5 a 7,5cm preferiblemente 6cm en la parte más ancha y de 4 a 5,5cm en su la parte más angosta; que la absorción total mínima es alrededor de 70gr de fluido corporal; y, la absorción es 130% mayor que la capacidad de un panti protector. Es posible deducirlo a todas luces, pues si tomamos cada caracterización por separado con base en el estudio de novedad anterior y las unimos, pues lo obtenido no es de ninguna manera un salto inventivo, toda vez que dichas patentes ya han plasmado dichas soluciones combinadas con una anterioridad no menor a 10 años. El hecho de reducir o aumentar el tamaño de

un producto absorbente es ampliamente conocido en la técnica y no es objeto de patentabilidad dado que los ojos de la ley, ello es sólo un hecho derivado del uso o aplicación. No es una solución técnica a un problema planteado. Por lo tanto, el modificar el tamaño, se deduce de manera evidente del estado de la técnica, para una persona del nivel medio versado en la materia. Así las cosas, del arte anterior, específicamente combinando los documentos de patente US5'248.309 de Serbiak, US5'609.588 de Dipalma y la patente US4'950.264 de Osborn, es posible deducir la toalla pretendida, por lo tanto, carece de altura o nivel inventivo.

- 3.6. Dado lo anterior, es posible deducir que la solicitud y lo reivindicado no es objeto de patentabilidad pues es contrario a lo que dicta la Decisión 486 de la Comunidad Andina de Naciones, Artículo 14.- *"Los Países Miembros otorgarán patentes para las invenciones, sean de producto o de procedimiento, en todos los campos de la tecnología, siempre que sean nuevas, tengan nivel inventivo y sean susceptibles de aplicación industrial."*

La solicitud pretendida no cumple con dos de los tres requisitos de patentabilidad.

- 3.7. Por consiguiente, si se concede el registro solicitado se induciría al monopolio a los cambios dimensionales de los productos existentes.

- 3.8. Por todo lo anterior, atentamente solicito a usted que se sirva declarar fundada la presente oposición y negar el registro Patente de invención denominada "TOALLA FEMENINA PARA NIÑAS", solicitud Colombiana que reivindica prioridad con base en la solicitud Mexicana MX 011277 del 16 de noviembre de 2000, solicitud que apareció publicada en la Gaceta de la Propiedad Industrial N° 531 del 29 de agosto de 2003, en la página 322, bajo el NP 531.

4. PRUEBAS

De conformidad con lo dispuesto por las normas vigentes, solicito a usted tener como prueba en este asunto los siguientes:

- 4.1. Patente US5'248.309 de Serbiak
- 4.2. Patente US5'609.588 de Dipalma.
- 4.3. Patente US4'950.264 de Osborn.

5. FUNDAMENTO DE DERECHO

Fundamento esta observación en las normas legales siguientes :

- 5.1. Numeral 1 del artículo 586 del Código de Comercio.
- 5.2. Artículo 42 de la Decisión 486 de la Comisión del Acuerdo de Cartagena.
- 5.3. En las demás normas concordantes.

6. ANEXOS

Para los efectos correspondientes anexo al presente escrito los siguientes documentos:

- 6.1. Patente US5'248.309 de Serbiak, Anexo 1.
- 6.2. Patente US5'609.588 de Dipalma, Anexo 2.
- 6.3. Patente US4'950.264 de Osborn, Anexo 3.
- 6.4. Recibo de pago expedido por el Fondo Especial de esa Superintendencia, en el cual consta que se ha pagado el valor correspondiente a la tasa por tramitación de esta oposición.
- 6.5. Copia de la oposición para el traslado al solicitante.
- 6.6. Poder para actuar a nombre de mi representada.

7. NOTIFICACIONES

Para efectos de notificaciones que por disposición del artículo 50 del Decreto 01 de 1984 debe hacer su Despacho, informo que mi representada y la suscrita recibiremos notificaciones en la Secretaría de su Despacho o en mis oficinas de abogado situadas en la carrera 9 No. 73-24 piso 3, ciudad de Bogotá.

Respetuosamente,

MAURICIO JARAMILLO CAMPUZANO
C.C. 80.421.942 USAQUEN
T.P.A. N° 74.555

Patent Number **5 748 210**

[45] Date of Patent: Sep. 28, 1993

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11. Let's not forget the other side of the coin.

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Primary Examiner—Randall L. Green

Assistant Examiner—K. M. Reichle

different Agent as Mrs. Thomas I. Connally.

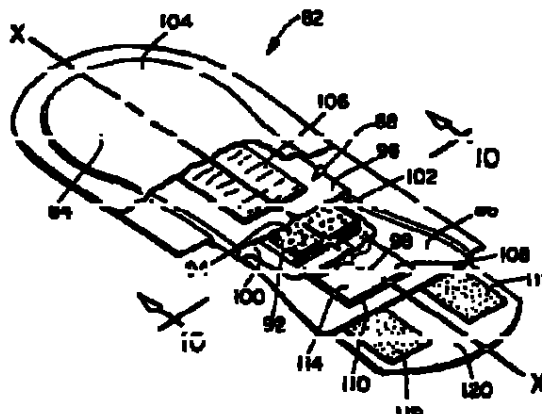
[57] ABSTRACT

A tam sanitary napkin is disclosed along with its method of manufacture. The napkin has a liquid-impermeable baffle and an absorbent retained on the baffle. The absorbent has a longitudinally-extending central absorbent zone with a width of less than about 2 inches. The central zone is capable of absorbing at least 20 grams of body fluid which is discharged from the vaginal cavity and deposited onto the napkin. The central zone also has a greater thickness than adjacent portions of the napkin so as to resist twisting and bunching during use. The sanitary napkin further has a caliber of less than about 5 millimeters.

19 Claims, 6 Drawing Sheets

19 Claims, 6 Drawing Sheets

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70
9 69

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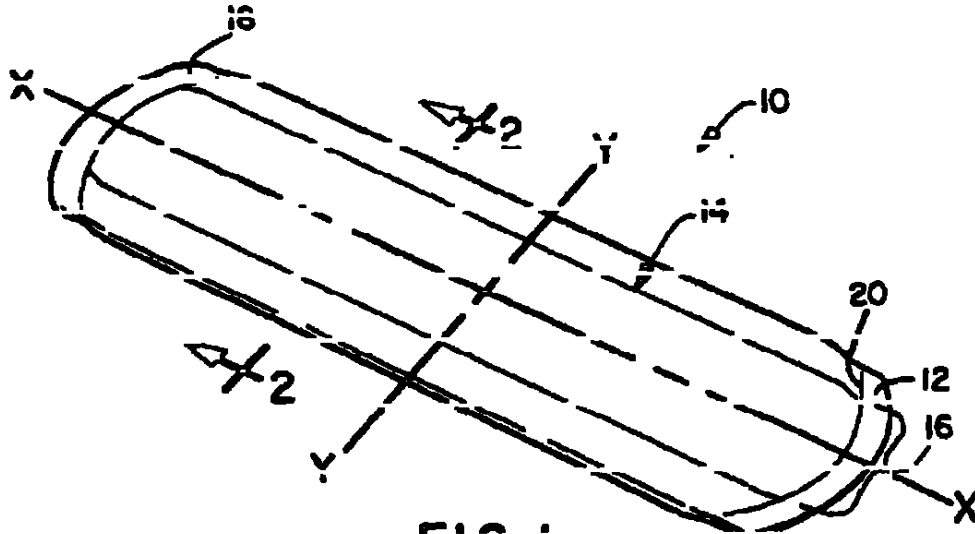


FIG. 1

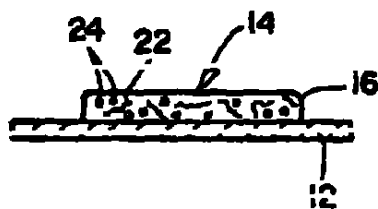


FIG. 2

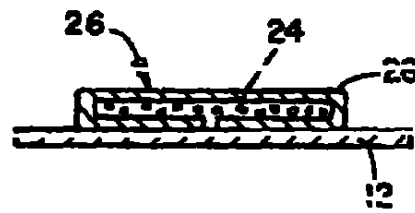


FIG. 3

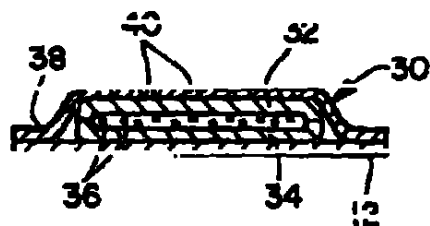


FIG. 4

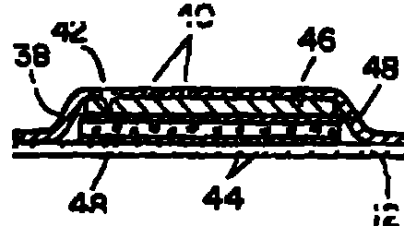


FIG. 5

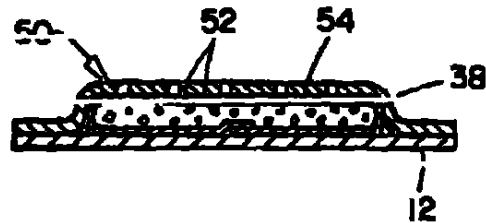


FIG. 6

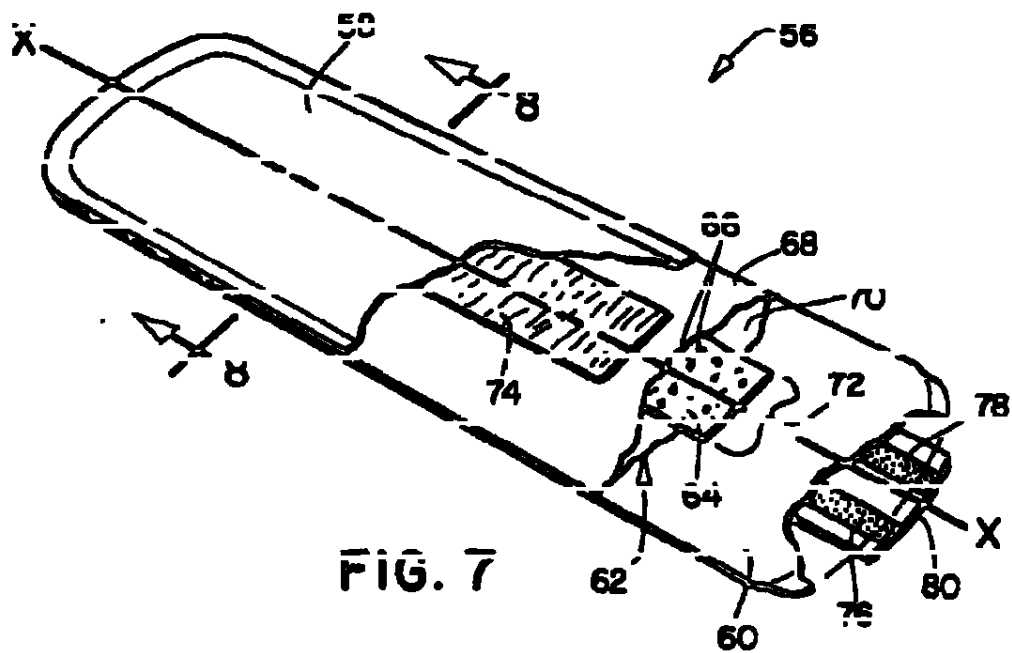


FIG. 7

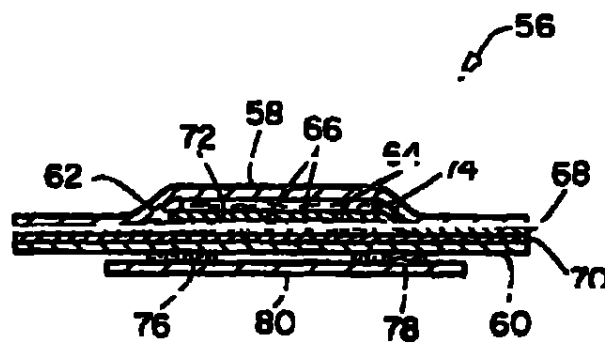


FIG. 8

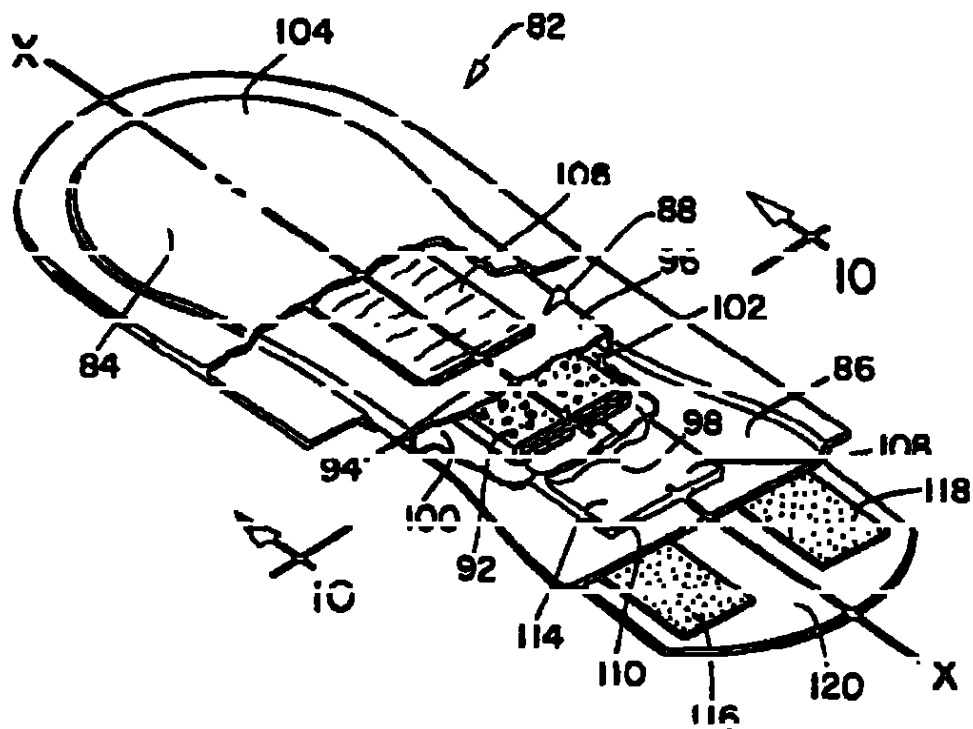


FIG. 9

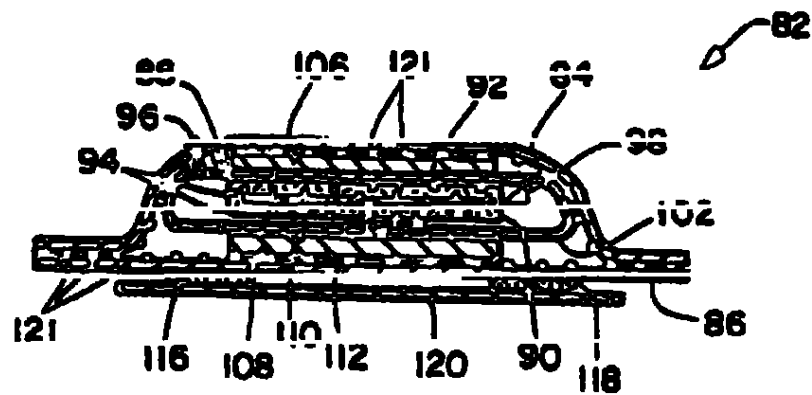


FIG. 10

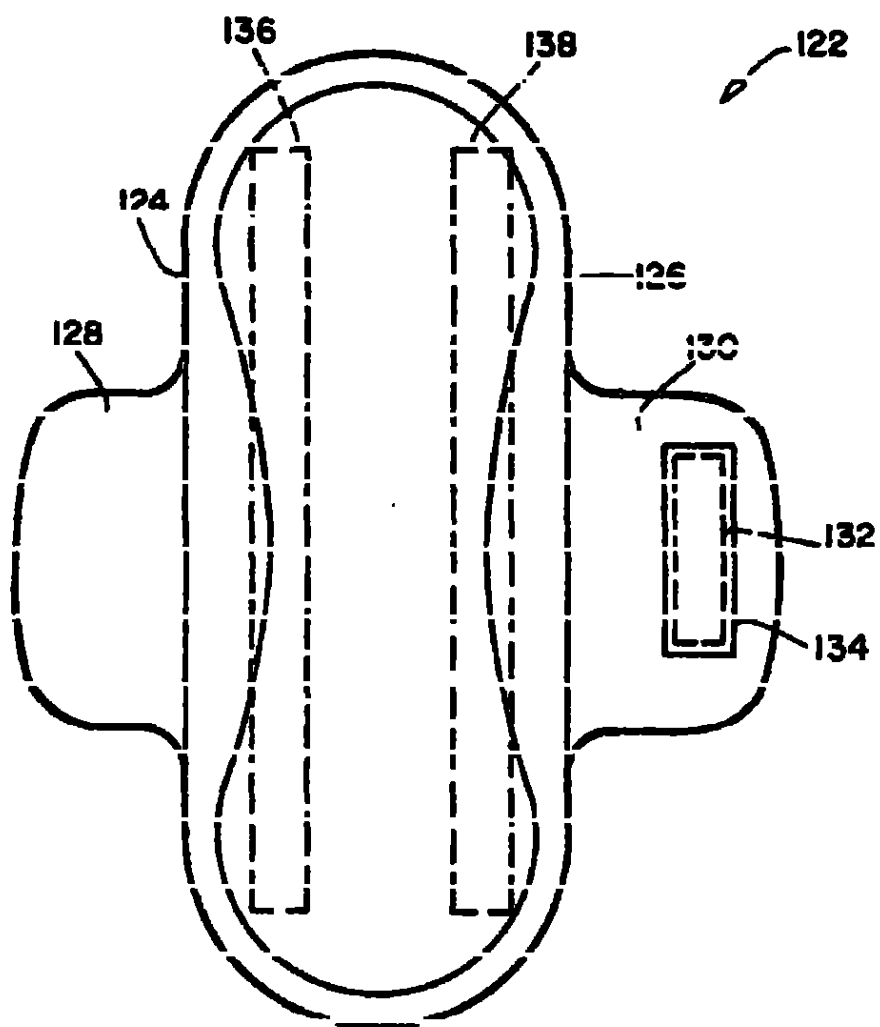


FIG. 11

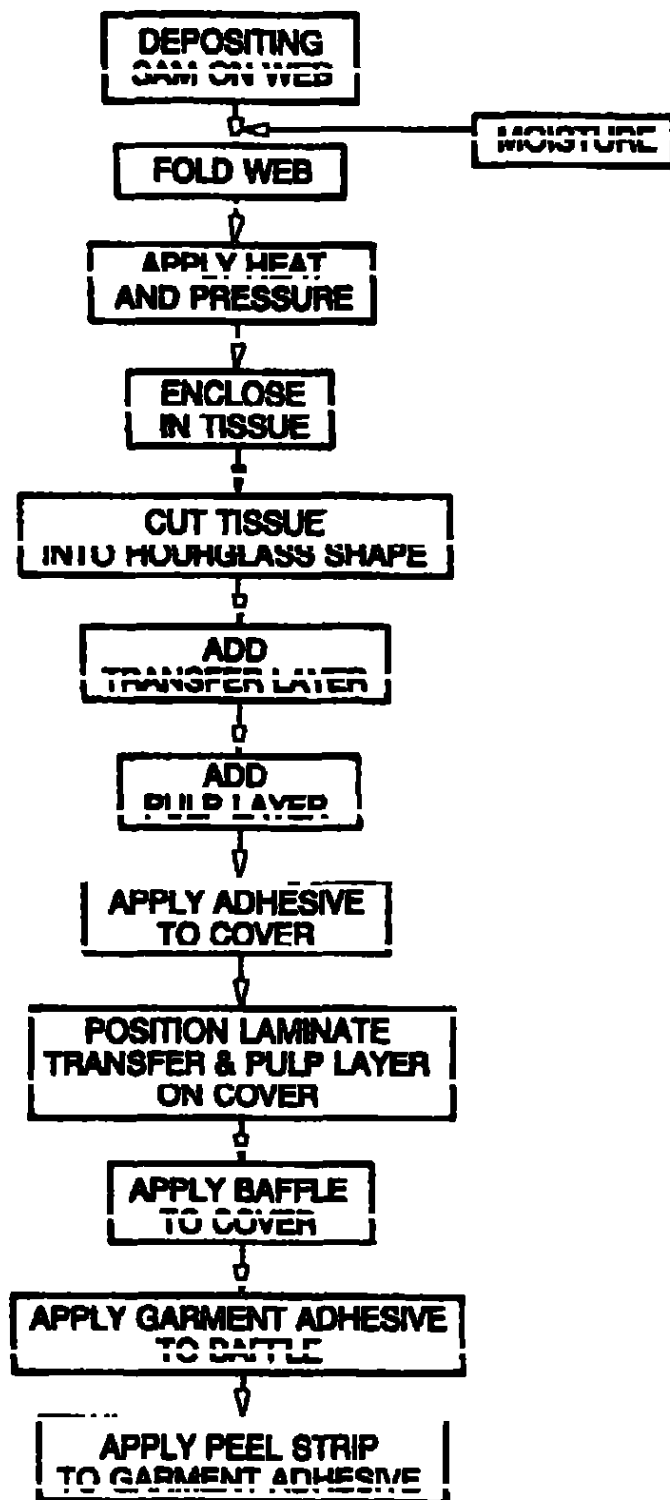


FIG. 12

THIN SANITARY NAPKIN HAVING A CENTRAL ABSORBENT ZONE AND A METHOD OF FORMING THE NAPKIN

This is a continuation of copending application Ser. No. 07/356,694 filed on Jul. 19, 1990, now abandoned.

FIELD OF THE INVENTION

This invention relates to a thin sanitary napkin and a method of manufacturing the napkin. More specifically, this invention relates to a thin sanitary napkin which has a caliper of less than about 5 millimeters and which has a longitudinally-extending central absorbent zone which is more absorbent and stiffer than adjacent zones so as to resist twisting and bunching during use.

BACKGROUND OF THE INVENTION

Sanitary napkins, also referred to as catamenial or feminine pads, are designed to be worn by a female to absorb medium to heavy flow of body fluids such as menses, blood, urine, and other excrements discharged by the body during a menstrual period. Sanitary napkins are external devices which are designed to be aligned approximately the pudendum region of the human body and are generally held in position by being adhesively or mechanically attached to an undergarment. Such products differ from tampons which are classified as internal devices and are designed to be physically inserted into the vaginal cavity. Sanitary napkins also differ from pantliners and panty shields in several noticeable ways. Sanitary napkins are generally larger in size, have a more defined three-dimensional configuration, are thicker in caliper and are bulkier in appearance than pantliners or panty shields. Functionally, sanitary napkins are different in that they are constructed to absorb a greater quantity of body fluid and are designed so that they can be worn for a longer period of time, for example, overnight if needed.

Since sanitary napkins are normally used during the major discharge portion of a menstrual period, they are constructed to handle medium to heavy flows and commonly have a total absorbent capacity in the range of about 20 to 30 grams of fluid. Pantliners and panty shields, on the other hand, are designed to absorb relatively small amounts of body fluids and are marketed to be used at the beginning and end of a menstrual period when flow is light or spotty. Commercially available pantliners and panty shields are constructed to have a total absorbent capacity in the range of about 1 to 15 grams of fluid.

Today's sociological changes have enabled women to become more active in sports and other types of physical activity. These changes have been complemented by a change in attire and have given women the option of wearing tight, body-fitting clothing. Current sanitary napkins, having a caliper of 6.4 mm or greater, can present an unsightly bulge adjacent the pudendum when worn inside tight-fitting shorts or pants. The overall size and configuration of the napkin can also restrict leg movement or cause discomfort when a woman participates in physical or sporting events. In view of this, there is a real need to develop a thin sanitary napkin which is less than about 5 millimeters in caliper yet able to absorb as much body fluid as current available products.

In developing a thin sanitary napkin less than about 5 millimeters in caliper, it was realized that such products

had a tendency to twist and bunch when worn. The squaring of the napkin between the thighs and the resulting deformation as a woman moves about, causes the upper surface of the napkin to acquire a curved or concave shape. This twisting and bunching is referred to as "roping" because a cylindrical profile can be imparted to the sanitary napkin. This roping effect is detrimental because the napkin is unable to absorb body fluid that contacts its upper surface. The fluid discharged from the vagina has a tendency to run off the roped napkin before it can be absorbed and, therefore, the fluid leaks onto the undergarment. This run-off becomes significant during periods of heavy flow.

It has been found that by positioning an absorbent strip, which is stiffer and more absorbent than adjacent portions, along the longitudinal central axis of the sanitary napkin, this roping phenomenon can be mitigated and/or eliminated.

Other manufacturers have recognized the need for a thin sanitary napkin but have not addressed the roping problem. U.S. Pat. No. 4,950,264, issued to Thomas W. Osborn, III, teaches a thin sanitary napkin. The Osborn application teaches a thin sanitary napkin comprised of an absorbent and a liquid-impermeable barrier. Claim 1 teaches that the sanitary napkin has a flexure-resistance of less than about 300 grams, a test capacity of at least about 8.0 grams, and a total capacity of at least about 20.0 grams. The Osborn application also teaches that the thin sanitary napkin is under 5.0 millimeters in caliper and has a capacity sufficient to absorb medium or heavy flows. However, Osborn does not teach the presence of a longitudinally-extending central absorbent zone, which is less than about 2 inches wide, and which is stiffer and more absorbent than adjacent portions of the napkin.

U.S. Pat. No. 4,079,739 issued to Howard A. Whitehead and assigned to the present assignee teaches a feminine pad having a thick central layer of absorbent material. The thick central layer does not contain superabsorbent as does the laminate taught in the present invention.

Other patents, which teach various aspects of this invention, include the following: U.S. Pat. No. 3,065,751 issued to Gobbo et al. which teaches a disposable diaper having a certain Gurley stiffness and having a flexible absorbent layer; U.S. Pat. No. Re. 32,649 issued to Brandt et al. which teaches hydrogel forming polymer compositions for use in absorbent structures and at column 18, lines 40-43, mentions the thickness of the absorbent core; and U.S. Pat. No. 4,578,068 issued to Kramer et al. which teaches an absorbent laminate structure containing superabsorbent particles.

Now, a thin sanitary napkin has been developed which has a longitudinally-extending central absorbent zone which is less than about 2 inches wide and which is stiffer and more absorbent than adjacent portions of the napkin.

SUMMARY OF THE INVENTION

Briefly, this invention relates to a thin sanitary napkin designed to be worn by a female to absorb body fluids such as menses, blood, urine, and other excrements discharged during a menstrual period. The sanitary napkin has a liquid-impermeable baffle, an absorbent retained on the baffle, and a caliper of less than about 5 millimeters. The absorbent has a longitudinally-extending central absorbent zone with a width of less than about 2 inches. The central zone is capable of absorbing

at least 20 grams of body fluid which is discharged from the vaginal cavity and deposited onto the napkin. The central zone also has a greater stiffness than adjacent portions of the napkin so as to resist twisting and bunching during use. A method of manufacturing the sanitary napkin is also disclosed.

The general object of this invention is to provide a thin sanitary napkin which has a longitudinally-extending central absorbent zone with a width of less than about 2 inches. A more specific object of this invention is to provide a thin sanitary napkin which has a caliper of less than about 5 millimeters and which has a longitudinally-extending central absorbent zone which is more absorbent than adjacent zones and stiffer, so as to resist twisting and bunching during use.

Another object of this invention is to provide a method of manufacturing a thin sanitary napkin which is less noticeable when worn under tight-fitting clothing.

A further object of this invention is to provide a sanitary napkin which uses less material and therefore is more environmentally friendly.

Still another object of this invention is to provide a sanitary napkin which is lower in cost by selectively placing expensive material, such as the superabsorbent and the transfer material, within the napkin where they are most effective while minimizing the amount of material needed.

Still another object of this invention is to provide a thin sanitary napkin which has at least three lateral zones which vary in caliper, stiffness and absorbency.

Still further, an object of this invention is to provide a thin sanitary napkin which has a relatively stiff central absorbent zone which resist twisting and bunching when worn.

Other objects and advantages of the present invention will become more apparent to those skilled in the art in view of the following description and the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a sanitary napkin having a longitudinally-extending central absorbent zone.

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

FIG. 3 is a cross-sectional view of a sanitary napkin showing an alternative embodiment wherein the absorbent is a laminate-containing superabsorbent.

FIG. 4 is a cross-sectional view of a sanitary napkin showing another embodiment which is similar to FIG. 3 except that a cover is positioned over the absorbent.

FIG. 5 is a cross-sectional view of a sanitary napkin depicting an absorbent comprised of a superabsorbent layer and a pulp layer sandwiched between a cover and a baffle.

FIG. 6 is a cross-sectional view of a sanitary napkin depicting an absorbent comprised of a superabsorbent wrapped in a meltblown web and sandwiched between a cover and a baffle.

FIG. 7 is a perspective view of a sanitary napkin having a longitudinally-extending central absorbent zone enclosed between two tissue layers and aligned below a transfer layer.

FIG. 8 is a cross-sectional of the sanitary napkin shown in FIG. 7 taken along line 8--8.

FIG. 9 is a perspective view of a sanitary napkin having a racetrack profile and having an absorbent with

an hourglass profile. The absorbent extends longitudinally along essentially the entire length of the napkin and is located between a transfer layer and a wicking layer.

FIG. 10 is a cross-sectional view of the sanitary napkin shown in FIG. 9 taken along line 10--10.

FIG. 11 is a top view of a sanitary napkin having a pair of wings attached to the longitudinal sides thereof.

FIG. 12 is a flow diagram of a method used to manufacture the sanitary napkin of this invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. 1, a thin sanitary napkin 10 is shown which is designed to be worn by a female to absorb body fluids such as menses, blood, urine, and other excrements discharged during a menstrual period. The sanitary napkin 10 is about 150 mm to 320 mm long, about 60 mm to 120 mm wide and has a racetrack shape with rounded ends. The napkin 10 has a caliper or thickness of less than about 5 millimeters, preferably less than about 4 millimeters, and most preferably less than about 3 millimeters. The sanitary napkin 10 includes a liquid-impermeable baffle 12 and an absorbent 14 which is secured to or retained on the baffle 12.

The liquid-impermeable baffle 12 is designed to face the lower surface, generally the crotch portion, of an undergarment (not shown). The baffle 12 permits the passage of air or vapor out of the sanitary napkin 10 while blocking the passage of body fluids and liquids. The baffle 12 can be made from a micro-embossed polymeric film such as polyethylene or polypropylene, or it can be made from bicomponent films. A preferred material is polyethylene.

The absorbent 14 can be secured to the baffle 12 by an adhesive or, alternatively, it can be enclosed by a liquid-permeable cover. The absorbent 14 has a longitudinally-extending central absorbent zone 16 aligned along the longitudinal axis, designated X--X, the napkin 10. The central absorbent zone 16 has an overall length which extends at least about 50%, and preferably about 75%, of the length of the napkin 10. More preferably, the central absorbent zone 16 extends essentially the entire length of the napkin 10 and terminates at the end seal lines 18 and 20. The central absorbent zone 16 has a width of less than about 2 inches (50.8 mm), preferably between about 0.5 and 2.0 inches (12.7 mm and 50.8 mm), and most preferably about 1.25 inches (31.8 mm). The central absorbent zone 16 can have a width which is equal to or less than the width of the absorbent 14 when measured across the central transverse axis Y--Y of the napkin 10. Preferably, the central absorbent zone 16 has a width which is less than about 60% of the width of the sanitary napkin 10 when measured across the narrowest portion of the napkin 10. The central absorbent zone 16 also has a width which is preferably less than about 75% of the width of the absorbent 14 when measured across the narrowest portion of the absorbent 14.

The central absorbent zone 16 represents the significant absorbing portion of the napkin 10 and has the capability of absorbing at least about 80%, preferably about 90%, and most preferably about 95% of the body fluid deposited onto the napkin 10. In terms of amount of body fluid, the central zone 16 can absorb at least 20 grams, preferably about 25 grams, and most preferably, about 30 or more grams of body fluid. It should be noted that the amount of body fluid which can be ab-

sorbed by the sanitary napkin 10 can be determined using a saline solution.

The capacity of the sanitary napkin 10 can be determined by the following test. In performing this test, one napkin is sufficient. The sanitary napkin to be tested is first conditioned by leaving it in a room which is at $21 \pm 1^\circ \text{C}$. and at $50 \pm 2\%$ relative humidity for a period of two hours. If the napkin contains a peel strip, this is removed. The entire napkin, minus any peel strip, is weighed to the nearest 0.1 gram. The napkin is then submerged in a beaker of stabilized isotonic saline which contains no preservatives. A suitable sterile saline is commercially sold by Baxter Travenol Company of Deerfield, Ill. under catalog no. 83158-2. The napkin is totally submerged and is not bent or otherwise twisted or folded. The napkin is submerged for 10 minutes. The napkin is removed from the saline and suspended for two minutes in a vertical position to allow the saline to drain out of the napkin. The napkin is then placed with the body-side cover face down on an absorbent blotter. The blotter can be filter paper no. ED 631-25 available from the Ahlstrom Filtration Inc., Mount Holly Springs, Pa. 17065. A uniform 17.6 grams per square centimeter load is placed over the napkin to squeeze out excess fluid. The absorbent blotter is replaced every 30 seconds until the amount of fluid transferred to the absorbent blotter is less than 0.5 grams in a 30 second period. Next, the napkin is weighed to the nearest 0.1 gram and the dry weight of the napkin is subtracted. The difference in grams is the capacity of the napkin.

The central absorbent zone 16 is also stiffer than adjacent, longitudinally-extending zones. This stiffness can be obtained by making the central zone 16 thicker; by constructing it out of several layers, by using stiffer materials, by changing the basis weight or by placing another layer of material vertically adjacent to it. Preferably, the central absorbent zone has a Gurley stiffness of at least about 500 milligrams, and preferably higher. See Table 1 below.

The ability of certain zones of a sanitary napkin to resist an applied bending force, known as pad stiffness, is determined by measuring the amount of force required to bend a rectangular composite sample cut from the sanitary napkin that includes all layers excluding the peel strip. The force needed to bend each sample is measured using a Gurley Model 4171-d Digital Stiffness Tester which along with weights and precalibration strips are available through Teledyne Gurley, Troy, N.Y. The Gurley stiffness test procedure is modeled after the Technical Association of the Pulp and Paper Industry (TAPPI) method T 543 pm-84. The Gurley Digital Stiffness Tester is an instrument consisting of a balanced vane, which is center-pivoted, and to which a variety of weights can be added below its pivot point. The vane moves freely to accommodate testing in both left and right directions which would be analogous to upward and outward body flexing of the samples.

There is a two part calibration to the Gurley Stiffness Tester. The first calibration is done to ensure that the "Vane" pendulum is swinging according to specification against a known material (i.e., a brass strip). The Gurley instrument is calibrated following the Gurley Digital Stiffness Tester Instruction Manual to within 5% variation with a 30.8 mm wide by 25.4 mm long precalibrated Brass Calibration Strip, Gurley part no. 31644. The second calibration is done to ensure that the

internal electronic calculations and conversions are accurate.

The samples cut from each sanitary napkin are $12.7 \text{ mm} \pm 0.4 \text{ mm}$ wide by $25.4 \text{ mm} \pm 0.4 \text{ mm}$ long. Each sample overlaps the top of the Gurley vane by 6.4 mm. During a test, the sample is moved against the top edge of the vane until the sample bends and the vane releases contact with the bottom edge of the sample. The point of release is measured by an electronic optical encoder which provides a greater degree of accuracy over the earlier model Gurley Stiffness Tester as was used in TAPPI T 543 pm-84. The electronic optical encoder also displays the result on the digital readout. The readout continuously displays readings from tests performed in both the left and right directions. The Gurley Model 4171-d also computes automatically through an internal microprocessor and displays the average of left and right bending stiffness data after each measurement. The average reading is then converted by this Gurley instrument into milligrams of Gurley stiffness relative to a sample size of 24.5 mm wide by 76.2 mm long.

The Gurley Stiffness Tester should be set up as follows. The required weight is attached and the base of the instrument is levelled by adjusting the leveling screw until the level's bubble is centered and the pendulum's pointer is indicating zero. The switches are set to correspond to the weight being used, the weight's position on the pendulum, the width of the specimen being tested, and the length of the specimen. For example: If a $25.4 \text{ mm} \times 12.7 \text{ mm}$ specimen is tested with the 5 gm weight in the 25.4 mm slot, the switches would be set as follows:

Weight =	5
Weight Position =	1 inch
Width =	3 inch
Length =	1 inch

The test procedure to be performed is as follows:

1. Center the specimen strip over the pendulum such that exactly 6.4 mm (0.25 inches) overlaps the top of the pendulum and exactly 6.4 mm (0.25 inches) will be held in the jaws.
2. Select an appropriate weight and a hole to give a reading between 2 and 6 on the scale. NOTE: The specimen should be brought to an approximate contact with the pendulum vane before applying force to avoid oscillation in the early stages.
3. Press the System Reset button. The display must read 00.000-00.
4. Press the Motor—Direction switch to cause the clamp arm to press the specimen against the pendulum.
5. Repeat step 4 in the opposite direction to establish both a left scale reading, a right scale reading, and an average reading.
6. Record the average scale reading.
7. Press the Select Button to attain the milligram calculation and record.
8. Repeat steps 1 through 7 for each specimen.

The following procedure should be used to obtain Gurley stiffness samples. A set of samples should be taken from five napkins. The longitudinal and transverse centerlines of each napkin is identified. The peel strip is removed and the garment adhesive is dusted with talc or corn starch. A sample $12.7 \text{ mm} \times 25.4 \text{ mm}$ is cut from each napkin at the intersection of the two

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1878

centerlines. Two additional samples of 12.7 mm x 23.4 mm are cut along the longitudinal centerline. The two additional samples are cut about 63.5 mm in front of and behind the first sample. The three samples from each napkin should be cut and handled carefully so as not to affect the sample stiffness. The Gurley stiffness is measured for each sample and the values are recorded as the stiffness of the central absorbent zone.

Next, one must identify parallel planes which are 63.5 mm in front of and behind the transverse centerline of the napkin. The width of the napkin is then measured at the narrowest point between the two planes as established. This is the width (C) of the napkin. The absorbent width is measured at the same point along the napkin. This is the width (B) of the absorbent. The width of the central absorbent zone is also measured at the same point along the napkin. This is the width (A) of the central absorbent zone. Points are then identified on the napkin which are located at the intersection of the parallel lines identified above and another set of lines which are parallel to the longitudinal centerline and at a distance of (C/4 + 6.4 mm) from the centerline. Take a 23.4 mm x 12.7 mm sample at each of these four points on the napkin. The Gurley stiffness of these samples is measured and are recorded as the stiffness of the adjacent zones.

Six additional points, three on each side of the longitudinal centerline, are identified which are about 7 mm from the longitudinal sides of the napkin. A sample 12.7 mm x 23.4 mm is cut from each of these points. The Gurley stiffness of each sample is measured and recorded as the "stiffness at the peripheral zone" of the napkin. The average for the stiffness of the peripheral zones is calculated and recorded as the "average stiffness of the peripheral zones" of the napkin. The maximum stiffness of the peripheral zones is then subtracted from the minimum stiffness of the central absorbent zone of the napkin and is recorded as the difference in stiffness between the central absorbent zone and the peripheral zones of the napkin.

The average of the values of the stiffness of the central absorbent zone is calculated and recorded as the "average stiffness of the central absorbent zone" for the napkin. The average of the values of the stiffness of the adjacent zones is calculated and recorded as the "average stiffness of the adjacent zones" for the napkin. The "average stiffness of the central absorbent zone" is then divided by the "average stiffness of the adjacent zones" and is reported as the ratio of the central absorbent zone to the adjacent zone stiffness.

The central absorbent zone 16 also has a ratio of machine direction stiffness to transverse direction stiffness of about 1.5 to 1.0, preferably about 1.8 to 1.0. Table 1 shows comparative data between the inventive product and two commercially available sanitary napkins which are relatively thin in caliper. The sanitary napkin also has a difference in stiffness between the central absorbent zone and peripheral zone of at least 130 milligrams. See Table 2 below. Lastly, the stiffness ratio of the central absorbent zone to the adjacent zones is greater than 2:1. See Table 3 below.

TABLE 1

COMPARISON OF MACHINE DIRECTION TO TRANSVERSE DIRECTION STIFFNESS OF NAPKIN OF THE CENTRAL ABSORBENT ZONE

No. of	Machine Direction Gurley Stiffness (mg)

TABLE 1-continued

	Samples	Average	Minimum	Maximum
Inventive Product	15	685	361	905
P&G Whisper Excel (with wings)	15	189	147	236
P&G Sheer Confidence (with wings)	15	184	133	242

	No. of Samples	Transverse Direction Gurley Stiffness (mg)		
		Average	Minimum	Maximum
Inventive Product	15	392	278	560
P&G Whisper Excel (with wings)	15	171	104	453
P&G Sheer Confidence (with wings)	15	131	88	199

	Ratio of Machine Direction/ Transverse Direction Gurley Stiffness	
	Averages	
Inventive Product	1.8	
P&G Whisper Excel (with wings)	1.1	
P&G Sheer Confidence (with wings)	1.4	

TABLE 2

STIFFNESS OF NAPKIN COMPARISONS OF CENTRAL ABSORBENT ZONE TO PERIPHERAL ZONES

	No. of Samples	Central Absorbent Zone Machine Direction Test Results Gurley Stiffness (mg)		
		Average	Minimum	Maximum
Inventive Product	15	685	361	905
P&G Whisper Excel (with wings)	15	189	147	236
P&G Sheer Confidence (with wings)	15	184	133	242

	No. of Samples	Peripheral Zone Machine Direction Test Results Gurley Stiffness (mg)		
		Average	Minimum	Maximum
Inventive Product	30	31.9	12.3	76.0
P&G Whisper Excel (with wings)	30	10.7	0.3	28.3
P&G Sheer Confidence (with wings)	30	6.2	0.3	24.7

	Difference in Stiffness Central Absorbent Zone (mg)- Peripheral Zone (mg)	
Inventive Product	445	
P&G Whisper Excel (with wings)	119	
P&G Sheer Confidence (with wings)	108	

TABLE 3

STIFFNESS OF NAPKIN COMPARISONS OF CENTRAL ABSORBENT ZONE TO ADJACENT ZONES

	No. of Samples	Central Absorbent Zone Machine Direction Test Results Gurley Stiffness (mg)		
		Average	Minimum	Maximum
Inventive Product	15	685	361	905
P&G Whisper Excel (with wings)	15	214	133	278
P&G Sheer Confidence (with wings)	15	251	189	300

	No. of Samples	Adjacent Zone Machine Direction Test Results Gurley Stiffness (mg)		
		Average	Minimum	Maximum

TABLE 3-continued

Inventive Product	20	24	20	200
P&G Whisper Excel (with wings)	20	147	136	220
P&G Super Confidence (with wings)	20	174	86	242

Ratio of Central Absorbent Zone/
Adjacent Zone
Gravley Machine Direction Stiffness
Averages

Inventive Product	8.1
P&G Whisper Excel (with wings)	1.3
P&G Super Confidence (with wings)	1.4

Note: The machine direction referred to in Tables 1, 2 and 3 corresponds to the longitudinal direction of the napkin, i.e. axis X—X'. The transverse direction referred to in Tables 1, 2 and 3 corresponds to the transverse direction of the napkin, i.e. axis Y—Y'.

Referring to FIG. 2, the central absorbent zone 16 is depicted as being a composite comprised of a hydrophilic material 22 and a hydrocolloidal material 24. The hydrophilic material 22 can be various natural or synthetic fibers, including cellulose fibers, surfactant-treated meltblown fibers, wood pulp fibers, regenerated cellulose or cotton fibers, or a blend of pulp and other fibers. A preferred material is an astringent tissue. The hydrocolloidal material 24, commonly referred to as a superabsorbent, can be a hydrogel-forming polymer composition which is water-insoluble, slightly cross-linked, and partially neutralized. It can be prepared from an unsaturated polymerizable, acid group-containing monomers and cross-linked agents. Such superabsorbents are taught in U.S. Pat. Nos. 4,798,603 issued to Meyers et al., Re. 32,649 issued to Brandt et al. and 4,467,012 issued to Paderni et al., as well as in published European Patent Application 0,339,461 to Kellenberger. These patents and the European Patent Application are incorporated by reference and made a part hereof.

Superabsorbents are very good at retaining body fluids. Superabsorbents have the ability to absorb a great amount of fluid in relation to their own weight. Typical superabsorbents used in sanitary napkins can absorb anywhere from 5 to 60 times their weight in blood. However, the absorption mechanism is not a rapid absorption and is usually slower than the rate of fluid absorption by the cellulose fluff material. The placement of the superabsorbent material in the center or lower portion of the napkin provides additional time for the superabsorbent to absorb the fluid from a transfer member.

It has been found that superabsorbents having a high mechanical stability in the swollen state, an ability to rapidly absorb fluid, and ones having a strong liquid binding capacity perform well in catamenial devices. Hydroxyfunctional polymers have been found to be good superabsorbents for this application. A hydrogel-forming polymer, specifically a partially neutralized cross-linked copolymer of polyacrylic acid and polyvinyl alcohol is preferred. After the polymer is formed, it is mixed with about a 1% anhydrous citric acid powder. The citric acid has been found to increase the ability of the superabsorbent to absorb menses and blood. This is particularly good for use in a sanitary napkin or feminine pad. The finely ground, anhydrous citric acid powder, which is void of water, along with trace amounts of fumed silica, is mixed with the polymer which has been screened to an appropriate particle size. This mixture

can then be formed into a composite or a laminate structure. Such superabsorbents can be obtained from Dow Chemical, Hoechst-Celanese, and Stockhausen, Inc., among others. This superabsorbent is a partially neutralized salt of cross-linked copolymer of polyacrylic acid and polyvinyl alcohol having an absorbency under load value above 25.

The superabsorbent 24 should have a high absorbency under load. That is, it should have the ability to expand or swell under a restraining pressure, typically about 0.3 psi. The absorbency under load value is a function of gel strength, osmotic pressure within the gel and the composition of the polymer itself. The absorbency under load value also pertains to the ability of the gel to swell against other superabsorbent particles as well as against adjacent fibers when under pressure. For purposes of this invention, a superabsorbent having a high absorbency under load is defined as having a value of 20 or higher. A preferred absorbency under load value is 25 or higher. The test for determining an absorbency under load value is taught on page 7, lines 14-52 of published European Patent Application 0,339,461 (Kellenberger) and assigned to the present assignee.

Referring to FIGS. 3 and 4, the central absorbent zone 16 can also be constructed as a laminate 26 comprised of a hydrocolloidal material 24 positioned within a folded hydrophilic material such as a pulp layer 28. In FIG. 4, a laminate 30 is shown wherein two astringent webs 32 and 34 enclose a superabsorbent 24 therebetween. The laminate 30 is retained in place upon the baffle 12 by a liquid-permeable cover 38. The cover 38 can be adhered about its outer periphery to the baffle 12. The cover 38 is designed to contact the body of the wearer and can be constructed of a woven or non-woven, natural or synthetic material which is easily penetrated by body fluid. Suitable materials include bonded carded webs of polyester, polypropylene, nylon, or other heat-bondable fibers. Other polyolefins such as copolymers of polypropylene and polyethylene, linear low-density polyethylene, finely-perforated film webs and net material also work well. A preferred material is a spun-bonded polypropylene, non-apertured web which contains about 1 to 6% titanium dioxide pigment to give it a clean white appearance. A white uniform spunbonded material is desirable because the color exhibits good masking properties to hide menses which has passed through it and the material has sufficient strength after being perforated in the longitudinal direction to resist being torn. U.S. Pat. Nos. 4,801,494 issued to Datta et al. and 4,908,026 issued to Suklenik et al. teach various cover materials which can be used with this sanitary napkin. These two patents are incorporated by reference and made a part hereof.

The liquid-permeable cover 38 can also contain a plurality of apertures 40 formed therein and the apertures 40 can be arranged along the longitudinal center line X—X', if desired. The apertures 40 will increase the rate at which body fluids can penetrate down into the absorbent laminate 30. The cover 38 can also be treated with a surfactant to make it more hydrophilic. The surfactant can include topical additions or internally applied materials like polysiloxanes.

Referring to FIGS. 5 and 6, two additional laminate embodiments are shown wherein a laminate is positioned between a baffle 12 and a cover 38. In FIG. 5, a laminate 42 is shown made up of a hydrocolloidal material 44 adhered to a layer of cellulose pulp 46. The hydrocolloidal material 44 can be adhered to both the

baffle 12 and the pulp layer 46 by a construction adhesive 48. It should be noted that the pulp layer 46 can also be adhered to the cover 38 and/or the baffle 12 as well. In FIG. 6, a laminate 50 is shown consisting of a hydrocolloidal material 52 completely enclosed by a nonwoven web 54. The nonwoven web 54 can be a surfactant treated meltblown web 54 which is secured to the baffle 12 and/or the cover 38 to give the sanitary napkin integrity.

Referring to FIGS. 7 and 8, a sanitary napkin 56 is shown having a liquid-permeable cover 58, a liquid-impermeable baffle 60 and an absorbent 62 enclosed therebetween. The absorbent 62 can be a composite or a laminate which includes a hydrophilic material 64 and a superabsorbent 66. The composite or laminate is sandwiched between two layers of tissue 68 and 70. The tissue layers 68 and 70 enclose and extend laterally outward from the composite or laminate and the combination forms the absorbent 62. The absorbent 62 has a central absorbent zone 72 which is aligned along the longitudinal central axis X—X of the sanitary napkin 56. The central absorbent zone 72 is similar in construction to the central absorbent zone 16 which is shown in FIG. 1, explained above.

Positioned above the absorbent 62 is a transfer member 74. The transfer member 74 is a nonwoven polypropylene meltblown web which facilitates movement of body fluid downward and outward from the cover 58 to distant areas of the central absorbent zone 72. Preferably, the transfer member 74 is aligned along the longitudinal axis X—X of the sanitary napkin 56 and is sized and configured to correspond to the shape and dimensions of the central absorbent zone 72. A description of a transfer layer is taught in U.S. Pat. No. 4,798,603 issued to Meyer et al and assigned to the present assignee. This patent is incorporated by reference and made a part hereof.

The sanitary napkin 56 also contains two longitudinally-extending strips of garment adhesive 76 and 78 which are attached to the exterior surface of the baffle 60. The garment adhesive is commercially available from National Starch Co. located at 10 Flinders Ave. Bridgewater, N.J. 08807. The strips of garment adhesive 76 and 78 are used to secure the sanitary napkin 56 to the inside of the crotch portion of an undergarment so that it can be properly aligned with the vaginal opening. A peel strip 80 is releasably attached to the garment adhesive strips 76 and 78 and prevents the adhesive from becoming contaminated prior to attachment to the undergarment. The peel strip 80 can be a white Kraft paper coated on one side so that it can be released from a hot melt adhesive. The peel strip 80 is designed to be removed by the ultimate consumer just prior to placement of the sanitary napkin 56 in the undergarment.

Referring to FIGS. 9 and 10, another embodiment of a sanitary napkin 82 is shown having a racetrack profile with essentially parallel, longitudinally-extending sides which are connected by a smooth curve at each end. The sanitary napkin 82 is constructed of a liquid-permeable cover 84, a liquid-impermeable baffle 86 and an absorbent 88. The absorbent 88 is completely enclosed by both the cover 84 and the baffle 86 and is aligned along the longitudinal central axis X—X of the sanitary napkin 82. The absorbent 88 includes a laminate 90 constructed of a hydrophilic material 92 and a superabsorbent 94. Preferably, the hydrophilic material is C-folded and the superabsorbent 94 is contained therein. The absorbent 88 also includes a tissue layer 96 which is

C-folded and overlapped upon itself. The tissue layer 96 extends laterally outward from the laminate 90 and is cut or formed into an hourglass profile, best seen in FIG. 9. The hourglass profile conveys a perception of comfort to the ultimate consumer.

The absorbent 88 has a central absorbent zone 98 and a pair of adjacent absorbent zones 100 and 102. The central absorbent zone 98 contains the superabsorbent 94 and represents the significant absorption portion of the sanitary napkin 82. The central absorbent zone is capable of absorbing a significant amount of body fluid, preferably at least about 20 grams, which is deposited onto the napkin 82. In FIG. 9, the central absorbent zone 98 is the area defined by the laminate 90. The adjacent zones 100 and 102 flank the central absorbent zone 98, but contain little if any superabsorbent. Preferably, the adjacent zones 100 and 102 do not contain superabsorbent. The adjacent zones 100 and 102 contain only the cover 84, the baffle 86 and the tissue layer 96. Each adjacent zone, 100 and 102, can absorb only a couple of grams of fluid but provides a lateral surface which prevents side leakage. All of the zones 98, 100 and 102 extend longitudinally at least 50% of the length of the napkin 82 and are aligned approximately parallel to the central axis X—X. Preferably, the three zones 98, 100 and 102 extend approximately the entire length of the napkin 82 and terminate at a peripheral seal line 104.

A transfer member 106 is positioned between the cover 84 and the absorbent 88 and is aligned along the longitudinal central axis of the napkin 82. The transfer member 106, as described above, can vary in size and configuration, but preferably will have a length and width which corresponds to the size of the central absorbent zone 98. The transfer member 106 is positioned vertically above the central absorbent zone 98 and facilitates movement of body fluid downward and outward from the cover 84 to distant areas of the absorbent 88.

A pulp layer 108 is positioned between the absorbent 88 and the baffle 86 and is aligned along the longitudinal central axis X—X of the napkin 82. The pulp layer 108 can be formed from a web of wood pulp fibers, such as common blotter paper and can contain a superabsorbent. The pulp layer 108 has relatively flat, first and second major surfaces, 110 and 112 respectively. One or both of the surfaces 110 and 112 can have a plurality of score lines 114 formed therein which extend parallel to the central longitudinal axis X—X of the napkin 82. The score lines 114 assist in wicking fluid lengthwise along the pulp layer 108. The pulp layer 108 preferably has a length and width corresponding to the central absorbent zone 98 and is vertically positioned below it. The pulp layer 108 facilitates movement of body fluid lengthwise to distant areas of the central absorbent zone 98. The pulp layer 108 also provides added stiffness to the central absorbent zone 98 and permits it to resist deformation when the napkin 82 is squeezed in the transverse direction. By resisting deformation, the central absorbent zone 98 is able to lay flat against the body and, therefore, will be in a much better position to absorb the body fluid discharged from the vaginal cavity.

The sanitary napkin 82 also has two strips of garment adhesive 116 and 118 secured to an exterior surface of the baffle 86. The garment adhesive provides a means for attaching the sanitary napkin to an inside surface of an undergarment. It should be noted that although two strips of garment adhesive 116 and 118 are shown, it is possible to use a single strip of adhesive or several smaller strips if desired. For best results, the sanitary

napkin should have between 10 to 20 square inches of garment adhesive applied to the baffle 86. A releasable peel strip 120 is positioned over the two strips of garment adhesive 116 and 118 and serves to prevent the adhesive from becoming contaminated prior to use.

The sanitary napkin 82 also contains several locations which have been coated with a construction adhesive 121. The construction adhesive 121 serves to hold the various layers together and gives the napkin 82 integrity. Preferably, the sanitary napkin 82 will contain construction adhesive 121 to retain the cover 84 to both the baffle 86 and to the transfer member 186. The construction adhesive can also secure the pulp layer 188 to the baffle 86 and secure the laminate 90 to the tissue 96. It should be noted that the amount and location of the construction adhesive 121 can vary depending upon the size and shape of the product and the type of machine the product is manufactured on. The adhesive strength will also determine how much adhesive 121 is needed.

Referring to FIG. 11, a sanitary napkin 122 is shown which is similar in construction to the napkin 82 depicted in FIG. 9. The napkin 122 differs in that attached to its longitudinal sides 124 and 126 are a pair of wings 128 and 130. The wings 128 and 130 extend laterally outward from the napkin 122 and are designed to wrap around the outer surface of the crotch portion of an undergarment. At least one of the wings 128 and 130 has an adhesive strip 131 attached to its upper surface which is covered by a releasable peel strip 134. The sanitary napkin 122 also has two spaced-apart garment adhesive strips 136 and 138 secured to the exterior surface of the baffle. The garment adhesive strips 136 and 138 can be covered by a releasable peel strip (not shown). When the consumer is ready to wear the product, she removes the peel strip from the bottom of the napkin 122 and adheres the napkin 122 via the garment adhesive strips 136 and 138 to the interior surface of her undergarment. She then removes the peel strip 134 and wraps the wings 128 and 130 around the exterior surface of the undergarment and adheres one wing to the other wing via the adhesive 131.

METHOD

Referring to FIG. 12, a flow diagram is depicted showing a method of manufacturing the sanitary napkin of this invention. The method includes the steps of depositing a superabsorbent onto a web of airlaid tissue. Moisture in the form of water particles or steam can be added to the airlaid tissue. The moisture causes the superabsorbent to acquire a tacky surface. Other ways to obtain a tacky surface is to treat the airlaid tissue with a hot melt pressure-sensitive adhesive, a latex binder or poly-vinyl-alcohol. The tissue is then folded about the superabsorbent to form a laminate. Conventional C-folds can be easily formed with commercially available equipment. The tacky surface on the superabsorbent aids in retaining the shape of the laminate, but it is beneficial to subject the laminate to both heat and pressure to obtain a predetermined shape. This can be accomplished by running the laminate between the nip of two rollers. The heat serves to drive off excess moisture and helps retain the fold formed in the web. The laminate is then enclosed in a tissue layer or, alternatively, it can be sandwiched between two tissue layers. The tissue layer or layers have a larger surface area than the laminate and therefore overlaps the edges of the laminate. Preferably, the tissue layer or layers are cut into an hourglass profile. The hourglass shape conveys a perception of

comfort to the consumer since it is narrow at the crotch portion and allows the napkin to fit between the thighs.

The method further includes the steps of positioning the hourglass profile between a transfer member and a pulp layer to form an absorbent structure. An adhesive is applied to a major surface of a liquid-permeable cover and the absorbent structure is adhered to the adhesive. It should be noted that the absorbent structure is aligned along the central longitudinal axis of the cover. A liquid-impermeable baffle is then placed over the absorbent structure and it, too, is adhered to the cover. For best results, the baffle and the cover should have coterminous edges. Preferably, the baffle and the cover have a racetrack profile with a pair of longitudinally-extending sides. The racetrack shape conveys to the consumer a perception that the napkin has sufficient width to prevent side leakage. A garment adhesive is then applied to the exterior surface of the baffle and a releasable peel strip is positioned over the garment adhesive. The sanitary napkin is then ready to be packaged and sold.

While the invention has been described in conjunction with several specific embodiments, it is to be understood that many alternatives, modifications and variations will be apparent to those skilled in the art in light of the foregoing description. Accordingly, this invention is intended to embrace all such alternatives, modifications and variations which fall within the spirit and scope of the appended claims.

We claim:

1. A sanitary napkin having a longitudinal axis, comprising:

- a liquid-impermeable cover;
- a liquid-impermeable baffle;
- an absorbent positioned between said cover and said baffle, said absorbent having a longitudinally-extending central absorbent zone aligned along the longitudinal axis of said napkin, said central absorbent zone having a width of less than 2 inches and being capable of absorbing at least 20 grams of body fluid; and
- a peripheral zone aligned adjacent to said absorbent zone, said peripheral zone including said cover, said baffle and a tissue therebetween, said peripheral zone having a different stiffness than said central absorbent zone and the difference in stiffness value is greater than about 150 mg. when measured by subtracting a maximum machine direction Gurley stiffness value of said peripheral zone from a minimum machine direction Gurley stiffness value of said absorbent zone, the difference in stiffness between said absorbent zone and said peripheral zone substantially preventing bunching of said napkin when said napkin is subjected to lateral stresses, and said napkin having a caliper of less than about 5 millimeters.

2. The sanitary napkin of claim 1 wherein a sample of said central absorbent zone measuring about 2.54 centimeters by about 1.27 centimeters has a Gurley stiffness value of at least 500 milligrams.

3. The sanitary napkin of claim 1 wherein said central absorbent zone is a laminate comprised of a superabsorbent enclosed by a nonwoven web.

4. The sanitary napkin of claim 1 wherein said central absorbent zone is a laminate comprised of a superabsorbent positioned between two airlaid webs.

5. The sanitary napkin of claim 4 wherein said superabsorbent is treated with citric acid to increase its affinity to absorb menses.

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6. The sanitary napkin of claim 4 wherein said superabsorbent is a copolymer of polyacrylic acid and polyvinyl alcohol.

7. The sanitary napkin of claim 4 wherein said superabsorbent is a hydroxyfunctional polymer.

8. The sanitary napkin of claim 4 wherein said superabsorbent has an absorbency under load value of at least about 20.

9. The sanitary napkin of claim 1 wherein said central absorbent zone is a composite comprised of hydrophilic fibers and a superabsorbent.

10. A sanitary napkin having a longitudinal axis, comprising:

- a) a liquid-permeable cover;
- b) a liquid-impermeable baffle;
- c) an absorbent positioned between said cover and said baffle, said absorbent having a longitudinally-extending central absorbent zone aligned along the longitudinal axis of said napkin, said central absorbent zone having a width of between about 0.5 and 2 inches and extending approximately the entire length of said napkin, said central absorbent zone capable of absorbing at least 20 grams of the body fluid, said central absorbent zone having a machine direction Gurley stiffness to transverse direction Gurley stiffness ratio of greater than 1.5:1, said stiffness ratio substantially preventing bunching of said napkin when said napkin is subjected to lateral

stress, and said napkin having a caliper of less than about 4 millimeters.

11. The sanitary napkin of claim 10 wherein said central absorbent zone is a composite comprised of meltblown fibers and a superabsorbent.

12. The sanitary napkin of claim 10 wherein said central absorbent zone is a laminate comprised of a hydrocolloid material enclosed in a hydrophilic material.

13. The sanitary napkin of claim 12 wherein said hydrophilic material is an alraid tissue.

14. The sanitary napkin of claim 12 wherein said hydrocolloid material has an absorbency under load value of at least about 20.

15. The sanitary napkin of claim 10 wherein said absorbent is in contact with a layer of tissue which has an hourglass profile.

16. The sanitary napkin of claim 10 wherein the exterior periphery of said napkin has a racetrack profile.

17. The sanitary napkin of claim 10 wherein said central absorbent zone is comprised of a superabsorbent enclosed by an alraid web.

18. The sanitary napkin of claim 10 wherein said central absorbent zone comprises a layer of superabsorbent adhered to a layer of cellulosic pulp.

19. The sanitary napkin of claim 10 wherein said central absorbent zone is flanked by a pair of adjacent zones and said central zone is capable of absorbing about 90% of the body fluid deposited onto said napkin.

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[45] Date of Patent: Mar. 11, 1997

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- Primary Examiner—John G. Weiss**
Assistant Examiner—K. M. Reichle
Attorney, Agent, or Firm—Mark L. Davis

- [57] ABSTRACT

An absorbent article, such as a sanitary napkin, has an absorbent and a substantially non-absorbent resilient layer adjacent to the absorbent. The absorbent is sufficiently stiff to resist twisting of the absorbent article during use. The resilient layer is sufficiently resilient to resist bunching during use. As a result, the absorbent article resists both twisting and bunching. The absorbent article has zones which vary in caliper, stiffness and absorbency. A central absorbent zone is thickest in caliper, more absorbent than the other zones and is stiffer than the other zones. An adjacent zone is less thick in caliper, less absorbent and less stiff. A peripheral zone, located near the outer side edges, is least thick in caliper, least absorbent and least stiff.

- ## 24 Chasing 9 Drawing Shirts

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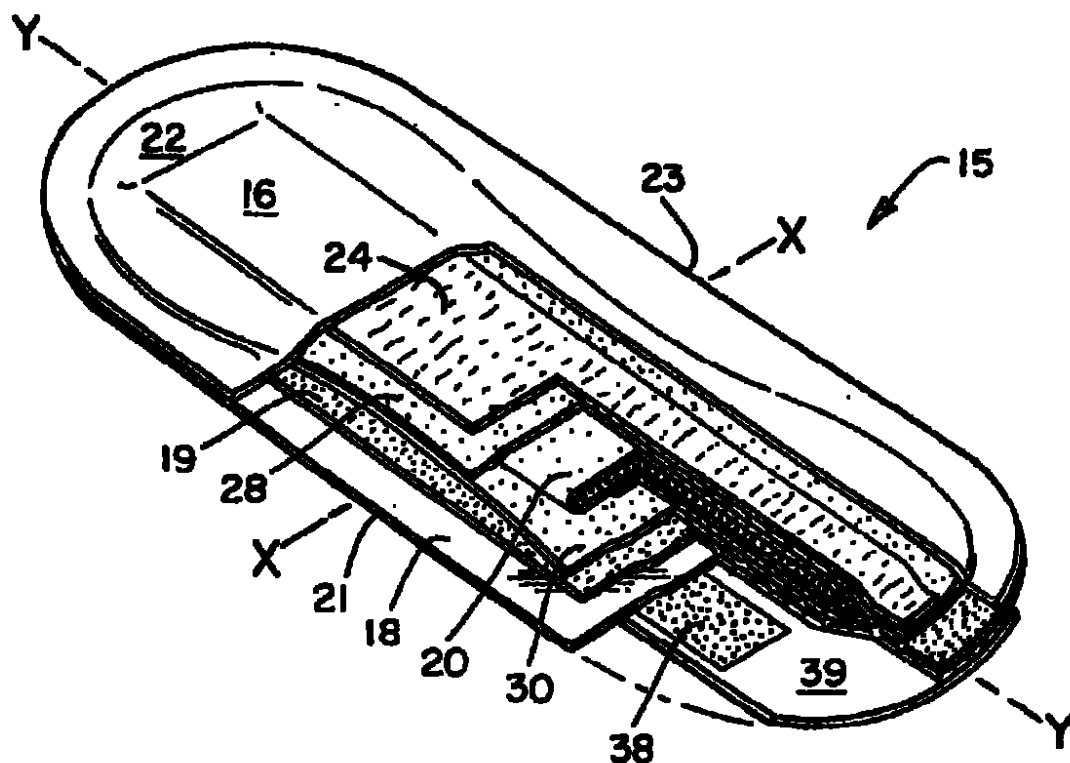


FIG. 1

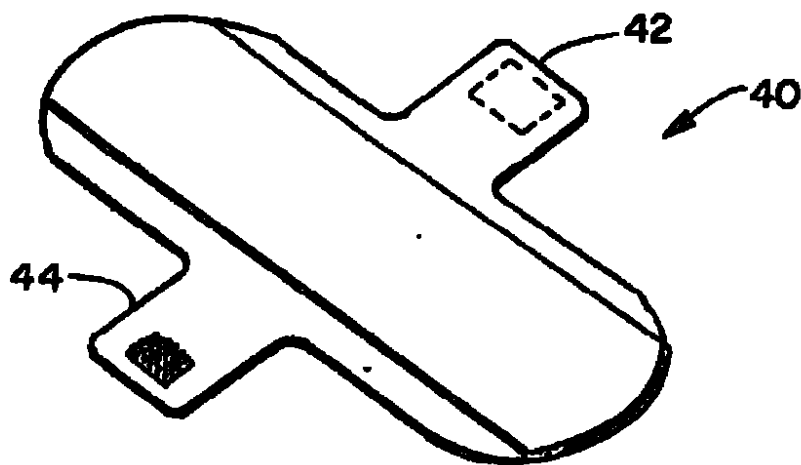
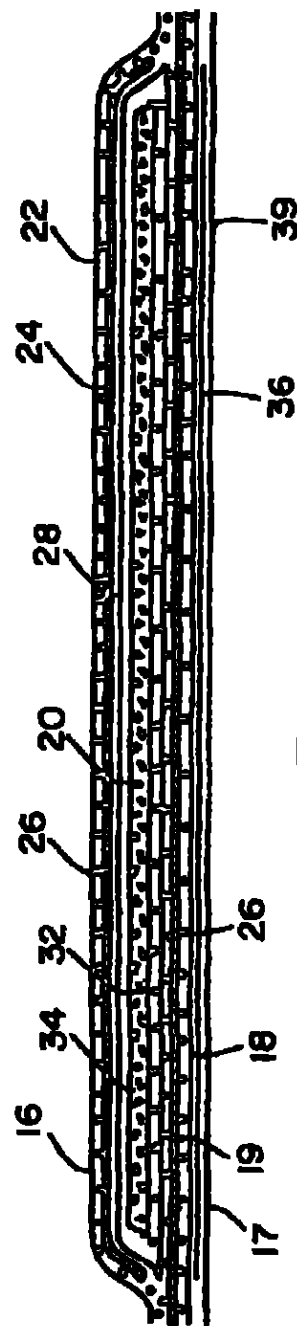
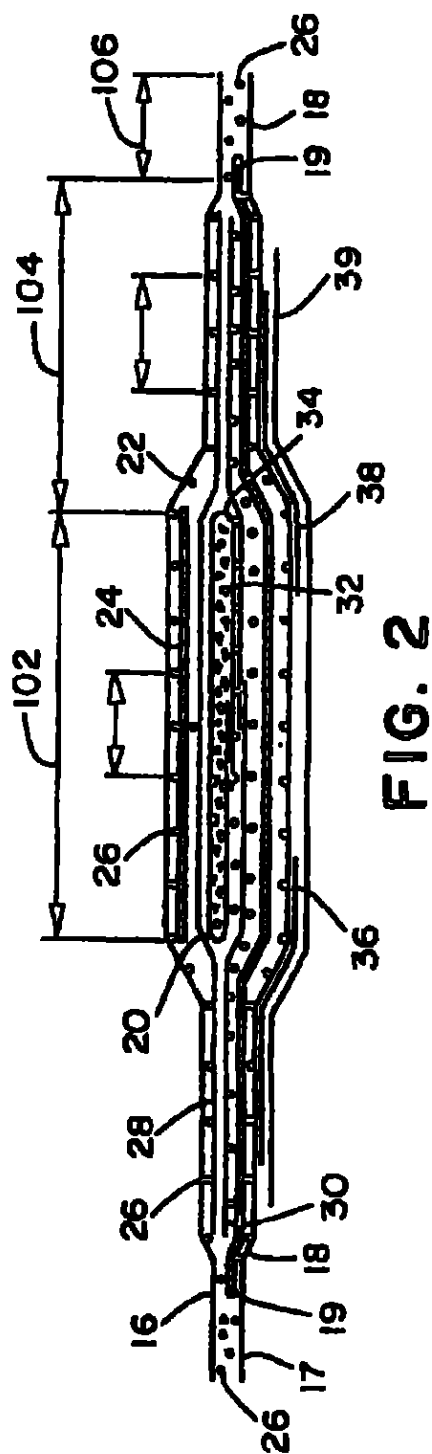


FIG. 4



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2x

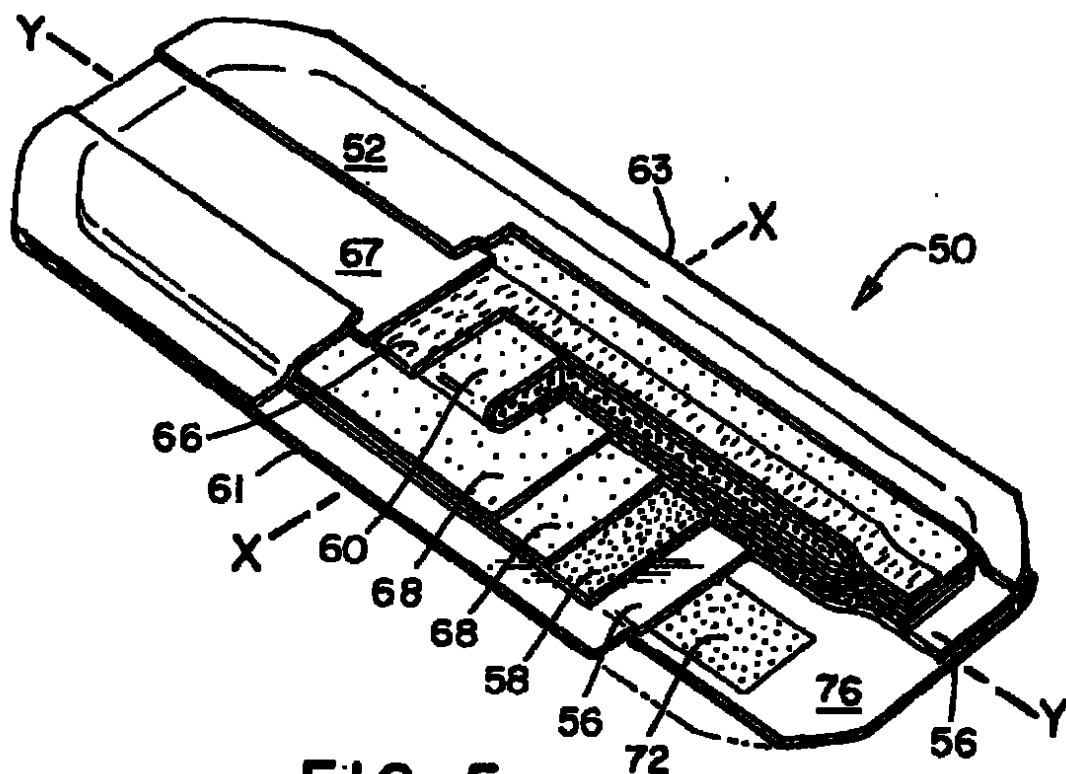


FIG. 5

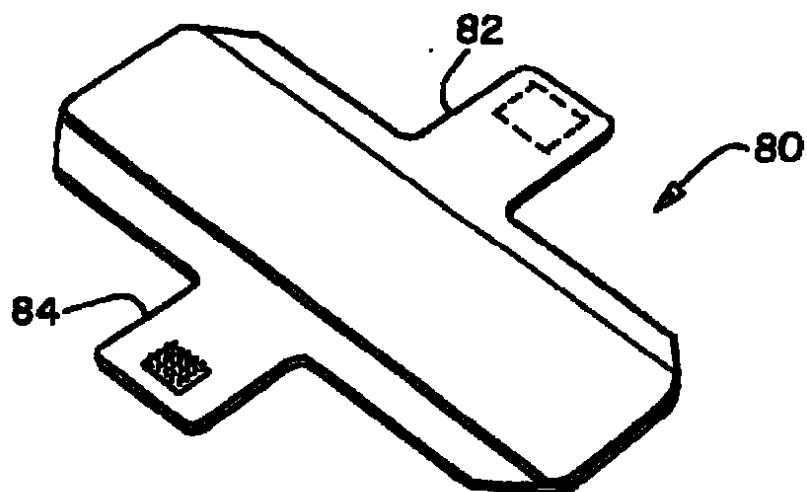


FIG. 8

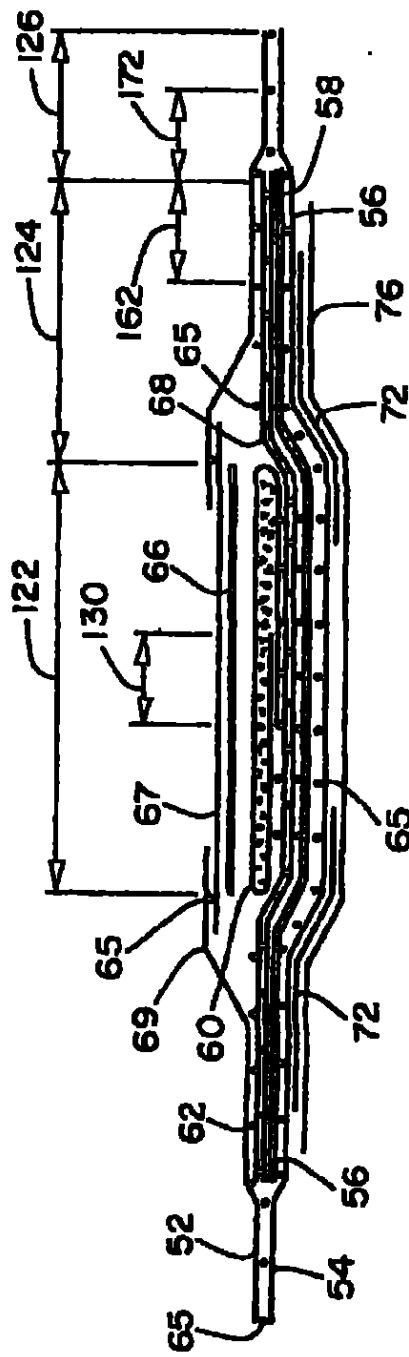


FIG. 6

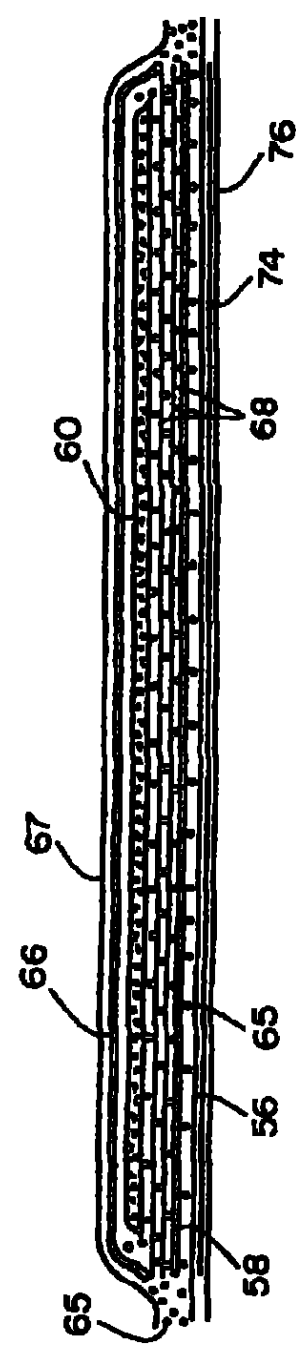


FIG. 7

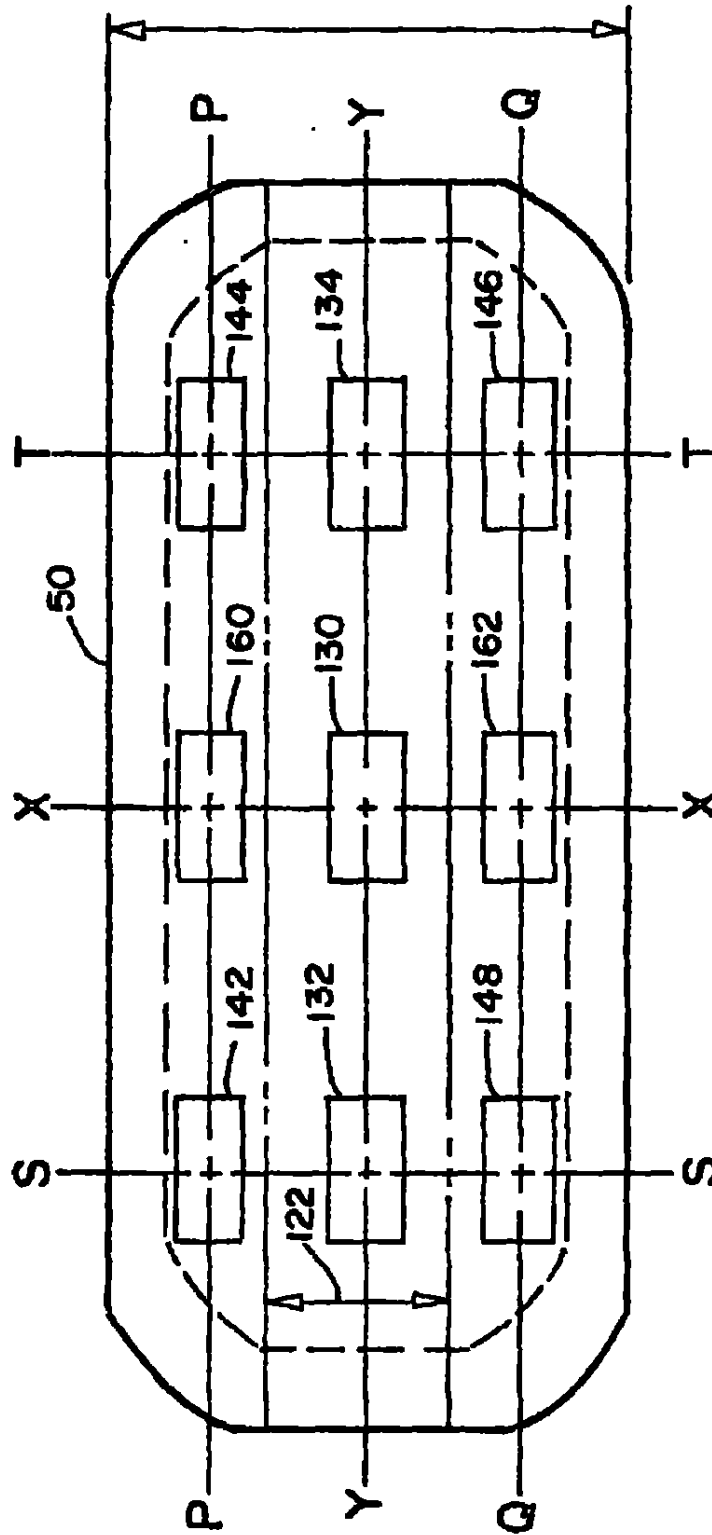


FIG. 9

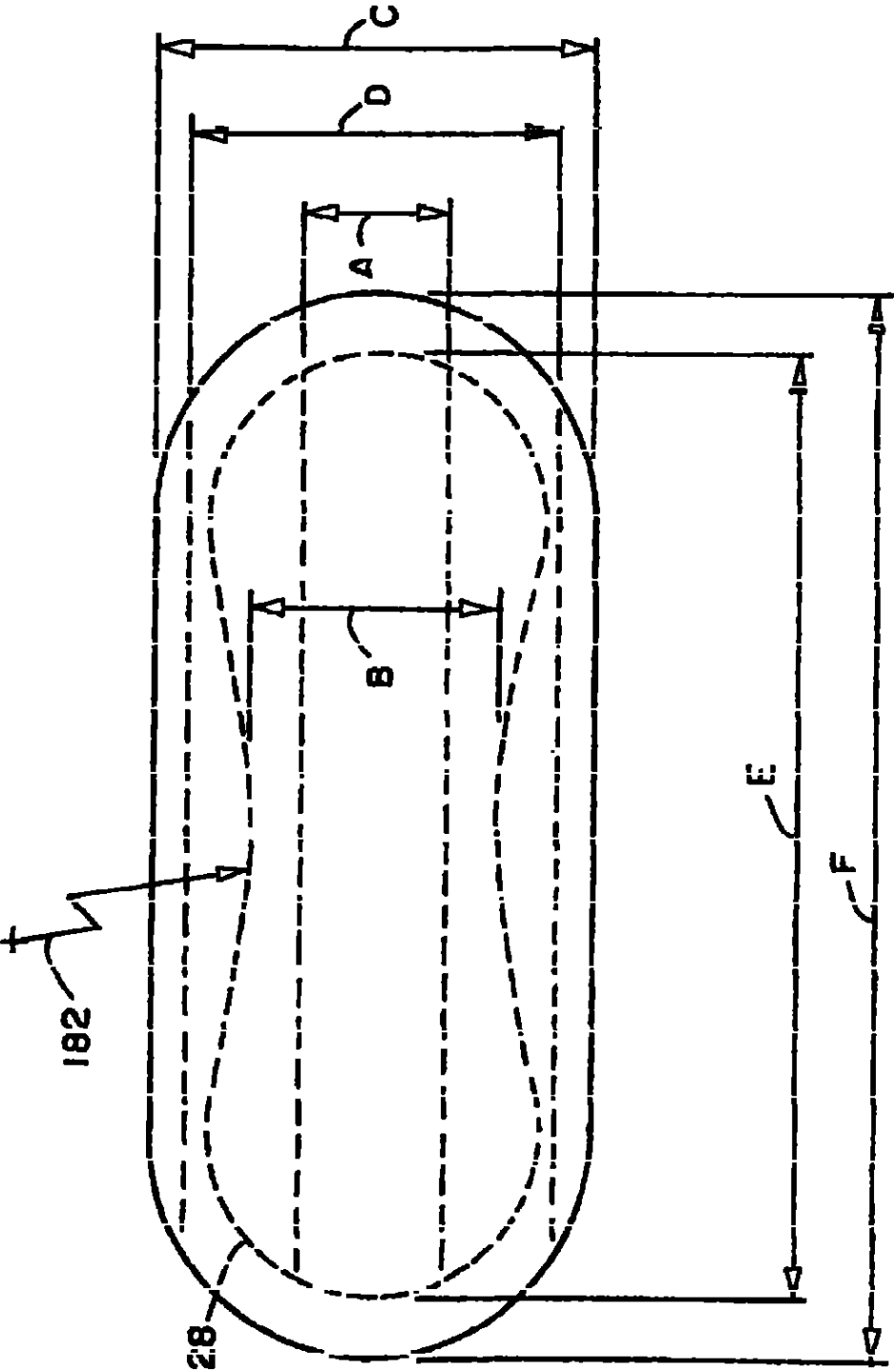


FIG. 13

means may have a width of less than 2.5 inches (63.5 millimeters). Alternately, it may have a width of less than 60 percent of the total width of the body facing side of the sanitary napkin. The sanitary napkin may have a caliper or thickness of less than about 5 millimeters (mm.).

One object of this invention is to provide an absorbent article which resists twisting and bunching during use. Another object of this invention is to provide a thin sanitary napkin which has a central longitudinal absorbent zone which is more absorbent and stiffer than adjacent zones, in combination with a resilient layer that is substantially non-absorbent. Still another object of the present invention is to provide an absorbent article that has zones that vary in caliper, stiffness and absorbency. A central absorbent zone is thickest in caliper, is more absorbent than any of the other zones and is the stiffest of any of the other zones. An adjacent zone, which is adjacent to the absorbent zone is less thick in caliper, less absorbent and less stiff. A peripheral zone, located near the outer side edges, is still less thick in caliper, less absorbent and less stiff.

The invention further includes a method for achieving improved performance in a sanitary napkin, including the steps of: providing a substantially resilient layer substantially aligned along the central, longitudinal axis of the napkin to resist bunching; providing a stiffening means substantially aligned along the central, longitudinal axis of said napkin and adapted to resist twisting of said napkin, arranging the substantially resilient layer so that its width extends across at least 60% of the total width of the body-facing surface of the napkin, and selecting for the stiffening means a material having comparatively high absorbent capacity and adapted to absorb fluid adjacent to the central, longitudinal axis of the napkin and thereby reduce flow of fluid toward the outer side edges of the napkin to reduce leakage of fluid at the outer side edges of the napkin. The method may also include the step of selecting for the substantially resilient layer a material that is substantially non-absorbent to further reduce leakage at the outer side edges of the napkin.

We have found that the combination of elements in absorbent articles of the invention described herein, such as sanitary napkins, provides products having unexpectedly good results and achieves a good balance between comfort to the user when worn, high absorbency and other good performance characteristics and reasonable cost. The products have a softness and thickness around the edges that enhance comfort. The products also resist twisting, bunching and leakage.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a first embodiment of the invention, with a portion broken away to show internal components.

FIG. 2 is a schematic illustration of a cross-sectional view of FIG. 1 along the lines X—X.

FIG. 3 is a schematic illustration of a cross-sectional view of FIG. 1 along the lines Y—Y.

FIG. 4 is a perspective view of a second embodiment of the invention.

FIG. 5 is a perspective view of a third embodiment of the invention with a portion broken away to show internal components.

FIG. 6 is a schematic illustration of a cross-sectional view of FIG. 5 along the lines Y—Y.

FIG. 7 is a schematic illustration of a cross-sectional view of FIG. 5 along the lines Y—Y.

FIG. 8 is a perspective view of a fourth embodiment of the invention.

FIG. 9 is a top plan view of the third embodiment shown in FIG. 5, showing segments in the machine direction for the central absorbent zone and the adjacent zones.

FIG. 10 is also a top plan view of the third embodiment shown in FIG. 5, showing segments in the transverse direction for the central absorbent zone and the adjacent zones.

FIG. 11 is also a top plan view of the third embodiment shown in FIG. 5, showing segments in the machine direction in the central absorbent zone and in the peripheral zones.

FIG. 12 is a top plan view of the first embodiment shown in FIG. 1, showing segments in both the machine direction and the transverse direction.

FIG. 13 is a top plan view of the first embodiment shown in FIG. 1.

DETAILED DESCRIPTION

The absorbent article may be a sanitary napkin which is designed to be worn by a female to absorb body fluids such as menses, blood, urine, and other excretions, such as those discharged during a menstrual period.

First Embodiment

Referring to FIGS. 1, 2, and 3, a first embodiment of the sanitary napkin 15 is about 150 millimeter (mm.) to 320 mm. long, about 60 mm. to 120 mm. wide and has rounded ends. The sanitary napkin 15 is rectangular and has a caliper or thickness of less than about 5 millimeters, more desirably less than about 4 millimeters, and most desirably less than about 3 millimeters. The sanitary napkin 15 has a body facing side 16, a garment-facing side 17, a substantially liquid-impermeable backing sheet or baffle 18, a substantially nonabsorbent, resilient layer 19 and an absorbent means 20.

The resilient layer 19 is made of one or more layers of a flexible, closed cell, polyethylene foam material. An example of a foam used in this embodiment may be purchased from Shofar Air Corporation, 7710 Sunset Fe Drive, Hodgkins, Ill. 60525 U.S.A. The grade specification is "CELL-AIRE" Foam, CA-30, thickness of 1/8 inch, density of 1.4 pounds per cubic foot, width of 60 inches, on rolls having a linear length of 2000 feet. Ametek Microfoam Division, Brandwine Four Building, Routes 1 and 202, Chadds Ford, Pa. 19317 U.S.A., produces a high weight polypropylene foam that is also suitable for this embodiment. The foam is called "MIRACULAM".

The resilient layer 19 is located adjacent to and on the body-facing side of the baffle 18. The absorbent means 20 is located on the opposite side of the resilient layer 19 from the baffle 18. The absorbent means 20 is substantially aligned along the central longitudinal axis Y—Y of the sanitary napkin 15. The resilient layer 19 has a width greater than the width of the absorbent means 20. The resilient layer 19 has a length equal to, and desirably greater than, the absorbent means 20. The resilient layer 19 has a length of at least 60% of the length of the napkin 15.

The baffle 18 is designed to face the outer surface, generally the crotch portion, of an undergarment (not shown). The baffle 18 hinders the passage of body fluids and other liquids. The baffle 18 can be made from various embossed polymeric films such as polyethylene or polypropylene, or it can be made from bi-component films. A preferred material is polyethylene film.

The absorbent means 20 has an overall length that extends at least about 50%, and desirably at least about 75%, of the length of the napkin 15. The absorbent means 20 has a width of less than about 2.5 inches (63.5 mm.), desirably less than about 2 inches (50.8 mm.), more desirably between about 0.5 and 2.0 inches (12.7 mm. and 50.8 mm.), and most desirably about 1.25 inches (31.8 mm.) or 1.50 inches (38.1 mm.) when measured across the central transverse axis Y—Y of the napkin 15. Desirably, the absorbent means 20 has a width which is less than about 60% of the total width of the body-facing side of the sanitary napkin 15 when measured across the narrowest portion of the napkin 15. The total width of the sanitary napkin 15 is measured along an axis, such as axis X—X in FIG. 1, transverse to the longitudinal axis Y—Y of sanitary napkin 15. The total width of the sanitary napkin 15 is the distance from one outer edge 22 to the opposite outer edge 23 of the body-facing side of the napkin. Desirably, the width of the napkin spans the width of the labia majora of the user. The absorbent means 20 has sufficient stiffness to enable the sanitary napkin 15 to resist (twisting and "roping", as a result of its stiffness. The absorbent means 20 does not extend the full width of the sanitary napkin 15 in order to enhance comfort to the wearer. Arranging the absorbent means 20 subventrally in the center that is in substantial alignment with the central longitudinal axis Y—Y of the sanitary napkin 15, provides the advantage of placing the absorbent means 20 close to the source of fluid.

The resilient layer 19 has sufficient resilience to resist bunching of the sanitary napkin 15. The combination of the resilient layer 19 and the absorbent means 20 resist twisting and bunching. The resilient layer 19 is not as stiff as the absorbent means 20 and, for that reason, is arranged to be wider than the absorbent means 20. Desirably the width of the resilient layer 19 is in the range of 60% to 100% of the total width of the sanitary napkin 15.

The absorbent means 20 constitutes the significant absorbing portion of the napkin 15 and has the capability of absorbing at least about 80%, desirably about 90%, and most desirably about 95% of the body fluid deposited on the napkin 15. In terms of amount of body fluid, the absorbent means 20 can absorb at least 10 grams, desirably about 20 grams, and most desirably, about 30 grams or more of body fluid. Thus, the absorbent means 20 is both the primary absorbent and a stiffening means.

On the body-facing side 16 of the sanitary napkin 15, there is a cover layer 22 on the outside of the sanitary napkin 15. Inside the cover layer 22 and adjacent to it, there is a transfer layer 24. There is construction adhesive 26 between the transfer layer 24 and the cover layer 22. In FIGS. 2 and 3, the construction adhesive 26 is represented by a series of dots in various locations and between various layers or components in the sanitary napkin 15.

The cover layer 22 is liquid-permeable and is designed to contact the body of the wearer. It can be constructed of a woven or non-woven, natural or synthetic material which is easily permeated by body fluid. Suitable materials include bonded carded webs of polyester, polypropylene, nylon, or other non-bonded fibers. Other polyolefins such as copolymers of polypropylene and polyethylene, linear low-density polyethylene, finely-perforated film webs and net material also work well. A preferred material is a spunbonded polypropylene, non-apertured web which contains about 1 to 6% titanium dioxide pigment to give it a clean white appearance. A white uniform spunbonded material is desirable because the color exhibits good masking properties to hide menses which has passed through it and the material

has sufficient strength to resist being torn. U.S. Pat. Nos. 4,801,494 issued to Datta et al. and 4,908,026 issued to Subramaniam et al. describe various cover materials which can be used with the sanitary napkin 15. The description in the two patents is incorporated herein by reference and made a part hereof.

The liquid-permeable cover layer 22 can also contain a plurality of apertures formed therein and the apertures can be arranged along the longitudinal axis Y—Y, if desired. The apertures will increase the rate at which body fluids can penetrate down into the absorbent means 20. The cover layer 22 may also be treated with a surfactant to make it more hydrophilic. The surfactant may include topical additions or internally applied materials such as polysiloxanes.

The transfer layer 24 is made of an absorbent nonwoven polypropylene meltblown web which facilitates movement of body fluid downward and outward from the cover 22 to distant areas of the central absorbent means 20. In the alternative, the transfer layer 24 may be made of an absorbent nonwoven polypropylene spunbond web or other material having similar properties. Desirably, the transfer layer 24 is aligned along the central longitudinal axis Y—Y of the sanitary napkin 15 and is sized and configured to correspond to the shape and dimensions of the central absorbent means 20. Desirably also, the transfer layer 24 is slightly longer than the absorbent means 20. A description of a transfer layer is taught in U.S. Pat. No. 4,798,603 issued to Meyer et al. and assigned to the present assignee. This patent is incorporated by reference and made a part hereof.

The transfer layer 24 has a width approximately equal to the absorbent means 20. The cover layer 22 has a width approximately equal to the width of the sanitary napkin 15 and the cover layer 22 extends out to the periphery of the sanitary napkin 15. A first tissue layer 28 is located between the transfer layer 24 and the absorbent means 20. The first tissue layer 28 has a width greater than the width of the transfer layer 24 and greater than the width of the absorbent means 20. During use, menses or other body fluid first contacts the cover layer 22, then reaches the transfer layer 24, then reaches the first tissue layer 28 and then reaches the absorbent means 20.

The body-facing side of the transfer layer 24 has adhesive 26 over substantially the entire surface of the body-facing side of the transfer layer 24. The garment-facing side of the transfer layer 24 also has adhesive 26 over its entire surface of the garment-facing side. Instead, the garment-facing side of the transfer layer 24 has a single line of adhesive 26 in the middle of the transfer layer 24, between the transfer layer 24 and the first tissue layer 28.

The cover layer 22 has a body-facing side and a garment-facing side. The garment-facing side of the cover layer 22 has adhesive 26 over its entire surface. As a result, there is adhesive 26 between the transfer layer 24 and the cover layer 22. In addition, there is adhesive 26 between the cover layer 22 and the first tissue layer 28. There is no adhesive between the first tissue layer 28 and the absorbent means 20.

The absorbent means 20 has a body-facing side and a garment-facing side. On the garment-facing side of the absorbent means 20, and between it and the resilient layer 19, there is a second tissue layer 30. The second tissue layer 30 has a width approximately equal to the width of the first tissue layer 28. Both tissue layers have a width which is greater than the width of the absorbent means 20 and, desirably, greater than two times the width of the absorbent means 20. There is adhesive 26 between the garment-facing side of the absorbent means 20 and the second tissue layer 30.

The second tissue layer 30 has a body-facing side and a garment-facing side. The garment-facing side of the second tissue layer 30 is adjacent to the resilient layer 19. Between the second tissue layer 30 and the resilient layer 19 there is adhesive 26 which extends over a portion of the garment-facing side of the second tissue layer 30 and a portion of the body-facing side of the resilient layer 19. The area over which there is adhesive 26 between the second tissue layer 30 and the resilient layer 19 is an area slightly less than the area of the garment-facing side of the absorbent means 20.

There is adhesive between the body-facing side of the second tissue layer 30 and the absorbent means 20. At the ends of the sanitary napkin 15, there is adhesive between the first tissue layer 28 and the second tissue layer 30. The resilient layer 19 has a body-facing side and a garment-facing side. The baffle 18 is located on the garment-facing side of the resilient layer 19. There is adhesive 26 between the resilient layer 19 and the baffle 18.

If the resilient layer 19 is too thick or too stiff, or both, such thickness or stiffness may interfere with comfort to the wearer. It has been found that a thin resilient layer 19 is effective if it is adhered or bonded to the baffle 18. Such a resilient layer 19 bonded to the baffle 18 achieves the desired stiffness and thus the desired resistance to bunching and yet allows a thinner resilient layer 19 to be used than if the resilient layer 19 were not bonded to the baffle 18. The thinner resilient layer 19 bonded to the baffle 18 provides more comfort to the user than a thicker resilient layer 19. Bonding the film baffle 18 to the resilient layer 19 of foam also facilitates use of a garment adhesive. It is easier to use a garment adhesive on a film baffle 18 than placing the garment adhesive on a resilient layer 19 made of foam.

Thus, bonding the foam layer to the film baffle 18 enhances comfort, achieves a thinner product and is more economical than a thicker layer of foam. It is desirable to use a layer of foam that is $\frac{1}{4}$ inch (3.175 mm.) thick or less. More desirably, one should use a layer of foam that is $\frac{1}{8}$ inch (1.587 mm.) in thickness or less. Even more desirably, one should use a layer of film that is $\frac{1}{4}$ inch (6.35 mm.) in thickness.

Referring to FIG. 1, the first tissue layer 28 and the second tissue layer 30 have an hourglass shape. As a result, the width of the first tissue layer 28 and the second tissue layer 30 is slightly greater at each end of the first tissue layer 28 and the second tissue layer 30. As a result, the width of the first tissue layer 28 and the second tissue layer 30, measured along the axis X-X', is less than the width at the outer ends of the first tissue layer 28 and the second tissue layer 30.

The cover layer 22 and the baffle 18 extend to the outer periphery of the sanitary napkin 15. At their outer periphery all around the sanitary napkin 15, the cover layer 22 and the baffle 18 are joined together by adhesive. At the sides of the napkin 15, the resilient layer 19 extends close to the outer periphery of the sanitary napkin 15, but within the periphery of the sanitary napkin 15. As a result, the width of the resilient layer 19 is slightly less than the width of the cover layer 22 and the baffle 18. At the ends of the napkin 15, the resilient layer 19 desirably extends to the outer edge of the napkin 15. As a result, at the ends of the napkin 15, the length of the resilient layer 19 is equal to the length of the cover layer 22 and the baffle 18. The first tissue layer 28 and the second tissue layer 30 have a size which is slightly less than the size of the resilient layer 19, both in length and in width.

Referring to FIG. 2, the absorbent means 20 is constructed as a laminate comprised of a hydrocolloidal material 32 restrained within a carrier layer 24 that is a folded hydro-

philic material such as an airfield tissue. The hydrocolloidal material 32, commonly referred to as a superabsorbent, can be a hydrogel forming polymer composition which is water-insoluble, slightly cross-linked, and partially neutralized. It can be prepared from an unsaturated polymerizable, acid group-containing monomers and cross-linker agents. Such superabsorbents are taught in U.S. Pat. Nos. 4,798,603 issued to Meyers et al., No. 32,649 issued to Bond et al. and 4,467,012 issued to Peterson et al., as well as in published European Patent Application 0 339 461 to Kellenberger. These U.S. Patents and the European Patent Application are incorporated herein by reference and made a part hereof.

Superabsorbents are very good at retaining body fluids. They have the ability to absorb a great amount of fluid in relation to their own weight. Typical superabsorbents used in sanitary napkins can absorb anywhere from 5 to 60 times their weight in liquid. However, the absorption mechanism is not a rapid absorption and is usually slower than the rate of fluid absorption by the cellulose stuff material. The placement of the superabsorbent material in the center or lower portion of the napkin provides additional time for the superabsorbent to absorb the fluid from the transfer layer 24.

It has been found that superabsorbents having a high mechanical stability in the swollen state, an ability to rapidly absorb fluid and have a strong liquid binding capacity perform well in catamenial devices. Hydroxyfunctional polymers have been found to be good superabsorbents for this application. A hydrogel forming polymer, specifically a partially neutralized cross-linked copolymer of polyacrylic acid and polyvinyl alcohol is desirable. Such superabsorbents can be obtained from Dow Chemical, Hoechst-Celanese, and Stockhausen, Inc., among others. The superabsorbent is a partially neutralized salt of cross-linked copolymer of polyacrylic acid and polyvinyl alcohol having an absorbency under load value about 25.

The superabsorbent should have a high absorbency under load, that is, it should have the ability to expand or swell under a restraining pressure, typically about 0.3 pound per square inch (psi). The absorbency under load value is a function of gel strength, osmotic pressure within the gel and the composition of the polymer itself. The absorbency under load value also pertains to the ability of the gel to swell against other superabsorbent particles as well as against adjacent fibers when under pressure. For purposes of this invention, a superabsorbent having a high absorbency under load is defined as having a value of 20 or higher. A desirable absorbency under load value is 25 or higher. The test for determining an absorbency under load value is taught on page 7, lines 14-52 of published European Patent Application 0 339 461 (Kellenberger) and assigned to the present assignee. In the alternative, the absorbent means 20 may be a composite comprised of a hydrophilic material and a hydrocolloidal material. The hydrophilic material can be various natural or synthetic fibers, including cellulose fibers, surfactant-treated machlowna fibers, wood pulp fibers, regenerated cellulose or cotton fibers, or a blend of pulp and rayon fibers.

The baffle 18 has a body-facing side and a garment-facing side. The sanitary napkin 15 also contains two longitudinally-extending strips of garment adhesive 36 and 38 which are attached to the exterior surface, that is, the garment-facing side, of the baffle 18. The garment adhesive is commercially available from National Starch and Chemical Company, located at 10 Fendene Ave. Ridgebury, N.J. 08807 U.S.A. The strips of garment adhesive 36 and 38 are used to secure the sanitary napkin 15 to the inside of the crotch portion of an undergarment so that it can be properly

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5,609,588

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aligned with the vaginal opening. A peel strip 39 is releasably attached to the garment adhesive strips 36 and 38 and prevents the adhesive from becoming contaminated prior to attachment to the undergarment. The peel strip 39 can be a white Kraft paper coated on one side so that it can be released from a hot melt adhesive. The peel strip 39 is designed to be removed by the ultimate consumer just prior to placement of the sanitary napkin 15 in the undergarment.

Second Embodiment

Referring to FIG. 4, a second embodiment of the invention is a sanitary napkin 40 that has two tabs 42 and 44, one tab arranged on each side of a sanitary napkin 40. In other respects, the sanitary napkin 40 is similar to the sanitary napkin 15 illustrated in FIGS. 1, 2 and 3. The tabs 42 and 44 are intended to be folded around the undergarment of the user and to increase the attachment of the sanitary napkin 40 to the garment.

Third Embodiment

Referring to FIGS. 5, 6, and 7, a third embodiment of the sanitary napkin 50 is also about 150 mm. to 320 mm. long, about 60 mm. to 120 mm. wide. The sanitary napkin 50 is relatively thin and has a caliper or thickness of less than about 5 millimeters, more desirably less than about 4 millimeters, and most desirably less than about 3 millimeters. The sanitary napkin 50 has a body-facing side 52, a garment-facing side 54, a substantially liquid-impermeable backing sheet or baffle 56, a substantially nonabsorbent, resilient layer 58 and an absorbent means 60.

The resilient layer 58 is made of a flexible, closed cell polyethylene foam material. It is the same type of foam material as used in the first embodiment and is available from the same sources as identified for the first embodiment. The resilient layer 58 is formed adjacent to the baffle 56. The absorbent means 60 is located on the opposite side of the resilient layer 58 from the baffle 56. The absorbent means 60 is substantially aligned along the central longitudinal axis Y—Y of the sanitary napkin 50. The resilient layer 58 has a width greater than the width of the absorbent means 60. The resilient layer 58 has a length equal to, and desirably greater than, the absorbent means 60. The resilient layer 58 has a length of at least 60% of the length of the napkin 50.

The baffle 56 is designed to face the inner surface, generally the crotch portion, of an undergarment (not shown). The baffle 56 permits the passage of air in vapor out of the sanitary napkin 50 while blocking the passage of body fluids and liquids. The baffle 56 can be made from micro-embossed polymers such as polyethylene or polypropylene, or it can be made from bi-component films. A preferred material is polyethylene film.

The absorbent means 60 has an overall length which extends at least about 50%, and desirably at least about 75%, of the length of the napkin 15. The absorbent means 60 has a width of less than about 2.5 inches (63.5 mm.), desirably less than about 2 inches (50.8 mm.), more desirably between about 0.5 and 2.0 inches (12.7 mm. and 50.8 mm.), and most desirably about 1.25 inches (31.8 mm.) or 1.50 inches (38.1 mm.) when measured across the central transverse axis X—X of the napkin 50. Desirably, the absorbent means 60 has a width which is less than about 60% of the total width of the body-facing side of the sanitary napkin 50 when measured across the narrowest portion of the napkin 50. The total width of the sanitary napkin 50 is measured along an axis, such as axis X—X in FIG. 5, transverse to the longitudinal axis Y—Y of sanitary napkin 50. The total width of the sanitary napkin is the distance from one outer side edge 61 to the opposite outer side edge 63 of the body-facing side of the napkin. Desirably, the width of the

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napkin spans the width of the labia majora of the user. Arranging the absorbent means 60 substantially in the center, that is, in substantial alignment with the central longitudinal axis Y—Y of the sanitary napkin 50, provides the advantage of placing the absorbent means 60 close to the source of fluid.

The absorbent means 60 has sufficient stiffness to enable the sanitary napkin 50 to resist twisting and "cupping", as a result of its stiffness. The absorbent means 60 does not extend the full width of the sanitary napkin 50 in order to enhance comfort to the wearer. The resilient layer 58 has sufficient resilience to resist bunching of the sanitary napkin 50. The combination of the resilient layer 58 and the absorbent means 60 resists both twisting and bunching. The resilient layer 58 is not as stiff as the absorbent means 60 and, for that reason, is arranged to be wider than the absorbent means 60. Desirably the width of the resilient layer 58 is in the range of 60% to 100% of the total width of the sanitary napkin 50.

The absorbent means 60 constitutes the significant absorbing portion of the napkin 50 and has the capability of absorbing at least about 50%, preferably about 50%, and most preferably about 95% of the body fluid deposited on the napkin 50. In terms of amount of body fluid, the absorbent means 60 can absorb at least 10 grams, desirably about 20 grams, and most desirably, about 30 grams or more of body fluid. Thus, the absorbent means 60 is both the primary absorbent and a stiffening means.

On the body-facing side 52 of the sanitary napkin 50, there is a bi-component cover 62 on the outside of the sanitary napkin 50. Under the cover 62 and adjacent to the cover 62, there is a transfer layer 66. There is no construction adhesive between the transfer layer 66 and the cover 62. In FIGS. 6 and 7, the construction adhesive 63 is represented by a series of dots in various locations and between various layers or components in the sanitary napkin 50.

The bi-component cover 62 is similar to a bi-component cover described in U.S. patent application Ser. No. 731,583, now U.S. Pat. No. 5,415,640 filed in the name of Robert C. Kirby et al., entitled "A Bodyside Cover for an Absorbent Article" and assigned to the same assignee as this Patent Application. The bi-component cover 62 is constructed of two different and distinct materials. The first material 67 of the cover 62 desirably contains a plurality of apertures formed therethrough, while the second material 69 of the cover 62 is desirably nonperforated. The first material 67 is positioned along the central longitudinal axis Y—Y of the sanitary napkin 50 and constitutes the primary fluid-receiving region of the bi-component cover 62. The sanitary napkin 50 is positioned such that discharge of body fluid from the vaginal orifice is in direct alignment with the upper surface of the first material 67.

In FIG. 6, the second material 69 overlaps a portion of the longitudinal side edges of the first material 67 and is bonded along the side edges by a line of adhesive 65. The second material 69 can be bonded to the first material 67 by a mechanical attachment, an adhesive, an ultrasonic bond, a chemical bond, a pressure bond or a combination of two or more and pressure. Other means of attaching the two materials together can also be used. It should be noted that the first material 67 can be bonded to the second material 69 before the apertures are formed in the first material 67 or vice versa. The bi-component cover 62 can be constructed off-line and then assembled into the sanitary napkin 50, or it can be constructed in-line.

The second material 69 is secured to the first material 67 and forms a secondary fluid receiving region of the bi-component

porous cover 62. The second material 69 is spaced further away from the point of discharge of body fluid than the first material 67. It should be noted that, even though the second material 69 is designated as the secondary fluid-receiving region of the bicomponent cover 62, it still has the ability to allow fluid to pass through it. The secondary rate of flow it takes for a material to absorb a certain quantity of fluid, is about equal to or less than the absorbency rate through the first material 67. Accordingly, most of the body fluid, under normal conditions, is designed to pass through the first material 67.

The liquid-permeable cover 62 can also contain a plurality of apertures formed therein and the apertures can be arranged along the longitudinal center line Y—Y, if desired. The apertures will increase the rate at which body fluids can pass down into the absorbent means 60. The cover 62 can also be treated with a surfactant to make it more hydrophilic. The surfactant can include topical antiseptics or ionically applied materials like polyvinylamine.

The transfer layer 66 is made of an absorbent nonwoven polypropylene spunbond material. In the alternative, the transfer layer 66 may be made of an absorbent nonwoven polypropylene meltblown material, a bonded carded web, or other material having similar properties. Desirably, the transfer layer 66 is aligned along the central longitudinal axis of the sanitary napkin 50 and is sized and configured to correspond to the shape and dimensions of the central absorbent means 60. Desirably also, the transfer layer 66 is slightly longer than the absorbent means 60. A description of a transfer layer 66 is taught in U.S. Pat. No. 4,730,003 issued to Meyer et al. and assigned to the present assignee. This patent is incorporated by reference and made a part hereof. Under the transfer layer 66 is the absorbent means 60. The transfer layer 66 has a width approximately equal to the absorbent means 60. The bicomponent cover layer 63 has a width approximately equal to the width of the sanitary napkin 50 and the cover layer 62 extends out to the periphery of the sanitary napkin 50.

There is a tissue layer 68 that has two plies and is located between the resilient layer 58 and the absorbent means 60. The tissue layer 68 has a width greater than the absorbent means 60. As a result, the tissue layer 68 extends between the cover layer 62 and the resilient layer 58. During use, most of the body fluid that comes out of the material 67 of the cover 62, then reaches the transfer layer 66, and then reaches the absorbent means 60. The body-facing side of the transfer layer 66 has no adhesive. The garment-facing side of the transfer layer 66 does have adhesive at each end. But, there is no adhesive between the garment-facing side of the transfer layer 66 and the body-facing side of the absorbent means 60. The absorbent means 60 has a body-facing side and a garment-facing side. There is also adhesive 64 on the garment-facing side of the absorbent means 60 between the tissue layer 68 and the absorbent means 60. There is also adhesive 64 between the two plies of the tissue layer 68.

The resilient layer 58 has a body-facing side and a garment-facing side. The baffle 56 is located on the garment-facing side of the resilient layer 58. There is adhesive between the resilient layer 58 and the baffle 56.

If the resilient layer 58 is too thick, the thickness interferes with comfort of the wearer. It has been found that a thin resilient layer 58 is effective if it is adhered or bonded to the baffle 56. Such a resilient layer 58 bonded to the baffle 56 achieves the desired resistance to bunching and yet allows a thinner resilient layer 58 to be used than if the resilient layer 58 were not bonded to the baffle 56. The thinner resilient

layer 58 bonded to the baffle 56 provides more comfort to the user than a thicker resilient layer 58. Bonding the film baffle 56 to the resilient layer 58 of foam also facilitates use of a garment adhesive. It is easier and seems to work better to use a garment adhesive on a film baffle 56 than placing the garment adhesive on a resilient layer 58 made of foam.

Thus, bonding the foam layer to the film baffle 56 enhances comfort, achieves a thinner product and is more economical than a thicker layer of foam. It is desirable to use a layer of foam that is $\frac{1}{8}$ inch thick or less. More desirably, one should use a layer of foam that is $\frac{1}{16}$ inch in thickness or less. Even more desirably, one should use a layer of foam that is $\frac{1}{32}$ inch or less.

The cover 62 and the baffle 56 extend to the outer periphery of the sanitary napkin 50. At their outer periphery, the cover 62 and the baffle 56 are joined together by adhesive. Desirably, the resilient layer 58 extends to both length and width close to the outer periphery of the sanitary napkin 50, but within the periphery of the sanitary napkin 50. As a result, the size of the resilient layer 58 is slightly less than the size of the cover 62 and the baffle 56, both in width and in length. The two ply tissue layer 68 has a size approximately equal to the size of the resilient layer 58, both in length and in width.

Referring to FIG. 6, the absorbent means 60 is constructed as a laminate comprised of a hydrocolloidal material positioned within a folded hydrophilic material such as an airlaid tissue, the same as described for sanitary napkin 15, the first embodiment.

The first material 67 of the bicomponent cover 63 may be a thermoplastic film, an extrusion-coated nonwoven, or a net material that has openings between the strands or threads due to its construction. Useful thermoplastic films include polyolefin materials, such as polyethylene, which can be manufactured in various forms. Such films and film making processes are commercially available from the following companies:

Smith & Nephew Plastic, Ltd. Gilberdyke, Brough North
Humberside HU 15 2TD United Kingdom

Applied Extrusion Technologies, Inc. P.O. Box 582
Middletown, Del. 19709

Paraplastics Rpt. Sordaniato 1 66020 Snc Cisterna
Toscano Italy

LCL Manufacturing PTE Ltd. 16 Paden Rd, Singapore
2200

The first material 67 can also be a net, an embossed net, an extruded netting or a net formed from strands of filaments or threads. Examples of covers constructed of netting are taught in U.S. Pat. Nos. 2,295,439; 2,564,689; 2,900,980; and 4,741,941. These patents are incorporated by reference and made a part hereof. The open spaces between the filaments or threads of the netting serve the same function as the apertures or perforations formed through a thermoplastic film. The first material 67 can also be a foam material having a plurality of apertures formed therethrough.

An embossed-netting material includes a laminate film composite and normally refers to a class of composite materials wherein a lower substrate ply is either mechanically, thermally or chemically adhered to an upper film based ply. The substrate may consist of any nonwoven including bonded carded webs, spunbond webs, meltblown webs or cellulose-based fibers. The upper film ply can be an apertured plastic film, a cast continuous film which would be apertured prior to application to the substrate or be a net material.

The first material 67 has a thickness of less than about 2 millimeters and desirably in the range of from about 0.05 to

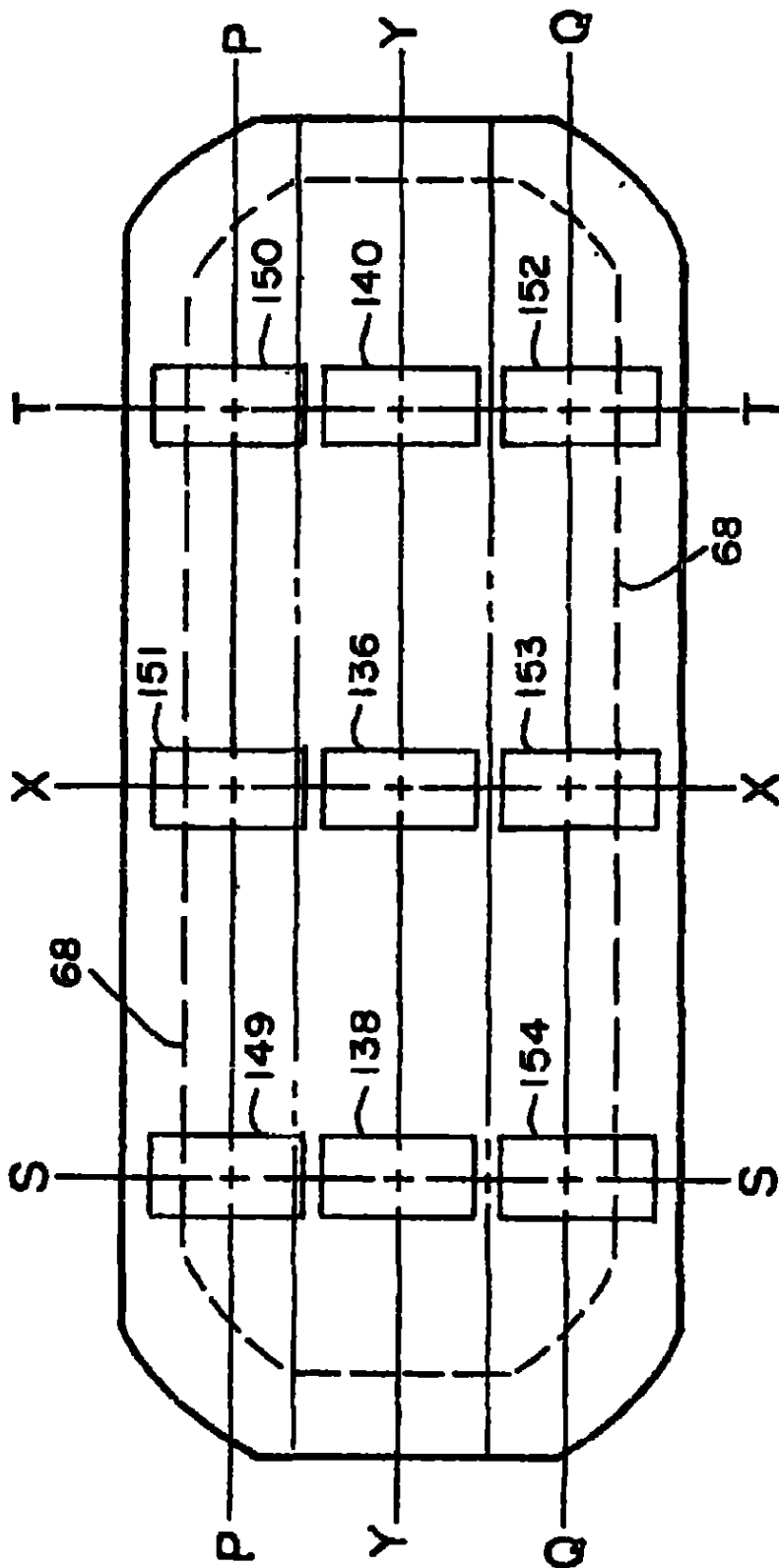


FIG. 10

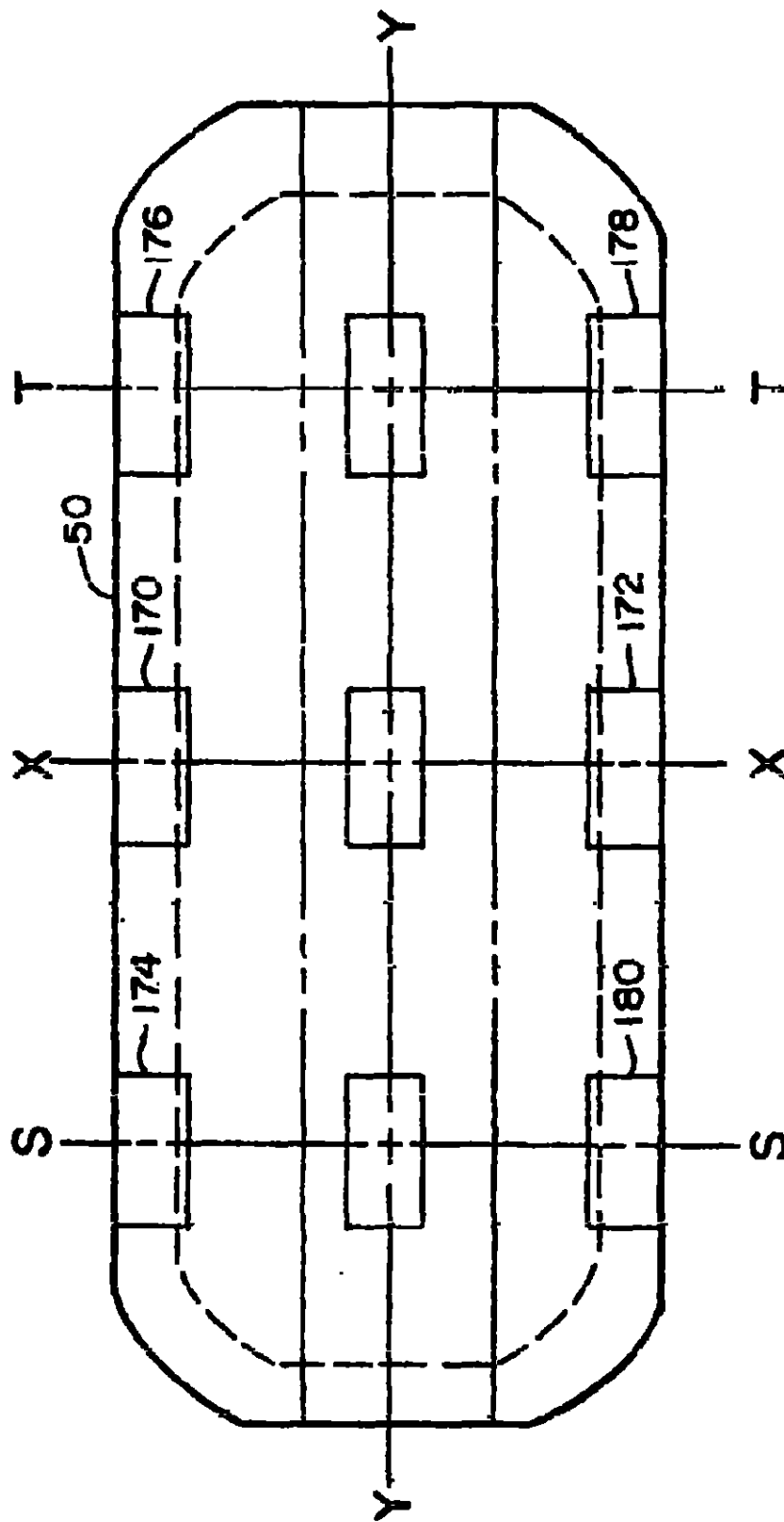


FIG. 11

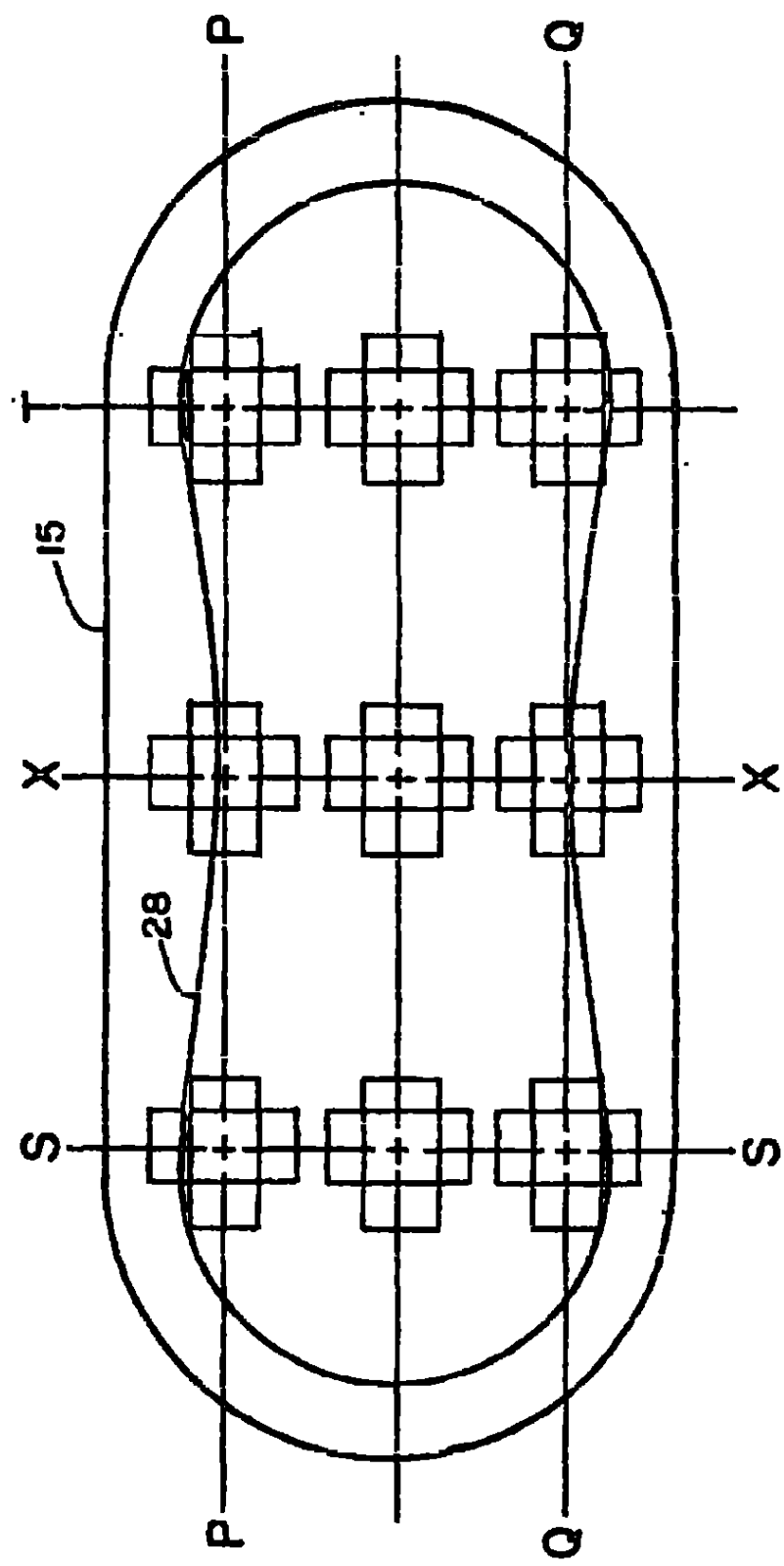


FIG. 12

about 2.0 millimeters. The first material 67 can have a three-dimensional profile to give it extra thickness and enhance its functionality. One way to acquire a three dimensional profile is to emboss the material between the nip of a pair of rollers.

The apertures formed in the first material 67 can vary in size, shape and pattern. The apertures can be arranged in either a systematic, uniform or random pattern. A systematic pattern, with similarly sized apertures, is desirable. The apertures can be formed by mechanically perforating the material, such as by needling or punching, be formed by hot vacuum drawing, or be formed by other methods known to those skilled in the art. The apertures should be formed through the entire thickness of the first material 67. It should be noted that the geometrical shape of the sidewalls of each aperture can vary. For example, the apertures can be round, triangular, square, or rectangular in cross-sectional shape. The sidewalls of the apertures can be aligned perpendicularly to the top plane of the first material 67 or they can be slanted at a desired angle.

When forming the apertures in the first material 67, it is possible to form the apertures such that the apex of each extends below the base plane of the first material 67. This configuration will allow the sidewalls of each aperture to contact and penetrate the fibers of an adjacent layer, for example, a cellulose pulp layer or a separation layer. This can be advantageous in providing rapid transfer of body fluid down into the absorbent or into a separation layer.

In FIG. 6, the first material 67 is shown forming a smaller portion of the exposed surface area of the bicomponent cover layer 62 than the second material 69. The reason for this is that, when the first material 67 is a thermoplastic film and the second material 69 is a nonwoven web, the film is more expensive than the nonwoven web, and therefore it is beneficial to use less of it. Even though the second material 69 occupies a larger portion of the exposed surface area of the bicomponent cover layer 62 than the first material 67, it is possible to have the first material 67 form an equal or larger portion of the bicomponent cover 62, if desired.

The second material 69 of the bicomponent cover layer 62 is preferably a liquid-permeable nonwoven web. The nonwoven web can be a fibrous material formed from natural polymeric fibers or filaments. The nonwoven web is non-perforated, although a perforated web can be used if desired. The nonwoven web can be formed from any of the following polymers: polyamides, polyesters, polyolefins, polyvinyl acetate, polyvinyl chloride, polyvinyl alcohol, cellulose acetate, viscose, and the like. Suitable materials include polypropylene spunbond and bonded carded webs. An appropriate nonwoven web material should have a uniform web with a density of about 1.5 or greater. Such a material, commonly referred to as a linear drawn spunbond, is described in U.S. Pat. No. 4,340,563 issued to Appel et al. and is hereby incorporated by reference and made a part hereof.

The sanitary napkin 50 also contains two longitudinally-extending strips of garment adhesive 72 and 74 which are attached to the exterior surface, that is, the garment-facing side, of the battie. The garment adhesive is commercially available from National Starch and Chemical Company, located at 10 Firdene Ave., Bridgewater, N.J. 08807 U.S.A. The strips of garment adhesive 72 and 74 are used to secure the sanitary napkin to the inside of the crotch portion of an undergarment so that it can be properly aligned with the vaginal opening. A peel strip 76 is releasably attached to the garment collecting strips 72 and 74 and provides the

adhesive from becoming contaminated prior to attachment to the undergarment. The peel strip 76 can be a white Kraft paper coated on one side so that it can be released from a hot melt adhesive. The peel strip 76 is designed to be removed by the ultimate consumer just prior to placement of the sanitary napkin in the undergarment.

Fourth Embodiment

Referring to FIG. 8, a fourth embodiment of the invention is a sanitary napkin 80 that has a first tab 82 and a second tab 84. One tab is arranged on each side of the sanitary napkin 80. In other respects, the sanitary napkin 80 is similar to the sanitary napkin 50 illustrated in FIGS. 5, 6 and 7. The tabs 82 and 84 are intended to be folded around the undergarment of the user and to insure the attachment of the sanitary napkin 80 to the garment.

Resilient Layer

In the context of this invention, resilience refers to the ability of a material to return or spring back to its original position, an approximately flat position, against the panty, after having been bent or compressed or both. Bending and compression occur during use, as a result of movements of the wearer of the sanitary napkin. This ability of the resilient layer is imparted to the sanitary napkin or other absorbent article. As a result, the entire sanitary napkin has the ability to return to its original position, approximately flat, against the panty.

For the first, second, third and fourth embodiments, it is desirable to select a material for the resilient layer that is substantially non-absorbent and substantially non-wicking. Such a material reduces wicking or other flow of fluid, especially in a transverse direction toward the edge of the sanitary napkin. As a result, such a material reduces any tendency to leak at the sides of the napkin and protects the undergarment and other garments of the user. The resilient layers 19 and 58 may be a foam polymer or it may be another material having properties similar to foam. The material selected for the resilient layer should be one which has desirable resilience properties. The resilience of the material should be substantially unaffected by water and body fluids. Many materials commonly used in absorbent articles, such as pulp and other absorbent materials, do not have sufficient resilience when wet. Two resilience, that is, resilience when wet, and dry resilience, that is, resilience when dry, are both important.

The resilient layers 19 and 58 provide resistance to bunching. The resilient layers also contribute to stiffness and resistance to twisting. Resistance to bunching is a function of crush resistance force and resilient force. Crush resistance is the ability of a material to resist an applied force, such as a force that tends to crush or bend the material. Resilient force is the force with which the material seeks to return to its original position. The resilient ratio is the ratio of the resilient force to the crush resistance force. To have adequate resistance to bunching, one needs a sufficient resilient force. It is desirable to have this sufficient resilient force in a material that does not have too high of a crush resistance, to insure comfort. Thus a certain minimum resilient ratio is desirable, to be able to deliver a sufficient resilient force to resist bunching without having too high of a crush resistance.

A measure of resilient ratio is rebound resilience, as defined by the American Society for Testing Materials (ASTM) of 1916 Race Street, Philadelphia, Pa. 19103, U.S.A. This is the ratio between the output and input energy of a gravity-activated mass which impacts the test piece. See ASTM Publications D 3575-84, D 3574-86, and D 1084-87. All of the foregoing ASTM publications are incorporated

herein by reference and made a part hereof. Desirable materials for use in this invention will have a rebound resilience of at least about 25%.

Crush resistance may be measured by an ASTM Circular Bend Flex Test, as described in ASTM publication D 4032-82. For the purpose of this invention, the plunger described in ASTM D 4032-82 has been modified to have a smaller diameter of 6.25 mm., an end tip radius of 2.97 mm. and a needle point extending 0.18 mm. from the end of the tip. The needle has a 0.33 mm. base diameter and a point having a radius of less than 0.5 mm.

For materials that have similar resilient ratios, resistance to bunching is indicated by this Circular Bend Flex Test. The polyethylene foam material that was here called out in the foregoing Detailed Description has a resilient ratio of about 50%, as indicated by a literature rebound resilience of 50%, listed in *Encyclopedia of Polymer Science and Engineering*, Vol. 3, pp. 6 and 7, John Wiley and Sons publishers, New York, N.Y., U.S.A., 1965. For this material, a desirable range of crush resistance to provide the desired level of resistance to bunching is indicated by a Circular Bend Flex in the range of from about 9 to about 42 grams, desirably in the range of from about 24 to about 42 grams, more desirably about 35 grams.

A useful class of material for this invention is foams such as cellular plastics. These cellular plastics have an apparent density which is substantially lower than that of the base polymer (plastic) which is made possible by the presence of numerous cells of gas (air) dispersed throughout its mass. Foams are two-phase gas-solid systems that have a supporting continuous polymer or inorganic cell walls that are continuous throughout the structure.

The gas (air) phase in a resilient foam is usually distributed in void pockets often called cells. Open cell foams contain interconnected cells where the gas (air) can pass from one cell to another. Closed cell foams contain cells that are discrete from each other such that the gas phase of each is held independently by each cell that are sealed by thin walls of polymer.

The American Society for Testing and Materials (ASTM) classifies foamed plastics as either rigid or flexible. A flexible foam which is most preferred for this invention is one that does not rupture when a 20x2.5x2.5 cm piece is wrapped around a 2.5 cm diameter at a uniform rate of 1 inch around in 10-20 degrees. Examples of rigid foams which are not most preferred for this invention are those that do rupture under this test, unless they are modified to make them resilient through such means as scoring or embossing.

Foamed plastics can be prepared by many means. The expansion process is that of expanding a fluid polymer phase to a low density cellular state and then "freezing" the polymer structure by curing or through cooling of the liquid polymer.

The extrusion process for producing resilient foams uses physical stabilization in a decomposition expansion process. This process uses a blowing agent combined with the material polymer that is extruded under pressure. This solution of polymer and blowing agent is forced out through a die opening as in a moving wall at uniform temperature and pressure. This reduction in pressure causes the blowing agent to vaporize resulting in expansion of the polymer. The polymer is allowed to cool during expansion such that enough structural strength is obtained for the required density and dimensional stability. Freezing of the structure or stabilization of the polymer structure is a result of the polymer phase cooling to a point below its glass transition temperature. Cooling comes entirely from three sources: (1) the

vaporization of the blowing agent, (2) gas expansion, and (3) heat loss to the environment.

Polyurethane foams made with foam polymers of polyisocyanate and polypropylene are prepared by both molding and extrusion processes. It is desirable for these embodiments to use low density polyisocyanate foam products which are prepared by an extrusion technique using a gaseous blowing agent. Other methods of producing cellular structures include leaching out solid or liquid materials that have been dispersed in a polymer, sintering small particles, and dispersing small cellular particles in a reference.

Other methods of generating the cellular structures are by dispersing gas (or solid) in the fluid state and stabilizing this cellular state, or by stabilizing polymer particles in a solution that contains a gas phase.

Chemical stabilization process is a common used method used to produce resilient foams. Concomitant polymers are more suitable for foaming by this process than for vinyl polymers because of the fast yet controllable curing reactions and the absence of atmospheric inhibition. Polyurethane based foams are made by this process. This is not the most desirable foam for these embodiments due to extractables and long term aging and discoloration of polyurethane formed products.

Thermosetting extrusion foam polymers are most preferred for making the foam used in these embodiments. By using a physical stabilization process, cellular polyisocyanate, cellular urethane polyurethane, or poly(vinyl chloride) can be manufactured for use in these embodiments.

Examples of other materials that may be used for the resilient layers is set out as: silicone, polyurethane, polypropylene, latex and pulp. If the material is not substantially non-absorbent, desirably it should be treated to make it substantially non-absorbent.

Zones of Thickness, Stiffness and Absorbency

Referring to FIGS. 1 and 2, the sanitary napkins 15 and 50 each have at least two zones which extend longitudinally, that is, parallel to longitudinal axis Y-Y: a central absorbent zone 102 and 122 and a peripheral zone 106 and 126. Desirably, the napkins 15 and 50 also have an adjacent zone 104 and 124 between the central absorbent zone and the peripheral zone. In addition, each of the napkins 15 and 50 has one on each side of the napkins 15 and 50 and two adjacent zones, one on each side of the napkin. The central absorbent zones 102 and 122, the adjacent zones 104 and 124 and the peripheral zones 106 and 126 are all at least 60% of the total length of the napkins 15 and 50.

The sanitary napkins 15 and 50 are thickest, stiffest, and most absorbent in their central absorbent zones 102 and 122 where the absorbent means 20 and 60 are located. They are less thick, less stiff, and less absorbent in the adjacent zones 104 and 124 and are least thick, least stiff, and least absorbent in the peripheral zones 106 and 126. In addition, the sanitary napkins 15 and 50 are thinner in their adjacent zones 104 and 124 and peripheral zones 106 and 126 than most sanitary napkins. Also, as a result, the sanitary napkins 15 and 50 are softer in their peripheral zones 106 and 126 than most sanitary napkins, which enhance comfort. The sanitary napkins 15 and 50 have a finished peripheral edge which visually communicates to the user that fluid is not likely to reach the edges, especially the side edges, because the main absorbent does not extend to the side edges.

The stiffness of the central absorbent zones can be obtained by making the central absorbent zone thicker, by constructing it out of several layers, by using stiffer materials, by changing the basis weight or by placing another layer of material directly adjacent to the central absorbent

bona zone has a Gurley stiffness of at least about 500 milligrams, and desirably higher. See Tables 1 and 2.

Referring to FIG. 7, the central absorbent zone 102, that is, in cross section, includes: the cover layer 22, the transfer layer 4, the first tissue layer 28, the absorbent means 20, the second tissue layer 30, the resilient layer 18, the baffle 16, the garment adhesive 36, the peel strip 39, and construction adhesive 26 between various layers. The absorbent means 20 is a component within the central absorbent zone 102. The central absorbent zone 102, like the absorbent means 20, has a central longitudinal axis that is coincident with the central longitudinal axis Y-Y' of the sanitary napkin 14. The width of the central absorbent zone 102 is equal to the width of the absorbent means 20.

Referring to FIG. 8, the central absorbent zone 102 of sanitary napkin 50 includes the following layers: the bi-component cover layer 62, the transfer layer 66, the absorbent means 60, the two ply tissue layer 68, the resilient layer 58, the baffle 56, the garment adhesive, the peel strip, and construction adhesive between the various layers. The absorbent means 60 is a component within the central absorbent zone 102. The central absorbent zone 102, like the absorbent means 60, has a central longitudinal axis that is coincident with the central longitudinal axis Y-Y' of the sanitary napkin 50. The width of the central absorbent zone is equal to the width of the absorbent means.

Referring to FIG. 2, the adjacent zones 104 include the following layers: the cover layer 22, the first tissue layer 28, the second tissue layer 30, the resilient layer 18, the baffle 16, the garment adhesive 36, and the peel strip 39, and construction adhesive 26 between the various layers. The adjacent zone 104 includes the transfer layer 24.

Referring to FIG. 6, the adjacent zone 124 likewise includes the following layers: the cover layer 62, the two ply tissue layer 68, the resilient layer 58, the baffle 56, the garment adhesive, the peel strip, and construction adhesive between the various layers. The adjacent zone 124 does not include the absorbent means 60 and the transfer layer 66.

Referring to FIG. 3, the peripheral zone 106 includes the following layers: the cover layer 22, the baffle 18 and construction adhesive 26 between the cover layer 22 and the baffle 18. The peripheral zone 106 may also include a small portion of the outer side edge of the resilient layer 18.

Referring to FIG. 6, the peripheral zone 126 of sanitary napkin 50 includes the following layers: cover layer 62, baffle 56 and construction adhesive 66 between the cover layer 62 and the baffle 56. The peripheral zone 126 may also include a portion of the outer edge of the tissue layer 68 and the resilient layer 58, and adjacent construction adhesive 65. **Stiffness Testing**

The ability of certain layers of a sanitary napkin to resist an applied bending force, known as pad stiffness, is determined by measuring the amount of force required to bend a rectangular composite sample cut from the sanitary napkin that includes all layers excluding the peel strip. The force needed to bend such sample is measured using a Gurley Model 4171-d Digital Stiffness Tester which along with weights and precalibration strips are available through Tele-type Gurley, Inc., 1000 York Road, St. Louis, Mo. 63103. The Gurley stiffness test procedure is modeled after the Technical Association of the Pulp and Paper Industry (TAPPI) method T 543 pm-84. The Gurley Digital Stiffness Tester is an instrument consisting of a balanced vane, which is center-pivoted, and to which a variety of weights can be added below its pivot point. The vane moves freely to accommodate testing in both left and right directions which would be analogous to upward and downward body flexing of the wearer.

There is a two part calibration for the Gurley Stiffness Tester. The first calibration is done to ensure that the "Vane" mechanism is extending accurately in specification against a known material (i.e., a brass strip). The Gurley instrument is calibrated following the Gurley Digital Stiffness Tester Instruction Manual to within 5% variation with a 67.8 mm. wide by 25.4 mm. long precalibrated Brass Calibration Strip, Gurley part no. 31644. The second calibration is done to ensure that the internal electronic calculations and conversions are accurate.

The samples cut from each sanitary napkin are 12.7 mm. x 25.4 mm. wide by 25.4 mm. long. Each sample overlaps the top of the Gurley vane by 6.4 mm. During a test, the sample is moved against the top edge of the vane until the sample bends and the vane releases contact with the bottom edge of the sample. The point of release is measured by an electronic optical encoder which provides a greater degree of accuracy over the earlier model Gurley Stiffness Tester as was used in TAPPI T 543 pm-84. The electronic optical encoder also displays the results on the digital readout. The readout continuously displays readings from tests performed in both the left and right directions. The Gurley Model 4171-d also compares continuously through an internal microprocessor and displays the average of left and right bending stiffness data after each measurement. The average reading is then converted by the Gurley instrument into milligrams of Gurley stiffness relative to a sample size of 24.5 mm. wide by 76.2 mm. long.

The Gurley Stiffness Tester should be prepared as follows. The required weight is attached and the base of the instrument is levelled by adjusting the levelling screws until the level's bubble is centered and the pendulum's pointer is indicating zero. The switches are set to correspond to the weight being used, the weight's position on the pendulum, the width of the specimen being tested, and the length of the specimen. For example: if a 25.4 mm. x 12.7 mm. specimen is used with the 5 gm weight in the 25.4 mm. box, the switches would be set as follows:

- Weight-5 gm
- Weight Position-1 inch
- Width-0.5 inch
- Length-1 inch

The test procedure to be performed is as follows:

1. Center the specimen strip over the pendulum such that exactly 6.4 mm. (0.25 inches) overlaps the top of the pendulum and exactly 6.4 mm. (0.25 inches) will be bent in the test.
2. Select an appropriate weight and a hole to give a reading between 2 and 6 on the scale. NOTE: The specimen should be brought to an approximate contact with the pendulum vane before applying force to avoid oscillation in the early stages.
3. Press the System Reset button. The display must read 00-000-00.
4. Push the Release-Directional Switches to cause the sample area to press the specimen against the pendulum.
5. Repeat step 4 in the opposite direction to establish both a left scale reading, a right scale reading, and an average reading.
6. Record the average scale reading.
7. Press the Select Button to attain the milligram calculation and record.
8. Repeat steps 1 through 7 for each specimen.

The following procedure was used to obtain samples for Gurley stiffness testing. A set of samples was cut from five

sanitary napkins of the types shown in the Tables. Each sample measured 12.7 mm. by 254 mm. Tables I through 16 show construction data between sanitary napkins of the invention described herein and commercially available sanitary napkins which are relatively thin in caliper. In the Tables, K-C refers to Kimberly-Clark Corporation of Dallas, Tex., U.S.A. Invention A and Invention B refer to sanitary napkins 50 of the type described herein as the Third Embodiment. Inventions H, J, M and W refer to sanitary napkins 15 of the type described herein as the First Embodiment. The K-C Ultra Thin Pad with Pulp is described in U.S. patent application Ser. No. 355,694, now U.S. Pat. No. 3,248,309 filed in the name of Schriak et al. and assigned to Kimberly-Clark Corporation. P&G refers to the Procter & Gamble Company of Cincinnati, Ohio U.S.A. The K-C Ultra Thin Pad with Pulp and the P&G Whisper Bacci product with wings shown in the Tables, are commercially available sanitary napkins. The commercially available sanitary napkins shown in the Tables do not have the same construction, layers and shape as the sanitary napkins of this invention. Samples were cut from comparable locations in the commercially available napkins as much as possible to provide the comparison shown in the Tables.

Figs. 9, 10, and 11 show where samples were cut from napkins 50, the Third Embroidered. Fig. 12 shows where samples were cut from napkins 15, the First Embroidered. Fig. 13 shows the location of certain measurements. The longitudinal direction $Y-Y$ and the transverse direction $X-X$ of each napkin were identified. The peel strip was removed and the garment adhesive was dusted with talc or zinc oxide. Napkin 123, a napkin 120 measuring 12.7 mm $\times$ 25.4 mm, was cut in the machine direction from each napkin 50 at the intersection of the two centerlines $Y-Y$ and $X-X$. The machine direction referred to in Tables 1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, and 14 corresponds to the longitudinal direction of the napkin, i.e., axis $Y-Y$. The transverse direction referred to in Table 2 corresponds to the transverse axis $X-X$ of the napkin 50. Two additional samples 132 and 134, each measuring 12.7 mm $\times$ 5 mm, were cut in the machine direction along the longitudinal centerline. The two additional samples 132 and 134 were cut about 2.5 mm in front of and behind the first sample 123. All samples from each napkin were cut and handled carefully so as not to affect the sample stiffness. Such samples ~~represented the central absorbent napkins 50 plus arguments from~~ the other layers present at the locations where the samples were taken, that is, from the central absorbent zone 122. The survey program was maintained for each sample and the values were recorded in Table 1 as the stiffness of the central absorbent zone 122 in the machine direction.

Referring to FIG. 9, we then identified parallel planes S and T. Planes S and T are parallel to the transverse coordinate X—X and are 61.9 millimeters in front of and behind the transverse coordinate X—X. Next we identified parallel planes P—P and Q—Q. Planes P—P and Q—Q are parallel to longitudinal coordinate Y—Y and at a distance of 6.4 (± 0.4) mm. from coordinate Y—Y. C is a measurement of the total width of the sapling 50 at its narrowest dimension (between planes P—P and Q—Q and planes T—T and S—S, shown in FIGS. 11 and 12). We then identified the points of intersection for planes P—P, Q—Q, S—S, and T—T. At the intersection of planes P—P and S—S, we cut sample 142. At the intersection of planes P—P and T—T, we cut sample 144. At the intersection of planes Q—Q and T—T, we cut sample 146. At the intersection of planes Q—Q and S—S, we cut sample 148. The four samples 142, 144, 146 and 148 each measured 25.4 millimeters by 12.7 millimeters. Such samples are in the

offset adjacent zone 124 and include the reaction layer 52, but not the absorbent means 60. Such samples are offset from transverse axis X-X'. The Gaudy stiffness of the samples from the adjacent zone were measured and recorded in Table 4 as the stiffness of the offset adjacent zones in the reaction direction.

Referring to FIG. 9, we also identified the points of intersection for planes P—P, Q—Q, X—X, and Y—Y. At the intersection of planes P—P and X—X, we cut sample 160. At the intersection of planes Q—Q and X—X, we cut sample 162. The two samples 160 and 162 each measured 2.5 mm. in length and 1.25 mm. in width. Such samples are in the center adjacent zones and include the resilient layer 58, but not the absorbent means 60. The Gurley stiffness of the samples from the center adjacent zones were measured and recorded in Table 3 as the stiffness of the center adjacent zone in the machine direction.

Returning to I-X, 18, from another set of five napkins 30 another sample 136 measuring 12.7 mm. and 25.4 mm. was cut in the transverse direction from each napkin at the intersection of the two centerlines Y—Y and X—X. Two additional samples 138 and 140, each measuring 12.7 mm. x 25.4 mm., were cut in the transverse direction along the longitudinal centerline. The two additional samples 138 and 140 were cut about 65.5 mm. in front of and behind the firm sample. All samples from each napkin were cut and handled carefully so as not to affect the sample stiffness. Such samples included the central absorbent means 20 plus segments from the outer layers attached to the absorbent means. The samples were taken, that is, from the central absorbent zone 122. The Curley stiffness was measured for each sample and the values were recorded in Table 2 as the stiffness of the central absorbent zone in the transverse direction.

Referring to FIG. 18, we also identified parallel planes S and T. Planes S and T are parallel to the transverse centerline X-X and are 61.5 millimeters in front of and behind the transverse centerline X-X. Next we identified parallel planes P-P and Q-Q. Planes P-P and Q-Q are parallel to longitudinal centerline Y-Y and are at a distance of (2)(6.4 mm.) from centerline Y-Y. C is a measurement of the total width of the aspin 58. We then identified the points of intersection of planes T-T, Q-Q, S-S, and T-T. At the intersection of planes P-P and S-S, we cut sample 149 in the transverse direction. At the intersection of planes P-P and T-T, we cut sample 150 in the transverse direction. At the intersection of planes Q-Q and T-T, we cut sample 152 in the transverse direction. At the intersection of planes Q-Q and S-S, we cut sample 154 in the transverse direction. The four samples 149, 150, 152, and 154 each measured 25.4 millimeters (1 inch) in length. Each sample is in the offset adjacent zone 124 and include the resilient layer 58, but not the absorbent means 60. Such samples are referred to as transverse main X-X. The chordal distance of the samples from the adjacent zone were measured as the stiffness of the offset adjacent zones in the transverse direc-

Referring to FIG. 10, we also identified the points of intersection for planes P—P, Q—Q, X—X, and Y—Y. At the intersection of planes P—P and A—A, we cut sample 151 in the transverse direction. At the intersection of planes Q—Q and X—X, we cut sample 153 in the transverse direction. The two samples 151 and 153 each measured 25.4 millimeters (2.7 millimeters). Such samples are in the corner adjacent zones and include the resilient layer 42, but not the absorbent zones 68. The Gukry stiffness of the samples from the corner adjacent zones were measured as the stiffness of the entire surface area in the transverse direction.

Referring to FIG. 11, four additional points, two on each side of the sanitary napkin 90 were located on the planes S—S and T—T on the outer longitudinal sides of the napkin. Samples 174, 176, 178 and 180 were cut in the machine direction from each of these points. Such samples did not include the central absorbent means 60 and included only a small portion of the resilient layer 58 and segments from the other layers present where the samples were taken. The Gurley stiffness of each sample is measured and recorded in Table 4 as the stiffness of the center peripheral zones of the napkin 90 in the machine direction. The average for the stiffness of the offset peripheral zones was calculated and recorded as the average stiffness of the peripheral zones of the napkin. The average stiffness of the offset peripheral zones was then subtracted from the average stiffness of the central absorbent zone of the napkin and is recorded in Table 8 as the difference in stiffness between the central absorbent zone and the offset peripheral zones of the napkin in the machine direction.

Referring to FIG. 11, two additional points, one on each side of the transverse section Y—Y, were identified on the outer longitudinal sides of the napkin 90. Samples 170 and 172 were cut in the machine direction from each of these points. These samples did not include the central absorbent means 60 and included only a small portion of the resilient layer 58 and segments from the other layers present where the samples were taken. The Gurley stiffness of each sample 170 and 172 was measured and recorded in Table 5 as the stiffness of the center peripheral zones of the napkin in the machine direction. The average for the stiffness of the center peripheral zones was calculated and recorded as the "average stiffness of the center peripheral zones" of the napkin. The average stiffness of the center peripheral zones was then subtracted from the average stiffness of the central absorbent zone of the napkin and is recorded in Table 7 as the difference in stiffness between the central absorbent zone and the center peripheral zones of the napkin in the machine direction.

The average of the values of the stiffness of the central absorbent zone was calculated and recorded as the "average stiffness of the central absorbent zone" for the napkin. The average of the values of the stiffness of the adjacent zones was calculated and recorded as the "average stiffness of the adjacent zones" for the napkin. The "average stiffness of the central absorbent zone" was then divided by the "average stiffness of the adjacent zones" and is recorded as the stiffness ratio of the central absorbent zone to the adjacent zones. Referring to FIGS. 12 and 13, sanitary napkin 15 has tissue layers 28 and 30 that form an absorbent zone 120. Samples were cut from napkins 15 in a manner similar to that previously described for FIGS. 9 and 10. Referring to FIG. 12, the width of the absorbent zone is the width of the tissue layers 28 and 30 along the transverse axis X—X is B. Dimension B is the minimum width of the tissue layers 28 and 30. The total width of the napkin 15 at its narrowest dimensions between planes S and X and planes T and X (shown in FIGS. 11 and 12). Dimension D is the width of the resilient layer. Dimension E is the length of the tissue layers. Dimension F is the length of the napkin.

Table 1 shows the stiffness of samples or segments cut from the central absorbent zone in the machine direction for sanitary napkins of the present invention and the stiffness of samples or segments cut from comparable locations for other sanitary napkins available commercially. For the present invention, the stiffness of the central absorbent zone in the machine direction is in the range of from about 477 milligrams (mg.) to about 3067 mg. Desirably, it is in the range of from about

782 mg. to about 2526 mg. Desirably also, it should be above about 477 mg.

Table 2 shows the stiffness of samples or segments cut from the central absorbent zone in the transverse direction for sanitary napkins of the present invention and the stiffness of samples from comparable locations for sanitary napkins available commercially. For the present invention, the stiffness of the central absorbent zone in the transverse direction is in the range of from about 342 mg. to about 2445 mg. Desirably, it is in the range of from about 424 mg. to about 1647 mg. Desirably also, it should be above about 494 mg.

Table 3 shows the stiffness of samples or segments cut from the center adjacent zones in the machine direction for sanitary napkins of the present invention and the stiffness of samples from comparable locations for other sanitary napkins available commercially. Such samples 160 and 162 from the center adjacent zones are shown in FIG. 9 at the intersection of plane P—P and transverse axis Y—Y and at the intersection of plane Q—Q and transverse axis X—X. For the present invention, the stiffness of the center adjacent zones is in the range of from about 99 mg. to about 745 mg. Desirably, it is in the range of from about 131 mg. to about 297 mg.

Table 4 shows the stiffness of samples or segments cut from the offset positions in the adjacent zones in the machine direction for sanitary napkins of the present invention and the stiffness of samples from comparable locations for other sanitary napkins available commercially. Such samples are shown in FIG. 9 that is, sample 142 at the intersection of plane P—P and S—S; sample 144 at the intersection of plane P—P and plane T—T; sample 146 at the intersection of plane Q—Q and plane T—T and sample 148 at the intersection of plane Q—Q and S—S. For the present invention, the stiffness of the offset adjacent zones is in the range of from about 67 mg. to about 412 mg. Desirably, it is in the range of from about 121 mg. to about 317 mg.

Table 5 shows the stiffness of samples cut from the center of the peripheral zones in the machine direction. That is, samples 170 and 172 shown in FIG. 11 along the transverse axis X—X at each side of the napkin for sanitary napkins of the present invention and the stiffness of samples from comparable locations for other sanitary napkins available commercially. For the present invention, the stiffness of the center peripheral zones is in the range of from about 28 mg. to about 127 mg. Desirably, it is in the range of from about 59 mg. to about 38 mg.

Table 6 shows the stiffness of samples or segments cut from the peripheral zones at their offset positions in the machine direction. That is, samples 174 and 176 along the plane S—S at each side of the napkin and samples 178 and 180 along the plane T—T at each side of the napkin. For the present invention, the stiffness of the offset peripheral zones is in the range of from about 30 mg. to about 115 mg. Desirably, it is in the range of from about 70 mg. to about 79 mg.

Table 7 shows the difference between the average stiffness of the central absorbent zone in the machine direction, shown in Table 1, and the average stiffness of the adjacent zones in the machine direction from Table 3 for center adjacent zones, and from Table 4 for the center peripheral zones for sanitary napkins of the present invention and differences in average stiffness for comparable locations for other sanitary napkins available commercially. "No data" in the Tables means no data is available.

Table 8 shows the difference in average stiffness in the machine direction between the center adjacent zones shown in Table 3 and the center peripheral zones shown in Table 5.

The stiffness of the center adjacent zones is represented by samples 160 and 162 in FIG. 9. The stiffness of the center peripheral zones is represented by samples 170 and 172 in FIG. 11.

Table 9 shows the difference in average stiffness in the machine direction between the central absorbent zones and offset zones, both the offset adjacent zones and the offset peripheral zones. The offset adjacent zones are represented by samples 144, 146, 148, and 149 in FIG. 9 and the average stiffness is shown in Table 4. The offset peripheral zones are represented by samples 174, 176, 178 and 180 in FIG. 11 and the average stiffness is shown in Table 6. For the present invention, the difference in average stiffness between the central absorbent zone and offset adjacent zones is in the range of from about 632 mg. to about 2293 mg. The difference in average stiffness between the central absorbent zone and the offset peripheral zones is in the range of from about 953 mg. to about 2456 mg.

Table 10 shows the difference in average stiffness between the center adjacent zones, shown in FIG. 9 and shown in Table 4; and the offset peripheral zones represented by samples 174, 176, 178, and 180 in FIG. 11 and shown in Table 6. For the present invention, the difference in average stiffness between the center adjacent zones and the offset peripheral zones is in the range of from about 50 mg. to about 162 mg.

Table 11 shows the ratio of the average stiffness of the central absorbent zones represented by samples 130, 132, and 134 in FIG. 9, to the average stiffness of the center adjacent zones, represented by 160 and 162 in FIG. 9 and shown in Table 4 and to the center peripheral zones, represented by samples 170 and 172 in FIG. 11 and shown in Table 5. The ratio of the average stiffness of the central absorbent zones to the average stiffness of the center adjacent zones is in the range of from about 3.7:1 to about 10.3:1. The ratio of the average stiffness of the central absorbent zones to the average stiffness of the center peripheral zones is in the range of from about 14.5:1 to about 32.4:1.

Table 12 shows the ratio of the average stiffness of the central adjacent zones, represented by samples 160 and 162 in FIG. 9 and shown in Table 3, to the average stiffness of the center peripheral zones represented by samples 170 and 172 in FIG. 11 and shown in Table 5.

Table 13 shows the ratio of the average stiffness of the central absorbent zones to the average stiffness of the offset zones. The central absorbent zones are represented by samples 130, 132 and 134 in FIG. 9. The offset adjacent zones are represented by samples 144, 146, 148 and 149 in FIG. 9 and shown in Table 4. The offset peripheral zones are represented by samples 174, 176, 178 and 180 in FIG. 11 and shown in Table 6.

Table 14 shows the ratio of the average stiffness of the offset adjacent zones to the average stiffness of the offset peripheral zones in the machine direction. The offset adjacent zones are represented by samples 142, 144, 146 and 148 in FIG. 9 and shown in Table 4. The offset peripheral zones are represented by samples 174, 176, 178 and 180 in FIG. 11 and shown in Table 6.

Table 15 shows the width of dimensions A, B, C and D in various sanitary napkins. For sanitary napkins identified as Invention H and Invention M, the width dimensions A, B, C and D are shown in FIG. 15. For sanitary napkins identified as Invention A, dimensions B and D are equal because there is no horizontal crease for the center layer.

Tables 17, 18 and 19 show the caliper or thickness of sanitary napkins of the present invention for the various zones within the sanitary napkin. Tables 17 and 18 show the caliper or thickness of commercially available sanitary napkins at comparable locations to where the various zones of the present invention would be located. Caliper refers to thickness measured by a caliper device. The center adjacent zone typically has a caliper in the range of from about 0.5 mm. to about 3.0 mm. More desirably, the center adjacent zone has a caliper in the range of about 1.3 mm. to about 1.5 mm.

TABLE 1

STIFFNESS OF THE CENTRAL ABSORBENT ZONE in Machine Direction				
No. of Samples	Caliper Stiffness in milligrams			
Average	Minimum	Maximum		
Invention A: K-C Ultra Thin Pad with Foam	15	171	322	1532
Invention B: K-C Ultra Thin Pad with Foam	15	2526	2030	3067
Invention C: K-C Ultra Thin Pad with Foam	15	1182	940	1549
Invention E: K-C Ultra Thin Pad with Foam	15	1070	697	1498
Invention M: K-C Ultra Thin Pad with Foam	15	1025	751	1288
Invention W: K-C Ultra Thin Pad with Foam	15	782	477	1143
K-C Ultra Thin Pad with Poly Foam Whisker Bond (with wings)	15	695	560	905
	15	614	179	1170

TABLE 2

STIFFNESS OF THE CENTRAL ABSORBENT ZONE in Transverse Direction				
No. of Samples	Caliper Stiffness in milligrams			
Average	Minimum	Maximum		
Invention A: K-C Ultra Thin Pad with Foam	15	2072	690	12740
Invention B: K-C Ultra Thin Pad with Foam	15	1647	1154	2445
Invention E: K-C Ultra Thin Pad with Foam	15	821	616	1010
Invention I: K-C Ultra Thin Pad with Foam	15	494	297	758
Invention M: K-C Ultra Thin Pad with Foam	15	886	390	977
Invention W: K-C Ultra Thin Pad with Foam	15	512	342	723
K-C Ultra Thin Pad with Poly Foam Whisker Bond	15	392	278	560
	15	171	104	423

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TABLE 3

STIFFNESS OF CENTER ADJACENT ZONES IN MACHINE DIRECTION				
	No. of Samples	Gurley Stiffness in milligrams		
		Average	Minimum	Maximum
Invention A: K-C Ultra Thin Pad with Foam	10	211	172	245
Invention B: K-C Ultra Thin Pad with Foam	10	245	195	289
Invention H: K-C Ultra Thin Pad with Foam	10	297	239	345
Invention J: K-C Ultra Thin Pad with Foam	10	193	99	175
Invention M: K-C Ultra Thin Pad with Foam	10	131	108	168
Invention W: K-C Ultra Thin Pad with Foam	10	189	142	219
K-C Ultra Thin Pad with Pulp	10	110	77	147
P&G Whisper Soft (with wings)	10	178	145	211

TABLE 4

STIFFNESS OF OPPOSITE ADJACENT ZONES IN MACHINE DIRECTION				
	No. of Samples	Gurley Stiffness in milligrams		
		Average	Minimum	Maximum
Invention A: K-C Ultra Thin Pad with Foam	20	198	133	245
Invention B: K-C Ultra Thin Pad with Foam	20	225	202	242
Invention H: K-C Ultra Thin Pad with Foam	20	317	279	411
Invention J: K-C Ultra Thin Pad with Foam	20	198	114	372
Invention M: K-C Ultra Thin Pad with Foam	20	121	97	175
Invention W: K-C Ultra Thin Pad with Foam	20	190	100	225
K-C Ultra Thin Pad with Pulp	20	86	20	200
P&G Whisper Soft (with wings)	20	187	146	230

TABLE 5

STIFFNESS OF THE CENTER PERIPHERAL ZONES IN MACHINE DIRECTION				
	No. of Samples	Gurley Stiffness in milligrams		
		Average	Minimum	Maximum
Invention A: K-C Ultra Thin Pad with Foam	10	77	47	110

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TABLE 5-continued

STIFFNESS OF THE CENTER PERIPHERAL ZONES IN MACHINE DIRECTION				
	No. of Samples	Gurley Stiffness in milligrams		
		Average	Minimum	Maximum
Invention B: K-C Ultra Thin Pad with Foam	10	78	44	127
Invention M: K-C Ultra Thin Pad with Foam	10	52	28	82
K-C Ultra Thin Pad with Pulp	10	25	13	43
P&G Whisper Soft (with wings)	10	7	1	14

TABLE 6

STIFFNESS OF THE CENTER PERIPHERAL ZONES IN MACHINE DIRECTION				
	No. of Samples	Gurley Stiffness in milligrams		
		Average	Minimum	Maximum
Invention A: K-C Ultra Thin Pad with Foam	20	79	54	112
Invention B: K-C Ultra Thin Pad with Foam	20	70	30	109
Invention M: K-C Ultra Thin Pad with Foam	20	72	34	104
K-C Ultra Thin Pad with Pulp	20	35	17	76
P&G Whisper Soft (with wings)	20	61	20	118

TABLE 7

THE CENTRAL ABSORBENT ZONES AND THE ADJACENT ZONES IN MACHINE DIRECTION			Gurley Stiffness in milligrams	
			Central Adjacent Zones	Central Peripheral Zones
Invention A: K-C Ultra Thin Pad with Foam			900	1784
Invention B: K-C Ultra Thin Pad with Foam			2282	2448
Invention H: K-C Ultra Thin Pad with Foam			812	N.D.
Invention J: K-C Ultra Thin Pad with Foam			897	N.D.
Invention M: K-C Ultra Thin Pad with Foam			894	973
Invention W: K-C Ultra Thin Pad with Foam			813	N.D.
K-C Ultra Thin Pad with Pulp			576	670
P&G Whisper Soft (with wings)			36	287

TABLE 8

DIFFERENCE IN AVERAGE STIFFNESS BETWEEN THE CENTRAL ADJACENT ZONES AND THE CENTER PERIPHERAL ZONES in Machine Direction	
	Stiffness Difference in milligrams
Invention A: K-C Ultra Thin Film with Foam	134
Invention B: K-C Ultra Thin Film with Foam	187
Invention C: K-C Ultra Thin Film with Foam	N.D.
Invention D: K-C Ultra Thin Film with Foam	N.D.
Invention E: K-C Ultra Thin Film with Foam	79
Invention F: K-C Ultra Thin Film with Foam	N.D.
K-C Ultra Thin Film with Poly	93
PdG Whisper Excel (with wings)	171

TABLE 9

DIFFERENCE IN AVERAGE STIFFNESS BETWEEN THE CENTRAL ADJACENT ZONES AND THE CENTER PERIPHERAL ZONES in Machine Direction		
	Offset Peripheral Zones	Offset Peripheral Zones
Invention A: K-C Ultra Thin Film with Foam	917	1877
Invention B: K-C Ultra Thin Film with Foam	2783	2496
Invention C: K-C Ultra Thin Film with Foam	794	N.D.
Invention D: K-C Ultra Thin Film with Foam	832	N.D.
Invention E: K-C Ultra Thin Film with Foam	904	913
Invention F: K-C Ultra Thin Film with Foam	682	N.D.
K-C Ultra Thin Film with Poly	810	880
PdG Whisper Excel (with wings)	74	177

TABLE 10

DIFFERENCE IN AVERAGE STIFFNESS BETWEEN THE OFFSET ADJACENT ZONES AND THE OFFSET PERIPHERAL ZONES in Machine Direction	
	Stiffness Difference in milligrams
Invention A: K-C Ultra Thin Film with Foam	110
Invention B: K-C Ultra Thin Film with Foam	163
Invention C: K-C Ultra Thin Film with Foam	N.D.

TABLE 10-continued

DIFFERENCE IN AVERAGE STIFFNESS BETWEEN THE OFFSET ADJACENT ZONES AND THE OFFSET PERIPHERAL ZONES in Machine Direction	
	Stiffness Difference in milligrams
Invention D: K-C Ultra Thin Film with Foam	N.D.
Invention E: K-C Ultra Thin Film with Foam	49
Invention F: K-C Ultra Thin Film with Foam	100
K-C Ultra Thin Film with Poly	30
PdG Whisper Excel (with wings)	80

TABLE 11

RATIO OF THE AVERAGE STIFFNESS OF THE CENTRAL ADJACENT ZONE TO THE AVERAGE STIFFNESS OF THE CENTER PERIPHERAL ZONES AND TO THE CENTER PERIPHERAL ZONES in Machine Direction		
	Center Adjacent Zones	Center Peripheral Zones
Invention A: K-C Ultra Thin Film with Foam	2.2	1.2
Invention B: K-C Ultra Thin Film with Foam	18.3	32.4
Invention C: K-C Ultra Thin Film with Foam	5.1	N.D.
Invention D: K-C Ultra Thin Film with Foam	7.7	N.D.
Invention E: K-C Ultra Thin Film with Foam	7.8	19.8
Invention F: K-C Ultra Thin Film with Foam	4.6	N.D.
K-C Ultra Thin Film with Poly	9.8	27.4
PdG Whisper Excel (with wings)	1.1	30.1

TABLE 12

RATIO OF AVERAGE STIFFNESS OF CENTER ADJACENT ZONES TO AVERAGE STIFFNESS OF CENTER PERIPHERAL ZONES in Machine Direction	
	Average
Invention A: K-C Ultra Thin Film with Foam	2.8
Invention B: K-C Ultra Thin Film with Foam	1.1
Invention C: K-C Ultra Thin Film with Foam	N.D.
Invention D: K-C Ultra Thin Film with Foam	N.D.
Invention E: K-C Ultra Thin Film with Foam	2.5
Invention F: K-C Ultra Thin Film with Foam	N.D.
K-C Ultra Thin Film with Poly	4.7
PdG Whisper Excel (with wings)	23.8

TABLE 13

RATIO OF AVERAGE STIFFNESS OF CENTRAL ABSORBENT ZONE TO AVERAGE STIFFNESS OF THE OFFSET ZONES in Machine Direction			S
	Offset Adjacent Zones	Offset Peripheral Zones	
Invention A: K-C Ultra Thin Pad with Foam	3.6	14.1	10
Invention B: K-C Ultra Thin Pad with Foam	10.8	36.0	
Invention H: K-C Ultra Thin Pad with Foam	3.5	N.D.	15
Invention J: K-C Ultra Thin Pad with Foam	5.2	N.D.	
Invention M: K-C Ultra Thin Pad with Foam	8.5	14.2	20
Invention W: K-C Ultra Thin Pad with Foam	8.5	14.2	
K-C Ultra Thin Pad with Pulp P&G Whisper Max (with wings)	1.3	2.5	

TABLE 14

RATIO OF AVERAGE STIFFNESS OF OFFSET ZONES TO AVERAGE STIFFNESS OF THE CENTRAL ZONE IN MACHINE DIRECTION		S
	Ratio of Averages	
Invention A: K-C Ultra Thin Pad with Foam	2.5	30
Invention B: K-C Ultra Thin Pad with Foam	2.5	
Invention H: K-C Ultra Thin Pad with Foam	N.D.	35
Invention J: K-C Ultra Thin Pad with Foam	N.D.	
Invention M: K-C Ultra Thin Pad with Foam	1.7	40
Invention W: K-C Ultra Thin Pad with Foam	N.D.	
K-C Ultra Thin Pad with Pulp P&G Whisper Max (with wings)	1.9	

TABLE 15

PAD WIDTH MEASUREMENTS				
	(A) CENTRAL ABSORBENT ZONE WIDTH, inches	(B) ABSORBENT ZONE WIDTH, inches	(C) PULP ZONE WIDTH, inches	(D) NON-ABSORBENT ZONE WIDTH, inches
Invention A: K-C Ultra Thin Pad with Foam	1.71 in. 32 mm.	2.825 in. 72 mm.	3.63 in. 97 mm.	2.825 in. 77 mm.
Invention H: K-C Ultra Thin Pad with Foam	1.25 in. 32 mm.	2.125 in.	3.75 in.	3.75 in.
Invention J: K-C Ultra Thin Pad with Foam	1.25 in. 32 mm.	2.125 in.	4.75 in. 90 mm.	3.75 in.
Invention M: K-C Ultra Thin Pad with Foam	1.71 in. 32 mm.	2.825 in.	3.75 in. 90 mm.	N.D.
Invention W: K-C Ultra Thin Pad with Pulp	2.57 in. 70 mm.	2.73 in. 70 mm.	3.5 in. 89 mm.	N.D.

TABLE 16

PAD WIDTH RATIOS				
	A/B ¹ 100%	A/C ² 100%	A/D ³ 100%	C/D %
Invention A: K-C Ultra Thin Pad with Foam	44	34	44	0.90
Invention H: K-C Ultra Thin Pad with Foam	39	33	33	0.84
Invention M: K-C Ultra Thin Pad with Foam	39	33	48	0.94
Invention W: K-C Ultra Thin Pad with Pulp P&G Whisper Max (with wings)	100	79	N.D.	0.88

TABLE 17

CALIPER OF INVENTION A: K-C ULTRA THIN PAD WITH FOAM	
Central Absorbent Zone	3.085 mm
Offset Absorbent Zone	1.281 mm
Offset Adjacent Zone	1.098 mm
Center Peripheral Zone	1.130 mm
Offset Peripheral Zone	1.294 mm
Peripheral Edge	0.376 mm

TABLE 18

CALIPER OF INVENTION B: K-C ULTRA THIN PAD WITH FOAM	
Central Absorbent Zone	3.11 mm
Offset Absorbent Zone	1.297 mm
Offset Adjacent Zone	1.307 mm
Center Peripheral Zone	0.846 mm
Offset Peripheral Zone	1.223 mm
Peripheral Edge	0.215 mm

TABLE 19

CALIPER OF HYPODERMIS AND K-C ULTRA THIN PAD WITH FOAM	
Central Absorbent Zone	1.47 mm
Center Adjacent Zones	1.930 mm
Outer Adjacent Zones	1.651 mm
Center Peripheral Zones	1.105 mm
Outer Peripheral Zones	1.643 mm
Peripheral Edges	0.314 mm

TABLE 20

CALIPER OF K-C CENTRAL ZONE AND OUTER ZONE	
Central Absorbent Zone	2.486 mm
Center Adjacent Zones	0.859 mm
Outer Adjacent Zones	0.705 mm
Center Peripheral Zones	0.293 mm
Outer Peripheral Zones	0.415 mm
Peripheral Edges	0.290 mm

TABLE 21

CALIPER OF P&G SUPERABSORBENT (S&S)	
Central Absorbent Zone	1.946 mm
Center Adjacent Zones	1.516 mm
Outer Adjacent Zones	1.374 mm
Center Peripheral Zones	0.480 mm
Outer Peripheral Zones	1.161 mm
Peripheral Edges	0.311 mm

Absorbency Testing

The absorbency of body fluids which can be absorbed by the sanitary napkins 15, 40, 50 and 60 can be determined using a saline solution in the following test. In performing this test, one napkin is sufficient. The sanitary napkin to be tested is first conditioned by leaving it in a room which is at 21 ± 1 degrees Centigrade and at $50 \pm 2\%$ relative humidity for a period of two hours. If the napkin contains a peel strip, this is removed. The entire napkin, minus any peel strip, is weighed in the nearest 0.1 grams. The napkin is then submerged in a beaker of stabilized isotonic saline which contains no preservatives. A suitable sterile saline is commercially sold by Becton Dickinson Corp. of Deerfield, Ill. U.S.A. under catalog no. B3158-2. The napkin is totally submerged and is not bent or otherwise twisted or folded. The napkin is submerged for 10 minutes. The napkin is removed from the saline and suspended for two minutes in a vertical position to allow the saline to drain out of the napkin. The napkin is then placed with the body-side cover face down on an absorbent blotter. The blotter can be filter paper no. BD 631-25 available from the Ahlstrom Filtration Inc., Mount Holly Springs, Pa. 17065 U.S.A. A uniform 17.6 grams per square centimeter load is placed over the napkin in a uniform fluid. The absorbent blotter is replaced every 30 seconds until the amount of fluid transferred to the absorbent blotter is less than 0.5 grams in a 30 second period. Next, the napkin is weighed in the nearest 0.1 grams and the dry weight of the napkin is subtracted. The difference in grams is the capacity of the napkin.

Absorbency testing was conducted for the entire napkins 15 and 50 and recorded as the "Total Capacity". The absorbency of the central absorbent zones 102 and 122 were also tested and recorded as the "Test Capacity."

For sanitary napkins 50, the Third Embodiment, Invention B, the average Total Capacity of five samples was 38.7

grams. The average Test Capacity of five samples was 22.3 grams.

For sanitary napkins 15 the First Embodiment, Invention W, the average Total Capacity of five samples was 37.9 grams. The average Test Capacity of five samples was 22.5 grams.

For another set of five samples of the sanitary napkin 15, the First Embodiment, the average Total Capacity of five samples was 37.8 grams. The average Test Capacity of five samples was 21.4 grams.

Samples of the K-C Ultra Thin Pad with Pulp, a commercially available sanitary napkin, were also tested. The average Total Capacity of the samples was 33.37 grams. The average Test Capacity of the samples was 19.81 grams.

Sanitex is a well known Ultra Thin product, a commercially available sanitary napkin were also tested. The average Total Capacity of the samples was 37.02 grams. The average Test Capacity of the samples was 14.08 grams.

Other Embodiments

While the invention has been described in detail with respect to specific embodiments thereof, it will be appreciated that those skilled in the art, upon attaining an understanding of the foregoing description, may readily conceive of alterations in, variations of and equivalents to these embodiments. Accordingly, the scope of the present invention should be construed so that it includes all such alterations and equivalents thereto.

For example, the invention has been described in the context of sanitary napkins. But, the invention is also applicable to other absorbent articles, such as thick sanitary napkins, diapers, pant liners, incontinent products, training pants, bandages, and the like. In other embodiments, a separate buffer may be omitted and the resilient layer may also function as the buffer.

The shape of the absorbent article may vary. It may be less rounded at the ends and more rectangular. More of the layers in all of the layers may be rectangular or rectangular in shape. The resilient layer may be positioned in a different location in reference to the other layers. The shape of the resilient layer may vary in comparison to the other layers. Other materials selected for the resilient layer may have a rebound resilience of about 90% or in the range of from about 25% to about 95%. The resilient layer may be discontinuous. For example, it may have holes in it. The number of layers of tissue may vary or may be eliminated. More or less adhesive may be used within the layers. A different absorbent means may be used, such as one which does not contain superabsorbent or hydrocolloidal material. The primary or central absorbent means may not be the central stiffening means that resists twisting. The absorbent article, such as a sanitary napkin may have a central stiffening means to resist twisting, and one or more separate absorbent layers or other absorbent means that may not be as stiff as the central stiffening means.

We claim:

1. An absorbent article having a central longitudinal axis, a caliper of less than about 5 millimeters, and a total width adapted to span the width of a user's labia majora, said absorbent article comprising:

a) an absorbent means having a predetermined length and width, a central longitudinal axis substantially aligned with the central longitudinal axis of said absorbent article, said absorbent means having the capacity to absorb at least 10 grams of body fluid; and

b) a substantially resilient layer comprising a closed cell, polyethylene foam having a width ranging from 60% to 100% of the total width of said absorbent article and

resilient layer being sufficiently resilient to resist bunching, as indicated by a Circular Bend Flex in the range of from about 0 to about 42 grams at a rebound resiliency of 50%.

2. An absorbent article adapted to receive and absorb body fluid and having a central longitudinal axis, said absorbent article comprising:

a) an absorbent means having a predetermined length and width, a central longitudinal axis substantially aligned along the central longitudinal axis of said absorbent article, said absorbent means capable of absorbing at least 10 grams of the body fluid deposited on said absorbent article; and

b) a substantially non-absorbent, substantially resilient layer positioned adjacent to said absorbent means, said resilient layer comprising a closed cell, polyethylene foam having a width greater than the predetermined width of said absorbent means and adapted to prevent bunching, as indicated by a Circular Bend Flex in the range of from about 0 to about 42 grams at a rebound resiliency of 50%, and wherein said absorbent article has a caliper of less than about 5 mm.

3. The absorbent article of claim 2 wherein said absorbent article has a body-facing side and a total width transverse to said longitudinal axis of said absorbent article defined by a distance from an outer side edge to an opposite outer side edge of the body-facing side of the absorbent article and said absorbent means has a width less than about 60% of the total width of said absorbent article.

4. The absorbent article of claim 3 wherein said substantially resilient layer has a length at least equal to the predetermined length of the absorbent means.

5. The absorbent article of claim 2 wherein said absorbent article comprises at least

a central absorbent zone and a peripheral zone, wherein said central absorbent zone is thicker in caliper, more absorbent and stiffer than zone; and

said peripheral zone.

6. The absorbent article of claim 5 further comprising an adjacent zone located between said central absorbent zone and said peripheral zone, said adjacent zone being less thick in caliper, less absorbent and less stiff than said central absorbent zone; said adjacent zone being thicker in caliper, more absorbent and stiffer than said peripheral zone.

7. The absorbent article of claim 6 wherein said central absorbent zone has a Gurley stiffness in the range of from about 782 milligrams to about 2526 milligrams, said adjacent zone has within it a center adjacent zone, said center adjacent zone has a Gurley stiffness in the range of from about 90 mg to about 345 mg and said center adjacent zone has a caliper in the range of from about 0.5 mm. to about 3.0 mm.

8. The absorbent article of claim 7 wherein said zone has a thickness of less than 1/4 inch.

9. The absorbent article of claim 2 wherein said resilient layer has a garment-facing side and said absorbent means further comprises a baffle disposed on the garment-facing side of said resilient layer.

10. The absorbent article of claim 2 further comprising a liquid-permeous cover sheet.

11. The absorbent article of claim 2 further comprising at least one tissue layer that extends beyond the absorbent means.

12. The absorbent article of claim 11 wherein said absorbent means has a garment-facing side and said at least one tissue layer is disposed on said garment-facing side of said absorbent means.

13. The absorbent article of claim 11 wherein said absorbent means has a body-facing side and said at least one tissue layer is disposed on said body-facing side of said absorbent means.

14. The absorbent article of claim 11 wherein said absorbent means has a body-facing side and a garment-facing side and said at least one tissue layer includes two tissue layers, said two tissue layers disposed on both said garment-facing side and said body-facing side of said absorbent means, respectively.

15. The absorbent article of claim 1 wherein said absorbent means has a body-facing side and said absorbent article further comprises a transfer layer disposed on said body-facing side of said absorbent means.

16. A sanitary napkin having a garment-facing side, a caliper of less than about 5 millimeters, and a central longitudinal axis, said sanitary napkin comprising:

a) a liquid-impermeable baffle disposed on said garment-facing side of said sanitary napkin, said baffle having a body-facing side;

b) a substantially non-absorbent, resilient layer comprising a closed cell, polyethylene foam and being disposed on said body-facing side of said baffle, said resilient layer adapted to prevent bunching, as indicated by a Circular Bend Flex in the range of from about 4 to about 42 grams at a rebound resiliency of 50%, said resilient layer having a body-facing side; and

c) a substantially non-absorbent, resilient layer disposed on said body-facing side of said resilient layer, said absorbent means having a central longitudinal axis substantially aligned along the central longitudinal axis of said napkin, said absorbent means adapted to resist twisting and capable of absorbing at least 10 grams of body fluid deposited on said napkin.

17. The sanitary napkin of claim 16 wherein said napkin comprises at least

a central absorbent zone and a peripheral zone, wherein said central absorbent zone is thicker in caliper, more absorbent and stiffer than said

peripheral zone and wherein said peripheral zone is located at an outer side edge of the napkin.

18. The sanitary napkin of claim 17 further comprising an adjacent zone located between said central absorbent zone and said peripheral zone, said adjacent zone being less thick in caliper, less absorbent and less stiff than said central absorbent zone; said adjacent zone being thicker in caliper, more absorbent and stiffer than said peripheral zone.

19. The sanitary napkin of claim 17 wherein said central absorbent zone has a Gurley stiffness in the range of from about 782 milligrams to about 2526 milligrams.

20. A sanitary napkin having a central longitudinal axis, a body-facing side and a total width transverse to said longitudinal axis defined by a distance from an outer side edge of the body-facing side of the sanitary napkin to an opposite outer side edge of the body-facing side, said sanitary napkin comprising:

a. a liquid pervious cover sheet;

b. an absorbent means having a central longitudinal axis substantially aligned along the central longitudinal axis of said napkin, said absorbent means capable of absorbing at least 10 grams of body fluid deposited on said napkin and being sufficiently stiff to resist twisting of the sanitary napkin during use; and

c. a substantially resilient layer comprising a closed celled polyethylene foam having a width ranging from 60% to 100% of the total width of said body-facing side of the

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sanitary napkin and having substantially constant to some
bunching as indicated by a Circular Bend Flex in the
range of from 9 to about 42 grams at a rebound
resiliency of about 50% and wherein said sanitary
napkin has a caliper of less than about 5 mm.

21. The sanitary napkin of claim 20 wherein said absorbent
means has a width less than 60% of the total width of
said sanitary napkin.

22. The sanitary napkin of claim 21 wherein said napkin
comprises at least a central absorbent zone and a peripheral
zone, wherein said central zone is thicker in caliper and
said peripheral zone is located at an outer side edge of the napkin.

23. The sanitary napkin of claim 22 further comprising an
adjacent zone between said central absorbent zone

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and said peripheral zone, said adjacent zone being less thick
in caliper and less stiff than said central absorbent zone.

24. The sanitary napkin of claim 23 wherein said central
absorbent zone has a Gurley stiffness in the range of from
about 782 milligrams to about 2526 milligrams, said adja-
cent zone has within it a center adjacent zone, and center
adjacent zone has a Gurley stiffness in the range of from
about 99 mN to about 349 mN, said center adjacent zone has
a caliper in the range of from about 0.5 mm. to about 3.0
mm., and the ratio of the average stiffness of the central
absorbent zone to the average stiffness of the center adja-
cent zone is in the range of from about 3.7:1 to about 10.3:1.

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Osborn, III

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[54] THIN, FLEXIBLE SANITARY NAPKIN
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4,681,578 7/1987 Anderson et al. 604/383 R
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4,846,529 7/1989 Lloyd 604/389

[21] Appl. No.: 293,686
[22] Filed: Jan. 4, 1989

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Related U.S. Application Data
[63] Continuation-in-part of Ser. No. 175,339, Mar. 31, 1988, abandoned.

[51] Int. Cl.³ A61F 13/16
[52] U.S. Cl. 684/383.1; 604/377; 604/387
[58] Field of Search 604/377, 378, 358.1

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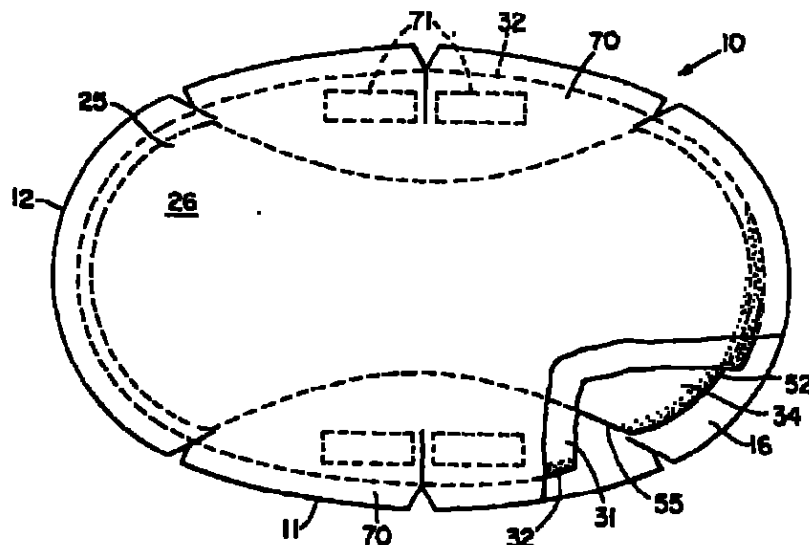
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[57] ABSTRACT

In accordance with the present invention, a sanitary napkin having a body surface and a garment surface and being comprised of an absorbent means underlaid by a liquid barrier means, wherein the sanitary napkin is relatively highly flexible and has a capacity great enough to handle medium to high menstrual flows, is provided. In a preferred embodiment, the sanitary napkin comprises, from the body surface down, an apertured formed film topsheet, an apertured nonwoven wipe acquisition sheet, a wet-laid tissue, a superabsorbent core, and a barrier sheet. Preferably, the central width of the absorbents is at least about 6.3 centimeters and the caliper of the napkin as a whole is less than about 2.6 millimeters. In a preferred embodiment, the napkin has laterally extending flaps which drape over the edges of the wearer's panties in the crotch and are attachable to the garment side of the wearer's panties.

28 Claims, 2 Drawing Sheets



113 114
52

Fig. 1

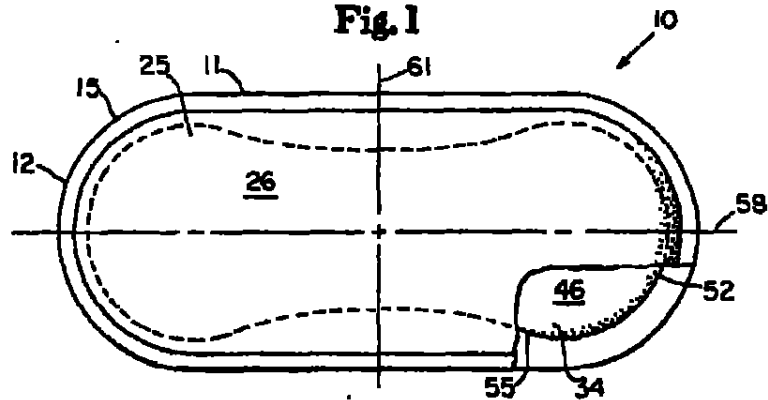


Fig. 2

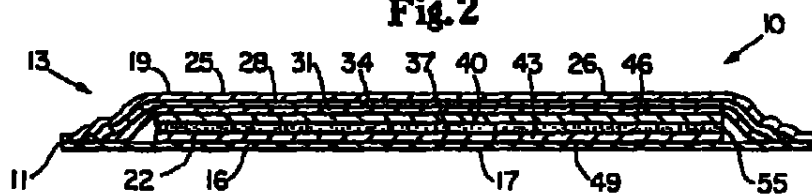
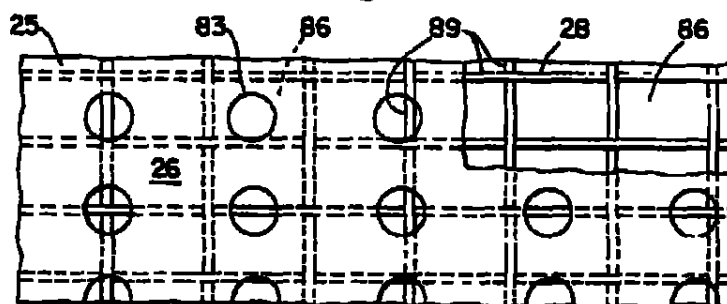


Fig. 3



114 115
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Fig. 4

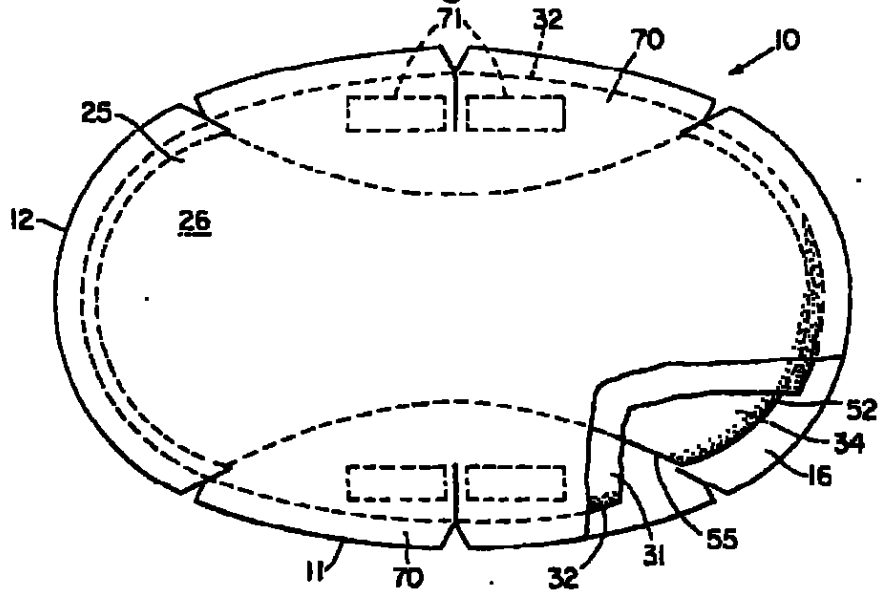
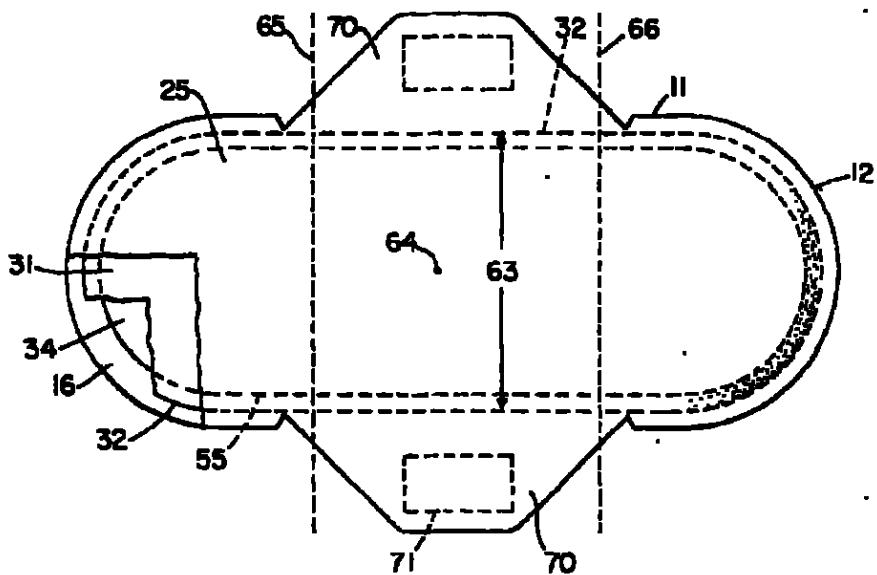


Fig. 5



THIN, FLEXIBLE SANITARY NAPKIN

This is a continuation-in-part of application Ser. No. 07/175,539, filed on March 31, 1988 now abandoned.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to female sanitary napkins. Particularly, the present invention concerns thin, flexible sanitary napkins offering enhanced fit and comfort through a construction which promotes a continuously self-conforming anatomical cooperation of the sanitary napkin to the wearer to yield a highly effective absorbent device.

2. Background Art

All manner and variety of absorbent articles configured for the absorption of body fluids such as menses, urine and feces are, of course, well known. With respect to feminine protection devices, the art has offered two basic types; sanitary napkins have been developed for external wear about the pudendal region while tampons have been developed for internal wear within the vaginal cavity for interruption of menstrual flow therefrom. Such tampon devices are disclosed in U.S. Pat. No. 4,412,833, entitled "Tampon Applicator", which patent issued to Weigner et al. on November 1, 1983, and U.S. Pat. No. 4,413,986, entitled "Tampon Assembly With Means For Sterile Insertion", which patent issued to Jacobs on November 8, 1983.

Hybrid devices which attempt to merge the structural features of the sanitary napkins and the tampons into a single device have also been proposed. Such hybrid devices are disclosed in U.S. Pat. No. 2,092,346, entitled "Catamenial Pad", which patent issued to Arons on September 7, 1937, and U.S. Pat. No. 3,903,372, entitled "Feminine Hygiene Protective Shield", which patent issued to Deskingers on September 16, 1973. Other less intrusive hybrid devices are known as labial or interlabial sanitary napkins and are characterized by having a portion which at least partially resides within the wearer's vestibule and a portion which at least partially resides external of the wearer's vestibule. Such devices are disclosed in U.S. Pat. No. 2,682,327, entitled "Sanitary Pad", which patent issued to Jacks on December 15, 1953, and U.S. Pat. No. 4,631,062, entitled "Labial Sanitary Pad", which patent issued to Lassen et al. on December 23, 1986.

With respect to sanitary napkins, at least two general classes pertinent to the present invention exist. One such class is for the absorption of medium to high menstrual flows. These sanitary napkins offer a fairly high absorptive capacity. Absorptive capacity is commonly achieved by providing the napkins with a fairly thick and bulky absorbent member, commonly fluff pulp. Sanitary napkins of this class are disclosed in U.S. Pat. No. 3,294,091, entitled "Sanitary Napkin", which patent issued to Morse on December 27, 1966, U.S. Pat. No. 4,634,040, entitled "Smooth-Edged Contoured Sanitary Napkin", which patent issued to Luceri on March 31, 1987, and U.S. Pat. No. 4,667,478, entitled "Sanitary Napkin With Flaps", which patent issued to Van Tilburg on August 18, 1987. Such sanitary napkins theoretically have a high absorptive capacity, however, when the sanitary napkin is worn and subjected to the compressive forces of the wearer's thighs and pudendal region, the fluff pulp core simply compacts or bunches into an arbitrary, but generally rope-like shape. Such

napkins commonly shift from their original placement so that after only a short wearing time, the napkin might only partially, if at all, be beneath the wearer's vaginal orifice or vestibule. Thus, in use, these sanitary napkins sometimes offer very little absorption. Further, the rolling and twisting of these napkins may create soiling on the wearer's panties and skin surfaces. In addition, the bulkiness of these napkins causes a high degree of wearing awareness and may make them quite obtrusive when worn with tight fitting slacks, body suits or bathing suits.

A second class of sanitary napkins are intended for light or low menstrual flows and are commonly referred to as panty liners or panty shields. Sanitary napkins of this type are disclosed in U.S. Pat. No. 4,681,578, entitled "Pantliner With Ventilation Areas", which patent issued to Anderson and Brandt on July 21, 1987. Sanitary napkins of this class, as a group, are thinner, somewhat more flexible and generally more comfortable than those of the first class, however, they lack the absorptive capacity of the napkins of the first class.

Therefore, there exists a real consumer need for a sanitary napkin which is thin and flexible, thereby offering enhanced fit and comfort, yet having a fluid capacity great enough for use with medium to high menstrual flows thereby allaying consumer fears of leakage and staining.

Therefore, it is an object of the present invention to provide a sanitary napkin which is thin and flexible and which is absorbent enough to absorb and contain medium to high menstrual flows.

It is an additional object of the present invention to provide a sanitary napkin which will closely conform to the various anatomical shapes of the female urogenital and buttocks region.

It is an additional object of the present invention to provide a sanitary napkin which offers enhanced fit and comfort and a low degree of wearing awareness.

It is an additional object of the present invention to provide a thin flexible sanitary napkin having laterally extending flaps configured to drape over the side edges of the wearer's panties in the crotch portion thus being disposed between the side edges of the wearer's panties in the crotch portion and the wearer's thighs.

It is an additional object of the present invention to provide the laterally extending flaps with an attachment means on their garment facing surface so that the flaps can wrap around the side edges of the wearer's panties in the crotch portion and be attached to the garment facing side of the wearer's panties in order to provide protection from soiling and so as to keep the napkin properly positioned in the wearer's panties.

These and other objects of the present invention will be more readily apparent when considered in reference to the following description and when taken in conjunction with the accompanying drawings.

SUMMARY OF THE INVENTION

In accordance with the present invention, a sanitary napkin having a body surface and a garment surface and being comprised of an absorbent means underlaid by a liquid barrier means, wherein the sanitary napkin is relatively highly flexible and has a capacity great enough to handle medium to high menstrual flows, is provided. In a preferred embodiment, the sanitary napkin comprises, from the body surface down, an apertured formed film topsheet, an apertured nonwoven wipe acquisition sheet, a wet-laid tissue, a superabsorb-

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ent core, and a barrier sheet. Preferably, the central width of the absorbents is at least about 7.0 centimeters and the caliper of the napkin as a whole is less than about 2.5 millimeters. In a preferred embodiment, the napkin has laterally extending flaps which drape over the edges of the wearer's panties in the crotch and are attachable to the garment side of the wearer's panties.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top plan view of a preferred sanitary napkin embodiment of the present invention with portions being torn away to show underlying structure.

FIG. 2 is a lateral cross-sectional view of the preferred sanitary napkin embodiment shown in FIG. 1 taken along line 2--3 of FIG. 1.

FIG. 3 is a top plan view of a preferred topsheet and wipe acquisition sheet laminate with portions of the topsheet being torn away to show underlying structure.

FIG. 4 is a top plan view of an alternatively preferred sanitary napkin embodiment of the present invention with portions being torn away to show underlying structure.

FIG. 5 is a top plan view of another alternatively preferred sanitary napkin embodiment of the present invention with portions being torn away to show underlying structure.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

The present invention relates to female sanitary napkins and in particular to sanitary napkins which are thin and flexible and offer enhanced fit, comfort, and containment.

As used herein, the term "sanitary napkin" 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 (i.e., it is not intended to be laundered or otherwise restored or reused). Intestinal 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.

A preferred embodiment of a sanitary napkin 10 of the present invention is shown in FIGS. 1 and 2. As can be seen in FIGS. 1 and 2, a preferred sanitary napkin 10 basically comprises an absorbent means 13 and a liquid impermeable barrier means 14. The absorbent means 13 may be any means which is generally compressible, conformable, non-irritating to the wearer's skin and capable of absorbing and containing body exudates such as menses, blood and urine. Preferably, the absorbent means 13 maintains integrity when wetted, in use. The absorbent means 13 has a first major surface 19 and a second major surface 22. The barrier means 16 is adjacent the second major surface 22 of the absorbent means 13. The barrier means 16 may be any means which is flexible and liquid impervious and which prevents the exudates absorbed and contained in the absorbent means 13 from wetting articles which contact the sanitary napkin 10 such as panties.

In the preferred embodiment shown in FIGS. 1 and 2, the absorbent means 13 is comprised of a liquid permeable topsheet 23, a liquid permeable wipe acquisition sheet 28, a wet-laid tissue sheet 31 and an absorbent core

34. In the preferred embodiment shown in FIGS. 1 and 2, the barrier means 16 is a barrier sheet. The absorbent core 34 is comprised of hydrogel-forming material 37 disposed between two air-laid tissue sheets 40 and 43. The sanitary napkin 10 has side edges 11 and end edges 12 which together form the periphery 15 of the sanitary napkin 10. The sanitary napkin 10 has a body surface 26 which is generally defined by the topsheet 23 and a garment surface 17 which is generally defined by the barrier sheet 16.

Looking at some of the elements of the sanitary napkin 10 more specifically, the absorbent core 34 may be any means which is generally compressible, conformable, non-irritating to the wearer's skin and capable of absorbing and containing body exudates. The absorbent core 34 has a first major surface 46, a second major surface 49, a pair of end edges 52 and a pair of side edges 53. The absorbent core 34 may be manufactured in a wide variety of sizes and shapes (e.g., rectangular, hourglass, etc.). A preferred shape of the absorbent core 34 is the dogbone shape shown in FIG. 1. This preferred absorbent core 34 is about 22.0 centimeters long (longitudinal dimension along the longitudinal centerline 58), about 7.0 centimeters wide across its midportion (lateral dimension along the lateral centerline 61) and about 8.0 centimeters wide across its widest portion (lateral dimension). The absorbent core 34 is asymmetrically configured for ease of manufacture and so that no conscious effort is required by the wearer to properly place the napkin 10 in the direction it should be worn. The midportion is configured to basically conform to the wearer's thighs and to the thinner crotch portion of the wearer's panties so as to prevent excessive bunching. The size of the absorbent core 34 may be varied to accommodate wearers ranging in size and also ranging in the expected amount of exudate fluid volume. The absorbent core 34 may be attached over the core's first or second major surfaces 46 and 49, respectively, to adjacent members such as the topsheet 23 and barrier sheet 16 by any of the means well known in the art, such as by spray-gluing or lines or spots of adhesive. Such attachment facilitates integrity and recoverability of the absorbent materials in use so as to maintain an optimum degree of absorbency. Preferably, the absorbent core 34 has a wet-tensile strength in the cross-direction of at least about 100.0 grams per centimeter. Wet tensile strength is determinable by ASTM Standard D 829-49.

The absorbent core 34 may be manufactured from a wide variety of liquid absorbent materials commonly used in disposable sanitary napkins, diapers, and other absorbent articles. Examples of suitable absorbent materials include constituted wood pulp which is generally referred to as airlaid, creped cellulose wadding, absorbent fluffs, absorbent springs, synthetic staple fibers, polymeric fibers, hydrogel-forming polymer gelling agents, or any equivalent materials or combinations of materials. A particularly preferred absorbent material are polymeric gelling agents. 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 34 can be required and held by the polymeric gelling agent, thereby providing the articles herein with enhanced absorbent capacity and/or improved fluid retention performance.

The polymeric gelling agent which is employed in the absorbent core 34 will generally comprise particles of a substantially water-insoluble, slightly cross-linked,

partially neutralized, hydrogel-forming polymer material. Such polymer materials can be prepared from polymerizable, unsaturated, acid-containing monomers. Suitable unsaturated acidic monomers for use in preparing the polymeric gelling agents used in this invention include those listed in U.S. Pat. No. 4,634,039, entitled "Hydrogel-Forming Polymer Compositions For Use In Absorbent Structures", which issued to Brandt, Goldman and Englin on March 31, 1987, and which patent is incorporated herein by reference. Preferred monomers include acrylic acid, methacrylic acid, and 2-acrylamido-2-methyl propane sulfonic acid. Acrylic acid itself is especially preferred for preparation of the polymeric gelling agent material.

In the hydrogel-forming polymeric gelling agent the polymeric component formed from unsaturated, acid-containing monomers may be grafted onto other types of polymer moieties such as starch or cellulose. Polyacrylate grafted starch materials of this type are especially preferred for use herein.

Preferred polymer gelling agents which can be prepared from conventional types of monomers include hydrolyzed acrylonitrile grafted starch, polyacrylate grafted starch, polyacrylates, maleic anhydride-based copolymers and combinations thereof. Especially preferred are the polyacrylates and polyacrylate grafted starch.

Whatever the nature of the basic polymer components of the hydrogel-forming polymeric gelling agents used in the absorbent core 34 herein, such materials will in general be slightly cross-linked. Cross-linking serves to render the hydrogel-forming polymer gelling agents used in this invention substantially water-insoluble, and cross-linking thus in part determines the gel volume and extractable polymer characteristics of the hydrogels formed from the polymeric gelling agents employed. Suitable cross-linking agents are well known in the art and include, for example, those described in greater detail in U.S. Pat. No. 4,076,663, which patent issued to Merenda et al. on February 28, 1978, and which patent is incorporated herein by reference. Preferred cross-linking agents are the di- or polyesters of unsaturated mono- or polycarboxylic acids with polyols, the bisacrylamides and the di- or triallyl amines. Especially preferred cross-linking agents are N,N'-methylenebisacrylamide, trimethylol propane triacrylate and triallyl amine. The cross-linking agent can generally comprise from about 0.001 mole percent to 5.0 mole percent of the resulting hydrogel-forming polymer material. More preferably, the cross-linking agent will comprise from about 0.01 mole percent to 3.0 mole percent of the hydrogel-forming polymeric gelling agent used herein.

The slightly cross-linked, hydrogel-forming polymeric gelling agents which may be used in the articles of the present invention are generally employed in their partially neutralized form. For purposes of this invention, such materials are considered partially neutralized when at least 25.0 mole percent, and preferably at least 50.0 mole percent of monomers used to form the polymer are acid group-containing monomers which have been neutralized with a salt-forming cation. Suitable salt-forming cations include alkali metal, ammonium, substituted ammonium, and amines. This percentage of the total monomer utilized which are neutralized acid group-containing monomers is referred to herein as the "degree of neutralization."

The polymeric gelling agent materials used in the absorbent articles herein must have a relatively high

capacity for imbibing fluids encountered in such article. The absorbent capacity of these materials can be quantified by referencing the "gel volume" of the polymeric gelling agents which are to be selected for use in the present invention.

For purposes of this invention, gel volume can be defined in terms of the amount of synthetic urine absorbed by any given polymeric gelling agent and is specified as grams of synthetic urine per gram of polymeric gelling agent. Gel volume in synthetic urine can be determined by forming a suspension of about 0.1-0.2 parts of dried polymeric gelling agent to be tested with about 20 parts of synthetic urine. This suspension is maintained at ambient temperature under gentle stirring for a time sufficient, e.g., about 1 hour, for swelling equilibrium to be attained. The gel volume of the polymeric gelling agent in grams of synthetic urine per gram of polymeric gelling agent is then calculated from the weight fraction of the polymeric gelling agent in the suspension and the ratio of the liquid volume excluded from the formed hydrogel to the total volume of the suspension.

The gel volume of the gelling agents used in the absorbent core 34 herein will generally be at least about 20.0 grams of synthetic urine per gram of polymeric gelling agent. More preferably, the gel volume of the materials employed will range from about 20.0 to about 60.0, most preferably from about 22.0 to about 35.0 grams of synthetic urine per gram of polymeric gelling agent.

Within the webs which form the layers of the absorbent core 34, the particles of the polymeric gelling agent should be thoroughly dispersed but may or may not be uniformly distributed. In particular, there may be regions or zones of the core layers which have higher concentrations of gelling agent particles than do other regions or zones of the layers.

In a preferred embodiment, the sanitary napkin 18 of the present invention will have a hydrogel-forming polymeric gelling agent distributed throughout at least about 17.0 square centimeters of the napkin, more preferably throughout at least about 50.0 square centimeters of the napkin, and most preferably throughout at least about 100.0 square centimeters of the napkin. Preferably, the hydrogel-forming polymeric gelling agent will be distributed in an amount of from about 0.001 grams per square centimeter to about 0.009 grams per square centimeter, more preferably of from about 0.003 grams per square centimeter to about 0.008 grams per square centimeter, and most preferably from about 0.004 grams per square centimeter to about 0.007 grams per square centimeter. Preferably, the absorbent core 34 will contain from about 5.0% to about 85.0% by weight of hydrogel-forming polymeric gelling agent, more preferably from about 10.0% to about 70.0%, and most preferably from about 15.0% to about 55.0%.

In the preferred embodiment shown in FIG. 2, the absorbent core 34 is a laminate comprised of a layer of superabsorbent polymer material 37 disposed between two air-laid tissues 40 and 43. A suitable laminate is the superabsorbent laminate WATER-LOCK L-535 available from the Grain Processing Corporation of Muscatine, Iowa (WATER-LOCK registered TM by Grain Processing Corporation). Such superabsorbent laminates are disclosed in U.S. Pat. No. 4,467,012, entitled "Composition For Absorbent Film And Method Of Preparation", which patent issued to Pedersen et al. on August 21, 1984, and U.S. Pat. No. 4,260,443, entitled "Laminated Absorbent Process", which patent issued

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to Lindsay et al. on April 7, 1981, and which patents are incorporated herein by reference. The WATER-LOCK L-535 has a hydrogel polymer loading of 0.009 grams per square centimeter, however, loadings of 0.001-0.009 grams per square centimeter have been found acceptable. The first and second tissue layers 40 and 49 provide containment of the superabsorbent polymer material 37, improve lateral wicking of the absorbed exudates throughout the absorbent core 34 and provide a degree of absorbency. In the case of non-particulate hydrogel-forming polymer gelling agents which can be formed into fibrous sheets, foams or films, the non-particulate gelling agent may comprise from about 15% to about 100% by weight of the absorbent core 34, more preferably of from about 40% to about 100%, and most preferably of from about 60% to about 100%. The basis weight of such non-particulate superabsorbents may be from about 0.002 to about 0.028 grams per square centimeter, more preferably of from about 0.003 to about 0.018, and most preferably of from about 0.004 to about 0.010. Two suitable and commercially available non-particulate absorbent materials for the absorbent core 34 are a double layer acrylic fibrous material available under the tradename Lantrel F from the Chohi Company, LTD., of Higashi, Osaka Japan and a carbonylmethylcellulose fibrous material available under the tradename Aqualon C from Hercules, Inc. of Wilmington, Delaware.

The total absorbent capacity of the absorbent core 34 should be compatible with the design exudate loading for the intended use of the sanitary napkin 18. 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 sanitary napkins intended for daytime use as compared with those intended for nighttime use, or for sanitary napkins intended for use by teenage females as compared with those intended for use by more mature women.

It should be noted that the scope of the present invention is not intended to extend to sanitary napkins which are void of any superabsorbent material and which have a central absorbent member overlaid solely by nonwoven materials, wherein the nonwoven materials have caliper of less than 0.50 millimeters, as determined by the caliper test, as later defined.

Superimposed over the absorbent core 34 and extending about 3.0 millimeters beyond the edges 52 and 53 of the absorbent core 34 is the wet-laid tissue 31. The wet-laid tissue 31 is liquid permeable. A satisfactory wet-laid tissue 31 has a basis weight of about 15.5 grams per square meter and an air permeability of about 30.5 cubic meters per minute per square meter at a pressure differential of about 12.8 millimeters of water. Preferably, the wet-laid tissue 31 maintains integrity when wetted, in use. The wet-laid tissue 31 preferably has a wet tensile strength in the cross-direction of at least about 15.0 grams per centimeter. Suitable tissue 31 and their manufacture are disclosed in U.S. Pat. No. 3,301,746, entitled "Process For Forming Absorbent Paper By Imprinting A Fabric Knuckle Pattern Thereon Prior To Drying And Paper Thereof", which patent issued to Sanford and Simon on January 31, 1967, and which patent is incorporated herein by reference. In a preferred embodiment, those parts of the wet-laid tissue 31 which extend beyond the edges 52 and 53 of the absorbent core 34 are associated with the barrier sheet 16. The wet-laid tissue 31 may be associated with

the barrier sheet 16 by attachment means as are well known in the art such as by spray-gluing or lines or spots of adhesive. The wet-laid tissue 31 serves a number of purposes. The tissue 31 serves to confine any loose superabsorbent material 37 between the tissue 31 and the barrier sheet 16 thereby preventing the superabsorbent material 37 from coming in contact with the wearer's skin. Also, the tissue 31 improves lateral wicking of the absorbed exudates over the absorbent core 34 thereby providing a more even distribution of the exudates throughout the absorbent core 34. Further, the tissue 31 provides some degree of absorbency and further inhibits exudates which have reached and been absorbed by the absorbent core 34 from rewetting the wearer's skin.

Superimposed over the wet-laid tissue 31 is a liquid permeable wipe acquisition sheet 28. In a preferred embodiment, the wipe acquisition sheet 28 is a nonwoven sheet. In the preferred embodiment shown in FIG. 2, the sheet 28 is a spunbond 70%/30% rayon/polyester fiber sheet. Spunbonded fabrics of this type are manufactured by E. I. DuPont Nemours & Company of Wilmington, Delaware, and are made available under the tradename "SONTARA" (SONTARA registered TM by E. I. DuPont Nemours & Company). These fabrics are available in a number of suitable styles, however, Style 8407 in its apertured form, having a basis weight of 0.005 grams per square centimeter and a thickness of about 0.04 millimeters, is preferred. The wipe acquisition sheet 28 extends beyond the edges of the wet-laid tissue 31 where it too is associated with the barrier sheet 16. The wipe acquisition sheet 28 greatly improves lateral wicking of exudates over the absorbent core 34 thereby providing a more even distribution of the exudates throughout the absorbent core 34. The lateral wicking of the wipe acquisition sheet 28 is important for the following reason. Many bulky prior art sanitary napkins rely on a high degree of vertical absorption at the point where exudates are initially deposited. In other words, because the absorbent cores of these napkins are fairly thick, they can absorb a high degree of exudates throughout their thickness while utilizing only degree of their surface area or lateral absorption capability. However, the relatively thin napkins 18 of the present invention have a comparatively small degree of vertical absorption. Therefore, for a relatively large amount of exudates to be absorbed, a wipe acquisition sheet 28 which can laterally disperse the exudates over a large surface area of the absorbent core 34 where the exudates can better and faster be vertically absorbed is highly desirable. Further, the wipe acquisition sheet 28 provides a fairly high degree of initial absorption during the time interval between the time exudates are deposited onto the topsheet 25 and the time they are absorbed by the absorbent core 34. This property will be more specifically described later.

Superimposed over the wipe acquisition sheet 28 is the liquid permeable topsheet 25. In a preferred embodiment, the topsheet 25 is associated with the wipe acquisition sheet 28 by spray-gluing the topsheet 25 to the surface of the wipe acquisition sheet 28. The topsheet 25 is compliant, soft feeling, and non-irritating to the wearer's skin. Further, the topsheet 25 is liquid pervious, permitting liquid to readily transfer through its thickness. A suitable topsheet 25 may be manufactured from a wide range of materials such as polymeric materials, formed thermoplastic films, apertured plastic films, porous foams, reticulated foams, natural fibers (e.g.,

wood or cotton fibers), synthetic fibers (e.g., polyester or polypropylene fibers) or from a combination of natural and synthetic fibers, with apertured formed films being preferred. Formed films are preferred for the topsheet 28 because they are pervious to liquids and yet non-absorbent. 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, entitled "Absorptive Structure Having Tapered Capillaries", which patent issued to Thompson on December 30, 1973, U.S. Pat. No. 4,324,246, entitled "Disposable Absorbent Article Having A Skin Resistant Topsheet", which patent issued to Mullane and Smith on April 13, 1982, U.S. Pat. No. 4,342,314, entitled "Resilient Plastic Web Exhibiting Fiber-Like Properties", which patent issued to Radcl and Thompson on August 3, 1982, and U.S. Pat. No. 4,463,045, entitled "Macroscopically Expanded Three-Dimensional Plastic Web Exhibiting Non-Glossy Visible Surface and Cloth-Like Tactile Impression", which patent issued to Ahr, Louie, Mullane, and Ouellette on July 31, 1984, all of which patents are incorporated herein by reference.

In a preferred embodiment of the present invention, the body surface 26 of the topsheet 28 is hydrophilic. The hydrophilic body surface 26 helps liquid to transfer through the topsheet 28 faster than if the body surface 26 was not hydrophilic. This diminishes the likelihood that menstrual fluid will flow off the topsheet 28 rather than being absorbed by the absorbent core 34. In a preferred embodiment, the body surface 26 of the topsheet 28 is made hydrophilic by treating the body surface 26 with a surfactant. It is preferred that the surfactant be substantially evenly and completely distributed throughout the body surface 26 of the topsheet 28. This can be accomplished by any of the common techniques well known to those skilled in the art. For example, the surfactant can be applied to the topsheet 28 by spraying, by padding, or by the use of transfer rolls. Further, the surfactant can be incorporated into the polymeric materials of a formed film topsheet or between or within the fibers of a nonwoven topsheet.

The barrier means 16 is adjacent the second major surface 23 of the absorbent means 13. In a preferred embodiment, the absorbent means 13 may be affixed over the second major surface 23 of the absorbent means 13 to the barrier means 16. Any of the common techniques well known in the art, such as spray-gluing or lines or spots of adhesive may be used for this purpose. The barrier means 16 generally defines the garment surface 17 of the sanitary napkin 10. The barrier means 16 may be any means which is impervious to liquids and which prevents exudates absorbed and contained in the absorbent means 13 from soiling articles, such as panties, which come in contact with the garment surface 17 of the sanitary napkin 10. In the preferred embodiment of the sanitary napkin 10 illustrated in FIGS. 1 and 2, the barrier means 16 is a barrier sheet manufactured from a thin plastic film. Other flexible liquid impervious materials may also be used. Preferably, the barrier sheet 16 is a polyethylene film having a thickness of from about 0.012 millimeter to about 0.051 millimeter. As used herein, the term "flexible" refers to materials which are compliant and which will readily conform to the general shape and contours of the human body.

A suitable polyethylene film is manufactured by Monsanto Chemical Corporation and marketed in the trade as Film No. 8020. The barrier sheet 16 is preferably embossed and/or matte finished to provide a more clothlike appearance. Further, the barrier sheet 16 may permit vapors to escape from the absorbent means 13 while still preventing exudates from passing through the barrier sheet 16.

Preferably, the topsheet 28 and the barrier sheet 16 have length and width dimensions generally larger than the absorbent core 34 so that they extend beyond the edges 52 and 53 of the absorbent core 34 where they are associated together in a suitable manner. As used herein, the term "associated" encompasses configurations whereby a first member is directly joined to a second member and configurations whereby a first member is indirectly joined to a second member by affixing the first member to intermediate members which in turn are affixed to the second member. The extension of the topsheet 28 and/or the barrier sheet 16 beyond the core end edges 52 and the core side edges 53 of the absorbent core 34 form the end edges 11 and the side edges 12, respectively, of the sanitary napkin 10. In a preferred embodiment, the barrier sheet 16 and the topsheet 28 have an elliptical shape and extend beyond the absorbent core 34 a distance of at least about 1.0 centimeter where they are joined directly to each other by attachment means as are well known in the art. The attachment means may be, for example, a uniform continuous layer of adhesive, a patterned layer of adhesive, or an array of separate lines or spots of adhesive.

The sanitary napkin 10 of the present invention has a low flexure-resistance. Thus, the sanitary napkin 10 of the present invention is highly flexible and conforms very well to the various shapes of the female urogenital region. Preferably, the sanitary napkin 10 of the present invention has a flexure-resistance of less than about 250.0 grams still, more preferably less than about 400.0 grams, more preferably less than about 175.0 grams and most preferably less than about 130.0 grams.

The flexure-resistance of a sanitary napkin is measured by peak bending stiffness. Peak bending stiffness is determined by a test which is modeled after the ASTM D 4032-82 CIRCULAR BEND PROCEDURE, the procedure being considerably modified and performed as follows. The CIRCULAR BEND PROCEDURE is a simultaneous multi-directional deformation of a material in which one face of 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.

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 102.0×102.0×6.35 millimeters having an 18.75 millimeter diameter orifice. The lip 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 0.48 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, Massachusetts.

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. Specimens having portions in which a topsheet is joined directly to a barrier sheet or which are a laminate of a topsheet, two or less tissue sheets and a barrier sheet, should 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. However, the present invention is more concerned with the overall flexibility of the sanitary napkin and not merely the peripheral portions thereof and, therefore, the flexibility of the present invention is more concerned with the flexibility of the significant absorbent portions of the sanitary napkin. If any of these significant absorbent portions of the sanitary napkin meet the parameters of this test, then the sanitary napkin satisfies the test. Therefore, a number of different specimens should be tested from each sanitary napkin. Certainly, the structurally most flexible portion of the sanitary napkin should be tested, excluding those portions excluded above. The test specimens should not be folded or bent 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 37.5x37.5 millimeter 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±1° C. and 50±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 26 of the specimen is facing the plunger and the garment surface 17 of the specimen is facing the platform. 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 re-

corded. 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. Remember that "Y" number of sets of five identical specimens were cut. 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" sets tested. Remember, if any of the significantly absorbent portions of the sanitary napkin have the requisite flexure-resistance, then the napkin satisfies the parameters of this test. Therefore, the flexure-resistance for a particularly designed sanitary napkin is the greatest of these average peak bending stiffnesses.

As alluded to earlier, the combination of topsheet 28 and wipe acquisition sheet 28 imparts some beneficial properties to the sanitary napkin 10. In particular, the combination of an apertured formed film topsheet 28 superimposed over an apertured nonwoven wipe acquisition sheet 28 is beneficial. A preferred wipe acquisition sheet 28 is the previously described SONTARA 8407. An enlarged depiction of such an arrangement is shown in FIG. 3. Such a combination is even more beneficial when the nonwoven wipe acquisition sheet 28 is formed or positioned such that no fiber bundles 89 of the sheet 28 are beneath some of the apertures 83 of the formed film topsheet 28 (i.e., the apertures in the two sheets 28 and 28 are aligned) while beneath other apertures 83 of the formed film topsheet 28 fiber bundles 89 of the nonwoven sheet 28 are present (i.e., apertures in the two sheets 28 and 28 are not aligned). Such an arrangement is readily apparent in FIG. 3, wherein the apertures 86 of the nonwoven sheet 28 are larger than the apertures 83 of the formed film topsheet 28. Such an arrangement provides the sanitary napkin 10 at least two beneficial properties: enhanced gush acquisition and enhanced wipe acquisition. Gush acquisition is enhanced in those areas where the apertures 83 of the topsheet 28 are aligned with the apertures 86 of the nonwoven wipe acquisition sheet 28. The aligned apertures 83 and 86 provide a direct route for exudates to flow from the body surface 26 of the topsheet 28 in the central absorbent materials of the napkin 10. Further, the apertures 83 and 86 themselves are able to contain a degree of fluid within their walls or boundaries until such fluid is absorbed. Wipe acquisition, which is the ability to pull liquid exudates from the wearer's skin into the absorbent material of the napkin 10, is enhanced in those areas where fiber bundles 89 of the nonwoven wipe acquisition sheet 28 are aligned such that the fiber bundles 89 are beneath the openings of the apertures 83 of the topsheet 28.

As just mentioned, wipe acquisition is critical in those regions where the topsheet 28 is in contact with exudates on the wearer's skin. In such areas, the sanitary napkin 10 is likely under compressive forces from the wearer's body. When such is the case, the fiber bundles 89 of the nonwoven wipe acquisition sheet 28 beneath the apertures 83 of the topsheet 28 are forced somewhat up into the apertures 83 of the topsheet 28, closer to the wearer's skin. Obviously, the spaces between the fiber bundles 89 and the walls of the apertures 83 or between the fibers of the fiber bundles 89 themselves will be less than the spaces which were between only the walls of the apertures 83. These spaces are capillaries. As is well known in the art, as capillary spaces are decreased,

capillary or drawing action is increased. Thus, the capillary action in these apertures 83 where fiber bundles 89 are present is increased and the sanitary napkin 10 is better able to draw exudates from the wearer's skin into these capillaries and eventually into the central absorbent materials of the sanitary napkin 10.

Although all of the apertures 83 of the topsheet 25 are referenced by the numeral "83", for the following teaching purposes, specific reference is directed to the aperture of FIG. 3 specifically labeled and designated "83". The specific aperture 83 referenced is an example in which an aperture 83 of the topsheet 25 is aligned with an aperture 86 of the nonwoven wipe acquisition sheet 28. Theoretically, such an aperture is useful for gush acquisition since exudates have uninterrupted flow from the body surface 26 of the topsheet 25 to the central absorbent material (not shown). Next, attention is directed to the aperture 83 immediately to the right of the specific aperture 83 just referenced. As seen, this aperture 83 is superimposed over a fiber bundle 89 of the nonwoven wipe acquisition sheet 28. Theoretically, exudates that flow into the aperture 83 will enter the capillaries of the fiber bundles 89. The exudates will then either be pulled or absorbed into the central absorbent materials or wicked to intersecting fiber bundles 89, then wicked further to other intersecting fiber bundles 89, and so on, until the exudates are absorbed into a more laterally distant portion of the central absorbent materials. Hence, a large portion of the total absorbent capacity of the absorbent materials can be utilized.

As previously mentioned, the sanitary napkin 10 of the present invention has a liquid capacity great enough to absorb medium to high menstrual flows. Two capacities, which, depending on the size of the sanitary napkin may be the same, are determinable: test capacity and total capacity. Preferably, the napkin 10 of the present invention has a test capacity of at least about 8.0 grams, more preferably of at least about 15.0 grams, and most preferably of at least about 18.0 grams. Preferably, the napkin 10 of the present invention has a total capacity of at least about 20.0 grams, more preferably of at least about 30.0 grams, and most preferably of at least about 40.0 grams.

The test and total capacities of a sanitary napkin are determined as follows. Any party adhesive release paper is removed from the napkin to be tested. To determine test capacity, a 4.75×14.0 centimeter portion, or any other configuration having 66.5 square centimeters, of the sanitary napkin is cut from the portion of the sanitary napkin which would be centered under the vaginal orifice when the sanitary napkin is worn. Total capacity is determined using the entire napkin minus any release paper. The article is weighed to the nearest 0.1 gram. The article is then submerged in a beaker of sterile saline (obtainable from the Baxter Travenol Company of Deerfield, Illinois), such that the article is totally submerged and is not bent or otherwise twisted or folded. The article is submerged for 10 minutes. The article is removed from the saline and suspended for two minutes in a vertical position to allow the saline to drain out of the article. The article is then placed body facing surface down onto an absorbent blotter, such as the filter paper #631 available from the Filtration Science Corp., Eaton-Dikeman Division of Mount Holly Springs, Pennsylvania. A uniform 17.6 grams per square centimeter load is placed over the article to squeeze excess fluid out. The absorbent blotter is replaced every 30 seconds until the amount of fluid transferred to the

absorbent blotter is less than 0.5 grams in a 30 second period. Next, the article is weighed to the nearest 0.1 gram and the dry weight of the article is subtracted. The difference in grams is the test or total capacity of the article, whichever the case may be.

The central absorbent width 63 of absorbent material of the sanitary napkin 10 of the present invention is an important parameter. The term "central absorbent width" refers to a specific area of the sanitary napkin 10 determinable as follows, reference being had to FIG. 5. A point 64 on the sanitary napkin 10 which is disposed beneath the center of the vaginal orifice, when worn, is located. A plane 65 parallel to the lateral centerline 61 and 3.75 centimeters forward from the point 64 in the direction of the wearer's mons pubis is located. Another plane 66 parallel to the lateral centerline 61 and 5.0 centimeters rearward from the point 64 in the direction of the wearer's buttocks is also located. The greatest flat-out, uncompressed, unmanipulated, lateral width of absorbent material of the sanitary napkin 10 between the planes 65 and 66 is the central absorbent width 63 of the sanitary napkin 10. It matters not whether the absorbent material is a single sheet, overlapping sheets, staggered sheets, etc., and it matters not whether the absorbent material is a nonwoven sheet, an absorbent top-sheet, an absorbent core, a tissue, synthetic staple fibers, etc. For example, a sanitary napkin 10 of the present invention might have a wipe acquisition sheet 28 or a wet-laid tissue 31 having a width of about 7.75 centimeters and an absorbent core 34 having a width of about 3.8 centimeters. Thus, in this example, the sanitary napkin 10 has a central absorbent width 63 of 7.75 centimeters.

The sanitary napkin 10 should preferably be scaled to the width of the crotch of the underwear of the wearer. A sanitary napkin 10 having a central absorbent width 63 which registers the absorbent 13 with the edges of the underwear crotch is particularly preferred. For relatively narrower underwear crotches, having a width of about 3.7 to about 6.4 centimeters, a sanitary napkin having a central absorbent width 63 of about 3.7 to about 6.4 centimeters works well.

The total width of the napkin 10 is scaled to the central absorbent width 63, and should be about 0.6 to about 1.0 centimeters greater than the central absorbent width 63, due to the additional margin necessary to join the edges of the topsheet 25 and barrier sheet 16 together. Generally about 0.3 to about 0.5 centimeters are necessary at each edge of the napkin 10 to join the topsheet 25 to the barrier sheet 16. Thus, a napkin having a central absorbent width 63 of about 3.7 to about 6.4 centimeters will have a total width ranging from about 4.3 to 4.7 centimeters to about 7.0 to 7.4 centimeters.

The sanitary napkin 10 of the present invention one embodiment of intended for underwear having a relatively greater crotch width should have a central absorbent width 63 of at least about 6.5 centimeters, more preferably of at least about 7.0 centimeters, more preferably of at least about 7.75 centimeters, and most preferably of at least about 9.0 centimeters. The central absorbent width 63 of the sanitary napkin 10 of the present invention is believed important for the following reason. As stated previously, the sanitary napkin 10 of the present invention relies more on the lateral distribution of exudates over or through a relatively large surface area of the absorbent core 34 rather than on a high degree of vertical absorption common to many prior art

sanitary napkin. Therefore, because exudates which are distributed onto the topsheet 25 may not be quickly absorbed before they migrate across the topsheet 25, it is important to contain such exudates pending absorption. The specified central absorbent width 63 of the sanitary napkin 10 of the present invention has been determined based on the width of a flexible napkin which will cup around the labia in the region of the vaginal orifice such that at least the edges of the absorbent material are positioned in the uppermost part of the wearer's legs at the crotch. Thus, the sanitary napkin 10 and the absorbent material may be cupped shaped in the surrounding regions of the vaginal orifice and exudates deposited thereon will be contained until absorbed.

Because of the flexibility requirements of the sanitary napkin 10 of the present invention, it is likely that the sanitary napkin 10 of the present invention will be relatively thin. It is preferred to keep the sanitary napkin 10 of the present invention thin so that the sanitary napkin 10 of the present invention will be unobtrusive and the user will have a low awareness of the sanitary napkin 10 of the present invention while it is being worn. The sanitary napkin 10 shown in FIGS. 1 and 2 has a caliper of about 1.9 millimeters. The caliper of a sanitary napkin 10 is determined by the following test.

A comparator gauge, and specifically the Ames, Model 150 with dial indicator Model 442, available from the B. C. Ames, Company of Waltham, Massachusetts is needed. The comparator gauge should have a circular comparator foot made of aluminum and having a weight of 10.0 grams and a contact surface of 3.16 square centimeters. The comparator gauge is zeroed. An 80.0 gram stainless steel weight is placed on the spindle extending above the comparator dial. The comparator foot is raised and the napkin, with any panty adhesive release paper being removed, is placed garment surface down on the base plate. The napkin is positioned on the base plate so that when the foot is lowered it is in the center of the napkin. Try to smooth out or avoid any wrinkles in the napkin. Gently lower the foot onto the napkin. Determine the napkin caliper by reading the comparator dial 30 seconds after the foot comes in contact with the napkin. Repeat the measurement 3.0 centimeters from each of the ends of the absorbent material along the longitudinal centerline 89 of the napkin. The average of the three readings is the caliper of the sanitary napkin. Preferably, the sanitary napkin 10 of the present invention have a caliper of less than about 2.6 millimeters, more preferably less than about 2.2 millimeters, and most preferably less than about 2.0 millimeters.

The caliper of the sanitary napkin of the present invention may be increased, in a less preferred embodiment, proportional to an increase in the flexure-resistance. If the flexure-resistance is increased to greater than about 400 grams, or even greater than about 500 grams, the caliper may be increased to as much as about 4.0 to about 5.0 millimeters, but preferably is not greater than about 3.0 millimeters.

An alternative embodiment of a sanitary napkin 10 of the present invention is shown in FIG. 4. In this embodiment, the sanitary napkin 10 has two flaps 70 each of which are adjacent to and extend laterally from a side edge 85 of the absorbent core 34. The flaps 70 are configured to drape over the edges of the wearer's panties in the crotch region so that the flaps 70 are disposed between the edges of the wearer's panties and the wearer's thighs. The flaps 70 serve at least two purposes.

First, the flaps 70 help serve to prevent soiling of the wearer's body and panties by menstrual fluid. Second, the flaps 70 are preferably provided with attachment means 71 on their garment surface 17 so that the flaps 70 can be folded back under the panty and attached to the garment facing side of the panty. In this way, the flaps 70 serve to keep the napkin 10 properly positioned in the panty. A preferred attachment means 71 is a pressure-sensitive adhesive, as is well known in the art. Alternatively, the flaps 70 may be attached to each other on the underside of the panty by the attachment means 71 without being affixed to the panty.

In the preferred embodiment shown, the flaps 70 are comprised of topsheet 25, tissue 31, and barrier sheet 16. Further, in the embodiment shown, the flaps 70 are unitary with the laminae of the napkin 10. In other words, the topsheet 25, tissue 31 and barrier sheet 16 simply extend laterally beyond the core 34 to form the flaps 70. However, the flaps 70 need not be unitary with the napkin 10 but can be separate elements which are affixed to the napkin 10. Further, the flaps 70 can be comprised of a single substrate or other laminae configurations. It is recommended, however, that the flaps 70 have a liquid impervious barrier sheet 16. The barrier sheet 16 prevents exudates which reach the flaps 70 from soiling the edges of the wearer's panties. Further, it is preferably that the flaps 70 be provided with an absorbent layer, at least to a point beyond the edges of the wearer's panties. Theoretically, only a relatively small amount of menses should reach the flaps 70, therefore, only a relatively small amount of absorbent material is desirable in the flaps 70. However, at least some absorbent material is recommended in order to prevent any exudates that reach the flaps 70 from being able to flow further to unprotected areas. The absorbent material may be a tissue, such as the tissue 31, or an extension of the absorbent core 34, such as the WATER-LOCK L-535. However, the absorbent material in the flaps 70 should be relatively highly flexible. A number of sanitary napkins having flaps suitable or adaptable for use with the sanitary napkin 10 of the present invention are known. Such flaps are disclosed in U.S. Pat. No. 4,687,478, entitled "Shaped Sanitary Napkin With Flaps", which patent issued to Van Tilburg on August 18, 1987, U.S. Pat. No. 4,608,047, entitled "Sanitary Napkin Attachment Means", which patent issued to Mattingly on August 26, 1986, U.S. Pat. No. 4,589,876, entitled "Sanitary Napkin", which patent issued to Van Tilburg on May 20, 1986, and U.S. Pat. No. 4,285,343, entitled "Sanitary Napkin", which patent issued to McNeir on August 25, 1981, all of which patents are incorporated herein by reference.

For illustration purposes, the central absorbent width 63 of the napkin 10 shown in FIG. 4 would extend laterally from the outer edge 32 of the tissue 31 in the one flap 70 to the outer edge 32 of the tissue 31 in the other flap 70.

Another alternative embodiment of a sanitary napkin 10 of the present invention is shown in FIG. 5. Like the napkin 10 shown in FIG. 4, this napkin 10 also has flaps 70, only of a different configuration. In this embodiment, the flaps 70 are comprised only of the topsheet 25 and the barrier sheet 88.

For illustration purposes, the central absorbent width 63 of the napkin 10 shown in FIG. 5 would extend laterally from one outer edge 32 of the tissue 31 to the other outer edge 32 of the tissue 31.

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 having a body surface and a garment surface, comprising:
an absorbent means having a first major surface and a second major surface; and
a liquid impermeable barrier means adjacent to said second major surface of said absorbent means;
said sanitary napkin having a flexure-resistance of less than about 300.0 grams, a test capacity of at least about 8.0 grams, and a total capacity of at least about 20.0 grams.

2. The sanitary napkin as claimed in claim 1, wherein said sanitary napkin has a flexure-resistance of less than about 250.0 grams.

3. The sanitary napkin as claimed in claim 1, wherein said sanitary napkin has a central absorbent width of at least about 3.7 centimeters.

4. The sanitary napkin as claimed in claim 3, wherein said sanitary napkin has a caliper of about 2.2 millimeters or less.

5. The sanitary napkin as claimed in claim 3, wherein said sanitary napkin has a caliper of less than about 2.6 millimeters.

6. The sanitary napkin as claimed in claim 5, wherein said sanitary napkin has a flexure-resistance of less than about 175.0 grams.

7. The sanitary napkin as claimed in claim 5, wherein said sanitary napkin has a test capacity of at least about 15.0 grams.

8. The sanitary napkin as claimed in claim 5, wherein said sanitary napkin has a flexure-resistance of less than about 130.0 grams.

9. The sanitary napkin as claimed in claim 5, wherein said absorbent means further comprises a hydrogel-forming polymer gelling agent.

10. The sanitary napkin as claimed in claims 5 or 9, wherein said barrier means comprises a barrier sheet and said absorbent means comprises a liquid permeable topsheet and an absorbent core.

11. The sanitary napkin as claimed in claims 5 or 9, further comprising a laterally extending flap configured to drape over a side edge of a wearer's panties in the crotch portion thus being disposed between a side edge of the wearer's panties in the crotch portion and the wearer's thigh.

12. The sanitary napkin as claimed in claim 11, wherein said flap has an attachment means adjacent to said garment surface for attaching said flap to the garment facing side of the wearer's panties.

13. The sanitary napkin as claimed in claim 11, comprising two flaps, wherein at least one of said flaps comprises an attachment means for attaching said flaps together on the garment side of the wearer's panties.

14. The sanitary napkin as claimed in claim 9, wherein said absorbent means comprises an absorbent core, and wherein said absorbent core contains from about 5% to about 85% by weight of a particulate hydrogel-forming polymer gelling agent.

15. The sanitary napkin as claimed in claim 9, wherein said absorbent means comprises an absorbent core, and wherein said absorbent core contains from about 15% to about 100% by weight of a non-particulate hydrogel-forming polymer gelling agent.

16. The sanitary napkin as claimed in claim 9, wherein said hydrogel-forming polymer gelling agent is distributed throughout at least about 17.0 square centimeters of said sanitary napkin.

17. The sanitary napkin as claimed in claim 16, wherein said hydrogel-forming polymer gelling agent is a particulate and is distributed in an amount of from about 0.001 grams per square centimeter to about 0.009 grams per square centimeter.

18. The sanitary napkin as claimed in claim 16, wherein said hydrogel-forming polymer gelling agent is a non-particulate and has a basis weight of from about 0.002 grams per square centimeter to about 0.010 grams per square centimeter.

19. The sanitary napkin as claimed in claim 5, wherein said barrier means comprises a barrier sheet and said absorbent means comprises a liquid permeable polymeric topsheet overlaying a wipe acquisition sheet overlaying an absorbent core, said topsheet being associated with said barrier sheet.

20. The sanitary napkin as claimed in claim 19, wherein said absorbent core further comprises a hydrogel-forming polymer gelling agent, topsheet is an apertured formed film, said wipe acquisition sheet is an apertured nonwoven sheet comprising fiber bundles and apertures, some of said apertures of said topsheet and said wipe acquisition sheet being aligned such that no fiber bundles of said wipe acquisition sheet are beneath some of said apertures of said topsheet while others of said apertures of said topsheet and said wipe acquisition sheet are not aligned such that a fiber bundle of said wipe acquisition sheet is beneath said aperture of said topsheet.

21. The sanitary napkin as claimed in claim 19, wherein said absorbent core further comprises a hydrogel-forming polymer gelling agent, topsheet is an apertured nonwoven sheet, said wipe acquisition sheet is an apertured nonwoven sheet comprising fiber bundles and apertures, some of said apertures of said topsheet and said wipe acquisition sheet being aligned such that no fiber bundles of said wipe acquisition sheet are beneath some of said apertures of said topsheet while others of said apertures of said topsheet and said wipe acquisition sheet are not aligned such that a fiber bundle of said wipe acquisition sheet is beneath said aperture of said topsheet.

22. The sanitary napkin as claimed in claim 5, wherein said barrier means comprises a barrier sheet and said absorbent means comprises a liquid permeable polymeric topsheet overlaying an absorbent core, said topsheet being associated with said barrier sheet.

23. The sanitary napkin as claimed in claims 19 or 22, wherein said absorbent core further comprises a tissue layer and a hydrogel-forming polymer gelling agent.

24. The sanitary napkin as claimed in claims 19 or 22, wherein said wipe acquisition sheet is a nonwoven sheet.

25. A sanitary napkin having a body surface and a garment surface, comprising:

an absorbent means having a first major surface and a second major surface; and
a liquid impermeable barrier means adjacent to said second major surface of said absorbent means;
said sanitary napkin having a flexure-resistance of less than about 400 grams, a test capacity of at least about 8.0 grams, a total capacity of at least about 14.0 grams and a caliper of less than about 3.0 millimeters.

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25. The sanitary napkin as claimed in claims 1 or 25 wherein said sanitary napkin has a total pad width of at least about 4.3 centimeters.

wherein said sanitary napkin has a total capacity greater than about 20 grams.

28. The sanitary napkin as claimed in claim 26, wherein said sanitary napkin has a caliper of less than about 3.0 millimeters.
* * * * *

27. The sanitary napkin as claimed in claim 26,

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CERTIFICADO DE EXISTENCIA Y REPRESENTACIÓN

El SECRETARIO DE LA CAMARA DE COMERCIO DE MEDELLÍN PARA ANTIOQUIA, con fundamento en las matrículas e inscripciones del Registro Mercantil,

CERTIFICA

NOMBRE

PRODUCTOS FAMILIA S.A, pero la sociedad podrá identificarse, igualmente, en el siguiente orden:

FAMILIA S.A.

SANCELA S.A.

PRFA S.A.

PRODUCTOS FAMILIA SANCELA S.A.

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DOMICILIO

MEDELLIN

MATRICULA

21-002643-4

NIT

890900161-9

CERTIFICA

CONSTITUCION: Que por escritura pública Nro.7973, otorgada en la Notaría 4a. de Medellín en diciembre 31 de 1958, inscrito su extracto en esta Cámara de Comercio en 16 de enero de 1959, en el libro 2o., folio 788, bajo No.1, se constituyó una sociedad anónima denominada:

"SCOTT DE COLOMBIA S.A."

CERTIFICA

REFORMAS: Que hasta la fecha la sociedad ha sido reformada por las siguientes escrituras:

No.2.535 del 16 de abril de 1959, de la Notaría 4a. de Medellín.

No.1.460 del 11 de marzo de 1964, de la Notaría 4a. de Medellín

No.2.116 del 17 de septiembre de 1970, de la Notaría 7a. de Medellín, registrada en esta Cámara de Comercio el 28 de septiembre de 1970, en el libro 2o., folio 674, bajo el No.119, por medio de la cual cambió su denominación por:

PÉPELES SCOTT DE COLOMBIA S.A.

No.7.420 del 20 de diciembre de 1974, de la Notaría 3a. de Medellín, aclarada por escritura No.2.080, del 28 de mayo de 1975 de la Notaría 3a. de Medellín.

No.4.354 del 9 de diciembre de 1980 de la Notaría 3a. de Medellín.

No.2.205 del 19 de julio de 1985, de la Notaría 7a. de Medellín

No.423 del 20 de febrero de 1986 de la Notaría 7a. de Medellín, registrada en esta Cámara de Comercio el 26 de febrero de 1986, en el libro 9., folio 165, bajo el No.1316, por medio de la cual cambia su

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razón social por la de:

PRODUCTOS FAMILIA S.A.

No.1.232 del 27 de mayo de 1986, de la Notaría 7a. de Medellín, registrada en esta Cámara de Comercio el 6 de junio de 1986, en el libro 9., folio 531, bajo el No.4243, por medio de la cual la sociedad se denomina:

PRODUCTOS FAMILIA S.A. pero podrá también hacer uso de la sigla y conocerse como: **FAMILIA S.A.**

No.2582 del 28 de octubre de 1986 de la Notaría 7a. de Medellín.

No.1554, de mayo 27 de 1987, de la Notaría 7a. de Medellín.

No.1.019, de mayo 9 de 1989, Notaría 7a. de Medellín.

No.2.494, de octubre 9 de 1989, de la Notaría 7a de Medellín

No.41, enero 18 de 1991, de la Notaría 20a. de Medellín.

No.421, de febrero 2 de 1994, de la Notaría 20a. de Medellín.

No.3.876, de agosto 4 de 1997, de la Notaría 4a. de Medellín, registrada en esta Cámara el 06 de agosto de 1997, en el libro 9., folio 907, bajo el No.6347, mediante la cual se solemniza la escisión de la sociedad la cual se fracciona el patrimonio, constituyendo una nueva sociedad la cual girará bajo la denominación social de:

VALORES INDUSTRIALES S.A.

No.5514 del 28 de octubre de 1998, de la Notaría 4a. de Medellín.

No.2.812, de julio 23 de 1999, de la Notaría 4a. de Medellín, registrada en esta Cámara el 28 de julio de 1999, en el libro 9o., folio 896, bajo el No.6270, mediante la cual se adiciona al nombre de sociedad una sigla, además de la que actualmente se usa, así:

"PRODUCTOS FAMILIA S.A."

pero podrá también hacer uso de las siglas siguientes y conocerse como **FAMILIA S.A.** o también como **PRFA S.A.**

No.4473 de noviembre 30 de 2.000, de la Notaría 20a. de Medellín,

No.4826 del 21 de diciembre de 2000, de la Notaría 20a. de Medellín, registrada en esta Entidad el 26 de diciembre de 2000, en el libro 9., folio 1781, bajo el No.12463, mediante la cual se aprobó el compromiso de FUSION, por absorción, entre las sociedades **PRODUCTOS FAMILIA S.A (ABSORBENTE)**, y la sociedad **PRODUCTOS SANITARIOS SANCELA S.A (ABSORBIDA)**, la cual tiene el domicilio principal en el municipio de Rionegro, la cual se Disuelve sin liquidarse.

No.195 del 29 de enero de 2001 de la Notaría 20a. de Medellín, registrada en esta Entidad el 31 de enero de 2001, en el libro 9o., folio 127, bajo el No.886, mediante la cual la sociedad cambió su denominación social y se denominará así:

PRODUCTOS FAMILIA S.A, pero la sociedad podrá identificarse, igualmente, en el siguiente orden: **FAMILIA S.A, SANCELA S.A, PRFA S.A:**
PRODUCTOS FAMILIA SANCELA S.A,

FAMILIA SANCELA DE COLOMBIA S.A.

No. 952 del 21 de mayo de 2002 de la Notaría 7a. de Medellín.

CERTIFICA

VIGENCIA: Que la sociedad no se halla disuelta y su duración es la siguiente: Hasta mayo 22 del año 2058:

CERTIFICA

OBJETO SOCIAL: La sociedad tiene por objeto:

- a. Adquirir, por concesión o por otro título cualquiera, el derecho a explotar bosques de la nación o de particulares.
- b. Plantar, cultivar y explotar toda clase de maderas o cosechas con el fin de obtener celulosa.
- c. Manufacturar, procesar, comprar y vender pulpa, papel, celulosa de todos los tipos y materiales similares a los anteriores o derivados de ellos, y construir o adquirir, y poner en operación una o más plantas o fábricas para manufacturar, procesar, etc., pulpa, papel y celulosa de todos los tipos o materiales similares a éstos o derivados de ellos.
- d. Establecer sucursales, agencias y, en general, dependencias para los propósitos que quedan indicados y para los demás que se indican en este artículo.
- e. Importar a Colombia o conseguir dentro de este país, toda clase de materias primas necesarias para la manufactura o procesamiento de pulpa, papel, celulosa de todos los tipos y de materiales similares a éstos o derivados de ellos y en general importar cualquier otro tipo de materia prima necesaria para la manufactura y procesamiento de los productos que constituyen el objeto social; vender, permutar y, en una palabra, negociar con tales materias primas.
- f. Comprar y vender maquinaria, repuestos, herramientas y, en general, equipos para la manufactura o procesamiento o utilización de los artículos que se dejan mencionados.
- g. Instalar o adquirir y poner en operación plantas de energía eléctrica con destino a la realización de los fines que tiene la sociedad, de acuerdo al artículo.
- h. Comercializar dentro del territorio nacional mercancías producidas por terceros.
- i. Fabricar, investigar, desarrollar y comercializar productos cosméticos, de belleza, implementos de aseo personal, industrial y del hogar, productos desechables a base de pulpa de papel, poliestireno, plástico y demás materiales, y productos similares.
- j. Podrá la sociedad participar como constituyente, o adquiriendo acciones, derechos de sociedades ya constituidas que se dediquen a la explotación, procesamiento y comercialización de productos naturales.

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como la madera, la sal, el café, el oro y sus derivados.

Para el cumplimiento de las actividades que constituyen el objeto de la sociedad, según lo dicho anteriormente, podrá celebrar o ejecutar en su propio nombre, por cuenta de terceros, en participación con ellos, todo los actos, operaciones comerciales, industriales y financieras sobre los bienes muebles e inmuebles, que sean necesarios o convenientes al logro de los fines que persigue y que pueden favorecer o desarrollar sus actividades, o las de aquellas empresas o sociedades en las cuales tenga interés, siempre que de manera directa se relacionen con el objeto social, según se determina en el presente artículo, como por ejemplo las siguientes: Adquirir o enajenar bienes muebles o inmuebles, hipotecarlos o gravarlos, según el caso, celebrar, contratos de arrendamiento relativos a dichos bienes; adquirir y usar o enajenar nombres y emblemas, patentes y marcas; promover, formar, administrar, organizar y financiar sociedades o empresas que tengan objetos similares al suyo o que negocien en ramos que faciliten el cumplimiento de éste y participar en tales sociedades o empresas y en otras ya constituidas, aportando bienes y adquiriendo acciones o interés en ellas o absorberlas fusionarse con ellas; celebrar contratos de mutuo con garantía o sin ella; firmar toda clase de títulos valores; dar en garantía sus bienes muebles o inmuebles; abrir y manejar cuentas corrientes, girar, aceptar, endosar, avalar, protestar; negociar con toda clase de documentos de crédito, sean civiles o mercantiles; emitir bonos nominativos o al portador, con interés o sin interés, con garantía específica o sin ella; y en general celebrar y ejecutar todo género de contratos o actos civiles o comerciales, industriales o financieros, que estén directamente relacionados con el objeto social y los que tengan como finalidad ejercer los derechos o cumplir las obligaciones que legal o convencionalmente se deriven de la existencia y actividad de la sociedad.

En general celebrar y ejecutar todo género de contratos o actos civiles o comerciales, industriales o financieros, y en general actos de disposición del patrimonio social, incluyendo donaciones de bienes en especie o dinero, que estén relacionados con el objeto social y los que tengan como finalidad ejercer los derechos o cumplir las obligaciones que legal o convencionalmente se deriven de la existencia y actividad de la sociedad.

CERTIFICA

CAPITAL AUTORIZADO: Que el Capital Autorizado de la sociedad es de \$800.000.000, dividido en 8.000.000.000 de acciones de \$0.10 centavos cada una.

CAPITAL SUSCRITO Y PAGADO: Que el capital suscrito y pagado de la sociedad es de \$111.066.788.80, dividido 1.110.667.888, de acciones de \$0.10 centavos cada una.

CERTIFICA

REPRESENTACION LEGAL: La representación Legal está a cargo de un Gerente.

El Gerente de la compañía tendrá cuatro (4) Suplentes, que 1

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emplazarán personal e individualmente en sus faltas temporales
accidentales, así como también en los actos en los cuales esté impedido.

CERTIFICA

CARGO	NOMBRE	CEDULA
GERENTE	LUIS CARLOS URIBE JARAMILLO	8254693

Nombrado por Acta No.354, de abril 23 de 1980, de la Junta Directiva,
inscrita en esta Cámara el 22 de mayo de 1980, en el libro 9o., foli
29, bajo el No.2586.

PRIMER SUPLENTE DEL GERENTE GENERAL	JUAN FELIPE HOYOS BOTERO	71714123
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SEGUNDO SUPLENTE DEL GERENTE GENERAL	MONICA PELAEZ PEREZ	43721218
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TERCER SUPLENTE DEL GERENTE GENERAL	MARIA ADELAIDA PEREZ JARAMILLO	43582297
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CUARTO SUPLENTE DEL GERENTE GENERAL	LUZ ANGELA WILLS TORO	32533962
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Según Acta No.567, del 31 de mayo de 2002, de la Junta Directiva,
registrado su extracto en esta Cámara el 24 de octubre de 2002, en el
libro 9o., bajo el No.10516.

CERTIFICA

FACULTADES DEL REPRESENTANTE LEGAL: Son funciones y facultades del
Gerente General de la Compañía, las siguientes:

Hacer de la denominación social; ejecutar los decretos de la Asamblea
General de Accionistas y los acuerdos o resoluciones de la Junta
Directiva. Ejercer las funciones indicadas en los estatutos, cuando le
sean delegadas, total o parcialmente, por la Junta Directiva, designar y
remover libremente los empleados de la Compañía que no dependan
directamente de la Asamblea General de Accionistas y escoger, también
libremente, el personal de trabajadores, determinar su número, fijar el
género de labores, remuneraciones etc., y hacer los despidos del caso.
Constituir los apoderados judiciales o extrajudiciales que juzgue
necesarios para la adecuada representación de la sociedad delegándoles
las facultades que estime convenientes de aquellas que él mismo goza;
ejecutar los actos y celebrar los contratos que tiendan al desarrollo
del objeto social en ejercicio de esta facultad, el Gerente General
podrá enajenar a cualquier título los bienes muebles o inmuebles y
darlos en prenda o en hipoteca; alterar la forma de los bienes raíces
por su naturaleza o su destino; dar o recibir en mutuo cantidades de
dinero; hacer depósitos bancarios; firmar toda clase de títulos
valores y negociar esta clase de instrumentos; firmarlos, aceptarlos,
protestarlos, endosarlos, pagarlos, descargarlos, tenerlos, etc.
comparecer en los juicios en que se discuta la propiedad de los bienes
sociales cualquier derecho de la Compañía; transigir, comprometer,

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desistir, novar, recibir e interponer acciones y recursos de cualquier género en todos los negocios o asuntos de cualquier índole que tenga pendiente la compañía; representar a la sociedad ante cualquier clase de funcionarios, tribunales autoridades, personas jurídicas o naturales, etc. y en general actuar en la dirección de las empresas sociales si se tratare de ejecución de un acto o de la celebración de un contrato por cuenta de la sociedad; para que dicho acto o contrato obligue a ésta es necesario que sea de aquellos para los cuales el Gerente general no tiene restricción alguna en los estatutos o que el órgano de la compañía quien corresponda autorizar a dicho funcionario se haya pronunciado favorablemente en el sentido de conocer la mencionada autorización y de ello haya quedado la constancia respectiva, se entiende que no existe restricción alguna para el Gerente General en la ejecución de actos y en la celebración de contratos que no sean de la naturaleza de aquellos para los cuales los estatutos han señalado como necesaria la autorización previa de otro órgano directivo; Convocar a la Asamblea General de Accionistas y a la Junta Directiva de la Compañía a sesiones extraordinarias, cada vez que lo juzgue conveniente o necesario, o en el caso de la Asamblea, cuando se lo solicite un número de accionistas que represente, por lo menos, el veinticinco por ciento (25%) de las acciones suscritas. Presentar a la Asamblea General de Accionistas, en sus sesiones ordinarias, en asociación de la Junta Directiva, el balance de cada ejercicio, y un informe escrito sobre la forma como hubiere llevado a cabo su gestión y las medidas cuya adopción recomiende a la Asamblea, informar a la Junta Directiva, acerca del desarrollo de los negocios y demás actividades sociales, someterle prospectos para el mejoramiento de las empresas que explote la compañía y facilitar a dicho órgano directivo el estudio de cualquier problema, proporcionándole los datos que requiera, apremiar a los empleados y demás servidores de la compañía a que cumplan los deberes de su cargo y vigilar continuamente la marcha de las empresas de la misma, especialmente su contabilidad y archivo, cuidar de que la recaudación o inversión de los fondos de la empresa se hagan debidamente. Ejercer todas las facultades que directamente deleguen en él la Asamblea General de Accionistas y la Junta Directiva.

Realizar los actos y contratos y las operaciones financieras, de obtención de créditos e inversiones de recursos necesarias para el giro ordinario del negocio incluyendo el pago de obligaciones tributarias, hasta por un monto igual o superior a 2000 SALARIOS MINIMOS LEGALES MENSUALES VIGENTES. Si la operación supera el monto de 2000 SALARIOS MINIMOS LEGALES MENSUALES VIGENTES, deberá ser autorizado por la Junta Directiva.

REQUERIMIENTOS DE AUTORIZACION:

El Gerente General requerirá autorización de la Asamblea General de Accionistas y de la Junta Directiva de la Compañía para ejercer sus funciones en aquellos casos en que cualquiera de estos organismos deba impartir la autorización previa, según lo dispuesto en la ley o en los estatutos, por razón de la naturaleza o de la cuantía de la operación.

LIMITACION: Que entre las funciones de la Junta Directiva, está la de: Autorizar al Gerente General de la compañía para que a nombre de ésta ejecute celebre actos contratos, cuando la cuantía de las obligaciones que de cada uno de ellos se derive para la misma exceda de una cantidad equivalente a DOS MIL SALARIOS MINIMOS LEGALES MENSUALES

VIGENTES, al momento de liquidarse la obligación, o que siendo de un valor indeterminado puedan asumir esa cuantía. No obstante para compras de materia prima y venta de productos elaborados de aquellos con que negocia habitualmente la compañía, no habrá restricción en materia de cuantía en cuanto a la capacidad del Gerente General para obrar a nombre de la compañía. Dentro de estas últimas operaciones se entenderán comprendidas las de apertura de cartas de crédito, aceptación de letras de cambio y todos los actos referentes a tales títulos valores cuando se creen para llevarlas a cabo.

CERTIFICA

JUNTA DIRECTIVA

PRINCIPALES

ALVARO GOMEZ JARAMILLO
C.C. 8299028

MONICA GOMEZ DE PELAEZ
C.C. 21384343

JOSE ANTONIO GOMEZ JARAMILLO
C.C. 70546880

OLOFF TOBISSON
PAS. 78355899

OLA SPRINGFORS
PAS. 09508231

JAN SCHIAVONE
PAS. 23014753

SUPLENTES

JOHN GOMEZ RESTREPO
C.C. 531554

MARIA STELLA GOMEZ DE SANIN
C.C. 32444553

PATRICIA GOMEZ DE CAICEDO
C.C. 32477197

GERHARD RUDISCHER
PAS. 0224255

STEFAN ANGWALD
PAS. 65831427

ANTONIO DUARTE AMEZQUITA
C.C. 19230082

Según Acta No.93 del 30 de marzo de 2001 de la Asamblea de Accionistas, registrada en esta Entidad el 15 de mayo de 2001, en el libro 90., f. 11 661, bajo el No.4625.

Except ALVARO GOMEZ JARAMILLO, MONICA GOMEZ DE PELAEZ, JOHN GOMEZ RESTREPO, MARIA STELLA GOMEZ DE SANIN, PATRICIA GOMEZ DE CAICEDO y ANTONIO DUARTE AMEZQUITA, nombrados según Acta No.94 del 22 de marzo de 2002, de la Asamblea General de Accionistas, registrada en esta Entidad el 29 de mayo de 2002, en el libro 90., folio 710, bajo el No.4969.

Except los señores OLOFF TOBISSON, OLA SPRINGFORS, JAN SCHIAVONE, GERHARD RUDISCHER y STEFAN ANGWALD, nombrados por Acta No.94, del 22 de marzo de 2002, de la Asamblea General de Accionistas, registrado su extracto en esta Cámara de Comercio el 1 de julio de 2002, en el libro 90., f. 110 904, bajo el No.6326.

Except el señor JOSE ANTONIO GOMEZ JARAMILLO nombrado según Acta No.94 del 22 de marzo de 2002, de la Asamblea General de Accionistas, registrada en esta Entidad el 29 de agosto de 2002, en el libro 90., bajo el No.8390.

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CERTIFICA

REVISOR FISCAL

La firma PRICEWATERHOUSECOOPERS

Reelegida por Acta No.94 del 22 de marzo de 2002 de la Asamblea General de Accionistas, registrada en esta Entidad el 29 de mayo de 2002, en el libro 9o., folio 710, bajo el No.4969.

Que según comunicación del 19 de mayo de 2003, registrada en esta Entidad el 23 de mayo de 2003, en el libro 9o., bajo el No. 5061, la Firma Revisora Fiscal efectuó el siguiente nombramiento:

PRINCIPAL: JORGE NELSON ORTIZ CHICA
C.C. 98.550.396

Que según comunicación del 4 de abril de 2002, registrada en esta Entidad el 29 de mayo de 2002, en el libro 9o., folio 710, bajo el No.4969, la Firma Revisora Fiscal efectuó el siguiente nombramiento:

SUPLENTE: GLORIA A. LOPEZ VASQUEZ
C.C.43532815

CERTIFICA

APODERADOS:

Que según Acta No.562 del 01 de noviembre de 2000 de la Junta Directiva, registrado su extracto en esta Entidad el 23 de febrero de 2001, en el libro 5o., folio 14, bajo el No.95, se autoriza al Gerente General, doctor Luis Carlos Uribe Jaramillo y/o a su Suplente, Doctor ALBERTO CHAVARRIAGA GONZALEZ, para facultar al Doctor GABRIEL JAIRO CARDONA ARBOLEDA C.C. 71581447, para firmar poderes, endosar y hacer la veces de Representante Legal de la compañía, en todas las operaciones de comercio exterior.

PODER GENERAL: Que por escritura No.1319 del 2 de abril de 2001, de la Notaría 4a. de Medellín, registrada en esta Entidad el 10 de abril de 2001, en el libro 9o., folio 26, bajo el No.182, se le confiere PODER GENERAL, amplio y suficiente, a GABRIEL JAIRO CARDONA ARBOLEDA, para que, actuando a nombre de la sociedad, como apoderado general, intervenga en todos los trámites relativos a cualquier tipo de operación cambiaria, y a las operaciones de comercio exterior de la compañía, bien sea por importaciones o exportaciones de bienes o servicios o por otras operaciones cambiarias diferentes, quedando especialmente facultado para que, con relación a esos trámites y operaciones, suscriba toda clase de documentos oficiales o privados, declaraciones y formulario cambiarios, comprometa la responsabilidad de la sociedad, otorgue los poderes a las sociedades de intermediación aduanera que sean necesarios, interponga los recursos que sean pertinentes respecto de los actos administrativos que se produzcan con ocasión por causa de esos mismos trámites y operaciones, y en general para que actúe, con las amplias facultades, en todo lo que haga relación a las operaciones cambiarias y/o de comercio exterior en que sea parte la sociedad. El apoderado puede sustituir el

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presente poder t tal parcialmente.

que mediante escritura No.2371 del 15 de agosto de 2001, de la Notaría 40a. de Medellín, registrada en esta Cámara de Comercio el 22 de agosto de 2001, en el libro 5o., folio 66, bajo el No.457, se amplía el Poder General, amplio y suficiente, otorgado al señor GABRIEL JAIRO CARDONA ARBOLEDA con C.C.71581447, mediante escritura No.1319 del 2 de abril de 2001, de la Notaría 4a. de Medellín.

que mediante documento privado del 13 de agosto de 2001, registrado en esta Cámara de Comercio el 22 de agosto de 2001, en el libro 5o., folio 66, bajo el No.460, se confiere Poder Especial de naturaleza extrajudicial a favor de JUAN FELIPE HOYOS BOTERO con C.C.71714123 de Medellín, y JOSE FELIX ESCOBAR CORREA con C.C.3314167 de Medellín, a fin de que los apoderados, obrando separadamente, representen a la sociedad ante la Administración de Impuestos Nacionales de Medellín, la Dirección General de Impuestos Nacionales, las administraciones de impuestos de las demás ciudades del país, las secretarías de Hacienda Municipales, y los municipios de Colombia en general, en lo relacionado con los impuestos sobre las ventas, renta y complementarios, timbres, retenciones en la fuente, impuesto de industria y comercio, impuestos complementarios de avisos y tableros, y demás impuestos de índole municipal, quedando expresamente facultados para firmar y presentar declaraciones, contestar requerimientos, interponer recursos, atender visitas e inspecciones y, en fin, llevar la representación de las sociedades en todos los asuntos relacionados con el cumplimiento de obligaciones sustanciales y formales en todas las etapas de determinación de los tributos.

PODER: Mediante escritura pública No. 2360 de noviembre 14 de 2002, de la Notaría 7a. de Medellín, inscrita en esta Entidad el 25 de noviembre de 2002, en el libro 5o., bajo el No. 618, la sociedad confiere poder especial pero amplio y bastante en cuanto a derecho se requiere, a favor de los señores FRANCISCO JAVIER UTRERA con C.I. 4.772.082 y MARIA ALEJANDRA MOLINA con C.I. 13.952.708 (Quienes no han aceptado), para que conjunta o separadamente representen a PRODUCTOS FAMILIA S.A. y las acciones propiedad de esta última en el capital social de FAMILIA SANCELA VENEZUELA S.A. específicamente en los siguientes asuntos:

a) En todas las Asamblea Ordinarias y/o Extraordinarias de la sociedad mercantil venezolana FAMILIA SANCELA VENEZUELA S.A. pudiendo a tal efecto, votar y deliberar en cualquier asunto sometida a la consideración de dichas asamblea, incluyendo la suscripción, adquisición y pag de acciones de capital social de esta última compañía, designación de administradores, directores, comisarios y funcionarios, aprobación de modificaciones al Documento Constitutivo y de los estatutos y cualesquiera otros puntos.

b) Para ejercer la representación de PRODUCTOS FAMILIA S.A. ante la Superintendencia de Inversiones Extranjeras de Venezuela (SIEEX) y cualquier Organismo competente en la materia, a fin de solicitar el registro de las inversiones extranjeras que realizare en Venezuela, quedando autorizados para actuar en nombre de mi representada, en todo relacionado con gestiones en Venezuela referente a lo anterior. A tales efectos, podrán los prenombrados apoderados, presentar ante los

Organismos, Dependencias y Agencias Gubernamentales Venezolanas, cualquier tipo de solicitudes, escritos, representaciones, apelaciones, recursos y documentos que sean de la competencia de los referidos Organismos y, en general, realizar por ante los mismos cualesquiera gestiones y diligencias, en el entendido de que la anterior enumeración de facultades es a título enunciativo y no limitativo.

Que mediante escritura No. 2862 de diciembre 23 de 2002, de la Notaría 7a. de Medellín, registrada en esta Entidad el 10 de enero de 2003, en el libro 5o., bajo los Nos. 10, 11, 12 y 13, respectivamente les fue conferido PODER ESPECIAL a los Sres. ALVARO CORREA ORDOÑEZ, C.C. 79.143.366, JUAN PABLO CONCHA, C.C. 80.416.654, RICARDO METKE MENDEZ, C.C. 19.074.428 y OLGA GEORGETTE OTERO. C.C. 51.925.615, para adelantar ante la Superintendencia de Industria y Comercio-División de Signos Distintivos los siguientes asuntos:

Registro de marcas, renovaciones, inscripción de cambios de nombre y de dirección del titular, traspasos; licencias de uso, lemas comerciales y marcas de certificación, depósito o registro de nombres comerciales y enseñas; oposiciones, acciones de cancelación; para adelantar ante el Consejo de Estado la prestación y contestación de acciones de nulidad y acciones de nulidad y restablecimiento del derecho, para adelantar ante los jueces civiles del circuito acciones de usurpación de marcas, y/o acciones de defensa de marcas y para adelantar ante las autoridades Aduaneras medidas en favor de Productos Familia S.A. y demás acciones judiciales, así como medidas cautelares y medidas en frontera relacionadas con procesos de propiedad industrial, a cuyo efecto lo faculta para adelantar ante dichas autoridades todos los pasos necesarios al objeto indicado, elevar solicitudes, presentar recursos y reclamos, pagar tasas e impuestos, solicitar testimonios, recibir documentos y valores, transigir, desistir, percibir. Se concede a los expresados mandatarios poder suficiente para recibir notificaciones a nombre de la compañía, representar a la compañía judicial extrajudicialmente u otorgar poderes para tal efecto, responder en juicio a todas las reclamaciones o demandas relacionadas con estas materias y hacer cuanto fuere necesario, para la adecuada defensa de los intereses de la sociedad, ante las autoridades administrativas judiciales de cualquier orden, dándoles así mismo facultad para sustituir el poder y en caso necesario revocar dichas sustituciones.

CERTIFICA

GRUPO EMPRESARIAL

MATRIZ 002643 04 PRODUCTOS FAMILIA S A

DOMICILIO MEDELLIN - COLOMBIANA

ACTIVIDAD ADQUIRIR POR CONCESION O POR OTRO TITULO CUALQUIERA, EL DERECHO A EXPLOTAR BOSQUES DE LA NACION O DE PARTICULARES.

Controla a:

143287 04 SORESA SOCIEDAD RECUPERADORA S.A.

DOMICILIO ITAGUI - COLOMBIANA

Subordinada

PRESUPUESTO ARTICULO 261-INCISO 1 DEL CODIGO DE COMERCIO: POSEER MAS DEL 50% DEL CAPITAL

VALIDO POR AMBAS CARAS

ACTIVIDAD COMERCIALIZACION DE INSUMOS PARA LA INDUSTRIA
PAPELERA

DOCUMENTO PRIVADO DEL 28 DE FEBRERO DE 2003

Libro 9 Nro 2304 03/03/10

183344 03 PULPAPEL LTDA

DOMICILIO MEDELLIN - COLOMBIANA

Subordinada

PRESUPUESTO ARTICULO 261-INCISO 1 DEL CODIGO DE COMERCIO:
INVERSION DEL 99.99%

ACTIVIDAD INVERSIONES EN LA INDUSTRIA PAPELERA Y REFORESTADORA

DOCUMENTO PRIVADO DEL 26 DE ABRIL DE 2002

Libro 9 Nro 9683 97/11/24

311670 04 DIAMONI LOGISTICA S.A.

DOMICILIO MEDELLIN - COLOMBIANA

Subordinada

PRESUPUESTO ARTICULO 261-INCISO 1 DEL CODIGO DE COMERCIO: POSEE
MAS DEL 50% DEL CAPITAL

ACTIVIDAD TRANSPORTE DE MERCANCIA

DOCUMENTO PRIVADO DE ABRIL 8 DE 2003

Libro 9 Nro 3640 03/04/09

FAMILIA DEL PACIFICO LTDA

DOMICILIO CALOTO - COLOMBIANA

Subordinada

PRESUPUESTO ARTICULO 261-INCISO 1 DEL CODIGO DE COMERCIO:
INVERSION DEL 99.99%

ACTIVIDAD FABRICACION DE PANALES Y PRODUCTOS DE PAPEL

DOCUMENTO PRIVADO DEL 26 DE ABRIL DE 2002

Libro 9 Nro 9683 97/11/24

PRODUCTOS FAMILIA SANCELA DEL ECUADOR S.A.

DOMICILIO QUITO - ECUATORIANA

Subordinada

PRESUPUESTO ARTICULO 261-INCISO 1 DEL CODIGO DE COMERCIO:
INVERSION DEL 100%

ACTIVIDAD FABRICACION DE PRODUCTOS DE PAPEL

DOCUMENTO PRIVADO DEL 26 DE ABRIL DE 2002

Libro 9 Nro 9683 97/11/24

PRODUCTOS SANCELA DEL PERU S.A.

DOMICILIO LIMA - PERUANA

Subordinada

PRESUPUESTO ARTICULO 261-INCISO 3 DEL CODIGO DE COMERCIO:
INFLUENCIA DOMINANTE EN LAS DECISIONES DE LOS ORGANOS DE ADM

ACTIVIDAD IMPORTACION Y EXPORTACION Y/O VENTA DE PRODUCTOS DE
PROTECCION SANITARIA

DOCUMENTO PRIVADO DEL 26 DE ABRIL DE 2002

Libro 9 Nro 3246 02/04/09

PRODUCTOS FAMILIA DE PUERTO RICO INC

DOMICILIO SAN JUAN DE PUERTO RICO - PUERTORIQUEÑA

Subordinada

PRESUPUESTO ARTICULO 261-INCISO 1 DEL CODIGO DE COMERCIO:
INVERSION DEL 100%

VALIDO POR AMBAS CARAS

ACTIVIDAD MANUFACTURAR, PROCESAR, COMPRAR, VENDER, IMPORTAR Y EXPORTAR PAPEL TISSUE EN TODAS SUS FORMAS, ETC
DOCUMENTO PRIVADO DEL 26 DE ABRIL DE 2002
Libro 9 Nro 4292 02/05/09

FAMILIA SANCELA DE VENEZUELA S.A
DOMICILIO CARACAS - VENEZOLANA
Subordinada
PRESUPUESTO ARTICULO 261-INCISO 1 DEL CODIGO DE COMERCIO:
INVERSION DEL 100%
ACTIVIDAD ADQUIRIR POR CONCESION O POR OTRO TITULO EL DERECHO A EXPLORAR BOSQUES DE LA NACION O PARTICULARES, ETC
DOCUMENTO PRIVADO DEL 26 DE ABRIL DE 2002
Libro 9 Nro 4292 02/05/09

SANCELA JAMAICA LIMITED
DOMICILIO JAMAICA - JAMAQUINA
Subordinada
PRESUPUESTO ARTICULO 261-INCISO 1 DEL CODIGO DE COMERCIO:
INVERSION DE MAS DEL 50%
ACTIVIDAD COMERCIALIZAR, EXPORTAR, IMPORTAR, COMPRAR Y VENDER MERCANCIAS Y PARTICULARMENTE PRODUCTOS DE PAPEL Y PRODUCTOS SANITARI
DOCUMENTO PRIVADO DEL 26 DE ABRIL DE 2002
Libro 9 Nro 4292 02/05/09

SANCELA CHILE S.A.
DOMICILIO CHILE - CHILENA
Subordinada
PRESUPUESTO ARTICULO 261-INCISO 3 DEL CODIGO DE COMERCIO:
INFLUENCIA DOMINANTE EN LAS DECISIONES DE LOS ORGANOS DE ADMINISTRACION
ACTIVIDAD COMERCIALIZAR, EXPORTAR, IMPORTAR, COMPRAR Y VENDER MERCANCIAS Y PARTICULARMENTE PRODUCTOS DE PAPEL Y PRODUCTOS SANITARIOS.
DOCUMENTO PRIVADO DEL 28 DE FEBRERO DE 2003
Libro 9 Nro 2304 03/03/10

CERTIFICA

DIRECCION ELECTRONICA: notificaciones@familia.com.co

CERTIFICA

NOTIFICACION DE DIRECCION JUDICIAL

CR 50 Nro 8 SUR - 117 MEDELLIN

CERTIFICA

Que en la CAMARA DE COMERCIO DE MEDELLIN PARA ANTIOQUIA, no aparece inscripción posterior a la anteriormente mencionada, de documentos referentes a ref rma, dis lución, liquidación o nombramiento de representantes legales de la expresada entidad.

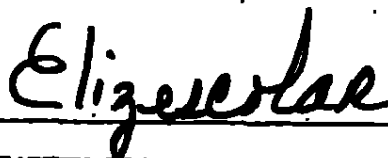
VALIDO POR AMBAS CARAS

Los actos de inscripción aquí certificados quedan en firme cinco (5) días hábiles después de la fecha de su notificación, siempre que no hayan sido objeto de los recursos de la vía gubernativa en los términos establecidos en el artículo 50 del Código Contencioso Administrativo.

CERTIFICA

Fecha de Renovación: Marzo 31 de 2003

Medellin, Octubre 24 de 2003 Hora: 9:50 AM



ELIZABETH ESCOBAR GUENDICA

VALID POR AMBAS CARAS

MEDELLÍN, 31 DE OCTUBRE DE 2003

**SEÑORES
DIVISION DE SIGNOS DISTINTIVOS
SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO
Bogotá D.C.**

MARIA ADELAIDA PEREZ JARAMILLO, mayor de edad, identificada como aparece al pie de mi firma, actuando como Representante Legal de la Sociedad **PRODUCTOS FAMILIA S.A.**, sociedad organizada y existente de conformidad con la Leyes Colombianas, domiciliada en Medellín, Antioquia - Colombia,, otorgo poder especial, amplio y suficiente a los doctores **MAURICIO JARAMILLO CAMPUZANO Y/O PAULÁ SAMPER SALAZAR**, abogados en ejercicio, mayores de edad, identificados como aparece al pie de sus firmas, quienes podrán actuar conjunta o separadamente, para presentar demanda de oposición contra la solicitud de Registro de la Patente de Invención denominada **"TOALLA FEMENINA PARA NIÑAS"**, Expediente 01097691.

Los apoderados quedan facultados para transigir, recibir, desistír, sustituir, resumir este poder, Interponer recursos y, en general, para todo lo encaminado a la mejor defensa de los intereses de la sociedad en cuyo nombre hablo.


MARIA ADELAIDA PEREZ JARAMILLO
C.C. No. 43'582.297 de Medellín (Ant.)

Acepta el Poder:



MAURICIO JARAMILLO CAMPUZANO
C.C. 80.421.942 de Usaquén

PAULA SAMPER SALAZAR
C.C. 51.854.274 de Bogotá

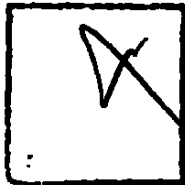
Diligencia de Reconocimiento

Compareció ante mí, Notaria Séptima del Circuito de Medellín, el Señor(a) Maria Adelaida
Férez Jaramillo
portador(a) de la cédula No. 43 582 297
de Med

y manifestó que el contenido del documento que antecede es cierto y que la firma que en él aparece, fue suscrita por él (ella) y la misma que usa en todos sus actos públicos y privados.

Para constancia firma

Maria A. F. 1
La impresión dactilar corresponde al dedo Ind-D



31 OCT. 2003

REPUBLICA DE COLOMBIA
MEDIDIN
DRA. MARY ORTIZ GAYIRIA
NOTARIA SEPTIMA
ENCARGADA

134
2
133

SUPERINDUSTRIA Y COMERCIO
Radicación : 01097631 00000003 Folios: 72
Fecha (MD): 2003-11-07 15:44:17
Trámite : 002 PATENTES D 1 REGISTRO/ 400 OPOSICION
Dependencia: 2020 DIVISION DE NUEVAS CREACIONES

NIT : 800176089-2

RECIBO OFICIAL DE CAJA : 03 - 81,334
FECHA : NOVIEMBRE 7 DE 2003

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

DEPOSITANTE	TIPO PAGO	BANCO	CUENTA	No. PAGO	FECHA PGO	Vr. PAGO
GOMEZ PINZON Y ASOCIADOS	CONSIGNACION	BANCO POPULAR	050-00110-6	10362976	07/11/2003	448,000.00
GOMEZ PINZON Y ASOCIADOS	CONSIGNACION	BANCO POPULAR	050-00110-6	10427318	07/11/2003	212,000.00
GOMEZ PINZON Y ASOCIADOS	CONSIGNACION	BANCO POPULAR	050-00110-6	16346115	07/11/2003	212,000.00
GOMEZ PINZON Y ASOCIADOS	CONSIGNACION	BANCO POPULAR	050-00110-6	16346116	07/11/2003	212,000.00

***** C O N C E P T O *****

CANT.	RENTISTICO	CONCEPTO	TOTAL CONCEPTO
1	50005-01-04	PRESENTACION DE OBSERVACIONES	
		12 MARCAS Y LEMAS COMERCIALES	212,000.00
		TOTAL :	\$ 212,000.00

SOM: DOSCIENTOS DOCE MIL PESOS

RESPONSABLE : 

RECIBO DE CAJA APLICADO AL EXPEDIENTE No. _____



Industria y Comercio
SUPERINTENDENCIA

2020
Bogotá, D.C.,

Oficio N°: 16115

Doctora:
Dilia María Rodríguez D'Aleman
Apoderada

ASUNTO:	Radicación N°	01-97691
	Trámite	002
	Evento	001
	Actuación	430
	Folios	073

Con fundamento en lo previsto por el artículo 43 de la Decisión 486 de la Comisión de la Comunidad Andina, se le comunica que la oposición presentada por el doctor Mauricio Jaramillo Campuzano, quien actúa como apoderado de la sociedad Productos Familia S.A., reúne los requisitos formales exigidos por la ley al momento de su presentación.

En cumplimiento de lo dispuesto en la citada norma, se le concede el término de sesenta (60) días hábiles siguientes a la fecha de notificación del presente oficio, para que haga valer sus argumentaciones y presente pruebas.

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


ALIX CARMENZA CESPEDES DE VERGEL
Jefe de la División de Nuevas Creaciones.

El anterior requerimiento fue notificado por fijación en lista de fecha, 23 de Nov 2004.

202021