

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO
DIRECCION DE NUEVAS CREACIONES

2020
Bogotá, D.C.,

Doctora
JIMENA ESCOBAR URIBE
Abogada

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



No. 07-053262- -00008-0000

Fecha: 2011-01-20 14:50:46 Dep. 2020 DIR.NUEVASCR
Tra. 11 PATENTEIYII Eve: 378 FASENACIONALI
Act. 519 TRASLADOINFORME Folios: 1

ASUNTO	Radicación	07-53262
	Trámite	311
	Evento	378
	Actuación	430
	Oficio	
	Folios	04

Patente de Invención	☒	Patente de Modelo de Utilidad	☐
Vía PCT (fase nacional)	☒	Cap.I	☒
		Cap. II	☐

No. Sol. Internacional: PCT/US2005/038935
Fecha de Presentación Internacional: 28 de Octubre de 2005

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

1. Documentos estudiados

Descripción:	Folios: 6 a 38	como se radicó inicialmente
	Folios: 94 a 138	modificada
Reivindicaciones:	Folios: 88 a 91	como se radicó inicialmente
	Folios: 139 a 144	modificadas
Figuras:	Folios: 39 a 41	como se radicó inicialmente

2. Objeto de la invención

Titulo de la invención:
Articulo absorbente que tiene indicio visible (folio 1).

Clasificación internacional de Patentes (IPC) en A61F13/15.

3. De la solicitud de Patente (según el caso)

Descripción (articulo 28 D 486)

La descripción no incluye la siguiente información:

- Una descripción de la invención en términos que permitan la compresión del problema técnico y de la solución aportada por la invención, exponiendo las diferencias y eventuales ventajas con respecto a la tecnología anterior.

Por lo anterior, la descripción no cumple con el requisito de claridad y suficiencia lo que haria difícil su comprensión y ejecución de acuerdo al art. 28 de de la Decisión 486.

Reivindicaciones (artículo 30 D 486)

- Los términos “al menos”, “menor” y “de menos”, utilizados en las reivindicaciones 1 a 18, deben eliminarse, dado que no proporcionan precisión ni concisión a las características esenciales de la invención.
- Las reivindicaciones 1 a 18 están caracterizadas por el resultado a obtener y no por sus características técnicas esenciales, es así que no se pueden aceptar, ya que equivaldría a definir el problema técnico a resolver y el alcance de estas reivindicaciones incluirá todas las alternativas presentes o futuras que lleguen a ese resultado. Los resultados a obtener son “una transmisión de luz de al menos 45%”, “un ΔE ”, “resistencia a la flexión” y “capacidad absorbentes”, los cuales son la consecuencia del análisis realizado a un producto absorbente terminado, obtenido por un proceso establecido y unas materias primas particulares, que hacen que se logren los resultados reivindicados, a través de los métodos de análisis respectivos.
Es así como las reivindicaciones deben caracterizar un producto por la forma o constitución del mismo, las partes que lo componen. No se aceptan reivindicaciones que caractericen resultados, usos, ventajas o efectos.
- No hay concisión entre las cinco reivindicaciones independientes 1, 4, 10, 16 y 18, siendo claro que la reivindicación 1 incluye las demás reivindicaciones independientes, es así que las reivindicaciones 4, 10, 16 y 18 se deben formular como dependientes, ya que son características particulares de la reivindicación 1.

Por lo anterior, el capítulo reivindicatorio no cumple con el requisito de claridad y concisión de acuerdo al art. 30 de la Decisión 486.

4. Determinación del Estado de la Técnica

Como fecha para determinar el estado de la técnica se tomará la fecha de radicación de la solicitud en esta Oficina siendo el 5 de octubre de 2004.
Tendiendo en cuenta la anterior fecha indicada, se realiza la búsqueda de las anterioridades de la presente solicitud, encontrándose los siguientes documentos relevantes:

Nº	Documento	Título	Fecha de Publicación
D1	ES2065043	INDICIOS DE CAPACIDAD PARA ARTICULOS ABSORBENTES	1993-04-04
D2	US2004170813	COLOR PRINTED LAMINATED STRUCTURE, ABSORBENT ARTICLE COMPRISING THE SAME AND PROCESS FOR MANUFACTURING THE SAME	2004-09-02
D3	US2003187415	COLORED ABSORBENT ARTICLE	2003-10-02

D1 describe un artículo absorbente desechable que tiene una línea central longitudinal y dos márgenes laterales longitudinales e incluye una lamina superior permeable a los líquidos, una lamina superior impermeable a los líquidos, una lámina posterior impermeable a los líquidos al menos parcialmente unida a la lamina superior en la periferia, un núcleo absorbente entre la lamina superior y posterior, y medios permeables a los líquidos, para indicar visualmente cuando el liquido absorbido se ha aproximado a los márgenes laterales longitudinales del artículo absorbente (Col 3 líneas 17-28, Fig. 2).

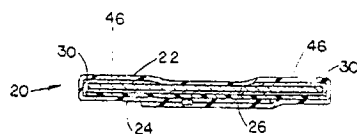


Fig. 2

D2 se refiere una estructura laminada permeable a los líquidos impresa en color que comprende una primera capa permeable a los líquidos y una segunda capa permeable a los líquidos, la primera capa es impresa con color en al menos una de sus superficies antes de ser laminado con la segunda capa y antes de estabilizar la estructura laminada con el medio de unión. Estas estructuras laminadas impresas de colores son especialmente adecuados para su uso en artículos absorbentes desechables para la protección femenina, y generalmente se pueden ver a través de la lámina superior "secundaria" opuesta a la lámina superior "primaria" (Resumen).

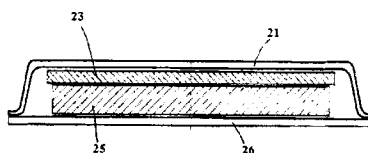
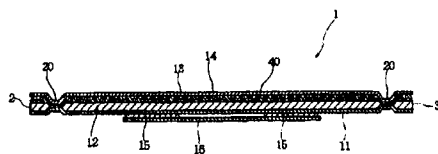


Fig. 4

D3 divulga un artículo absorbente de color que debe atribuirse a una parte interna de una prenda interior a hace juego con el color del artículo. El artículo absorbente tiene una superficie que enfrenta el cuerpo del usuario y una superficie que enfrenta las prendas de vestir. El artículo absorbente incluye una lámina superior que aparece en la superficie del cuerpo. La lámina superior es un tejido no tejido formado por fibras de colores que son al menos un tipo de fibras seleccionadas a partir de fibras de resina sintética, fibras semi-sintéticos y fibras regeneradas.

Fig. 2



5. Análisis de patentabilidad (según requisito) (artículo 14 D486)

Es importante mencionar que el siguiente análisis de patentabilidad se realizó teniendo en cuenta la objeción del numeral 3 de la presente comunicación.

Novedad (artículo 16 D486)

Respecto a la reivindicación 1:

La reivindicación 1 hace referencia: "Un artículo que comprende:

- Una primera capa que tiene una superficie interna y una superficie externa;
 - Una segunda capa que tiene una superficie interna y una superficie externa
 - Indicios dispuestos en al menos una de dichas superficies internas de dicha primera capa o sobre dicha superficie interna de dicha segunda capa;
- En donde al menos una de dicha primera capa o dicha segunda capa tiene una transmisión de luz de al menos 45% en donde dicho indicio es visible desde al menos una de dichas superficies externas".

Análisis de las diferencias respecto al estado de la técnica:

Características Técnicas Esenciales reivindicaciones 1	D1 ES2065043	D2 US2004170813	D3 US2003187415
Un artículo que comprende	SI (Col 1 líneas 3-5)	SI (párrafo 0034, 0125, fig. 4 y 5)	SI (párrafo 002, fig. 4 (21))
Una primera capa que tiene una superficie interna y una superficie externa;	SI (Col 5 líneas 40-41, fig. 1, 2 (22))	SI (párrafo 0126, fig. 4 (21))	SI (párrafo 0053, fig. 2 (14))
Una segunda capa que tiene una superficie interna y una superficie externa	SI (Col 5 líneas 41-42, fig. 1, 2 (24))	SI (párrafo 0126, fig. 4 (26))	SI (párrafo 0053, fig. 2 (11))
Indicios dispuestos en al menos una de dichas superficies internas de dicha primera capa o sobre dicha superficie interna de dicha segunda capa; en donde dicho indicio es visible desde al menos una de dichas superficies externas	SI (Col 3 líneas 32-33, Col 5 líneas 16-20, col 13 líneas 62-65, fig. 1, 2 (46))	SI (párrafo 0148, fig. 4 (23))	SI (párrafo 0053, fig. 2 (13))

De acuerdo con el cuadro anterior donde se comparan las características técnicas de la reivindicación 1 con las anterioridades D1, D2, y D3 se concluye que el artículo absorbente descrito en la citada reivindicación, ya era conocido en el estado de la técnica como se evidencia con las anterioridades encontradas. Por lo tanto la reivindicaciones 1 y sus dependientes no pueden considerarse nuevas.

6. Conclusión

Los requisitos de patentabilidad de la presente solicitud se encuentran afectados así:

Nº	Documento Nº	Reivindicaciones afectadas	Requisito que afecta
D1	ES2065043	1-18	Novedad
D2	US2004170813	1-18	Novedad
D3	US2003187415	1-18	Novedad

En cumplimiento del artículo 45 de la Decisión 486 de la Comisión de la Comunidad Andina, se le indica que debe dar respuesta dentro del término de 60 días contados a partir de la fecha de notificación de la presente comunicación. En caso de no dar respuesta al presente requerimiento, o si a pesar de la respuesta subsistieran los impedimentos para la concesión, se denegará la patente.

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



JOSÉ LUIS SALAZAR LOPEZ
Director de Nuevas Creaciones (E)

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

CONCEPTO TÉCNICO Nº 4609	EXAMINADOR TÉCNICO Código Nº 202090
-----------------------------	--

Es también un objeto de esta invención crear medios para indicar visualmente cuando esta a punto de excederse la capacidad de un núcleo absorbente. Adicionalmente, un objeto de este invento es indicar visualmente el fallo incipiente del núcleo sin reducir su área útil. Finalmente, un objeto de este invento es crear índices discernibles visualmente que mejoren la forma aparente del núcleo absorbente para el usuario.

Breve Resumen del Invento

Para cumplir con estos objetivos, el invento está caracterizado por los aspectos específicos de la reivindicación 1^a.

El presente invento comprende un artículo absorbente desechable, tal como un pañal, compresa sanitaria, o producto para incontinencia de adultos. El artículo absorbente desechable tiene una línea central longitudinal y dos márgenes laterales longitudinales e incluye una lámina superior permeable a los líquidos, una lámina posterior impermeable a los líquidos al menos parcialmente unida a la lámina superior en su periferia, un núcleo absorbente entre la lámina superior y la lámina posterior, y medios permeables a los líquidos, preferiblemente absorbentes, para indicar visualmente cuando el líquido absorbido se ha aproximado a los márgenes laterales longitudinales del artículo absorbente desechable.

Los medios absorbentes o permeables a los líquidos para indicar la aproximación de líquidos a los márgenes laterales longitudinales del artículo pueden comprender dos índices discernibles, visualmente, estando dispuesto uno de los índices a lo largo de cada margen lateral longitudinal del artículo absorbente. Los índices pueden ser paralelos a la línea central longitudinal o pueden ser cóncavos hacia la línea central longitudinal. Los índices pueden consistir en una división entre el núcleo y la lámina superior o en un colorante aplicado a la lámina superior, lámina posterior, o núcleo, o pueden ser bandas independientes fuera del núcleo que pueden representar una diferencia en la elevación aparente entre el núcleo y los índices.

Los índices pueden ser independientes del núcleo absorbente o formar parte integral del mismo. Los índices pueden ser del mismo color que el núcleo absorbente o de un color que contraste con el del núcleo absorbente. Los índices pueden ser del mismo espesor que el núcleo absorbente o pueden ser de un espesor diferente del del núcleo absorbente.

Breve Descripción de los Dibujos

Aun cuando la memoria concluye con reivindicaciones que destacan particularmente y reivindican claramente el presente invento, se estima que se comprenderá mejor el invento a partir de la siguiente descripción considerada en combinación con los dibujos que se acompañan, en los que los componentes idénticos se han designado con los mismos números de referencia, y artículos análogos se han designado con un símbolo de prima, y en donde:

La figura 1 es una vista en planta desde arriba, representada con partes arrancadas, de una compresa sanitaria de acuerdo con el presente invento;

La figura 2 es una vista en corte vertical tomada a lo largo de la línea 2-2 de la figura 1, que

muestra un índice del tipo de división continua entre el núcleo y la lámina posterior;

La figura 3 es una vista en planta desde arriba de una compresa sanitaria con alas de acuerdo con el presente invento;

La figura 4 es una vista en corte vertical de la figura 3, que ilustra una fijación de índice diferente para cada ala;

La figura 5 es una vista en corte vertical de una compresa sanitaria de acuerdo con el presente invento, que tiene un núcleo absorbente e índices de alturas diferentes;

La figura 6 es una vista en planta desde arriba de un pañal, que tiene índices discretos independientes dispuestos lateralmente fuera del núcleo; y

La figura 7 es una vista en corte vertical tomada a lo largo de la línea 6-6 de la figura 6.

Descripción Detallada del Invento

Con referencia a la figura 1, los índices 46 pueden consistir en medios cualesquiera para indicar cuando el artículo absorbente está llegando a su capacidad, y alertar al usuario o al cuidador de la necesidad de quitar el artículo absorbente desechable antes de que se produzca una carga adicional importante. Son adecuados medios cualesquiera para indicar visualmente al usuario cuando la carga se está aproximando a los márgenes laterales 32 del núcleo 26.

Preferiblemente, los índices 46 son absorbentes, de modo que no se reduce el área útil del núcleo 26. Sin embargo, son adecuados índices 46 que son permeables a los líquidos y permiten que los líquidos depositados en la parte superior de dichos índices 46 penetren a través de ellos hasta llegar al núcleo absorbente 26.

Los componentes, tales como los índices 46, se consideran "permeables a los líquidos" si tales componentes permiten que los líquidos pasen a su través sin retardar o obstruir significativamente la transmisión de tales líquidos. Los componentes se consideran "absorbentes" si tales componentes no solamente transmiten tales líquidos, sino que también pueden retener una parte de los líquidos depositados en ellos. De este modo, resultará evidente que todos los componentes absorbentes son permeables a los líquidos, pero no todos los componentes permeables a los líquidos son absorbentes.

Son adecuados índices 46 de cualquier tipo que sean fácilmente distinguibles visualmente del núcleo 26, mientras no se produzca una obstrucción importante al paso de líquidos depositados sobre ellos hacia el núcleo absorbente 26. Si los índices 46 no son permeables a los líquidos o no son absorbentes, los líquidos depositados pueden correr lateralmente hasta los márgenes laterales longitudinales 30, con lo cual puede producirse fallo y exposición o manchas en las prendas de vestir o ropas de cama.

Preferiblemente, los índices 46 tienen forma convexa hacia la línea central 34 longitudinal. Esta disposición aporta la ventaja de que los índices 46 presentarán un aspecto conformado incluso cuando se utilicen con un núcleo absorbente 26 de forma rectangular. De este modo, el artículo desechable, bien sea una compresa sanitaria 20, un pañal 20' o un producto de in-

continencia para adultos, puede aprovechar tanto las ventajas de un núcleo 26 conformado rectangularmente para mayor facilidad de fabricación, como las ventajas de un aspecto abultado, dado que la línea central lateral cumple aproximadamente las preferencias del consumidor. Sin embargo, los índices 46, si se desea, pueden ser rectos o cóncavos hacia la línea central 34 longitudinal.

Si se desea, los índices 46 pueden ser discernibles del núcleo absorbente 26 visualmente o por tacto. Preferiblemente, los índices 46 son discernibles visualmente del núcleo absorbente 26 mediante un color diferente que contrasta con el de este último. Típicamente, el núcleo absorbente 26 de la mayoría de los artículos es blanco. Son adecuados índices 46 de color pastel, aún más oscuros que el material típico del núcleo absorbente 26 de fibra de celulosa AGM suave. Los índices 46 deberán ser visualmente discernibles a través de cualquier lámina superior 22 que pueda utilizarse en combinación con el núcleo absorbente 26. Cuando el núcleo absorbente 26 queda cargado con líquidos, puede aparecer algo más oscuro que cuando no se utiliza. Los índices 46 deberán contrastar suficientemente con el núcleo absorbente 26 en condiciones de carga importante, de modo que incluso en tales condiciones el usuario o cuidador pueda asegurar que se está llegando a la capacidad máxima del núcleo absorbente 26. Los índices 46 pueden presentar una topografía diferente o pueden contrastar de otros modos detectables por el usuario o cuidador.

Con referencia a la figura 1, en una realización, el invento comprende un artículo absorbente desechable, particularmente una compresa sanitaria 20. La compresa sanitaria 20 se utiliza para recoger descargas vaginales, tales como fluidos menstruales, y evitar el ensuciamiento de las prendas del usuario por tales descargas. La compresa sanitaria 20 se caracteriza por una lámina superior 22 impermeable a los líquidos, una lámina posterior 24 permeable a los líquidos, y un núcleo absorbente 26 situado entre la lámina superior 22 y la lámina posterior 24. El perímetro de la compresa sanitaria 20 está definido por dos márgenes laterales longitudinales 30 y dos márgenes laterales 32. La compresa sanitaria 20 tiene los índices 46 dispuestos a lo largo de cada uno de los márgenes laterales longitudinales 30 y en posición adyacente o yuxtapuestos con dichos márgenes para indicar visualmente cuando el núcleo absorbente 26 está casi totalmente cargado.

Con referencia a la figura 3, la compresa sanitaria 20 puede tener al menos un ala 28 que se extiende desde uno de los márgenes laterales longitudinales 30 de la compresa sanitaria 20, y preferiblemente dos alas 28 simétricamente opuestas, extendiéndose cada una desde cada uno de los márgenes laterales longitudinales 30 de la compresa sanitaria 20. La compresa sanitaria 20 puede tener medios, tales como un adhesivo, para fijar liberablemente la compresa sanitaria 20 a la ropa interior de una usuaria.

Con referencia nuevamente a la figura 1, la compresa sanitaria 20 y el núcleo absorbente 26 tienen una línea central 34 longitudinal que divide conceptualmente la compresa sanitaria 20 en dos mitades sustancialmente opuestas

simétricamente. En la forma en que se utiliza en la presente memoria, el término "longitudinal" se refiere a una línea imaginaria, eje o dirección del núcleo absorbente 26, cuya línea, eje o dirección está centrada típicamente entre los márgenes laterales longitudinales 30 del núcleo absorbente 26 y está alineada en general con el plano vertical que biseca a una portadora en pie en mitades izquierda y derecha del cuerpo. El término "lateral" se refiere a una línea imaginaria, eje o dirección generalmente ortogonal a la dirección longitudinal, dentro del plano del núcleo absorbente 26, y está en general alineada transversalmente con relación a la usuaria.

Examinando los componentes de esta realización del invento con más detalle, continuando con referencia a la figura 1, la lámina superior 22 es el componente de la prenda interior que está orientado hacia el cuerpo de la usuaria y está en contacto con el mismo, y recibe descargas corporales. La lámina superior 22 es permeable a los líquidos y deberá ser flexible y no irritante para la piel. En el sentido en que se utiliza en la presente memoria, el término "flexible" se refiere a materiales que son deformables y se adaptan fácilmente a la forma del cuerpo, o responden deformándose fácilmente en presencia de fuerzas exteriores. Preferiblemente, la lámina superior 22 no es ruidosa, para proporcionar discreción a la usuaria. La lámina superior 22 deberá ser sanitaria, de aspecto limpio y algo opaca para ocultar las descargas corporales recogidas en el núcleo absorbente 26 y absorbidas por el mismo.

La lámina superior 22 deberá presentar adicionalmente buenas características de penetración y retención, que permitan que las descargas corporales penetren fácilmente a través de la lámina superior 22 hasta el núcleo absorbente 26, pero que no fluyan en retorno a la piel de la usuaria a través de la lámina superior 22. Las láminas superiores 22 adecuadas pueden estar hechas de materiales no tejidos o de películas poliolefinicas perforadas.

La lámina superior 22 tiene una pluralidad de aberturas para permitir que los líquidos depositados sobre ella pasen hasta el núcleo 26. Tales aberturas pueden estar presentes en las alas 28, pero esto no es necesario. Es adecuada una lámina superior 22 de película poliolefinica perforada que tenga aproximadamente entre un 5 y un 60% de área libre, típicamente un 25% de área libre aproximadamente, y un espesor comprendido aproximadamente entre 0,01 y 0,05 mm antes de ser perforada, y aproximadamente comprendido entre 0,42 y 0,51 mm después de la perforación.

Si se desea, la lámina superior 22 puede ser rociada con un surfactante para mejorar la penetración de líquidos hacia el núcleo 26. El surfactante es típicamente no iónico y no deberá ser irritante para la piel. Es adecuada una densidad de surfactante de aproximadamente 0,01 miligramos por centímetro cuadrado de lámina superior 22. Es comercializado un surfactante adecuado por la Glyco Chemical, Inc. de Greenwich, Connecticut, con la denominación Pegospense 200 ML.

Una lámina superior 22 particularmente adecuada puede fabricarse de acuerdo con la Patente Norteamericana N. 4,342,314 expedida el 3 de

agosto de 1982 a favor de Rawl y otros, y con la Patente Norteamericana N° 4,463,045 expedida el 31 de julio de 1984 a favor de Ahr y otros, cuyas patentes se incorporan en la presente memoria como referencia con el fin de exponer ejecuciones particularmente preferidas de láminas superiores permeables a los líquidos. Se ha encontrado que funciona correctamente una lámina superior 22 hecha de película perforada modelo X-3265 o modelo P1552 comercializada por la Tredegar Corporation of Terre Haute, Indiana.

La lámina posterior 24 puede estar hecha de cualquier material flexible, resistente a los líquidos y preferiblemente impermeable, tal como una película poliolefinica. La lámina posterior 24 impide que se escapen de la compresa sanitaria 20 y ensucian las prendas de vestir y ropas de cama de la usuaria, las descargas recogidas y contenidas en la compresa sanitaria 20, y en particular las descargas absorbidas por el núcleo 26. Preferiblemente, la lámina posterior 24 es silenciosa, para proporcionar discreción a la portadora.

La lámina posterior 24 debe ser también impermeable a gases malolientes generados por descargas corporales absorbidas, de modo que los malos olores no escapen y sean notados por la usuaria. Se ha encontrado que funciona correctamente una lámina posterior 24 de polietileno de baja densidad de aproximadamente 0,01 a 0,08 mm de espesor, y preferiblemente de aproximadamente 0,05 mm de espesor. Se ha encontrado particularmente adecuada para la lámina posterior 24 una película de polietileno tal como la comercializada por la Tredegar Corporation of Terre Haute, Indiana, como modelo X-813.

Adicionalmente, la lámina posterior 24 puede estar hecha de un material de tacto textil suave que sea hidrofóbico con relación a la lámina superior 22; por ejemplo, funciona correctamente una lámina posterior 24 de poliéster o fibra poliolefinica. Un material para la lámina posterior 24 de tacto textil suave particularmente preferido es un estratificado de un material laminar de poliéster no tejido y una película tal como la descrita en la Patente Norteamericana N° 1,476,180 expedida el 9 de octubre de 1984 a favor de Wnuk.

En una realización particularmente preferida, la lámina posterior 24 es ligeramente mayor que la lámina superior 22 y que el núcleo absorbente 26 intermedio. En tal realización, la lámina superior 22 y el núcleo absorbente 26 intermedio están circunscritos periféricamente por la lámina posterior 24 que tiene un margen radial de aproximadamente 0,5 a 1,5 cm, y preferiblemente de aproximadamente 1,0 cm, desde los márgenes laterales de la lámina superior 22. Esta geometría proporciona un área marginal de protección si el núcleo 26 resultase sobrecargado o la compresa sanitaria 20 fallase de otro modo. En la realización, la lámina posterior 24 y las alas 28 son preferiblemente unitarias y coextensivas.

La lámina superior 22 y la lámina posterior 24 se unen preferentemente en su periferia utilizando técnicas conocidas, bien sea en su totalidad de modo que el perímetro completo de la compresa sanitaria 20 está circunscrito por tal unión, o bien parcialmente en su periferia en el perímetro. El término "unido" se refiere a la condición en que

un primer miembro o componente se fija, o conecta, a un segundo miembro o componente directamente, o bien indirectamente, en los casos en que el primer miembro o componente se fija o une a un miembro o componente intermedio que se fija, a su vez, al segundo miembro o componente. Se prevé que la condición de unión entre el primer miembro o componente y el segundo miembro o componente se mantenga durante la vida de la compresa sanitaria 20. Recíprocamente, los componentes se consideran "fijados liberablemente" si los componentes pueden desacoplarse y separarse entre sí sin destrucción o gran deformación no prevista de cualquiera de ellos.

Es adecuada cualquier disposición de componentes unidos que permita la retención del núcleo absorbente 26 en posición intermedia entre la lámina superior 22 y la lámina posterior 24 formando un conjunto unitario. Tal conjunto tiene dos caras principales mutuamente opuestas, una de ellas definida por la lámina superior 22 y la otra definida por la lámina posterior 24.

La cara de la lámina posterior 24 orientada hacia el exterior puede comprender adicionalmente medios para fijar la compresa sanitaria 20 a la ropa interior del usuario. Se ha encontrado que da buen resultado para este fin un adhesivo sensible a la presión. Preferiblemente, una banda de adhesivo orientada longitudinalmente proporciona protección evitando que se separen de la ropa interior de la usuaria indistintamente la cara frontal o la cara posterior de la compresa sanitaria 20. La banda adhesiva puede ser continua o intermitente. Una disposición particularmente preferida utiliza dos bandas orientadas longitudinalmente, una a cada lado de la línea central 34 longitudinal.

El núcleo absorbente 26 funciona como medios para recoger y contener descargas corporales, en particular flujos menstruales, depositadas sobre el mismo o que atraviesan de otro modo la lámina superior 22 permeable a los líquidos. El núcleo 26 es el componente de la compresa sanitaria 20 que recibe y retiene las descargas corporales. El núcleo 26 es adaptable y no irritante para la piel. El núcleo 26 puede tener forma rectangular o de reloj de arena. El perímetro del núcleo absorbente 26 está definido por dos bordes laterales longitudinales y dos bordes laterales transversales, que están alineados con los márgenes 30 y 32 longitudinal y lateral de la compresa sanitaria 20, respectivamente. El núcleo 26 tiene preferiblemente dos caras opuestas, una orientada hacia la lámina posterior 24 y otra orientada hacia la lámina superior 22, y es generalmente de configuración plana, es decir no tiene variaciones importantes de espesor o huecos macroscópicos aislados.

Entre los materiales adecuados para el núcleo 26 se incluyen combinaciones de fieltro ligero, tal como algodón de celulosa, y pulpa textil en fibra, capas de papel de seda, y materiales gelificantes absorbentes. Si se selecciona un núcleo 26 de papel de seda, el papel de este tipo fabricado de acuerdo con la Patente Norteamericana N° 4,191,609, expedida el 4 de marzo de 1980 a favor de Trokhan, presenta un diseño constructivo para el núcleo de papel de seda particularmente preferido para la compresa sanitaria 20 descrita

en la presente memoria. Si se desea incorporar materiales gelificantes absorbentes dentro del núcleo 26 de la compresa sanitaria 20, son adecuados los materiales gelificantes absorbentes fabricados de acuerdo con la Patente Norteamericana Re.32,649, expedida el 19 de abril de 1988 a favor de Brandt y otros. Puede adquirirse un estratificado adecuado de materiales gelificantes absorbentes y papel de celulosa en la Grayn Processing Corporation of Muscatine, Iowa, Modelo Número 1.535.

El núcleo 26 no necesita tener una capacidad absorbente total muy superior a la cantidad total de descargas corporales a absorber. El núcleo 26 es preferiblemente estrecho y delgado para que sea cómodo para el usuario. Para la realización descrita en la presente memoria, la capacidad del núcleo 26 deberá ser de al menos aproximadamente 2 gramos de solución salina al 0,9%. Una solución salina adecuada es comercializada por Travenol Laboratories of Deerfield, Illinois.

El núcleo 26 deberá estar dimensionado para adaptarse al tamaño de la lámina superior 22 y la lámina posterior 24. Para mayor facilidad de fabricación, el núcleo absorbente 26 deberá tener forma rectangular. Sin embargo, el núcleo absorbente 26 puede tener costados curvos, disminuyendo en ancho hacia adentro al aproximarse a la línea central lateral para proporcionar un aspecto generalmente preferido. El núcleo absorbente 26 puede tener una forma parecida a un huso o reloj de arena para presentar un aspecto generalmente preferido, a costa de implicar dificultades de fabricación. Alternativamente, tal aspecto puede ser proporcionado por índices 46 que son cóncavos hacia la línea central 34 longitudinal y recubren el núcleo 26. El núcleo 26 está preferiblemente interpuesto entre la lámina superior 22 y la lámina posterior 24 para evitar que el material absorbente del núcleo 26 se desmenice o se separe mientras se lleva puesta la compresa sanitaria 20 y para asegurar una contención correcta de las descargas corporales. Esta disposición ayuda también a crear un conjunto unitario.

La ejecución de la compresa sanitaria 20 de acuerdo con este invento tiene preferiblemente un calibre inferior a 4 mm aproximadamente, y más preferiblemente menor que aproximadamente 6 mm, medido con una galga comparadora que tiene un peso de ensayo de aproximadamente 80,0 gramos, o con un pie comparador de aproximadamente 10,0 gramos que tiene un diámetro aproximado de 2,54 cm y una superficie de contacto de aproximadamente 5,1 cm². También, la compresa sanitaria 20 de acuerdo con el presente invento deberá tener una superficie de la lámina superior 22 de al menos aproximadamente 100 cm² para evitar que los líquidos descargados se salgan de la superficie útil.

El núcleo 26 está unido preferiblemente a la lámina superior 22, y puede estar unido a la lámina posterior 24. La unión se realiza preferiblemente pegando con un adhesivo el núcleo 26 a la lámina superior 22 o a la lámina posterior 24. Tal adhesivo (no representado) puede aplicarse según cualquier configuración de pulverización adecuada, tal como en espiral o en puntos

orientados longitudinalmente. El adhesivo deberá ser resistente a los surfactantes y de baja sensibilidad a la presión, a fin de que no se pegue a la piel de la usuaria.

Con referencia a la figura 3, la compresa sanitaria 20 puede comprender también un ala 28 que se extienda desde un margen 30 lateral longitudinal de la compresa sanitaria 20, y preferiblemente un ala 28 que se extienda desde cada uno de los márgenes 30 laterales longitudinales de la compresa sanitaria 20. Las alas 28 tienen un extremo proximal 36 que coincide típicamente con la unión de fijación del ala 28 al margen 30 lateral longitudinal de la compresa sanitaria 20 o, alternativamente, el extremo proximal 36 del ala 28 puede estar unido a la compresa sanitaria 20 en cualquier otra posición yuxtapuesta con el margen 30 lateral longitudinal. Las alas 28 se extienden lateralmente hacia afuera de la compresa sanitaria 20 y terminan en un extremo distal 38 que representa el punto del ala 28 más alejado del eje longitudinal 34 de la compresa sanitaria 20.

Las alas 28 pueden ser de cualquier forma deseada, mostrándose una forma preferida en la figura 3. Las alas 28 se fabrican preferiblemente de acuerdo con las enseñanzas de las Patentes Norteamericanas 4,589,876, expedida el 20 de Mayo de 1986 a Van Tirburg, y 4,687,478, expedida el 18 de Agosto de 1987 a favor de Van Tilburg.

Las alas 28 se apartan lateralmente de la línea central 34 longitudinal y de la porción central de la compresa sanitaria 20. Como se utiliza en la presente memoria, la frase "porción central" se refiere a la parte de la compresa sanitaria 20 que está en posición intermedia, en particular en posición lateralmente intermedia, y está definida por los extremos proximales 36 de las alas 28.

Las alas 28 pueden consistir en una prolongación integral o contigua de la lámina superior 22, la lámina posterior 24, o un estratificado de ambas. Alternativamente, las alas 28 pueden estar hechas de una pieza separada e independiente de material unido al margen lateral longitudinal 30 de la compresa sanitaria 20.

Cada ala 28 tiene una cara generalmente coextensiva con la lámina superior 22 y una cara mutuamente opuesta que puede ser en general coextensiva con la lámina posterior 24. Se considera que las caras son coextensivas con la lámina superior 22 o con la lámina posterior 24 si puede dibujarse una línea que tiene un componente lateral desde la porción central de la lámina superior 22 o la lámina posterior 24, respectivamente, que cruza un margen lateral 30 o 32 en el perímetro de la compresa sanitaria 20 e intercepta tal cara.

Las alas 28 tienen preferiblemente medios para fijar una de las caras del ala 28 a la ropa interior del usuario o a la otra ala 28. Los medios de fijación pueden consistir en un adhesivo sensible a la presión. Si se selecciona un adhesivo sensible a la presión, deberá disponerse sobre la cara del ala 28 que es en general coextensiva con la lámina posterior 24 de modo que cuando las alas 28 se arrojan alrededor de la porción de entropierna de la ropa interior del usuario, el adhesivo entrará en contacto con la cara externa de la ropa interior del usuario. Da buen resultado un parche generalmente rectangular de adhesivo sobre cada

ala 28, de un tamaño de aproximadamente 25 mm x 20 mm. Es comercializado por un adhesivo sensible a la presión adecuado por la Anchor Continental, Inc., 3 Sigma Division of Covington, Ohio, con la denominación Century Adhesive A305-4 con un peso de 0,02 mm.

Con referencia a la figura 2, en una realización los índices 16 pueden comprender divisiones 46. Las divisiones 46, al igual que el núcleo absorbente 26, están preferiblemente interpuestas entre la lámina superior 22 y la lámina posterior 24, y están limitadas lateralmente por dichas láminas. Sin embargo, si la lámina superior 22 y el núcleo absorbente 26 son más estrechos lateralmente que la lámina posterior 24, los índices 46 no necesitan estar dispuestos entre la lámina superior 22 y el núcleo absorbente 26, sino que pueden ser exteriores a la lámina superior 22 y, si se desea, pueden estar incorporados en la lámina posterior 24. Alternativamente, los índices 16 pueden ser componentes dedicados independientes del artículo absorbente 20 desechable. Los índices 46 están dispuestos a lo largo de los márgenes laterales longitudinales 30 de la compresa sanitaria 20 siguiendo su orientación, y más preferiblemente son adyacentes a los bordes longitudinales del núcleo absorbente 26.

Examinando los índices 46 con más detalle, las divisiones 46 están hechas de materiales que son absorbentes o permeables a los líquidos, y están interpuestas entre la lámina superior 22 y el núcleo absorbente 26. Las dos divisiones 46 pueden ser integrales, unitarias, y están unidas entre sí como un miembro integral dispuesto entre el núcleo absorbente 26 y la lámina posterior 24. Las divisiones 46 deberán ser en general delgadas, de modo que no se presente a través de la lámina superior 22 un bulto importante y una superficie no uniforme o no plana. Si se desea, las divisiones 46 pueden ser tratadas con un surfactante para favorecer la transmisión de los líquidos hacia el núcleo absorbente 26 a través de las divisiones 46.

Entre los materiales adecuados para las divisiones 46 se incluyen el papel de celulosa, materiales textiles no tejidos, y películas perforadas. Un material particularmente preferido para las divisiones 46 es el papel fino con un peso base de aproximadamente $2,3 \times 10^{-3}$ kilogramos por metro cuadrado y fabricado de acuerdo con las enseñanzas de la Patente Norteamericana N° 3,301,746 expedida el 31 de enero de 1967 a favor de Sanford y otros. Los expertos en la técnica reconocerán que si las divisiones 46 están hechas de papel u otro material absorbente, la capacidad total del artículo absorbente 20 se aumenta ligeramente. Sin embargo, si la división es permeable a los líquidos, tal como ocurre con las películas conformadas, no se produce un aumento importante en la capacidad del artículo absorbente 20.

Si se desea, las divisiones 46 pueden estar incorporadas en las alas 20 de una compresa sanitaria 20, como se ilustra en la figura 3. Utilizando esta disposición, las divisiones 46 pueden utilizarse en diversos diseños para dar un aspecto conformado al núcleo absorbente 26 de la compresa sanitaria 20.

Las divisiones 46 pueden estar yuxtapuestas,

como se muestra, a los márgenes laterales longitudinales 30 de la compresa sanitaria 20, y unidas a los mismos, en posición adyacente a los bordes exteriores del núcleo absorbente 26. Más particularmente, como se ilustra en el lado izquierdo de la figura 4, las divisiones 46 pueden estar unidas indistintamente al núcleo absorbente 26 o a la lámina posterior 24, o pueden estar unidas e incorporadas al ala 28, como se ilustra en el lado derecho de la figura 4.

Si la división 46 está interpuesta entre la lámina superior 22 y la lámina posterior 24 del ala 28, la división 46 puede estar unida a cualquiera o a ambas de dichas láminas. Alternativamente, la división 46 puede envolver al núcleo absorbente 26, y estar interpuesta entre el núcleo absorbente 26 y la lámina posterior 24. Esta es una configuración similar a la de la figura 2, y en tal configuración la división 46 puede estar unida al núcleo absorbente 26, a la lámina posterior 24, o a ambos elementos.

Si se desea, los índices 46 pueden formar parte integral indistintamente de la lámina superior 22, la lámina posterior 24 o el núcleo absorbente 26. Esto puede realizarse imprimiendo los índices 46 sobre la superficie que mira hacia el centro de la lámina superior 22 o de la lámina posterior 24, o sobre la superficie principal del núcleo absorbente 26 indistintamente. Sin embargo, se prefiere en general que los índices 46 no estén impresos sobre la lámina posterior 24 o sobre la cara del núcleo absorbente 26 orientada hacia la lámina posterior 24, de modo que los índices 46 puedan verse más fácilmente a través de la lámina superior 22 y no queden bloqueados u oscurecidos por el núcleo absorbente 26, en particular si se seleccionan índices 46 con colores luminosos o pastel.

Los índices 16 pueden imprimirse según cualquier configuración deseada, siendo preferido en general el diseño mencionado e ilustrado anteriormente, que es convexo hacia la línea central 34 longitudinal. Pueden utilizarse índices impresos 46 indistintamente con la compresa sanitaria 20 con alas de las figuras 3 y 4, con una compresa sanitaria 20 de acuerdo con las figuras 1 y 2 sin alas 28, o con cualquier otro artículo absorbente, como se comenta posteriormente. Los índices 46 pueden imprimirse sobre cualquiera de los componentes mencionados anteriormente de la compresa sanitaria 20 mediante un sistema de grabado, como es bien conocido en la técnica, y pueden imprimirse utilizando tintas o colorantes. Un material particularmente preferido para los índices impresos 46 es el tinte líquido Pontamine Fast Scarlet 48 comercializado por la Movai Chemical Corporation of Union, New Jersey.

Si se desea, los índices discretos 46 y el núcleo absorbente 26 pueden ser del mismo color. Por ejemplo, con referencia a la figura 5, los índices 46 y el núcleo absorbente 26 pueden ser de espesores diferentes, presentando al usuario un aspecto de un cambio importante de altura. Alternativamente, los índices 16 pueden no tener una diferencia importante de elevación con respecto al núcleo absorbente 26, sino que pueden presentar simplemente una textura rugosa o una topografía más basta para el usuario. Si se selecciona una diferencia de elevación para los índices

46, esta estructura puede realizarse disponiendo índices 46 y un núcleo absorbente 26 de espesores diferentes. Preferiblemente, los índices 46 son de densidad menor que la del núcleo absorbente 26. Por consiguiente, en general los índices 46 son más gruesos que el núcleo absorbente 26, de modo que los índices 46 pueden formarse, por ejemplo, haciendo pasar el núcleo 26 a través de una pinza que comprime el núcleo 26 hasta obtener la diferencia de espesor deseada y quedando los índices 46 en las zonas no comprimidas. Esta diferencia de densidad impide el empapamiento rápido de carga líquida a través de los índices 46 y evita que se produzca un fallo rápido de la compresa sanitaria 20.

Aún cuando es factible la estructura en términos generales opuesta a la ilustrada en la figura 5, es decir un núcleo absorbente 26 que es más grueso que los índices 46, tal estructura es generalmente menos preferida porque típicamente los índices 16 serán de una densidad más alta que la del núcleo absorbente 26. Esta estructura presenta la propiedad indeseable de que la carga que ha emigrado lateralmente hasta los índices 46 penetrará en general rápidamente en los índices 46 y provocará el fallo de la compresa sanitaria 20 antes de que el usuario o el cuidador se den cuenta de que la carga ha llegado a los índices 46.

Si se desea, los índices 46 y el núcleo absorbente 26 pueden utilizarse en combinación con artículos absorbentes diferentes de las compresas sanitarias 20. Por ejemplo, y con referencia a las figuras 6 y 7, los medios 46 reivindicados para alertar a un usuario o cuidador del fallo incipiente de un núcleo absorbente 26 pueden utilizarse ventajosamente en una ejecución de un pañal desechable 20'. Tal pañal 20' tiene una lámina superior 22, una lámina posterior 24, y un núcleo absorbente 26, en general de acuerdo con los componentes descritos anteriormente. Sin embargo, el pañal 20' está conformado para ser llevado alrededor de las nalgas y el torso inferior de un usuario. Adicionalmente, el pañal desechable 20' comprende típicamente medios para mantener tal disposición alrededor de las nalgas y torso inferior de un usuario. Se han utilizado ventajosamente para este fin desde hace mucho tiempo cintas adhesivas 50. Son adecuadas las cintas adhesivas 50 fabricadas de acuerdo con la Patente Norteamericana N° 3,818,594 cedida en común y expedida el 19 de Noviembre de 1974 a favor de Buell. En general, un pañal desechable puede fabricarse de acuerdo con la Patente Norteamericana N° 3,860,003, cedida en común, expedida el 14 de Enero de 1975 a favor de Buell.

Con referencia a la figura 6, si se desea, los índices 46 y el núcleo absorbente 26 pueden ser componentes discretos e independientes. Esto puede conseguirse disponiendo índices 46 de un espesor en general equivalente al del núcleo absorbente 26 y disponiendo un índice 46 lateralmente fuera del núcleo absorbente 26. Cada uno de los índices 16 puede estar unido a la lámina posterior 24, a la lámina superior 22, o a los márgenes laterales longitudinales 30 del núcleo absorbente 26 o a cualquier combinación de estos componentes, o pueden estar simplemente yuxtapuestos con los márgenes laterales longitudinales 30 del núcleo

absorbente 26.

Como se ilustra en la figura 7, es adecuada cualquier disposición en la que los índices 46 estén desplazados lateralmente fuera del núcleo 26 y el usuario o cuidador puedan detectar visualmente la presencia de carga en los índices 46 antes de que el perímetro del artículo absorbente 20 sea alcanzado por tal carga. Los índices 46 pueden ser sustancialmente del mismo color que el núcleo absorbente 26 o, preferiblemente, pueden ser de un color que contraste con el del núcleo absorbente 26.

Entre los materiales adecuados para índices 46 independientes se incluyen el algodón de celulosa, similar al utilizado para el núcleo absorbente 26, el papel de 28 granos por metro cuadrado de peso base de acuerdo con la Patente Norteamericana N° 3,301,746 expedida el 31 de Enero de 1967 a favor de Sanford y otros, y el papel de 24 o 52 granos por metro cuadrado de peso base Spec 10 fabricado por la James River Corporation of Green Bay, Wisconsin. Preferiblemente, los índices independientes 46 no tienen AGM, de modo que la capacidad absorbente principal del pañal 20' queda centrada lateralmente.

Será evidente para los expertos en la técnica que cualquiera de los índices 46 ilustrados anteriormente puede utilizarse del mismo modo ventajosamente en una ejecución de un producto de incontinencia para adultos (no representado). Son bien conocidos en la técnica varios productos de incontinencia para adultos y comprenden sistemas de dos piezas y componentes múltiples que tienen cintas separables, broches rápidos y otras formas de accesorios de fijación. Los productos de incontinencia para adultos pueden fabricarse adaptando adecuadamente la escala de los pañales infantiles 20' mencionados anteriormente, o pueden fabricarse de acuerdo con las enseñanzas de la Patente Norteamericana B1 4,490,148 expedida el 18 de Noviembre de 1986 a favor de Berkestrom. Los índices 46 reivindicados pueden utilizarse en cualquiera de tales ejecuciones.

Si los índices 46 no son elementos independientes, sino que más bien están incorporados en la lámina posterior 24, como se ha descrito anteriormente, los índices 46 pueden tener un color diferente del de la lámina superior 22, o bien pueden presentar un aspecto diferente al usuario o cuidador utilizando una diferencia de topografía o textura.

Tal diferencia de color, topografía o textura puede conseguirse disponiendo una lámina posterior 24 que sea de un material sustancialmente diferente del de la lámina superior 22. Por ejemplo, la lámina posterior 24 puede estar hecha de un material no tejido, en vez de estar hecha de la película poliolefínica mencionada anteriormente. Un estratificado impermeable a los líquidos de un material no tejido, tal como el material Sontara Style 8407, comercializado por la DuPont Company of Wilmington, Delaware, se ha encontrado suficientemente discernible de la lámina superior 22 de película conformada mencionada anteriormente para permitir una fácil detección visual de los fluidos corporales absorbidos que se aproximan a tal elemento. Los índices 16 se forman disponiendo bandas orientadas longitudinalmente

del material diferente de la lámina posterior 24 lateralmente fuera del núcleo absorbente 26 y de la lámina superior 22.

Resultará evidente para los expertos en la técnica que son posibles diversas combinaciones y permutaciones de los índices 46 descritos anteriormente. Por ejemplo, un artículo absorbente, tal como un pañal desechable 20', una compresa

sanitaria 20, o un producto para incontinencia de adultos, puede tener tanto las divisiones 46 como un núcleo 26 con índices 46 de una topografía o textura diferentes de las del núcleo absorbente 26. Será evidente para los expertos en la técnica que son posibles otras diversas combinaciones, todas las cuales quedan comprendidas en el ámbito del invento reivindicado.

REIVINDICACIONES

1. Un artículo absorbente desechable para absorber líquidos, que tiene una línea central longitudinal y dos márgenes laterales longitudinales, comprendiendo dicho artículo: una lámina superior (22) permeable a los líquidos; una lámina posterior (24) impermeable a los líquidos unida periféricamente al menos parcialmente a dicha lámina superior; un núcleo absorbente (26) generalmente plano dispuesto en posición intermedia entre dicha lámina superior y dicha lámina posterior, teniendo dicho núcleo dos bordes laterales longitudinales; y medios (46) permeables a los líquidos para indicar visualmente cuando un líquido se ha aproximado a un margen (30) lateral longitudinal de dicho artículo absorbente desechable, comprendiendo dichos medios dos indicadores (46) de humedad discernibles dispuestos entre dicha lámina superior y dicha lámina posterior, estando dispuesto uno de dichos indicadores a lo largo de cada uno de dichos bordes laterales longitudinales de dicho núcleo absorbente; **caracterizado** porque los indicadores de humedad están formados por divisiones (46) interpuestas entre la lámina superior (22) y el núcleo absorbente (26), extendiéndose las divisiones (46) hasta una posición yuxtapuesta con los márgenes laterales longitudinales (30) de la compresa sanitaria (20) adyacente a los bordes exteriores del núcleo absorbente (26).

2. Un artículo absorbente desechable de acuerdo con la reivindicación 1^a, **caracterizado** porque las divisiones se extienden alrededor de los bordes exteriores longitudinales del núcleo absorbente (26) hasta una posición entre el núcleo (26) y la lámina posterior (24).

3. Un artículo absorbente desechable de acuerdo con la reivindicación 2^a, **caracterizado** porque las divisiones (46) forman un miembro in-

terior unitario, quedando unidas entre sí entre el un núcleo absorbente (26) y la lámina posterior (24).

4. Un artículo absorbente desechable de acuerdo con la reivindicación 1^a, **caracterizado** porque las divisiones (46) forman una porción de las alas.

5. Un artículo absorbente desechable de acuerdo con cualquiera de las reivindicaciones 1^a a 4^a, **caracterizado** porque las divisiones (46) consisten en materiales que incluyen papel fino, materiales textiles no tejidos y películas conformadas perforadas.

6. Un artículo absorbente desechable de acuerdo con cualquiera de las reivindicaciones precedentes, **caracterizado** porque las divisiones (46) son cóncavas hacia la línea central (34) longitudinal del artículo absorbente desechable.

7. Un artículo absorbente desechable de acuerdo con cualquiera de las reivindicaciones precedentes, **caracterizado** porque las divisiones (46) están unidas al menos a dicha lámina superior (22), a dicha lámina posterior (24), o a dicho núcleo absorbente (26).

8. Un artículo absorbente desechable de acuerdo con cualquiera de las reivindicaciones 1^a a 6^a, **caracterizado** porque dicho artículo es una compresa sanitaria.

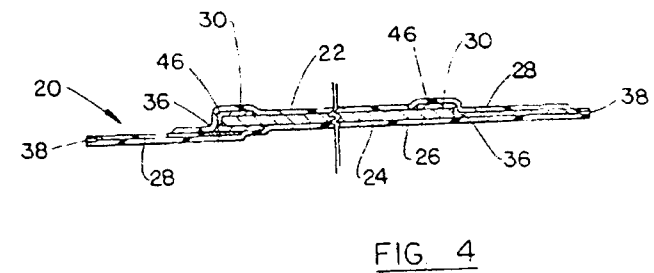
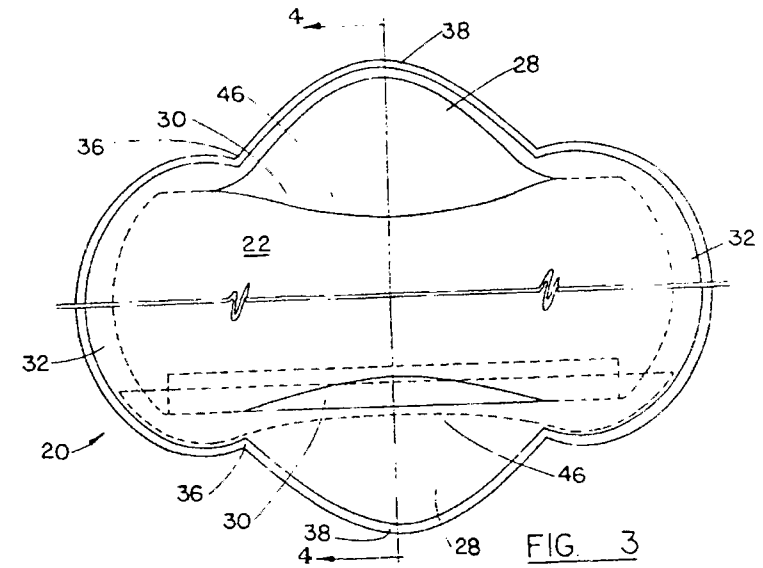
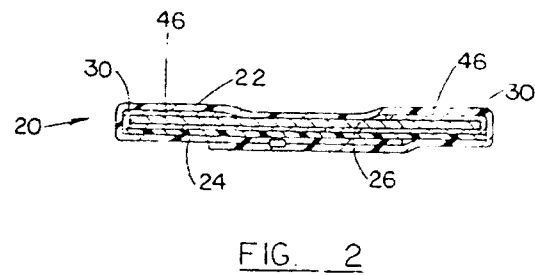
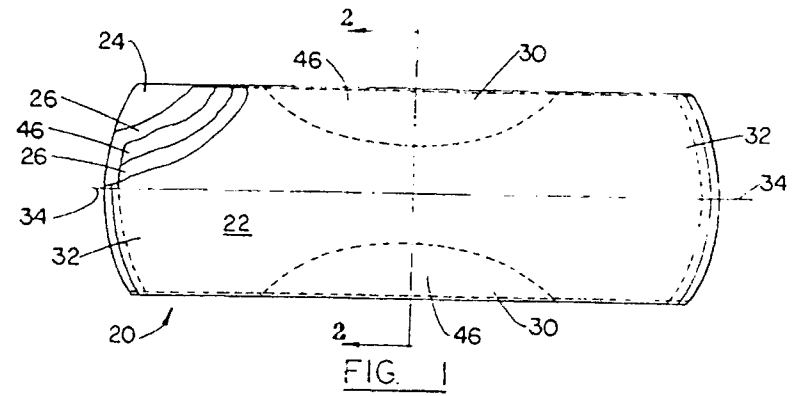
9. Un artículo absorbente desechable de acuerdo con cualquiera de las reivindicaciones 1^a a 6^a, **caracterizado** porque dicho artículo es un pañal.

10. Un artículo absorbente desechable de acuerdo con cualquiera de las reivindicaciones 1^a a 6^a, **caracterizado** porque dicho artículo es producto para incontinencia de adultos.

11. Un artículo absorbente desechable de acuerdo con cualquiera de las reivindicaciones precedentes, **caracterizado** porque dichas divisiones (46) son absorbentes.

NOTA INFORMATIVA: Confronte a la reserva del art. 167.2 del Convenio de Patentes Europeas (CPE) y a la Disposición Transitoria del RD 2424/1986, de 10 de octubre, relativo a la aplicación del Convenio de Patente Europea, las patentes europeas que designen a España y solicitadas antes del 7.10.1992, no producirán ningún efecto en España en la medida en que confieran protección a productos químicos y farmacéuticos como tales.

Esta información no prejuzga que la patente esté o no incluida en la mencionada reserva.



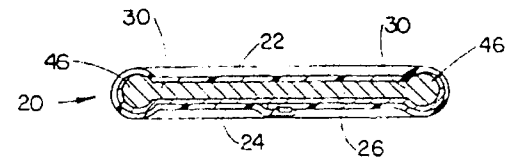


FIG. 5

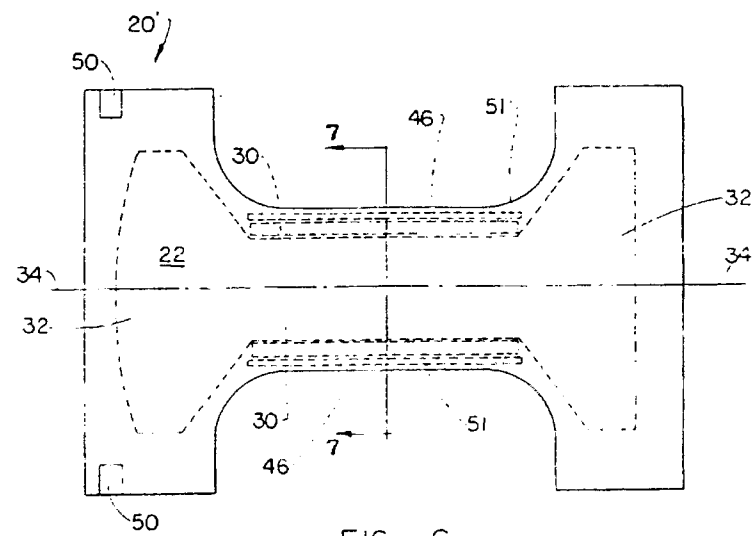


FIG. 6

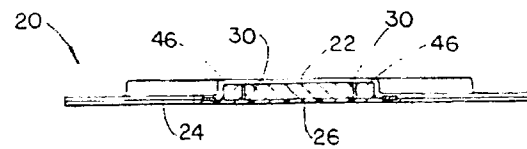


FIG. 7

(19) **United States**

(12) **Patent Application Publication**
Digiacomantonio et al.

(10) Pub. No.: **US 2004/0170813 A1**

(43) Pub. Date: **Sep. 2, 2004**

(54) **COLOR PRINTED LAMINATED
STRUCTURE, ABSORBENT ARTICLE
COMPRISING THE SAME AND PROCESS
FOR MANUFACTURING THE SAME**

Related U.S. Application Data

(63) Continuation of application No. PCT US02/29558,
filed on Sep. 18, 2002.

(30) Foreign Application Priority Data

Sep. 19, 2001 (EP) 01121751.0

Publication Classification

(51) Int. Cl.⁷ B31D 1/00

(52) U.S. Cl. 428/195.1; 156/62.2; 156/277;
604/385.01

(75) Inventors: **Marco Digiacomantonio**, Foggia (IT);
Carlo Toro, Cepagatti (Pescara) (IT);
Giovanni Carlucci, Chieti (IT); **Remo
Bellucci**, Pescara (Spoltore) (IT)

Correspondence Address:

**THE PROCTER & GAMBLE COMPANY
INTELLECTUAL PROPERTY DIVISION
WINTON HILL TECHNICAL CENTER - BOX
161
6110 CENTER HILL AVENUE
CINCINNATI, OH 45224 (US)**

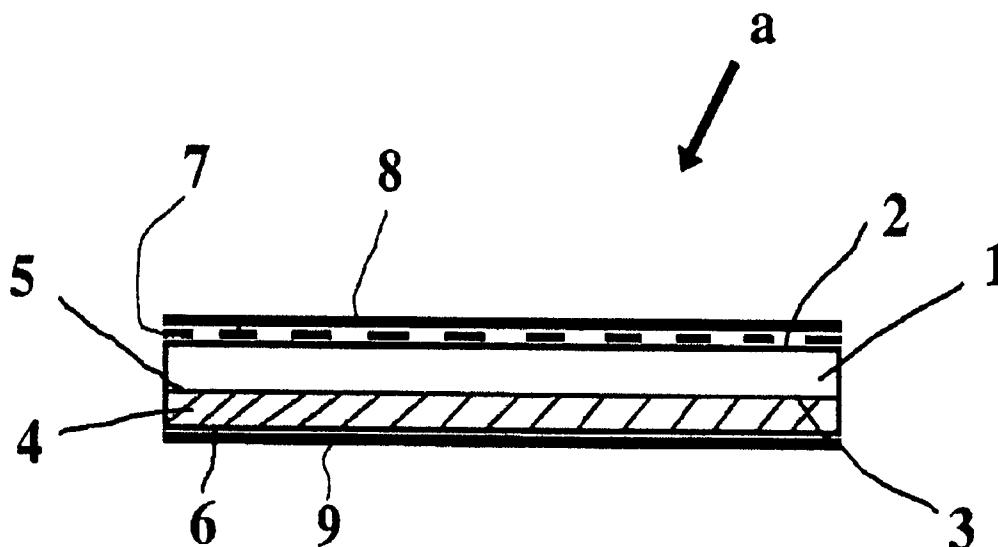
(57) ABSTRACT

The present invention relates to a color printed liquid permeable laminated structure comprising a first liquid permeable layer and a second liquid permeable layer, the first layer is color printed on at least one of its surfaces prior being laminated to the second layer and stabilizing the laminated structure with a bonding means. These color printed laminated structures are particularly suitable for use in disposable absorbent articles for feminine protection, typically as so called 'secondary' topsheet in face to face relation with so called 'primary' topsheet, through which they are visible.

(73) Assignee: **The Procter & Gamble Company**

(21) Appl. No.: **10/795,371**

(22) Filed: **Mar. 8, 2004**



COLOR PRINTED LAMINATED STRUCTURE, ABSORBENT ARTICLE COMPRISING THE SAME AND PROCESS FOR MANUFACTURING THE SAME

FIELD OF THE INVENTION

[0001] The present invention relates to a liquid permeable color printed laminated structure comprising at least a first and a second layer, the second layer being a fibrous web, preferably a dry laid fibrous web, the first layer being color printed on one of its surfaces before applying thereto fibers to form the fibrous web and stabilizing the resulting laminated structure. The present invention also relates to a process for manufacturing such a color printed laminated structure and to disposable absorbent articles comprising such a color printed laminated structure, typically as a so-called secondary topsheet directly underlying the primary topsheet of the articles.

BACKGROUND OF THE INVENTION

[0002] Conventional absorbent articles normally comprise a liquid permeable (topsheet) topsheet having a user-facing surface, a liquid impermeable (imperious) backsheet having a patient-facing surface, and an absorbent core located intermediate the topsheet and the backsheet.

[0003] These elements of absorbent articles like feminine protection articles namely sanitary napkins and/or panty liners, are typically provided in a white color, thereby providing a hygienic, clean look. Upon body fluid discharge like menstruation the absorbent article, typically the absorbent core, absorbs colored body fluid, and changes color to that of the fluid being absorbed. This is disadvantageous to the user. It is, therefore, such as able to provide a clean appearance and a dry surface after the discharge of colored body fluids.

[0004] Also, each menstrual period is very troublesome for women and almost all the women are, in a depressed mood during menstruation. It has been known that there is thus a need for an absorbent article for feminine protection with which a woman can feel relieved from a melancholic mood and may experience menstruation without distress or inconvenience.

[0005] This problem could be addressed per absorbent articles with a color printed non-woven as the topsheet. Although in the field of absorbent articles for baby protection it is known to color print non-woven (especially the backsheet) of diapers, the use of this technology in absorbent articles for feminine protection as a topsheet directly facing the wearer's skin still encounters negatives like color bleeding, and/or color rub-off towards the wearer's skin, this especially under wet conditions per discharge of body fluids on the articles.

[0006] Furthermore, the use of color printing technology on, for example, body fluid receiving/transmitting elements (e.g., absorbent core) of absorbent articles is not justifying the primary benefits of said elements/layers and hence of the overall body fluid handling properties of the articles per se.

[0007] It is thus an object of the present invention to provide an absorbent article for feminine protection which provides a pleasant feel to a woman before she uses it and

which is so structured as to be disposed off cleanly while concealing the flow once the article is used.

[0008] It is a further object of the present invention to provide improved colored printed elements/layers for use in absorbent articles for feminine protection typically as topsheet (preferably as secondary topsheet) with reduced color bleeding and reduced color rub-off without compromising on the inherent acquisition, diffusion/transmission and absorption properties of such elements/layers.

[0009] It has now been found that these objects are solved by providing a color printed liquid permeable laminated structure comprising at least a first layer and a second layer, each layer having a first outer surface and a second outer surface, the two surfaces being opposite each other, the first layer being color printed on at least one of its surfaces (i.e., at least on its first or second surface or both) prior being laminated to the second layer, the second layer being a fibrous web, preferably a dry laid fibrous web, the laminated structure being stabilized by a bonding means preferably a latex binder, and a process for manufacturing such a laminated structure.

[0010] Advantageously by color printing the first layer, preferably a non-woven, prior laminating it to fibers to form a fibrous (dry-laid) web and stabilizing the resulting laminated structure per bonding means, preferably latex binder, the laminated structure retains essentially all its acquisition, diffusion and absorption properties towards body fluid deposited thereon. In contrast, color printing as a subsequent step, a laminated structure after having laminated a first layer, e.g., a nonwoven, to a (dry laid) fibrous web and stabilized the resulting structure per bonding means, results in loss of acquisition, diffusion and absorption properties of the laminated structure. Indeed, printing with conventional printing technologies known to those skilled in the art (e.g., flexography) on a surface of such a laminated structure (once laminated) results in capillary reduction of the whole laminated structure thickness, thereby increasing the density of the fibrous dry laid web, and hence reducing its body fluid handling properties.

[0011] Advantageously stabilizing the color printed laminated structure of the present invention by applying a bonding means preferably a latex binder contributes to reduced color bleeding and reduced color rub-off.

[0012] In a broadest aspect the present invention also encompasses an absorbent article for feminine protection comprising a liquid permeable topsheet, an underlying layer directly adjacent to the topsheet and visible through the liquid permeable topsheet, a liquid impermeable backsheet and an absorbent core positioned between the underlying layer and the backsheet, the underlying layer visible through the topsheet is a color printed liquid permeable laminated structure, comprising at least two liquid permeable layers, each layer having a pair of opposed surfaces, at least one of said layers of the laminated structure is color printed on at least the surface directly adjacent another liquid permeable layer of the laminated structure, prior laminating the liquid permeable layers of the laminated structure together. Advantageously such construction results in reduced color bleeding, and reduced color rub-off towards the topsheet while not compromising on the body fluid handling properties of the article.

BACKGROUND ART OF THE INVENTION

[0013] Ink-printed non-woven fibrous webs and absorbent articles comprising the same are known in the art.

[0014] Representative of the art are the following references:

[0015] U.S. Pat. No. 5,458,590 discloses ink-printed non-woven fibrous webs comprising a non-woven fibrous web comprising a pair of opposed surfaces, and an image printed with having an average wet crackiness value of at least about 4 or greater. 590 also discloses disposable absorbent articles comprising a topsheet, a backsheet and an absorbent composite, the backsheet comprising such a ink-printed non-woven fibrous web.

[0016] J.P.A. 934 737 discloses an absorbent article comprising a topsheet, a backsheet and an absorbent core intermediate the topsheet and the backsheet. The topsheet includes a primary topsheet and a secondary topsheet. At least some of the primary topsheet has apertures arranged in a regularly spaced first pattern. At least some of the secondary topsheet has indicia arranged in a regularly spaced second pattern, the indicia being positioned, shaped and dimensioned to be substantially homogeneously visible through the apertures in the first topsheet. The secondary topsheet being provided relative to the primary topsheet by a pivot angle from the first position to a second or on-use position so that the indicia of the secondary topsheet are differentially out of alignment with the apertures of the primary topsheet forming a regularly spaced third pattern. The regularly spaced third pattern facilitates correct positioning of the absorbent article whilst, simultaneously, masking any colored fluid absorbed by the absorbent core.

[0017] None of these prior art discloses, nor teaches the color printed laminated structure as presently claimed, nor absorbent articles comprising the same, let alone a process for manufacturing the same.

SUMMARY OF THE INVENTION

[0018] The present invention relates to a color printed liquid permeable laminated structure comprising at least a first liquid permeable layer and a second liquid permeable fibrous layer, preferably a dry laid fibrous web, the first layer is color printed on at least one of its surfaces prior being laminated to the (dry laid) fibrous web and stabilizing the laminated structure with a bonding means, preferably a latex binder. The present invention further relates to a process of manufacturing such a color printed laminated structure.

[0019] It is broadest aspect the present invention also encompasses an absorbent article for feminine protection comprising a liquid permeable topsheet, an underlying layer visible through the liquid permeable topsheet, a liquid impermeable backsheet and an absorbent core positioned between the underlying layer and the backsheet, characterized in that the underlying layer visible through the topsheet is a color printed liquid permeable laminated structure comprising at least two liquid permeable layers with a pair of opposed surfaces, at least one layer of the laminated structure (typically the so-called first layer in the description herein) is color printed on at least one of its surfaces, preferably at the surface directly adjacent another liquid

permeable layer of the laminated structure, prior laminating the liquid permeable layer of the laminated structure together.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] While the specification concludes with claims particularly pointing out and distinctly claiming the present invention, it is believed that the present invention will be better understood from the following description in conjunction with the following drawings:

[0021] FIG. 1 is a schematic fragmentary side elevational view of an apparatus for making a laminated structure according to the present invention;

[0022] FIG. 2 is an enlarged cross-sectional view of a color printed laminated structure according to the present invention;

[0023] FIG. 3 is an enlarged cross-sectional view of an alternative embodiment of a color printed laminated structure according to the present invention;

[0024] FIG. 4 is an enlarged cross-sectional view of a feminine protection absorbent article taken along line I-I of FIG. 5;

[0025] FIG. 5 is a top view of a feminine protection absorbent article according to the present invention;

[0026] FIG. 6 is an alternative top view of a feminine protection absorbent article according to the present invention.

DETAILED DESCRIPTION OF THE INVENTION

Definitions

[0028] The term "absorbent article" as used herein embraces articles which absorb and contain body exudates. More specifically, the term relates to articles placed against or in proximity to the body of a user to absorb and contain the various exudates discharged from the user's body. The term "absorbent article" is intended to include baby diapers, sanitary napkins, panty liners, incontinence products, flow-over articles such as wet absorbent undergarment pads, nursing pads, collar inserts, absorbent wound dressings and any other articles used to absorb body fluids or body exudates can also benefit from the present invention.

[0029] The term "absorbent" is used herein to describe absorbent articles that are not intended to be launched or otherwise reduced or reused as absorbent articles (i.e., they are intended to be discarded after a single use and, preferably, to be recycled, composted or otherwise disposed of in an environmentally compatible manner).

[0030] The term "use", as used herein, refers to the period of time that starts when the absorbent article is actually put in contact with the anatomy of the user.

[0031] In a preferred embodiment of the invention the color printed laminated structure consists of two layers (i.e., the first and second layers, as described herein after). In such executions the term "user surface" of respectively the first and second layer of the laminated structure, refers to the surface of the first layer facing the second layer and to the surface of the second layer facing the first layer, the "outer

surface" of respectively the first and second layer is accordingly respectively the opposite surface of each layer. In other words, in the preferred embodiment wherein the laminated structure consists of the first and second layers, the outer surfaces of the first and second layers form the outer surfaces of the laminated structure.

[0032] Color Printed Laminated Structure

[0033] The present invention relates to a color printed liquid permeable (fibrous) laminated structure primarily intended for acquiring, diffusing and absorbing fluids, typically body fluids. The structure comprises at least two layers, a first layer that is color printed on at least one of its surfaces and a second layer, the so-called fibrous web. In preferred embodiment herein the color printed fibrous laminated structure consists of only the first and second layers as described herein.

[0034] In a preferred embodiment, the laminated structures of the present invention are incorporated into absorbent articles, intended for absorption of body fluids. Preferably it is used as topsheet, more preferably as a secondary topsheet underlying a primary topsheet. Such a secondary topsheet is intended to acquire and diffuse body fluids through the primary topsheet towards the absorbent core. Alternatively the color laminated structures according to the present invention can constitute integrally the absorbent core of a disposable absorbent article, or they can be comprised therein as part of the absorbent core.

[0035] It has surprisingly been found that by color printing a liquid permeable layer prior to laminating it to a second liquid permeable layer, preferably a dry and fibrous web and stabilizing the resulting structure, not bonding means, preferably a latex binder, a color stable, printed liquid permeable laminated structure is provided that retains its acquisition, diffusion and absorption properties, low turbidity.

[0036] Advantageously the color printed laminated structure according to the present invention has improved color bleeding resistance that reduces the transfer of printed ink to other surfaces/layers and improved color rub-off resistance while retaining desired physical characteristics of the laminated structure as a whole, like softness, drapability, thickness, wetability and fluid acquisition speed.

[0037] In a preferred embodiment herein the color printed laminated structures according to the present invention meet at least one of the parametric features specified herein after and preferably all of them. Indeed the color printed laminated structures according to the present invention typically have a color fastness to water when measured according to ISO 105-E01 of at least 3, preferably 4 or more, typically a color fastness to rubbing when measured according to ISO 105-X12 in dry condition of at least 3, preferably 4 or more, and in wet condition of at least 2, preferably 3 or more, and typically a color fastness to perspiration when measured according to ISO 105-F06 of at least 3 and preferably 4 or more (for independently both alkaline solution and acid solution). These test methods are standard ones as described in respective ISO test (International Organization for Standardization). The test results are performed on a scale of 1 (the worst rating) to 5 (the best rating) as provided in these test methods.

side-by-side, wa-in-islands, and concentric fiber configurations. Furthermore, fibers with non-circular cross-sections such as "Y" and "X" shapes may be used.

[0039] The fibers and/or webs may have other components and/or treatments. For example, adhesives, waxes, flow modifiers, processing aids and other additives may be used during the formation of the fibers and webs. In addition, pigments may be added to the fibers to change their color and other additives may be incorporated into the compositions to make the fibers and/or webs elastic. Lastly, blends of fibers, as well as straight and bicomponent fibers may be combined to form nonwoven webs suitable for use as the first layer of the laminated structure of the present invention.

[0040] When forming a nonwoven, such as a nonwoven polyolefin fibrous web, the fiber size and basis weight of the material can be varied according to the particular end use. In personal care product, typical fiber sizes will range from between about 0.1 to about 10 denier, and basis weights will range from between about 10 grams per square meter to about 105 grams per square meter. For other applications, both the fiber size and the basis weight can be adjusted.

[0041] Examples of suitable first layer for use herein are spunbonded polypropylene nonwoven, 17 gsm, commercially available from BHA (full name) under code 1W105, 01-17B and/or spunbonded polyethylene nonwoven, 17 gsm, commercially available from BHA (full name) under name 127AXC.

[0042] It is an essential feature of the invention that the first layer is color printed on at least one of its surface. Color printing process is described herein below in more details.

[0043] The inherent color of the first layer material might affect the color printing, especially of lighter tints color printing. It will be appreciated that color printing on more distinct against a soft (yellowish) white, whilst process colors reproduce most accurately on neutral white material. The brightness of the first layer material may be altered to adjust the contrast or brilliance of the color printing. Color reproduction may be affected if artificial brighteners (e.g., fluorescent additives) are incorporated in the first layer material, since most artificial brighteners are not neutral in color but, rather, have excess blue reflectance. Although per se the first layer might be colored (i.e., might have another color than white) it is highly desirable that the first layer rest is not colored, i.e. is white, prior to undergoing color printing as described herein after.

[0044] Whatever surface of the first layer that is color printed, the resulting colored print is visible not only on the surface printed but also through the thickness of the first layer on its opposite surface (i.e. surface of the first layer being opposite to the one printed). Thus in the embodiments herein wherein the color printing occurs on the first layer on at least the surface thereof directly adjacent to the second layer in the laminated structure, prior laminating the first layer to the second layer, the color print is visible through the thickness of the first layer on its opposite surface (which, in the preferred structure herein consisting of only two layers, i.e., the first and second layers, corresponds to the outer surface of the laminated structure). This is achieved per the properties of the first layer, for example, non-woven, such as fibers transparency, and/or open area percent within the first layer and/or low basis weight. In a common practice to these

skilled in the art to vary such parameters to obtain the desired relative transparency. Alternatively transparency might be obtained per heat application and/or pressure, for example per application of an embossment pattern.

[0051] The first layer is color printed on at least one area of at least one of its surfaces. At least one surface of the first layer is color printed following any desired image. Per "image" it is understood herein the overall pattern, printed onto at least one surface of the layer. The image might cover only a limited area of the surface of the layer, typically in the center (so as for example to identify visually the body fluid discharge area when used into a disposable article for feminine protection), to the whole surface of the layer. The image can be a plain color printing or can be made of various indicia composing the image. Accordingly the image includes any form of color printing from uniform printing of only one color to multiple indicia of multiple colors. Indeed, the image and indicia may be of various colors and/or tones, with different distributions and densities depending on the requirements of use. The image and indicia might have any size or shape. The image/indicia may be regular or irregular in shape. Suitable image/indicia include, but are not limited to, any type of designs, marks, figures, identification codes, words, patterns, and the like. Example of image/indicia include, but are not limited to, triangles, tetragons, pentagons, hexagons, circles, ellipses, crescent shapes, teardrop shapes, or a mixture thereof. In the case of a plurality of indicia forming the image, the color printed indicia can be the same or different (color, shape, and/or form), being irregularly or regularly spaced on the surface of the layer to which they are printed.

[0052] Examples of color printed images in absorbent articles are shown in FIGS. 5 and 6.

[0053] The colored image printed onto at least one surface of the first layer might be of any color including only one color or combination thereof. It will be appreciated that the color choice may have a psychological effect since, for example, red would be an "angry" color whilst blue would be a calming color or green a relaxing color. In a particularly preferred embodiment according to the present invention, the color is selected within a range of colors from yellow to blue (440 to 580 nanometers), i.e., colors being complementary to the colors of menstruation (dominantly red) and hence are able to absorb the red wavelengths of the light that are the ones reflected by a dominantly red color. Advantageously by color printing a layer with such a color or combination thereof, the visibility of menstrual blood stains absorbed onto such a layer is reduced. In other words, the stains seem to be smaller and less vivid per visual inspection when using color printed laminate structures according to the invention printed with colors ranging from yellow to blue (440 nm to 580 nm) in absorbent articles in contrast to color printed laminate structures printed with colors ranging from violet to orange. Considering that blood is not only one, totally, but a series of hues (from violet) magenta, to orange, preferred colors used herein range from yellow to blue in order to provide enhanced blood masking effect for all these tonalities.

[0054] In an alternative embodiment, if the first layer is pre-colored, the colored image may be applied in white ink. This gives a reversed, but sharper, impression of printed image.

[0055] The second layer of the Color Printed Laminated Structure

[0056] The second layer of the color printed laminated structure is a fibrous web

[0057] Fibrous web for use herein include spunbonded, wet laid web and dry laid fibrous web. Dry laid fibrous web are preferred herein and described in more details herein after.

[0058] Dry laying and, more specifically, air laying processes are widely used to produce webs from dry fibres. Particularly, dry laying refers to the formation of carded webs, i.e., webs in which the fibres are oriented (carded) in a given direction, whereas the air laying process refers to the formation of webs with a completely random fibre orientation; the properties of such air laid webs are therefore somewhat isotropic. The fibrous webs produced by dry laying processes are soft, flexible and porous.

[0059] The fibrous structures of the present invention can be made using conventional equipment designed for dry laying processes, and although the invention is described hereinbelow with particular reference to air laid structures, it should be understood that other dry laying processes, e.g., carding, are also applicable.

[0060] The dry laid fibrous web used in the laminated structure of the present invention is soft and yet strong and absorbent. It can be desirable for preferred dry laid fibrous webs of this type to have relatively low bulk. A reduction in bulk, which means a reduction in volume, the fibrous web is occupying, without sacrificing significantly other desired properties is important from the standpoint of manufacturing, storage and packaging. Hence, for dry laid fibrous web (second layer) used according to the present invention the basis weight can range from about 5 g/m² to 600 g/m², preferably from about 10 g/m² to 300 g/m², more preferably from about 20 g/m² to 100 g/m² and most preferably from about 40 g/m² to 70 g/m². Advantageously, the strength of the laminated structure according to the present invention is provided per the first layer for example nonwoven, which acts as a carrier, giving the main strength to the resulting laminated structure. When the basis weight exceeds the upper limit, the product may be too stiff and therefore not useful for most applications.

[0061] The air laid fibrous web herein comprises randomly distributed fibres. Any of a variety of fibres, including a blend or admixture, can be used in the fibrous web herein. The fibres may be cellulosic, modified cellulosic, or synthetic, and include such fibres as wood pulp, rayon, cotton, cellulose acetate, polyester, polyethylene, polypropylene, nylon, and the like. A fibrous web comprising cellulosic fibres such as wood pulp fibres is particularly useful for use as an absorbent structure or top-sheet in feminine protection absorbent articles as sanitary napkins or panty liners because the cellulose is liquid absorbent, therefore enhances the overall absorbency of the laminated structure as well as creates a network that contributes to the strength of the overall structure and retains particles that might be present like for example polyethylene powder. Blend of cellulosic and synthetic fibres might also be used, typically blend comprising about 65% to 95% by weight of cellulosic fibres, and corresponding remaining percent of synthetic fibres and more preferably up to about 20% by weight of the synthetic fibres. The synthetic fibres, which can be provided as dry

integrity/stability of the whole structure, and optimum reduction of color-bleeding and rub-off

[0069] This later execution is illustrated in FIGS. 2 and 3, where both the outer surface (2, 20) of the first layer (1, 10) and the inner surface (6, 60) of the second layer (4, 40) of the color printed laminated structure (2, 20) bear a latex coating, indicated in the drawing by lines (8,80,90). The latex coating typically penetrates or impregnates the structure to some degree and partially coats most of the fibres. The penetration might be controlled as desired so as not to impair the characteristics of the laminated structure. Indeed the depth of penetration of the latex into the fibrous web (second layer) and/or into the first layer can be controlled by the vacuum applied by means of the suction boxes positioned in correspondence with the dispensing means dispensing the latex binder, and by the choice of the amount to be applied.

[0070] In another embodiment of the present invention the bonding means used herein is a thermoplastic polymeric material, alone or in combination with other bonding means, preferably latex binder. Optionally but highly preferred the fibrous web, especially dry laid web, might comprise a thermoplastic polymeric material in finely divided form, preferably in particle or powder form, beside the latex binder its distribution among the fibres of the dry laid web helps to bind the fibres upon thermal treatment. The subsequent thermal treatment melts the thermoplastic polymeric material and therefore creates a framework of discrete bonding points within the web, i.e. among the fibres where the thermoplastic polymeric material is finely divided form has been distributed. The use of thermoplastic polymeric material in finely divided form can advantageously be combined with latex bonding, e.g. the thermoplastic powder performs the bonding preferably of the inner portion of the dry laid web, while the application of a latex binder stabilizes the outer surfaces of the dry laid web. Typically the thermoplastic polymeric material may range from about 1% to 30% by weight of the total weight of the laminated structure, and preferably from about 10% to 20% by weight.

[0071] The (dry laid) fibrous web used according to the present invention might comprise a particulate material distributed in the web that is typically capable of performing absorption of aqueous fluids and/or control of the odours, e.g., those odours associated with the absorbed fluids. Preferably the particulate material comprises an absorbent gelling material and/or an odour control means, both in particle form.

[0072] The color printed laminated structures according to the present invention are illustrated in FIGS. 2 and 3. FIG. 2 shows a color printed laminated structure (2) with a first layer (1) made of non-woven and a second layer (4) being an air laid fibrous web, the first layer (1) having an outer surface (2) and an inner surface (6), the outer surface (2) being color printed, as indicated in the drawing per dotted line (7), the second layer (4) having an outer surface (6) and an inner surface (5). The structure being stabilized per latex coating on both the outer surface (2) of the first layer (1) and the inner surface (6) of the second layer (4), as used in the color printed laminated structure (2). FIG. 3 shows a color printed laminated structure (2) with a first layer (10) made of non-woven and a second layer (40) being an air laid fibrous web, the first layer (10) having an outer surface (20) and an inner surface (60), the outer surface (20) being color printed, as indicated in the drawing per dotted line (7), the second layer (40) having an outer surface (6) and an inner surface (5). The structure being stabilized per latex coating on both the outer surface (20) of the first layer (10) and the inner surface (60) of the second layer (40), as used in the color printed laminated structure (2). FIG. 3 shows a color printed laminated structure (2) with a first layer (10) made of non-woven and a second layer (40) being an air laid fibrous web, the first layer (10) having an outer surface (20) and an inner surface (60), the outer surface (20) being color printed, as indicated in the drawing per dotted line (7), the second layer (40) having an outer surface (6) and an inner surface (5). The structure being stabilized per latex coating on both the outer surface (20) of the first layer (10) and the inner surface (60) of the second layer (40), as used in the color printed laminated structure (2).

layer (10) being color printed, as indicated in the drawing per dotted line (70), the second layer (40) having an outer surface (60) and an inner surface (50), the structure (20) being stabilized per latex coating on both the outer surface (20) of the first layer (10) and the inner surface (60) of the second layer (40), indicated in the drawing by lines (80, 90).

[0073] Examples of such color printed laminated structures illustrated in FIGS. 2 and 3 are laminates of two non-woven. The first layer can be made of a 17 gsm spunbonded polypropylene non-woven material referred to as product No. 1W105-01-178 (or "P-9") obtained from BHA. Linetex, color printed on one of its surfaces. The second layer can be a multi-bonded air laid non-woven material that is thermally bonded using polyethylene powder and latex bonding. In a preferred embodiment, this multi-bonded air laid non-woven material comprises about 60-70% cellulose fibres, 20-38% polyethylene powder and 2-10% of latex (40% of latex is preferably sprayed on the first layer and remaining 60% thereof is sprayed on the second layer of the laminated structure) and has a basis weight of 40-100 gsm. These two non-woven layers are preferably laminated together by deposition the multi-bonded air laid non-woven material on the spunbonded polypropylene non-woven material. The spunbonded material is used as a process aid or carrier web in the process of forming the laminated structure as described herein after. In alternative embodiments, the spunbonded polypropylene nonwoven material may have a greater or lower basis weight, or it may be replaced by an air laid tissue, a wet laid tissue or any of the materials described herein before.

[0074] Process of Manufacturing the Color Printed Laminated Structure

[0075] A suitable process for manufacturing a color printed laminated structure, comprising two layers, a first layer and a second layer, which is a fibrous web, preferably a dry laid fibrous web, comprises at least the following steps:

[0076] (a) providing the first layer and a first printing it on at least one of its surfaces;

[0077] (b) then providing latex on the first layer to form the second layer;

[0078] (c) then applying bonding means, preferably latex binder, onto the outer surface of said second layer and curing; and/or

[0079] (d) applying bonding means, preferably latex binder, onto the outer surface of said first layer and curing.

[0080] When both Steps (c) and (d) are carried out, this might be done in any sequence first (c) then (d) or first (d) then (c) or simultaneously, provided (c) and (d) are operated before (e) and (f).

[0081] The first layer might be color printed on its inner or outer surfaces or both of them. Preferably the first layer is color printed on its inner surface, the surface in face-to-face relation with (i.e., directly adjacent to) the second layer in the laminated structure. This construction is preferred as it further improves the abrasion resistance (color rub-off resistance) properties of the whole color printed laminated structure as well as further reduces occurrence of color bleeding, especially when used as a secondary top-sheet in an absorbent article for feminine protection.

[0082] Advantageously, the first layer is printed with a mono-color image or with a multi-color image. In this later embodiment, where multi-color printing is desired, tight registration is suitable. Tight registration refers to the precise alignment of the different colors comprising an image. Inherent difficulties in achieving tight registration include the distance between the color printing stations, the uniformity of the printing substrate, and the extensibility of the printing substrate.

[0083] Any printing process known in the art, for example, letterpress, lithography, gravure or silk screen are suitable for use herein. Suitable printing processes are, for example, described in U.S. Pat. No. 5,695,855. The colored image may be obtained by generating a halftone in any conventional way. Thus, a preferred printing process is half tone printing. As used herein, the term "halftone" means breaking up a continuous solid tone into a plurality of tiny individual inks of varying sizes, shapes and/or tonal intensities (tonalities).

[0084] The inks used to form the colored image may be any ink known in the art such as those described in, for example, U.S. Pat. No. 5,695,855. The inks used should be safe for human use and should not have environmentally deleterious effects. The ink chosen should, of course, be suitable for the intended printing process. Thus, for example, letterpress and lithographic inks are fairly stiff and require long ink roller trains on the press, to obtain the required flow and film thickness for printing. In contrast, gravure and flexographic inks are very fluid and dry mainly by solvent evaporation. Inks for screen printing are paint-like in their consistency and dry by characteristics. The inks used herein once applied onto the absorbent article and optionally stabilized thereon should be substantially insoluble in the fluids (e.g., menses and urine) to be absorbed by the absorbent article.

[0085] The present invention preferably utilizes flexographic printing to provide the proper balance of cost effective, high quality printing suitable for printing the first layer, preferably nonwoven fibrous web, while maintaining the tactile softness of the layer. Flexography is a printing technology, which uses flexible raised rubber or polymeric plates to carry the image to a given substrate. The flexible plates carry a typically low-viscosity ink directly onto the substrate. The quality of flexographic print in recent years has rapidly advanced such that, for many end-uses, it is comparable to lithographic or gravure printing.

[0086] The types of plates that can be used with the process of the present invention include plates identified as DuPont CycloRIM III, PDS, HDS, PLS, and LP, which may be obtained from E. I. DuPont de Nemours & Co., Inc., 1007 Market Street, Wilmington, Del. 19898; a plate identified as BASF Nyl-dex RTM, which may be obtained from BASF, 1255 Broad Street, Clifton, N.J. 07015; and a plate identified as Flex-light RTM type PL-SKOR-RTM, which may be obtained from W.R. Grace & Co., 5210 Phillip Lee Drive, Atlanta, Ga. 30336. Others include laser etched vulcanized rubber cylinders, such as those supplied by Linotype Products Corporation, 115 Rochester Street, Saitama, N.Y. 14779; or by Flexo Express, 270 Rochester Street, Saitama, N.Y. 14779; or rubber printing plates, such as those supplied by Tufflex, Incorporated, P.O. Box

4546, Middletown, R.I. 02804. The rubber plates and vulcanized cylinder could be natural rubber, EPDM, nitriles, or urethanes.

[0087] Although flexographic printing is preferred herein, other printing methods known to those skilled in the art might be used, including screen printing, rotogravure printing, ink jet printing and the like.

[0088] In comparison to flexographic printing, screen printing equipment is relatively costly and cannot be run as fast as flexographic equipment.

[0089] Rotogravure printing uses an engraved print roll that increases the life of the print pattern and provides higher definition, but rotogravure entails higher cylinder costs and does not give consistent ink depositions on many non-woven substrates. However, rotogravure equipment can be used with water-based, solvent-based, and hot-melt, adhesive-based inks.

[0090] Ink jet printing equipment generally requires inks that have a very low viscosity, often in the range of 1 to 10 centipoises, in order to achieve appropriate processing and application. Water-based and adhesive-based inks can be brought into this range. An advantage of ink jet printing equipment is the relatively high speed at which it can be run. Although only one color can be used per jet, multiple jets can be used to provide multiple colors.

[0091] In printing processes, the ink would cover or print in a varying manner on bond points (i.e., those points where fibers cross and are bonded together), on the fibers themselves, and where the fibers merely cross, but are not bonded together. The varying ink printing or contrast is identified as a paler or more washed-out color, or even a change of color, due to the differences of surface characteristics between the bond points, fiber crossover regions, and the fibers themselves.

[0092] Suitable inks to be used herein include the so-called water-based ink and solvent-based ink.

[0093] A "solvent-based" ink does not use water as the mobile phase, to carry various pigments, resin(s) or binders, and additives, such as wax. Typically, "solvent-based" inks use one or more of various organic solvents such as alcohols, esters, aliphatics, and aromatics to solubilize these components. Solvents that solubilize resins well are generally referred to as "active", while those that are not "active" are called "diluent". A "water-based" ink typically uses water predominantly as the mobile phase. Resins used with water-based inks typically are emulsions, and can be dispersions in some cases. Other solvents may be added to act as co-solvents or coalescing agents to help emulsions form a continuous film.

[0094] Solvent-based inks that typically use aliphatic hydrocarbons with common binder types, such as polyamide, shellac, resin esters, nitro-cellulose, and styrene-maleic are suitable for use herein. Highly preferred solvent-based ink includes non-catalytic, block urethane resin, which have demonstrated superior durability over traditional flexographic binders, such as styrene-maleic, resin-maleic, acrylic solutions.

[0095] Desired solvent blends include blends ranging in volume up to about 50% of various acetates such as ethyl acetate, N-propyl acetate, isopropyl acetate, isobutyl acetate,

N-butyl acetate, and blends thereof, up to about 10% of various alcohols including ethyl alcohol, isopropyl alcohol, normal propyl alcohol, and blends thereof; and up to 75% glycol ethers including Ektasolve RTM EP (ethylene glycol monopropyl ether), EB (ethylene glycol monobutyl ether), DM (diethylene glycol monomethyl ether), DP (diethylene glycol mono-propyl ether), and PM (propylene glycol monomethyl ether), which can be obtained from Eastman Chemical, P.O. Box 431, Kingsport, Tenn. 37662. Other suitable solvents can also be obtained from Union Carbide Chemicals, 39 Old Ridgebury Road, Danbury, Conn. 06817. A desired solvent blend is a blend of about 50% to about 75% glycol ether, about 25% to about 35% N-propyl acetate, and about 15% to about 25% N-butyl acetate. Other glycols can be used such as DOWANOL RTM, obtainable from Dow Chemical, Midland, Mich. 48640.

[0096] Suitable water-based inks for use herein include emulsions that are stabilized in water-ammonia, and may contain alcohols, glycols, or glycol ethers as co-solvents. Indeed, it is common practice to add organic solvents (7% maximum) to water-based inks: alcohols, e.g., propan-2-ol- to speed up drying and assist wetting, glycols, e.g., mono propylene glycol to slow down drying, glycol ethers, e.g., dipropylene glycol mono methyl ether to aid film formation. Such solvents are commodity chemicals, commercially available from various companies. Highly preferred water-based ink includes well-crosslinking acrylic copolymer emulsion, which has demonstrated superior durability over traditional non-crosslinking binders such as acrylic solutions and dispersion copolymers.

[0097] The water-based inks and solvent-based inks also include coloration in addition to the binders and solvents; water coloration is typically imparted by the use of inert pigments and dyes, collectively referred to as pigments for purposes of the present invention, which can be added in levels of about 0.25% to about 40% on a dry weight basis and preferably between 1 and 10%.

[0098] The most common pigments include azo dyes (for example, Solvent Yellow 14, Dispersed Yellow 23, and Metanil Yellow), anthraquinone dyes (for example, Solvent Red 111, Dispersed Violet 1, Solvent Blue 56, and Solvent Orange 3), xanthene dyes (Solvent Green 4, Acid Red 52, Basic Red 1, and Solvent Orange 63), azine dyes (for example, Jet Black), and the like.

[0099] Major organic pigments include diarylide yellow AA01 (for example, Pigment Yellow 14 (1#21095), diarylide yellow AA0A (for example, Pigment Yellow 12 (1#21090), Hansa Yellow, C1 Pigment Yellow 74, Phthalocyanine Blue (for example, Pigment Blue 15), lithol red (for example, Pigment Red 52 (1#15860 1), toluidine red (for example, Pigment Red 22 (1#12315), diazine violet (for example, Pigment Violet 23 (1#51319), phthalocyanine green (for example, Pigment Green 7 (1#74260), phthalocyanine blue (for example, Pigment Blue 15 (1#74160), naphthoic acid red (for example, Pigment Red 48:2 (1#15865 2).

[0100] Inorganic pigments include titanium dioxide (for example, Pigment White 6 (1#73891), carbon black (for example, Pigment Black 7 (1#77266), iron oxides (for example, red yellow, and brown), ferric oxide black (for example, Pigment Black 11 (1#77499), chromium oxide (for example, green), ferric ammonium ferrocyanide (for example, blue), and the like.

[0101] Besides the solvent and pigments, the inks preferably comprises a binder or mixtures thereof. The binder helps stabilizing the pigment onto the support to which it is applied to. Typically the pigment-to-binder ratios is typically from 1:20 to 1:2 and preferably ranges up to about 1:1.7.

[0102] Waxes are also included in the present invention to increase the slip and improve the rub-resistance of the inks of the printed polyolefin substrate. Common classifications of waxes include animal (for example, beeswax and lanolin), vegetable (for example, carnauba and candellilla), mineral (for example, paraffin and microcrystalline), and synthetic (for example, polyethylene, polyethylene glycol, and Teflon-RTM). A recommended range is between about 0.5% to about 5% wax based on the total formula weight.

[0103] The printing provided can be single color or multiple-color depending upon the aesthetic needs. According to the present invention it is desirable to have an image in one or more colors or tonalities printed on at least one surface of the first layer such that it is visible to the wearer of an absorbent article comprising the laminated structure, for example as a topsheet, preferably secondary topsheet. With feminine protection absorbent articles, for example, it is desirable to make the articles as attractive and as fun as possible, to wear in order to encourage women especially teens to feel better and more relaxed during their periods.

[0104] The process of manufacturing color printed laminated structure according to the present invention will now be described by way of example, with reference to the accompanying drawings in which:

[0105] FIG. 1 is a simplified schematic illustration of a preferred embodiment for the manufacture of the dry laid fibrous laminated structure of the present invention. In accordance with this embodiment, the air forming system, indicated generally by the numeral 100, includes a distributor unit 101 disposed transversely above a continuous forming screen, the color printed first layer (e.g. color printed nonwoven) 102, mounted on rollers 103 and driven by a suitable motor (not shown), and vacuum means or suction box 104 is positioned beneath the screen. Upstream of the distributor unit 101 is a distributor or feeder 105, such as a hammermill or Rando-feeder, where bales, laps or the like (for example wood pulp provided per roll 106) are debarked. The fibres may be cleaned and/or blended if necessary or desired depending largely on the type of fibres used, the blend of fibres used, and the end product sought. For example, wood pulp fibres can be blended with synthetic fibres and applied as a blend by a single distributor, or different fibres can be each conveyed by a different distributor to the first layer to form separate plies or layers.

[0106] The porous forming screen, the color printed first layer, e.g., nonwoven layer 102, is essentially coextensive with the distributors 101, and the vacuum belt or suction box 104 beneath the first layer draws the air stream downwardly and conveys the fibres to the surface of the first layer, thereby forming plies or a loose web, i.e. second layer of the laminated structure (air laid fibrous web). At this stage in the process, the resulting laminated structure exhibits little integrity, and the vacuum means 104 retains the loose, fibrous air laid web on the first layer 102. The air laid web has an outer surface that faces the distributor and an inner surface, opposite to the outer surface, that faces the forming first layer 102. At least one of the surfaces of the first layer

102 is color printed before undergoing the manufacturing of the dry laid fibrous laminated structure.

[0107] It should be understood that the system may be modified to control the composition and thickness of the end laminated structure. For example, the distributor unit can comprise a plurality of individual distributors, and although FIG. 1 shows schematically two distributors respectively at 101A and 101B, the number of distributors and particular arrangement can be altered or varied depending on such factors as machine speed, capacity, type of fibres, and end product desired.

[0108] In one embodiment herein the laminated structure formed on the first layer 102 might incorporate therein a particulate material. For example the particulate materials might be an absorbent gelling material or an odour control means, both in particle or powder form, or a mixture thereof. In such an embodiment a dosing unit or feed hopper (not shown), containing the particulate materials is for example positioned in between the distributor units, e.g., between distributors 101A and 101B.

[0109] In a preferred embodiment herein a thermoplastic polymeric material in finely divided form, preferably in powder form, is preferably added to the fibrous web. In the embodiment shown in FIG. 1 the thermoplastic polymeric material in powder form is supplied to the dosing unit 108 from the container 107, the dosing unit being located between the distributors 101A and 101B. In this manner, the thermoplastic polymeric materials in powder form are deposited between plies of fibres laid by each distributors 101A and 101B. That is, the thermoplastic polymeric materials are discharged from hopper 108 onto the moving layer of fibres laid down by distributor 101A, and the ply of fibres laid down by distributor 101B is laid over the thermoplastic polymeric material.

[0110] It should be understood, however, that the fibres are relatively porous, and therefore the thermoplastic polymeric material tend to distribute somewhat within adjacent plies. Therefore the resulting fibrous web comprises the thermoplastic polymeric material concentrated intermediate the thickness of the web, forming a region of the web in which the fibres constitute a lower percentage as compared to the thermoplastic polymeric material. Indeed it is preferred that the thermoplastic polymeric material is distributed within the thickness of the web, intermediate the outer and inner surfaces thereof. Alternatively the thermoplastic polymeric material (e.g., polyethylene) is mixed together to the fibres (typically cellulose fibres) in each dosing unit. For example the dosing unit 101A might contain 50% of cellulose and 50% of polyethylene, while the dosing units 108 and 101B might contain 75% cellulose and 25% polyethylene.

[0111] The resulting laminated structure 112 might require further stabilization. According to the embodiment of the present invention illustrated in FIG. 1 the laminated structure is bonded on one, or preferably both outer surfaces (outer surface of the first layer and/or outer surface of the second layer, i.e., air laid fibrous web) by means of the application of a latex composition. In the embodiment shown the laminated structure is preferably first passed between compression rollers 109, which may be heated, to densify the structure, but this step is optional. This densification step can enhance the penetration of the latex binder into the laminated structure, and the degree or percent of

densification can vary depending on such factors as basis weight of the laminated structure, the desired degree of penetration of the latex binder into the laminated structure, and the end product sought.

[0112] After the (optional) compression rollers the laminated structure is transported to a suitable dispensing means 110, such as a spray nozzle, doctor blade, roller applicator, or the like, where a latex binder is applied to the outer surface of the fibrous web (air laid fibrous web) of the laminated structure. A vacuum applied by a suction box (not shown) is positioned beneath the dispensing means 110 and the laminated structure 112, and helps to draw the latex binder into the structure. The dispensing means or applicator 110 is essentially coextensive with the width of the fibrous air laid web, and preferably a substantially uniform coating is applied to the fibrous web surface. However, the latex binder may be applied as a non-uniform, random or pattern coating, and because the latex binder is water-based, it will diffuse throughout the fibrous web/laminated structure and function as a binder when cured.

[0113] The latex binder when cured imparts integrity to the fibrous web/laminated structure. The extent or degree of penetration of the latex binder into the web/laminated structure might be controlled by controlling the amount of latex applied and by controlling the vacuum applied to the web/laminated structure (the vacuum helps to draw the latex into the web/laminated structure). The amount of the latex binder is also kept to such an extent that it does not impair the absorbency and softness characteristics of the fibrous web and hence the resulting laminated structure.

[0114] The latex binder is usually applied as an aqueous emulsion, and can be a thermosetting plastic. In order to activate the latex, the latex emulsion might contain a suitable curing agent or cross-linking agent, and after the web is coated, the latex is cured to effect cross-linking. Most typically, curing is accomplished by passing the coated web/laminated structure through a hot oven or through an air drier 111, and the temperature typically ranges from 100° C. to 260° C., but this depends upon the specific type of latex resin used, upon the curing agent or cross-linking agent, upon the amount of latex, the thickness of the web, the degree of vacuum, and the machine speed.

[0115] It is desirable to coat the outer surface of the first layer 102 of the resulting laminated structure 112 with latex binder as well, and this is readily accomplished by the dispensing means 118 as the laminated structure is conveyed via there under via pulleys 113 and 114. This step is desirable as beside stabilizing the laminated structure it also further stabilizes the color printing on the first layer, thereby further reducing color-bleeding in use conditions and color rub-off. Coating the outer surface of the first layer with latex is especially desired in the embodiment of the invention wherein the outer surface of the first layer is color printed. The second dispensing means 118 includes a suction box (not shown). This second latex coating is likewise cured by passing the laminated structure through a second oven 115 within about the same temperature range.

[0116] In the preferred embodiment herein wherein thermoplastic polymeric material has been added as shown in FIG. 1 per dosing unit 108, this material contributes to stabilizing the structure herein. Indeed bonds among the fibres are generated by the melting of the individual particles

of thermoplastic polymeric material in powder form when in oven 111 and/or 115; as it melts, the thermoplastic polymeric material forms "bridges" connecting directly the fibres.

[0117] The overall surface area of the bond points represents a small fraction of the surface area of the fibres that are involved in the bonding, the characteristics of which thus remain almost unchanged.

[0118] The thermoplastic polymeric material in finely divided form, e.g., in form of powder has the purpose of bonding the particulate material and, at least partially, the fibres of the dry laid absorbent structure together by melting and forming discrete, spaced-apart bond points among the particles and the fibres. The thermoplastic polymeric material can also be used in other finely divided forms, e.g. in form of fibrils.

[0119] The melting is preferably conducted at temperatures so as to not affect the characteristics of the other constituents, i.e., fibres and optional particulate materials. These preferred characteristics can be achieved by a thermoplastic polymeric material in finely divided form having a melt flow index (M.F.I.), evaluated by the ASTM method D 1238-85 under conditions 190/2.16, of at least 25 g/10 min, preferably at least 40 g/10 min, and even more preferably at least 60 g/10 min.

[0120] If the fibres of the dry formed fibrous structure are short cellulose fibres, it is preferable to use a thermoplastic polymeric material composed of powder of high-density polyethylene, with maximum dimensions of the particles of about 400 microns, characterized by a melt flow index of about 50 g/10 min, in a quantity between 12 g/m² and 90 g/m².

[0121] The resulting stabilized laminated structure 117 exiting from the last oven now exhibits sufficient integrity and can be rolled (e.g., as shown in FIG. 1 on a winding roll slitting 116) or alternatively cut and packaged, etc.

[0122] The laminated structure made in accordance with the foregoing process is illustrated in FIG. 2 and FIG. 3. The first layer of the laminated structure comprises randomly distributed fibres, such as wood pulp fibres. In the preferred embodiment herein wherein the first layer comprises the thermoplastic polymeric material in powder form distributed randomly among the fibres of the first layer, this material performs the bonding of at least part of the fibres of the first layer of the laminated structure, i.e. those fibres that enter in contact with the thermoplastic polymeric material. Both outer surfaces (2, 6 and 20, 60) of the laminated structure (a,b) bear a latex coating, indicated in the drawing by lines 8,9 and 80,90. The latex penetrates or impregnates the outer surfaces of the structure to some degree and partially coats some of the fibres (not shown).

[0123] In an alternative embodiment of the present invention, not illustrated, the latex coating first is applied on the outer surface of the first layer of the structure and cured before being applied on the outer surface of the second layer, i.e. air laid fibrous web, or both steps are carried out simultaneously.

[0124] Absorbent Article

[0125] While the present invention will be described herein after in the context of sanitary napkins and panty liners, the invention might also be applicable as mentioned

herein before for other protection than feminine protection, like adult incontinence protection or baby protection.

[0126] In a preferred embodiment herein the absorbent article according to the present invention comprises a top-sheet, an underlying layer visible through the top-sheet, an absorbent core and a backsheet. The underlying layer visible through the top-sheet is directly adjacent to the top-sheet, i.e. in face-to-face relation with the top-sheet, typically located between the top-sheet and the absorbent core. The underlying layer is made of the color printed laminated structure according to the present invention. Preferably the outer surface of the first layer of the laminated structure is facing the wearer (hence might also be called herein wearer facing surface) and the outer surface of the second layer of the laminated structure is facing the garment of the wearer (hence might also be called garment facing surface). In the preferred embodiment herein the underlying layer is the so-called secondary top-sheet layer.

[0127] The Topsheet

[0128] The topsheet for use in the present invention also called herein after primary topsheet is formed from at least one primary top layer. In a preferred embodiment herein the primary topsheet is in face-to-face relation to an underlying layer, also called herein secondary topsheet.

[0129] The primary topsheet should be compliant, soft feeling, and non-irritating to the wearer's skin. The primary topsheet is fluid pervious, permitting fluids (e.g., menses and/or urine) to readily penetrate through its thickness. The underlying layer, typically the secondary topsheet, is visible through the primary topsheet so to allow recognition of color printed on the secondary topsheet per human eyes. The primary topsheet is typically provided with some regions, which are transparent as opposed to opaque. By "opaque" it is referred herein to a material, which inhibits the passage of light, such that a color printed image located opposite the material can not be viewed by naked eyes. By "transparent" it is referred to material through which light passes such that color printed image located opposite the transparent material can be viewed by the naked eye. Preferably herein the primary topsheet is provided with at least some regions which are transparent and most preferably the transparent areas represent at least 20%, preferably at least 50%, more preferably at least 90%, and most preferably 100% of the whole topsheet (i.e. the topsheet is preferably completely made of transparent material). As a general rule a material will be considered to be transparent when it has a light transmission of greater than 50 percent, preferably greater than 80 and most preferably greater than 90.

[0130] A suitable primary topsheet can be manufactured from a wide range of materials such as woven and non woven materials; polymeric materials such as apertured formed thermoplastic films, apertured plastic films, and hydroformed thermoplastic films, and thermoplastic scums. Suitable woven and non woven materials can be comprised of natural fibers (e.g., wood or cotton fibers), synthetic fibers (e.g., polymeric fibers such as polyester, polypropylene, or polyethylene fibers) or from a combination of natural and synthetic fibers or bi-/multi-component fibers.

[0131] Preferred primary topsheets for use in the present invention are selected from high loft non-woven topsheets and apertured formed film topsheets. Apertured formed films

are especially preferred for the primary topsheet because they are pervious to body exudates and yet non absorbent and have a reduced tendency to allow fluids to pass back through and rewet the wearer's skin. Thus, the surface of the formed film that 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; U.S. Pat. No. 4,324,246; U.S. Pat. No. 4,342,314; U.S. Pat. No. 4,463,045; and U.S. Pat. No. 5,006,394. Particularly preferred micro apertured formed film primary topsheets are disclosed in U.S. Pat. No. 4,609,518 and U.S. Pat. No. 4,629,643. A preferred primary topsheet for the present invention comprises the three-dimensional formed film described in one or more of the above patents and marketed on sanitary napkins by The Procter & Gamble Company of Cincinnati, Ohio as "DRI-WEAVE". WO 97/14388 also describes a suitable apertured primary topsheet.

[0132] Preferred primary topsheets have apertures being dimensioned to permit show-through (or visualization) of the colored printed image on the secondary topsheet. The pattern of apertures might be regularly spaced or random.

[0133] A preferred regularly spaced first pattern of apertures comprises a macroscopically expanded pattern of irregularly shaped pentagonal apertures described in U.S. Pat. No. 4,463,045. The primary topsheet described in U.S. Pat. No. 4,463,045 is a three-dimensional formed film comprising an array of sub-patterns, each sub-pattern comprising four irregular pentagonal apertures forming an irregular hexagon. Another preferred primary top layer exhibits apertures arranged in an ordered or pseudo-random array. A suitable ordered array may be a regular square, rectangular, rhomboidal or hexagonal array, the apertures themselves being square or, alternatively, circular or slightly elliptical as described in U.S. Pat. No. 4,780,452. The interspacing between adjacent apertures may be about 1.4 mm. Overall, the ratio between the surface occupied by the apertures and the whole surface of the primary top layer is typically within the range 10-50%, depending on the requirements of use and the strength characteristics of the materials used. Preferably, the open area is about 25%. It will of course be appreciated that the apertures may be arranged in an array other than a regular square, rectangular, rhomboidal or hexagonal array or other than in a pseudo-random array.

[0134] Suitable apertures may be made by a perforating or punching action. A suitable perforating station would constitute two counter-rotating rollers, the lower roller of which acts as a rotary support and has a generally smooth surface and the upper roller of which has teeth or projections arranged in the array corresponding to the first pattern. Feeding of the primary top layer through the perforation station causes the teeth or projections of the upper roller to penetrate the primary top layer, thereby perforating its structure, as described in U.S. Pat. No. 4,780,352.

[0135] Primary topsheet being made of transparent/translucent material, in contrast to white conventional topsheet are highly preferred herein. Advantageously the use of such transparent topsheet enhances the visibility of the colored laminated structure positioned beneath the so-called primary topsheet. Such transparent materials are typically available by simply reducing or even omitting white pigment conven-

tionally used during manufacturing thereof, like titanium oxide. The topsheet can be completely transparent or can be provided only with regions of transparency. Such material although provided with inherent transparency can further comprise apertures.

[0136] An example of transparent topsheet is commercially available under code name Ris CPM-Clear from Tredegar-Terrehaute Ind.

[0137] Alternatively the primary topsheet material might be made of conventional material (white) and treated to render it transparent. Such treatment generally consists of applying thermal energy through a discontinuous heat bonding, sonic bonding or pressure embossing operation.

[0138] The primary topsheet typically extends across the whole of the absorbent structure and outside the area co-extensive with the absorbent structure.

[0139] When referring to the primary topsheet, a multi layer apertured structure or a mono layer apertured structure are each contemplated.

[0140] Absorbent Core

[0141] Absorbent cores suitable for use in the present invention may be selected from any of the absorbent cores or core systems known in the art. As used herein, the term "absorbent core" refers to any material or multiple material layers whose primary function is to absorb, store and distribute fluid. In one embodiment herein the color printed laminated structure of the invention might also be used as part of the absorbent core or as the absorbent core in its entirety.

[0142] Backsheet

[0143] The backsheet primarily prevents the exudates absorbed and contained in the absorbent structure from wetting garments that contact the absorbent product such as underpants, pants, pyjamas and undergarments. The backsheet is preferably impervious to fluids (e.g. menses and/or urine) and is preferably manufactured from a thin plastic film, although other flexible liquid impervious materials can also be used.

[0144] The backsheet can comprise a woven or nonwoven material, polymeric films such as thermoplastic films of polyethylene or polypropylene, or composite materials such as a film-coated nonwoven material.

[0145] Preferably the backsheet of the absorbent article is moisture vapour permeable and thus comprises at least one gas permeable layer. Suitable gas permeable layers include two dimensional, planar micro- and macro-porous films, macroscopically expanded films, formed apertured films and monolithic films. The apertures in said layer may be of any configuration, but are preferably spherical or oblong and may also be of varying dimensions. The apertures preferably are evenly distributed across the entire surface of the layer. However layers having only certain regions of the surface having apertures are also envisioned.

[0146] A preferred sanitary napkin or panty liner of the present invention has a pair of conventional flaps or wings. If desired these flaps or wings might also comprise a color printed laminated structure according to the present invention.

[0147] The invention will now be further described, by way of example, with reference to the accompanying drawings, in which

[0148] FIG. 5 illustrates a top plan view of a sanitary napkin 20 viewed per its wearer facing surface, said napkin 20 comprising one primary top layer 21 and a secondary topsheet layer 23 visible through the primary topsheet layer 21. The secondary topsheet layer 23 is provided with color printed image 24 visible through the primary topsheet layer 21. The primary top layer 21 is a three-dimensional formed film exhibiting a macroscopically expanded three-dimensional pattern of irregularly shaped pentagonal apertures 22. In an alternative embodiment not shown such a sanitary napkin can be embossed, embossing points are obtained as described in U.S. Pat. No. 4,397,644 or WO98/27904.

[0149] An alternative sanitary napkin is illustrated in FIG. 6. The sanitary napkin in FIG. 6 differs from the sanitary napkin illustrated in FIG. 5 only in the image color printed per flexography printing on the first layer of the laminated structure forming the so-called secondary topsheet.

[0150] Referring to FIG. 5, it will be observed that the color printed image 24 is positioned, shaped and dimensioned to be visible through the primary topsheet, namely through the apertures thereof. In an alternative embodiment the primary topsheet material per se is fully transparent (apertured or not) (e.g., Ris CPM-Clear [X-27221] from Tredegar-Terrehaute Ind.), the color printed image being visible through the entire surface of the primary topsheet.

[0151] Referring now to FIG. 4 of the accompanying drawings, there is illustrated a cross sectional view of the sanitary napkin of FIG. 5. The sanitary napkin comprises

[0152] as a primary topsheet 21, a white apertured polyethylene formed film having holes of 0.889 square millimeters, basis weight of 25 g/sqm and an open area of 80% (white CPM, code name X25602 commercially available from TREDEGAR, Terrehaute Ind.)

[0153] as a secondary topsheet 23, a color printed laminated structure (77 g/sqm) made of a 22% weight of spunbonded polypropylene nonwoven material having a basis weight of 17 g/sqm, referred to as product No. 1WH05-01-17B (or "P-9") obtained from BBA, Linetec, color printed on its inner surface, together with a multibonded air laid nonwoven material made of 68% weight cellulose and 25% weight polyethylene powder of the total laminated structure basis weight, 3% latex per weight of total laminated structure applied on both side (2.5% on the multibonded air laid and 1.5% on the spunbonded polypropylene nonwoven) (cf. FIG. 3).

[0154] a spiral layer of adhesive (H25450, available from Ato Lindley) (not shown in FIG. 4).

[0155] a white absorbent tissue core 25 with 17% super absorbent fibers, polypropylene and polyethylene bi-component fibres and cellulose (code GH.150 1006, basis weight 150 gsm commercially available from Concept GmbH, Falkenhagen-Germany).

[0156] a spiral layer of adhesive (H25450, available from Ato Lindley) (not shown in FIG. 4).

[0157] as backsheet, a polyethylene micro embossed film 26, commercially available from Tredegar, under code XBE 616W

[0158] stripes of partly fastening adhesive (LA203/TF102, available from Savatec) (not shown in FIG. 4), and release paper (not shown)

[0159] Advantageously the color printed laminated structure as described herein before as topsheet 23 (illustrated in FIG. 3) in the sanitary napkin (illustrated in FIG. 4) has a color fastness to water when measured according to ISO 105-E01 of 4, a color fastness to rubbing when measured according to ISO 105-X12 in dry condition of 4 and in wet condition of 3 and a color fastness to perspiration when measured according to ISO 105-E04 of 4 (both for alkaline solution and acid solution).

What is claimed is:

1. A color printed liquid permeable laminated structure comprising at least a first liquid permeable layer and a second liquid permeable layer, the second layer being a fibrous web, the first layer being color printed on at least one of its surfaces prior laminating it to the second layer and stabilizing the laminated structure with a bonding means.

2. A laminated structure according to claim 1, wherein the first layer is a non-woven, preferably a spunbonded non-woven.

3. A laminated structure according to claim 1, wherein the first layer, prior laminating it to the second layer, is color printed on at least the surface thereof directly adjacent to the second layer in the laminated structure, the color print being visible through the first layer on its opposite surface.

4. A laminated structure according to claims 1 or 2 or 3, wherein the second layer is a dry laid fibre web, typically comprising cellulose fibres.

5. A laminated structure according to claim 4, wherein the dry laid fibrous web is an air laid.

6. A laminated structure according to claim 1, wherein the bonding means stabilizing the structure comprises a latex binder typically selected from the group consisting of vinyl acetate and acrylic ester copolymers, ethylene vinyl acetate copolymers, styrene butadiene carboxylate copolymers, and polyacrylonitriles, typically at a level of about 2% to about 30% by weight of the total weight of the laminated structure.

7. A laminated structure according to claim 1, wherein the bonding means comprises a thermoplastic polymeric material in finely divided form distributed into the second fibrous layer in order to bond the fibers of said fibrous layer.

8. A laminated structure according to claim 1, wherein the color for color printing the first layer is selected from a range of colors ranging from yellow to blue (440 to 580 nanometers).

9. A laminated structure according to claim 1, wherein the first layer is color printed with a water-based ink and preferably a self-crosslinking acrylic copolymer emulsion.

10. A disposable absorbent article, preferably a sanitary napkin or pantyliner, comprising a topsheet, a backsheet and a color printed laminated structure according to any of the preceding claims 1, 2 or 3, typically as an underlying layer directly adjacent to the topsheet so as to be visible through said topsheet.

11. A disposable absorbent article according to claim 10, wherein said topsheet is provided with at least some regions, which are transparent, and most preferably is completely transparent.

12. A process for manufacturing a laminated structure according to any of the preceding claims 1 to 9, wherein the process comprises the steps of

- (a) providing the first layer, then color printing it on at least one of its surfaces,
- (b) then providing fibers onto the first layer to form the second layer,
- (c) then applying a bonding means, preferably a latex binder, onto the outer surface of said second layer and curing and/or
- (d) applying a bonding means, preferably a latex binder, onto the outer surface of said first layer and curing

wherein when both steps (c) and (d) are carried out, steps (c) and (d) might be carried in any sequence, including first (c) then (d) or first (d) then (c) or simultaneously, provided (a) and (b) are operated before (c) and (d)

13. A process according to claim 12, wherein the color printing of the first layer is made per flexography printing.

14. An absorbent article for feminine protection comprising a liquid permeable topsheet, an underlying layer visible through the liquid permeable topsheet, a liquid impermeable backsheet and an absorbent core positioned between the underlying layer and the backsheet, characterized in that the underlying layer visible through the topsheet is a color printed liquid permeable laminated structure comprising at least two liquid permeable layers, each layer having a pair of opposed surfaces, at least one layer of the laminated structure is color printed on at least a surface directly adjacent another liquid permeable layer of the laminated structure, prior laminating the liquid permeable layers of the laminated structure together.

* * * * *



OFICINA ESPAÑOLA DE
PATENTES Y MARCAS

ESPAÑA

N.º de publicación: **ES 2 065 043**

Int. Cl.º: A61F 13/42

TRADUCCION DE PATENTE EUROPEA

T3

Número de solicitud europea: **91911027.0**

Fecha de presentación: **30.05.91**

Número de publicación de la solicitud: **0 535 047**

Fecha de publicación de la solicitud: **07.04.93**

Título: **Indices de capacidad para artículos absorbentes.**

Prioridad: **18.06.90 US 539779**

Titular/es: **The Procter & Gamble Company
One Procter & Gamble Plaza
Cincinnati Ohio 45202, US**

Fecha de la publicación de la mención BOPI:
01.02.95

Inventor/es: **Osborn, Thomas, Ward, II y
Redwine, Nona, Jane**

Fecha de la publicación del folleto de patente:
01.02.95

Agente: **Díez de Rivera y Hocés, Alfonso**

Aviso. En el plazo de nueve meses a contar desde la fecha de publicación en el Boletín europeo de patentes, de la mención de concesión de la patente europea, cualquier persona podrá oponerse ante la Oficina Europea de Patentes a la patente concedida. La oposición deberá formularse por escrito y estar motivada; sólo se considerará como formulada una vez que se haya realizado el pago de la tasa de oposición (art. 99.1 del Convenio sobre concesión de Patentes Europeas).

Venta de traducción: Oficina Española de Patentes y Marcas. C/Princesa, 1. 28036 Madrid

ES 2 065 043 T3

DESCRIPCION

El invento se refiere a un artículo absorbente desechable de acuerdo con el preámbulo de la reivindicación 1ª.

El invento está dirigido a un artículo absorbente desechable que tiene medios para indicar cuando un núcleo absorbente está cargado hasta un nivel para el cual puede excederse su capacidad, y alertar al usuario o cuidador sobre el fallo potencial del núcleo absorbente al producirse una carga adicional con líquido.

Se describe un artículo absorbente de este tipo en el documento FR-A-2 575 905. De acuerdo con este documento, que se refiere a un pañal que tiene una lámina anterior, un núcleo absorbente y una lámina posterior impermeable al agua, están dispuestos sobre la superficie de la lámina posterior que está en contacto con el núcleo absorbente líneas puntos o configuraciones de un material polimérico superabsorbente. El material superabsorbente cambiará de color si el líquido ha llegado a la superficie exterior del núcleo.

El documento US-A-4 738 674 describe pañales, o artículos similares, que tienen bandas indicadoras de humedad aplicadas a una banda de algodón absorbente incorporada en el pañal.

El documento US-A-4 022 211 describe un indicador de humedad para un conjunto de compresa absorbente. El indicador comprende un agente colorante dispersable en agua fijado a medios portadores adyacentes a la compresa absorbente, cuyo indicador es visible a través de la lámina posterior después de mojarse.

Antecedentes del invento

Son bien conocidos en la técnica los núcleos absorbentes utilizados para recoger y contener descargas corporales. Se utilizan núcleos absorbentes en combinación con artículos absorbentes desechables, tales como compresas sanitarias, pañales desechables, prendas especiales de componentes múltiples para incontinencia de adultos, etc. para recoger y contener tales descargas, que son típicamente líquidas. Tales artículos pueden ser desechables, reutilizables, integrales, limpios y previstos para ser llevados por niños o adultos.

El portador de cualquier artículo que utilice un núcleo absorbente, o la persona que cuida a un portador, puede frustrarse o irritarse si se supera la capacidad del núcleo absorbente, es decir si se produce la situación de carga que supera a la que puede ser absorbida por el núcleo y este último falla, o sea las descargas corporales no son contenidas por el núcleo. Tales descargas pueden desbordar el núcleo y ser transportadas fuera de los límites de la compresa sanitaria, pañal, prenda de incontinencia para adultos, u otro artículo absorbente, y pueden manchar las prendas o ropa de cama del portador.

Típicamente, no se utiliza la capacidad total del núcleo absorbente antes de que se produzca el fallo y el núcleo es teóricamente capaz de recoger y contener descargas adicionales cuando se produce el fallo. El fallo se produce frecuentemente debido a la migración lateral de descargas líquidas corporales depositadas. Las descargas depositadas sobre el núcleo absorbente pueden migrar la-

teralmente hacia cualquiera de los márgenes laterales longitudinales del núcleo absorbente, en particular si tales descargas no se depositan en coincidencia de la línea central longitudinal del núcleo absorbente, o incluso cerca de dicha línea. Al producirse el fallo, una carga adicional de líquido no penetra en el núcleo ni queda así absorbida, sino que más bien se desborda e invade los márgenes laterales longitudinales del artículo que utiliza tal núcleo.

Se han hecho varios intentos en la técnica para proteger los márgenes laterales longitudinales de artículos absorbentes contra desbordamiento lateral de líquidos depositados. Por ejemplo, algunas compresas sanitarias han sido provistas de divisiones impermeables a los líquidos que recubren el núcleo. Tales divisiones o tabiques impermeables a líquidos pueden interponerse entre el núcleo absorbente y la lámina superior, o bien pueden recubrir dicha lámina. En cualquier realización, sin embargo, las divisiones reducen el área efectiva útil del núcleo absorbente. Esto ocurre debido a que los líquidos depositados sobre las divisiones usualmente no penetran en el núcleo. En vez de ello, los líquidos depositados sobre las divisiones corren a lo largo del exterior de las divisiones, a través de los márgenes laterales longitudinales del núcleo absorbente, e invaden el artículo absorbente asociado con el núcleo absorbente.

Otro intento de la técnica para indicar al portador o cuidador de que una prenda absorbente está cerca de su capacidad y lista para ser cambiada, es un indicador de humedad. Un indicador de humedad, tal como el del tipo expuesto en la Patente Norteamericana N.º 4,231,370, expedida el 4 de noviembre de 1980 a favor de Mroz y otros, reacciona típicamente al pH de los fluidos corporales descargados cambiando de color. Sin embargo, tales indicadores de humedad se aplican típicamente a la cara orientada hacia adentro de una lámina posterior transparente y no reaccionan para indicar al usuario o cuidador el estado de carga, a no ser que el núcleo esté cargado sustancialmente en todo su espesor. De este modo, los fluidos corporales descargados que no son absorbidos dentro del espesor del núcleo fallarán en cuanto a ser registrados con un indicador de humedad dispuesto sobre la cara del núcleo absorbente opuesta al portador, o en posición adyacente a dicha cara. También, tales indicadores de humedad imponen limitaciones de opacidad en la selección del material de la lámina posterior.

Típicamente, el núcleo absorbente de tales artículos está conformado rectangularmente para mayor facilidad de fabricación. Sin embargo, los usuarios prefieren frecuentemente un núcleo absorbente que sea más estrecho en el centro que en los extremos, para alojar cómodamente las piernas, y evitar o reducir a un mínimo la acumulación o apelotonamiento del núcleo. Tal preferencia del usuario se encuentra con más frecuencia cuando el núcleo absorbente se utiliza en combinación con una compresa sanitaria.

Consignicentemente, un objeto de este invento es crear un núcleo absorbente y medios para indicar la incipiente de un modo de fallo frecuente, es decir para indicar que está a punto de producirse el desbordamiento lateral del núcleo absorbente.

100R and line for base type is preferably set on the range of 5.7 to 10.9 (each range is a thickness range in the Munsell color space). By setting base within the mentioned ranges, values can be easily set within the range of 5.7 to 9.3.

[0082] The top sheet 14 and the intermediate sheet 13 may be formed of nonwoven fabric. For the top sheet 14, it may be made of spunbonded nonwoven fabric consisting of colored synthetic resin fibers. For the intermediate sheet 13, it may be made of spunbonded nonwoven fabric consisting of or comprising colored synthetic fibers.

[0083] The colored synthetic resin fibers may be formed by melt extruding a mixture of a pellet of a synthetic resin such as polypropylene resin and a masterbatch comprising a coloring agent and a synthetic resin such as polypropylene resin. As a result, synthetic resin fibers containing the coloring agent can be obtained, and spunbonded nonwoven fabric having both sheet surfaces uniformly colored can be manufactured from the synthetic resin fibers thus colored. Nonwoven fabric using the colored synthetic resin fibers should not be limited to spunbonded nonwoven fabric, but may be other kinds of nonwoven fabric, such as spunlaid nonwoven fabric.

[0084] Other examples of colored fibers for forming the nonwoven fabric include polyethylene resin fibers containing a coloring agent, polyethylene resin fibers containing a coloring agent, semi-synthetic fibers such as acetate containing a coloring agent and regenerated fibers such as rayon containing a coloring agent. In an alternative, a coloring agent may be adhered to the surface of a finished nonwoven fabric by printing so that the synthetic resin fibers, semi-synthetic fibers or regenerated fibers have the coloring agent thereon.

[0085] Uniform coloring that is impossible in natural fibers can be realized by the fibers containing a coloring agent. In addition, synthetic resin fibers, semi-synthetic fibers and regenerated fibers whose surfaces are not layered can be uniformly colored even by printing, wherein uniformity and stability of the given color are superior to natural fibers coated with a coloring agent. Thus, the woven fabric and nonwoven fabric comprising the synthetic resin fibers, semi-synthetic fibers, the regenerated fibers or combinations thereof can be prevented from being irregularly colored.

[0086] Here, at least one of the top sheet 14 and the intermediate sheet 13 may be of a multi-layer structure, wherein two nonwoven fabrics may be partially or totally bonded together or bonded together through an adhesive. In this case, one layer for facing the wearer's body may be a nonwoven fabric comprising colored fibers, the other layer for facing an undergarment may be formed of uncolored fibers. In an alternative, three nonwoven fabrics may be joined together as set forth above. In a multi-layer structure, wherein two outer layers may be nonwoven fabrics comprising colored fibers, an intermediate sheet may be formed of uncolored fibers.

[0087] In an alternative, the top sheet 14 may be formed by melt extruding a synthetic resin such as polyethylene resin or polypropylene resin mixed with a masterbatch containing a coloring agent into a colored synthetic resin film, and

pressing the colored synthetic resin film to have apertures. Also, in the synthetic resin film, coat the coloring agent uniformly coloring each sheet, and the color of the synthetic resin film may be adjusted so that the coloring agent may be easily retained. The synthetic resin containing a coloring agent may be formed into a net-like sheet having relatively large liquid passage holes in it, a fine-meshed sheet having interconnected cells through which liquid can pass. In the case where the apertured synthetic resin film or the net-like sheet is used for the top sheet 14, since the color of the underlying sheet can be easily seen through the apertures or the liquid passage holes, a colored intermediate sheet is preferably disposed beneath the top sheet 14. Here, although nonwoven fabric is suitable for the top sheet 14, because the surface texture becomes analogous to that of cloth of an undergarment, the synthetic resin film and the net-like sheet also have an advantage in that they can be manufactured at a low cost and durability of the body surface 40 can be increased. Here, it is also possible to join the colored apertured resin film or the net-like sheet to the nonwoven fabric of the colored fibers or join the colored resin film to a nonwoven fabric of uncolored fibers.

[0088] It is, of course, possible to apply a coloring agent to a surface of a finished synthetic resin film by printing, and then process it to have apertures.

[0089] Here, printing of the nonwoven fabric or the synthetic resin film may be performed by flexographic printing, screen printing, ink jet printing or the like. Among them, when performed flexographic printing, the use of organic solvents is needed. Therefore, printing is preferably performed on the human body. Here, since plastic printing leads to apply large tension to nonwoven fabric or resin film, uniform and stable printing is difficult. On the other hand, since flexographic printing is performed by nonwoven fabric or resin film had on a drum, no large tension is given to nonwoven fabric or resin film, so that it is possible to stably fix ink without displacement. Printing techniques other than flexographic printing and gravure printing are not suitable for mass production due to their high cost. When nonwoven fabric or resin film is colored by printing, it is preferred to choose a highly stable ink such as white lead ink.

[0090] The top sheet 14 may also be formed by combining the colored nonwoven fabric and the color of synthetic resin sheet. For example, a central portion of the top sheet 14 may be formed from the nonwoven fabric and left and right side portions and front and rear end portions to the top sheet 14 may be formed from the synthetic resin sheet. It is also possible to form the central portion from the synthetic resin sheet and the left and right side portions and the front and rear end portions from the nonwoven fabric. In an alternative, the nonwoven fabric of colored fibers may be laminated to the lower surface of the color of synthetic resin sheet.

[0091] For the back sheet 11, preferably used is a film of a colored synthetic resin such as polyethylene resin. This resin film may be formed by melt extruding a mixture of a synthetic resin such as polyethylene and a masterbatch comprising a coloring agent and a synthetic resin such as polyethylene, as set forth above. The back sheet 11 may be made of a colorable permeable (breathable) by adding holes or pores to the colored synthetic resin and drawing the resulting film to have pores. It is also possible to use a spunbond-meltblown-spunbond (SMS) laminate, in which at least one layer of nonwoven fabric comprises covered

synthetic resin fibers. It should be noted that the back sheet 11 may be a white sheet on which any coloring agent or other than white is not used) or a transparent sheet.

[0092] For the absorbent sheet 12, preferably used is spunlaid nonwoven fabric comprising rayon that is regenerated cellulose fibers, polyethylene terephthalate fibers and polypropylene fibers. In the absorbent sheet 12, the synthetic fibers are white or have natural colors of individual fibers.

[0093] For the absorbent sheet 12, also usable are an all-wood nonwoven fabric containing pulp, the air-laid and superabsorbent polymer, pulp and superabsorbent polymer, and a superabsorbent polymer sheet. In the case where superabsorbent polymer is used, however, menstrual blood given to the panty liner 1 may possibly be missed due to superior absorbency of superabsorbent polymer. In addition, since the panty liner 1 becomes stiff due to superabsorbent polymer, it cannot be comfortably worn as a substitute for a crutch portion of an undergarment. In order to reduce such stiffness, superabsorbent polymer need be used together with soft materials such as pulp so that the resulting panty liner becomes thick and appropriate for a substitute for a crutch portion. Furthermore, if delamination of the panty liner before washing an undergarment is frequent, superabsorbent polymer absorbs water used for washing, possibly causing trouble in washing.

[0094] As has been described heretofore, at least the top sheet 14 is required to be colored in order to prevent the panty liner 1 with a color of predetermined hue and value. If such a colored sheet is manufactured from synthetic resin, synthetic resin fibers, semi-synthetic fibers or regenerated fibers containing a coloring agent, hue and value can be easily adjusted depending on the amount of kind of coloring agent. In addition, since the coloring agent does not hardly drops off, the panty liner can be left safe for the human body and hardly causes a problem of changing color of an undergarment.

[0095] Particularly when the top sheet 14, the back sheet 11 and seven comprise colored regions and fibers, it is possible to make the panty liner disintegratable in water after use is gradable. In this case, when the panty liner after use is disposed in a flush toilet, fibers of the water-disintegratable sheet can be dispersed in water, and then break apart, thereby preventing function damage to septic tank and sewage system as well as preventing deterioration of environment. As used herein, the term "disintegratable" means that fibers can be broken down within a living body or by bacteria. The term "water-disintegratable" means that when a sheet is put in water, constituent fibers of the sheet can be dispersed.

[0096] In the shown embodiment, the panty liner 1 is illustrated as having four layers (i.e., the top sheet 14, the intermediate sheet 13, the absorbent sheet 12, and the back sheet 11). However, the present invention should not be limited thereto, but may be of other structures as long as Munsell value of the body surface of the finished panty liner is in the range of 5.7 to 9.3. For example, the panty liner may be of three-layer structure without involving the intermediate sheet 13. If the top sheet 14 is formed of a thick material having an ability to absorb rayon and liquid (i.e., panty liner may be of two-layer structure having the top sheet 14 and the

back sheet 11), a single layer structure having the top sheet 14 alone, it is also possible to provide two or more intermediate sheets.

[0097] In the shown embodiment, the top sheet 14 is illustrated as having the central liquid passage region 30 over which the top of passage holes 14a are dotted, but the present invention should not be limited thereto. For example, the liquid passage holes 14a may not be formed as long as Munsell value of the body surface of the finished top sheet 14 is in the range of 5.7 to 9.3. It is also possible to subject the top sheet 14 to other secondary mechanical processes for forming corrugation in the like as long as Munsell value is in the above-mentioned range.

[0098] The intermediate sheet 13 may not be corrugated as long as Munsell value is in the above-mentioned range.

[0099] FIG. 3 is a perspective view showing a panty liner 1A as an absorbent article according to a second embodiment of the present invention, and FIG. 4 is a half-sectional view of the panty liner 1A taken along line IV-IV.

[0100] Similar to the panty liner 1, this panty liner 1A is of film type and intended to be attached to a crutch portion of an undergarment for use so as to mainly absorb vaginal discharges of the like. Here, the detailed description of the portions having the same constructions as those of the panty liner 1 will be omitted by designating them by the common reference numerals.

[0101] In the panty liner 1A of FIGS. 3 and 4, the right and left side edges 2 and 3 are successively outwardly protruded from the front and rear end edges 4 and 5, respectively, at a location near the transversely extending centerline. In the individual wing portions 10, 10, the back sheet 11 and the top sheet 14 are stacked on one another and bonded to each other through a hot melt type adhesive or the like, as shown in FIG. 4. In the respective wing portions 10, 10, moreover, pressure sensitive adhesive layers 15a, 15a are provided on the surface of the back sheet 11.

[0102] This panty liner 1A is, as a certainly fixed on an undergarment, so that the pressure sensitive adhesive layers 15, 15 are adhered to an inner side of a crutch portion of the undergarment and then the wing portions 10, 10 are hooked back about side edges of the crutch portion and adhere to an outer side of the undergarment through the pressure sensitive adhesive layers 15a, 15a.

[0103] In the case where at least the top sheet 14 is colored so that the wing portions 10, 10 has a value in the range of 5.7 to 9.3 as viewed from the side of the top sheet 14, the wing portions 10, 10 on the outer side of the undergarment can also match in color with the undergarment. Therefore, the panty liner attached to the undergarment can be made less noticeable.

EXAMPLES

[0104] Uncoverability of vaginal discharge and visibility of menstrual blood were evaluated with respect to Examples and Comparative Examples.

Examples 1 to 11 and Comparative Examples 1 to 5.

[0105] In Examples 1 to 11 and Comparative Examples 1 to 5, a first intermediate sheet and a second intermediate

sheet were selectively used beneath a topsheet, as shown in Table 1. None of the topsheet, the first intermediate sheet and the second intermediate sheet was used to have roughness such as corrugation. In addition, these sheets were not formed with liquid passing holes, ink, or adhesive stated.

[0106] In Examples 1 to 11, the topsheet, the first intermediate sheet and the second intermediate sheet were selected from the following four kinds of spun-mold nonwoven fabric. Table 2 shows hue, value and chroma of each spun-molded nonwoven fabric, that were measured for the body surface without laying any other sheets on the garment surface. Hue (huebow hue, value and chroma were average of three measurements using the colorimeter CR 300 manufactured by MINOTA Co., Ltd.

[0107] Pink spun-molded nonwoven fabric was manufactured from fibers (2.2 dex) that were obtained by extending polypropylene (PP) resin into white pink in serbatch (40% by weight of titanium oxide, 0.46% by weight of quinine red, 0.13% by weight of condensed iron red, 42.8% by weight of PP resin, 16.7% by weight of discharging agent) was mixed in an amount of 1.6% by weight. The pink spun-molded nonwoven fabric had a basis weight of 25 g/m². Hue was 5.8R, value was 8.8, and chroma was 13.

[0108] Light blue spun-molded nonwoven fabric was manufactured from fibers (2.2 dex) that were obtained by extending polypropylene resin into white light blue, mixed with 6.12% by weight of titanium oxide, 3.3% by weight of copper phthalocyanine blue, 3.9% by weight of quinine red, 89.06% by weight of PP resin. The light blue spun-molded nonwoven fabric had a basis weight of 25 g/m². Hue was 5.0PB, value was 8.9, and chroma was 11.

[0109] Beige spun-molded nonwoven fabric was manufactured from fibers (2.2 dex) that were obtained by extending PP resin into white, mixed with 0.46% by weight of titanium oxide, 0.13% by weight of quinine red, 42.8% by weight of condensed iron red, 42.8% by weight of PP resin, 16.7% by weight of discharging agent) was mixed in an amount of 1.6% by weight. The beige spun-molded nonwoven fabric had a basis weight of 25 g/m². Hue was 6.0YR, value of 7.6, and chroma of 1.3. The other three spun-molded nonwoven fabric, having a basis weight of 80 g/m² had hue of 5.2YR, value of 6.5 and chroma of 4.6.

Example 1

[0110] For the topsheet and the first intermediate sheet used was the pink spun-molded nonwoven fabric (basis weight 25 g/m²).

[0111] For the absorbent sheet used was spun-molded nonwoven fabric (basis weight 38 g/m²) that was manufactured by blending 55% by weight of 1.49 dex, 1.44 mm viscose rayon fibers, 30% by weight of 1.44 dex, 38 mm polyethylene terephthalate (PET) fibers, and 15% by weight of 1.67 dex, 45 mm polypropylene (PP) fibers, and hydroentangling them. Any coloring agents having a color other than white were not used in the materials of the absorbent sheet. The viscose rayon had a natural color that was not changed from the color at the time of manufacture, while the PET and PP fibers were whitened due to the dry mill, added its natural hue, value and chroma measured for the absorbent sheet.

above were obtained as those stated in Examples 12 and 13. The same spun-molded nonwoven fabric was used for the absorbent sheet in all Examples and Comparative Examples.

[0112] For the backsheet, used was white polyethylene film having a basis weight of 75 g/m². The same white film was used for the backsheet in Examples 1 to 5, to 11 and Comparative Examples 1 to 5.

[0113] The absorbent sheet, the first intermediate sheet and the topsheet were stacked on the backsheet one by one, and then the sheets were bonded together along the peripheral edge through a hot-melt type adhesive, to form an absorbent article, which was used as Example 1. Munsell value measured for the body surface of Example 1 was 9.00.

Example 2

[0114] For the second intermediate sheet, the first intermediate sheet and the topsheet, used was the pink spun-molded nonwoven fabric (basis weight 25 g/m²). That is, three sheets of the pink spun-molded nonwoven fabric (basis weight 25 g/m²) were stacked on the absorbent sheet. Munsell value measured for the body surface was 8.70.

Example 3

[0115] For the first intermediate sheet and the topsheet, used was the light blue spun-molded nonwoven fabric (basis weight 25 g/m²). Munsell value measured for the body surface was 9.00.

Example 4

[0116] For the second intermediate sheet, the first intermediate sheet and the topsheet, used was the light blue spun-molded nonwoven fabric (basis weight 25 g/m²). Munsell value measured for the body surface was 8.70.

Example 5

[0117] For the first intermediate sheet and the topsheet, used was the beige spun-molded nonwoven fabric (basis weight 25 g/m²). Munsell value measured for the body surface was 7.00.

Example 6

[0118] Example 6 was prepared to have a structure similar to that of Example 1, except that the first intermediate sheet was omitted. Munsell value measured for the body surface was 9.30.

Example 7

[0119] Example 7 was prepared to have a structure similar to that of Example 1, except that the first intermediate sheet was omitted. Munsell value measured for the body surface was 9.40.

Example 8

[0120] Example 8 was prepared to have a structure similar to that of Example 5, except that the first intermediate sheet was omitted. Munsell value measured for the body surface was 8.10.

Example 9

[0121] For the topsheet, used was the beige spun-molded nonwoven fabric (basis weight 30 g/m²). Munsell value measured for the body surface was 7.25.

[0122] For the first intermediate sheet and the topsheet, used was the beige spun-molded nonwoven fabric (basis weight 30 g/m²). Munsell value measured for the body surface was 5.90.

Example 10

[0123] For the second intermediate sheet, the first intermediate sheet and the topsheet, used was the beige spun-molded nonwoven fabric (basis weight 25 g/m²). Munsell value measured for the body surface was 5.70.

Example 11

[0124] In Comparative Example 1, the beige spun-molded nonwoven fabric (basis weight 35 g/m²) was used for the topsheet, while the beige spun-molded nonwoven fabric (basis weight 30 g/m²) was used for the first intermediate sheet and second intermediate sheet. Munsell value measured for the body surface was 5.90.

Comparative Example 1

[0125] Spun-molded nonwoven fabric (basis weight 25 g/m²) was manufactured from fibers (2.2 dex) that were obtained by extending PP resin into white black masterbatch (18.3R, by weight of carbon black, 34.40% by weight of PP resin, 72.30% by weight of wax) was mixed in an amount of 10% by weight, and used for the topsheet in Comparative Example 2. Munsell value was 3.50.

Comparative Example 2

[0126] Comparative Example 3 was prepared to have a structure similar to that of Comparative Example 2, except that the topsheet was formed with liquid passing holes.

Comparative Example 3

[0127] The liquid passing holes were drilled over a topsheet extending over the entire length of the topsheet along a longitudinally extending direction, the top and having a width of 30 mm in a transverse direction crossing the centerline. The liquid passing holes were arranged at a pitch of 3 mm in both the longitudinal and transverse directions, and had a diameter of 1 mm at the top end and on the side of the body surface. Munsell value was 4.05.

Comparative Example 4

[0128] For the topsheet and the first intermediate sheet in Comparative Example 4, used was nonwoven fabric identical to that used for the topsheet in Comparative Example 3. Munsell value was 2.10.

Comparative Example 5

[0129] White spun-molded nonwoven fabric (basis weight 35 g/m²) was manufactured from fibers (2.2 dex) that were obtained by extending PP resin into white titanium oxide was mixed in an amount of 0.5% by weight, and used for the topsheet in Comparative Example 5. Munsell value was 9.60.

[0130] Evaluation of Concealability of Vaginal Discharge and Evaluation of Visibility of Menstrual Bloods

(1) Measurement of Value

[0131] Value was measured for the body surface (liquid-receiving surface) of each test sample (Examples and Comparative, Example 2) before dropping liquid.

[0133] (2) Evaluation of Concealability of Artificial Vaginal Discharge

[0134] By using the colorimeter, a color difference between a color-difference reference color and the body surface of each test sample was measured as Hunter (L) value. An initial color difference measured before dropping liquid was indicated by ΔL^* . On the other hand, a color difference measured after dropping (0.5 ml of distilled water (artificial vaginal discharge) onto the topsheet of each test sample was indicated by ΔL^* . The absolute value of the difference between ΔL^* and ΔL^* ($|\Delta L^* - \Delta L^*|$) was taken to represent concealability of artificial vaginal discharge, and stated in Table 1.

[0135] As the absolute value $|\Delta L^* - \Delta L^*|$ decreases, the concealability of artificial vaginal discharge can be enhanced. From the results of next evaluation (3) by monitors stated in Table 1, it is seen that the absolute value $|\Delta L^* - \Delta L^*|$ is preferably equal to or less than 10, and particularly when based on Examples, the absolute value $|\Delta L^* - \Delta L^*|$ is preferably equal to or less than 9.12.

[0136] (3) Evaluation of Concealability of Artificial Vaginal Discharge by Monitors

[0137] After dropping 0.5 ml of artificial vaginal discharge onto the topsheet of each test sample, concealability was visually evaluated by 10 monitors. Evaluation was conducted at a place having brightness of 50 lux, and the average of visual activities (including corrected visual acuity) of the monitors was 1.0.

[0138] Concealability was evaluated by each monitor according to the five-grade system "very good", "good", "not good", "very good", "very good". In Table 1, "very good" means the case where the test sample was evaluated "very good" or "good" by at least 8 monitors. "A" represents the case where the test sample was evaluated "very good" or "good" by 6 or 7 monitors, and "X" represents the case other than the cases of "A" and "A".

[0139] (4) Evaluation of Visibility of Artificial Menstrual Blood

[0140] As in the evaluation (3), a color difference between a color-difference reference color and the body surface of each test sample was measured. An initial color difference measured before dropping artificial menstrual blood was indicated by ΔE^* . On the other hand, a color difference measured after dropping 0.5 ml of artificial menstrual blood (the topsheet of each test sample was indicated by ΔE^*). The absolute value of the difference between ΔE^* and ΔE^* ($|\Delta E^* - \Delta E^*|$) was taken to represent visibility of artificial menstrual blood, and stated in Table 1.

[0141] Here, the artificial menstrual blood was prepared by dissolving 8 g of carboxymethyl cellulose sodium, 80 g of glycine, 4 g of sodium hydrocarbon carbonate, 8 g of Red No. 102, 2 g of Red No. 2, and 2 g of Yellow No. 5 in 1 liter of distilled water.

[0142] As the absolute value $|\Delta E^* - \Delta E^*|$ increases, the visibility of artificial menstrual blood can be enhanced. From the results of next evaluation (5) by monitors stated in Table 1, it is seen that the absolute value $|\Delta E^* - \Delta E^*|$ is preferably equal to or less than 10, and particularly when based on Examples, the absolute value $|\Delta E^* - \Delta E^*|$ is preferably equal to or greater than 44.8.

[0143] (5) Evaluation of Visibility of Artificial Menstrual Blood by Monitors

[0144] After dropping 0.5 ml of artificial menstrual blood onto the topsheet of each test sample, visibility was visually evaluated by 10 monitors. Evaluation was conducted at a place having brightness of 76 lux, and the average of visual acuities (including corrected visual acuity) of the monitors was 1.0.

[0145] Visibility was evaluated by each monitor according to the five-grade system "highly visible", "visible", "not very visible", "hardly visible", "invisible". In Table 1, "○" represents the case where the test sample was evaluated "highly visible" or "visible" by at least 8 monitors "A" represents the case where the test sample was evaluated "highly visible" or "visible" by 6 or 7 monitors, and "X" represents the case other than the cases of "○" and "A".

[0146] <Result>

[0147] Table 1 shows evaluation results of the concealability of vaginal discharge and the visibility of menstrual blood, as well as constructions of Examples and Comparative Examples.

[0148] From Table 1, it is seen that Munsell value is required to be in the range of 5.7 to 9.3 in order to improve both the vaginal discharge concealability and the menstrual blood visibility. In addition, it is seen that when the uncolored absorbent sheet is disposed beneath the topsheet or the stack of the topsheet and the intermediate sheet(s) having a Munsell value of 5.7 to 9.3, value of the body surface of the finished panty liner can be set in the range of 5.7 to 9.3 as long as the basis weight of the topsheet or the total basis weight of the topsheet and the intermediate sheet(s) is in the range of 25 to 75 g/m². It should be noted that the lower limit of the basis weight may be as low as 20 g/m² in order to obtain a similar effect.

TABLE 1

	Ex. 1	Ex. 2	Ex. 3	Ex. 4	Ex. 5	Ex. 6	Ex. 7	Ex. 8
Topsheet	Pink SB 25 g/m ²	Pink SB 25 g/m ²	Light Blue SB 25 g/m ²	Light Blue SB 25 g/m ²	Beige SB 25 g/m ²	Pink SB 25 g/m ²	Light Blue SB 25 g/m ²	Beige SB 25 g/m ²
1 st Intermediate Sheet	Pink SB 25 g/m ²	Pink SB 25 g/m ²	Light Blue SB 25 g/m ²	Light Blue SB 25 g/m ²	Beige SB 25 g/m ²	Pink SB 25 g/m ²	Light Blue SB 25 g/m ²	Beige SB 25 g/m ²
2 nd Intermediate Sheet	—	—	—	—	—	—	—	—
Absorbent Sheet	Wet-laid Spunlaid	Wet-laid Spunlaid	Wet-laid Spunlaid	Wet-laid Spunlaid	Wet-laid Spunlaid	Wet-laid Spunlaid	Wet-laid Spunlaid	Wet-laid Spunlaid
Backsheet	White PE Film	White PE Film	White PE Film	White PE Film	White PE Film	White PE Film	White PE Film	White PE Film
Munsell Color System								
Hue	6.4 YR	6.4 YR	5.9 B	5.9 B	6.4 YR	6.4 YR	5.9 B	6.4 YR
Value	9	8.7	9	8.7	9	9	8.7	9
Chroma	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
Concealability of Vaginal Discharge	○	○	○	○	○	○	○	○
Evaluation by Monitors [M ₁₀ (A)]	5.63	5.63	5.63	5.63	5.63	5.63	5.63	5.63
Visibility of Menstrual Blood	○	○	○	○	○	○	○	○
Evaluation by Monitors [M ₁₀ (A)]	56.27	56.27	56.27	56.27	56.27	56.27	56.27	56.27
	Ex. 9	Ex. 10	Ex. 11	Comp. Ex. 1	Comp. Ex. 2	Comp. Ex. 3	Comp. Ex. 4	Comp. Ex. 5
Topsheet	Beige SB 40 g/m ²	Beige SB 30 g/m ²	Beige SB 25 g/m ²	Beige SB 25 g/m ²	Black SB 25 g/m ²	Black SB 25 g/m ²	Black SB 25 g/m ²	White SB
1 st Intermediate Sheet	—	Beige SB 30 g/m ²	Beige SB 25 g/m ²	Beige SB 25 g/m ²	—	—	—	—
2 nd Intermediate Sheet	—	—	Beige SB 25 g/m ²	Beige SB 25 g/m ²	—	—	—	—
Absorbent Sheet	Wet-laid Spunlaid	Wet-laid Spunlaid	Wet-laid Spunlaid	Wet-laid Spunlaid	Wet-laid Spunlaid	Wet-laid Spunlaid	Wet-laid Spunlaid	Wet-laid Spunlaid
Backsheet	White PE Film	White PE Film	White PE Film	White PE Film	White PE Film	White PE Film	White PE Film	White PE Film

TABLE 1-continued

Munsell Color System	6.4 YR 7.5 3.2	6.4 YR 5.9 3	6.4 YR 5 4	6.4 YR 5.5 2.7	0.25 Y 3.5 0.6	1.25 Y 4.05 0.5	3.7 Y 7 0.2	5.7 Y 9.6 0.2
Evaluation by Monitors [M ₁₀ (A)]	5.63	5.63	5.63	5.63	5.63	5.63	5.63	5.63
Visibility of Menstrual Blood	○	○	○	○	○	○	○	○
Evaluation by Monitors [M ₁₀ (A)]	56.27	56.27	56.27	56.27	56.27	56.27	56.27	56.27

[0149]

TABLE 2

Nonwoven Fabric	Pink SB 25 g/m ²	Light Blue SB 25 g/m ²	Beige SB 25 g/m ²	Beige SB 40 g/m ²
Hue	6.4 YR	5.9 B	6.4 YR	6.4 YR
Value	9	8.7	9	9
Chroma	3.2	3.2	3.2	3.2

Examples 12 and 13

[0150] For Examples 12 and 13, panty liner was prepared by stacking topsheet, intermediate sheet, absorbent sheet and backsheet.

[0151] For the topsheet and the intermediate sheet, used was spunbonded nonwoven fabric (basis weight: 30 g/m²) comprising colored polypropylene fibers that were melt extruded after mixture of masterbatch. In a region having a width of 20 mm, the topsheet used for Examples 12 and 13 was corrugated at a constant pitch in a transverse direction to have longitudinally extending ribs and valleys. In the corrugated region, moreover, a large number of recesses were regularly formed by pin-embossing. It should be noted that the topsheet was not forcibly apertured by pin-embossing. The ribs were arranged at a pitch of 2 mm in the transverse direction. The recesses due to pin-embossing were arranged along bottoms of the valleys. More specifically, the recessed due to pin-embossing were arranged at a pitch of 2 mm (identical to the pitch of ribs) in the transverse direction and at a pitch of 2.3 mm in the longitudinal direction (in a direction parallel with the valleys). These recesses had a diameter of 0.7 mm, and occupied 8.3% the area of the corrugated region. The topsheet was prepared by pressing the nonwoven fabric between first and second rolls for simultaneously forming the corrugation and the recesses. The first roll was provided with circumferentially extending grooves, which had a width of 1.3 mm and were arranged at an axial pitch of 2 mm, and also provided with pressing pins, which had a diameter of 0.7 mm and were arranged at a circumferential pitch of 2.3 mm between adjacent grooves. The second roll was provided with circumferentially extending ridges, which had a width of 0.3 mm and were arranged at an axial pitch of 2 mm. The nonwoven fabric was pressed between the first and second rolls that were in such a mated condition that the pressing pins of the first roll faced bottoms

of grooves formed between adjacent ridges of the second roll. At this time, the temperature of the roll surface was set at 100 to 110° C, and the pressure between the rolls was set at 2450 kPa. As a result, the topsheet having the corrugation and the recesses was produced to have a thickness of 1 mm. On the other hand, the intermediate sheet was provided with neither corrugation nor recesses.

[0152] For the absorbent sheet, used was uncolored absorbent sheet that was identical to that used in Examples 1 to 11 and Comparative Examples 1 to 5.

[0153] For the backsheet, used was polyethylene film manufactured from colored polyethylene resin to have a basis weight of 23.5 g/m².

[0154] In Examples 12 and 13, hue, value and chroma were measured for the individual sheets before assembling the panty liner, and then, hue, value and chroma were measured again from the side of the topsheet after assembling the panty liner.

Example 12

[0155] The topsheet had hue of 7.8YR, value of 8.9, and chroma of 2.0 according to the Munsell color system.

[0156] The intermediate sheet had hue of 6.4YR, value of 7.3, and chroma of 3.2 according to the Munsell color system.

[0157] The absorbent sheet had hue of 4.2Y, value of 9.6, and chroma of 0.2 according to the Munsell color system.

[0158] The backsheet had hue of 4.4YR, value of 7.7, and chroma of 3.3 according to the Munsell color system.

[0159] The finished panty liner had a beige color as viewed from the side of the body surface, wherein hue was 6.4YR, value was 7.3, and chroma was 2.8 according to the Munsell color system.

Example 13

[0160] The topsheet had hue of 1.3R, value of 9.4, and chroma of 1.0 according to the Munsell color system.

[0161] The intermediate sheet had hue of 1.5R, value of 9.2, and chroma of 1.2 according to the Munsell color system.

[0162] The absorbent sheet was identical to that of Example 12.

[0163] The backsheet had hue of 5.9R, value of 9.5, and chroma of 0.8 according to the Munsell color system.

[0164] The finished panty liner had a pink color as viewed from the side of the body surface, wherein hue was 0.2R, value was 9.2, and chroma was 2.2 according to the Munsell color system.

[0165] The concealability of vaginal discharge and the visibility of menstrual blood were evaluated for Examples 12 and 13 by monitors, as in Examples 1 to 11 and Comparative Examples 1 to 5. As a result, both Examples 12 and 13 were evaluated "++".

TABLE 3

	Example 12 (Blue)	Example 13 (Pink)
Finished Article		
Hue	6.4 Y	1.7 R
Value	7.3	9.2
Chroma	2.5	2.2
Topsheet		
Hue	78.5 Y	1.3 R
Value	5.3	6.3
Chroma	3	1.7
Intermediate Sheet		
Hue	65.5 Y	1.5 R
Value	7.3	6.3
Chroma	2.2	1.7
Absorbent Sheet		
Hue	1.1 Y	4.1 Y
Value	5.4	5.3
Chroma	0.7	0.7
Backsheet		
Hue	4.4 Y	1.7 R
Value	9.5	9.5
Chroma	0.8	0.8

[0166] As has been described hereinabove, the absorbent article of the present invention is suitable for use with a colored undergarment that matches in color with the article. Because the body surface of the absorbent article has a Munsell value from 5.7 to 9.3, the absorbent article has an excellent concealability of vaginal discharge adhered to the body surface, whereas, when menstruation begins during wear of the absorbent article, the beginning of menstruation can be sensed by a wearer in an early stage. Accordingly, the absorbent article of the present invention can be suitably used as a substitute for a crotch portion of an undergarment.

[0167] Although the present invention has been illustrated and described with respect to exemplary embodiment thereof, it should be understood by those skilled in the art that the foregoing and various other changes, omission and additions may be made therein and thereto, without departing from the spirit and scope of the present invention. Therefore, the present invention should not be understood as limited to the specific embodiment set out above, but to include all possible embodiments which can be embodied within a scope encompassed and equivalent thereof with respect to the feature set out in the appended claims.

What is claimed is:

1. A colored absorbent article to be attached to an inner side of an undergarment matching in color with the article,

the absorbent article having a body surface for facing the skin of a wearer and a garment surface for facing the inner side of the undergarment, the absorbent article comprising a topsheet appearing on the body surface, the topsheet being a nonwoven fabric formed of only colored fibers that are at least one kind of fibers selected from synthetic resin fibers, semi-synthetic fibers and regenerated fibers, wherein

when measured for the body surface of the absorbent article, a Munsell value is in a range of 5.7 to 9.3.

2. A colored absorbent article as set forth in claim 1, wherein the colored fibers are fibers containing a coloring agent.

3. A colored absorbent article as set forth in claim 1, wherein the colored fibers are fibers having a coloring agent applied thereon.

4. A colored absorbent article as set forth in claim 1, wherein beneath the topsheet, provided is an intermediate sheet that is a nonwoven fabric comprising colored fibers.

5. A colored absorbent article as set forth in claim 4, wherein the colored fibers of the intermediate sheet are at least one kind of fibers that are selected from synthetic resin fibers, semi-synthetic fibers and regenerated fibers and contain a coloring agent.

6. A colored absorbent article as set forth in claim 4, wherein the colored fibers of the intermediate sheet are at least one kind of fibers that are selected from synthetic resin fibers, semi-synthetic fibers and regenerated fibers and have a coloring agent applied thereon.

7. A colored absorbent article as set forth in claim 1, wherein a sheet of uncolored fibers is provided beneath the topsheet, and the topsheet has a basis weight of 25 to 75 g/m².

8. A colored absorbent article as set forth in claim 4, wherein a sheet of uncolored fibers is provided beneath the topsheet and the intermediate sheet, and the topsheet and the intermediate have a total basis weight of 25 to 75 g/m².

9. A colored absorbent article as set forth in claim 1, wherein when measured for one surface of the topsheet alone, a Munsell value is in a range of 5.7 to 9.3.

10. A colored absorbent article as set forth in claim 1, which is to be used as a panty liner for absorbing vaginal discharge.

11. A colored absorbent article to be attached to an inner side of an undergarment matching in color with the article,

the absorbent article having a body surface for facing the skin of a wearer and a garment surface for facing the inner side of the undergarment, the absorbent article comprising a topsheet appearing on the body surface, the topsheet being a colored synthetic resin sheet, wherein

when measured for the body surface of the absorbent article, a Munsell value is in a range of 5.7 to 9.3.

12. A colored absorbent article as set forth in claim 11, wherein beneath the topsheet, provided is an intermediate sheet that is a nonwoven fabric comprising colored fibers.

13. A colored absorbent article as set forth in claim 12, wherein the colored fibers of the intermediate sheet are at least one kind of fibers that are selected from synthetic resin fibers, semi-synthetic fibers and regenerated fibers and contain a coloring agent.

14. A colored absorbent article as set forth in claim 12, wherein the colored fibers of the intermediate sheet are at

least one kind of fibers that are selected from synthetic resin fibers, semi-synthetic fibers and regenerated fibers and have a coloring agent applied thereon.

15. A colored absorbent article as set forth in claim 11, wherein a sheet of uncolored fibers is provided beneath the topsheet, and the topsheet has a basis weight of 25 to 75 g/m².

16. A colored absorbent article as set forth in claim 12, wherein a sheet of uncolored fibers is provided beneath the topsheet and the intermediate sheet, and the topsheet and the intermediate have a total basis weight of 25 to 75 g/m².

17. A colored absorbent article as set forth in claim 11, wherein when measured for one surface of the topsheet alone, a Munsell value is in a range of 5.7 to 9.3.

18. A colored absorbent article as set forth in claim 11, which is to be used as a panty liner for absorbing vaginal discharge.

19. A colored absorbent article to be attached to an inner side of an undergarment matching in color with the article,

the absorbent article having a body surface for facing the skin of a wearer and a garment surface for facing the inner side of the undergarment, the absorbent article comprising a topsheet appearing on the body surface, the topsheet being a composite of a nonwoven fabric and a colored synthetic resin sheet, the nonwoven fabric being formed of only colored fibers that are at least one kind of fibers selected from synthetic resin fibers, semi-synthetic fibers and regenerated fibers, wherein

when measured for the body surface of the absorbent article, a Munsell value is in a range of 5.7 to 9.3.

20. A colored absorbent article as set forth in claim 19, wherein the colored fibers are fibers containing a coloring agent.

21. A colored absorbent article as set forth in claim 19, wherein the colored fibers are fibers having a coloring agent applied thereon.

22. A colored absorbent article as set forth in claim 19, wherein beneath the topsheet, provided is an intermediate sheet that is a nonwoven fabric comprising colored fibers.

23. A colored absorbent article as set forth in claim 22, wherein the colored fibers of the intermediate sheet are at least one kind of fibers that are selected from synthetic resin fibers, semi-synthetic fibers and regenerated fibers and contain a coloring agent.

24. A colored absorbent article as set forth in claim 22, wherein the colored fibers of the intermediate sheet are at least one kind of fibers that are selected from synthetic resin fibers, semi-synthetic fibers and regenerated fibers and have a coloring agent applied thereon.

25. A colored absorbent article as set forth in claim 22, wherein a sheet of uncolored fibers is provided beneath the topsheet, and the topsheet has a basis weight of 25 to 75 g/m².

26. A colored absorbent article as set forth in claim 22, wherein a sheet of uncolored fibers is provided beneath the topsheet and the intermediate sheet, and the topsheet and the intermediate have a total basis weight of 25 to 75 g/m².

27. A colored absorbent article as set forth in claim 22, wherein when measured for one surface of the topsheet alone, a Munsell value is in a range of 5.7 to 9.3.

28. A colored absorbent article as set forth in claim 22, which is to be used as a panty liner for absorbing vaginal discharge.

• • • • •



US 2003/0187415 A1

(19) United States

(12) Patent Application Publication
Kudo et al.

(10) Pub. No.: US 2003/0187415 A1
(43) Pub. Date: Oct. 2, 2003

(54) COLORED ABSORBENT ARTICLE

Aug. 16, 2002 (JP) 2002-237695

(75) Inventors: Jun Kudo, Kagawa (JP); Hideki Kondo, Kagawa (JP); Yukihito Ito, Kagawa (JP)

Publication Classification

(51) Int. Cl.⁷ A61F 13/15
(52) U.S. Cl. 604/367, 604/385.03

Correspondence Address:
DARBY & DARBY P.C.
805 Third Avenue
New York, NY 10022 (US)

(73) Assignee: Uni-Charm Corporation

(21) Appl. No. 10/340,636

(22) Filed: Jan. 10, 2003

(30) Foreign Application Priority Data

Jan. 11, 2002 (JP) 2002-4215

ABSTRACT

Disclosed is a colored absorbent article to be attached to an inner side of an undergarment matching in color with the article. The absorbent article has a body surface for facing the skin of a wearer and a garment surface for facing the inner side of the undergarment. The absorbent article includes a topsheet appearing on the body surface. The topsheet is a nonwoven fabric formed of only colored fibers that are at least one kind of fibers selected from synthetic resin fibers, semi-synthetic fibers and regenerated fibers. When measured for the body surface of the absorbent article, a Munsell value is in a range of 5.7 to 9.3.

Patent Application Publication Oct. 2, 2003 Sheet 1 of 2 US 2003/0187415 A1

Fig. 1

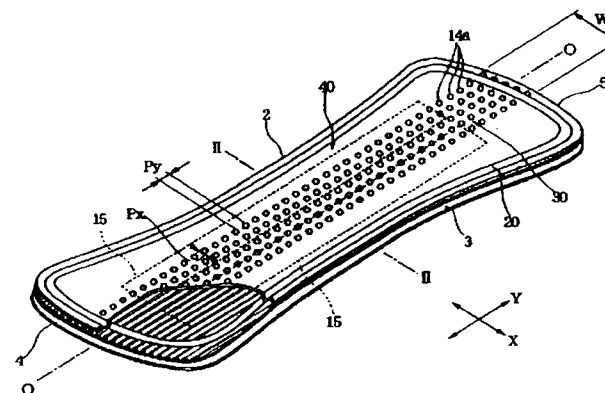
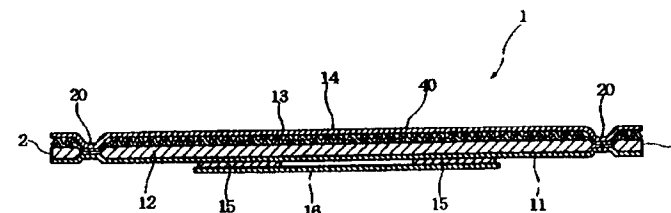


Fig. 2



D3
199

COLORED ABSORBENT ARTICLE BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to an absorbent article suitable for use with an undergarment that matches in color with the article, more particularly, relates to a colored absorbent article that is suitable for use as a panty liner and has an excellent concealability of vaginal discharge and an excellent visibility of menstrual blood.

[0003] 2. Description of the Related Art

[0004] Absorbent articles to be attached to a crotch portion of a woman's undergarment include panty liners that are intended to mainly receive vaginal discharge, as well as sanitary napkins and incontinence pads. Conventional panty liners are intended to absorb a relatively large amount of vaginal discharge so that the vaginal discharge does not leak out of the liner, without giving an unpleasant feeling to the private parts.

[0005] In recent years, however, a growing number of users have chosen to wear panty liners when an amount of vaginal discharge is relatively small. Such users do not wear panty liners for absorption of large amount of vaginal discharge, as in the conventional case, but for the liner for stain prevention of undergarments. That is, people who want to keep undergarments clean, ask wearers of undergarments of dislike stain on undergarments, and wish to wear panty liners. These people do not wear panty liners as the entire band absorb of urine, but mainly intend to use them as a substitute for a crotch portion of an undergarment. In such a case, the crotch portion of an undergarment is a woman's underwear of late years, business and others are intensively designed and they are usually purchased as a two-piece set or a three-piece set. Such users do not wear panty liners since the crotch portion of the panties stain easily, the panties stain clearly the crotch portion thereof. After washed more carefully accompanied with other underwear or washed with a heavy duty detergent with a bleaching agent. Since the cloth of the panties may be easily exclusively damaged due to the presence of such washing as can be done with other undergarments, not a few women purchase spare panties when they purchase undergarments as a two-piece set or a three-piece set. Panty liners are beneficial to such women as a substitute for a crotch portion of an undergarment. By using panty liners everyday, the crotch portion of the panties can be prevented from staining, so that such spare panties are not more required to purchase.

[0006] When panty liners are used as a substitute for a crotch portion of an undergarment, an exchangeable crotch portion of an undergarment, waters (urine) which do not panty liner is comfortable to wear and which do not panty liner is full as an integral part of undergarment rather than absorbency that has been conventionally regarded as important. Therefore, thinner and smaller panty liners have become popular. Such panty liners to be used as a substitute for a crotch portion of an undergarment are usually white.

[0007] However, a lot of women who stick to underwear in which take good care of undergarment choose undergarments according to the mood of the day or the schedule

[0014] In the panty liner when an odor given to the absorbent layer on backsheet can be seen through the top-sheet, on the other hand, the color varies depending on fiber density of the top-sheet, and hue and value also vary depending on an angle for visual observation. Thus, the color varies with the location on the surface of each panty liner, and also varies for different products.

[0015] The absorbent article disclosed in Patent Publication EP1108405 has a color that matches with a black undergarment and has an effect of concealing body fluids (vaginal discharge, menstrual blood, urine) discharged from the private parts.

[0016] In the panty liner having a dark color such as black, body fluids adhered thereto are less noticeable. During a period other than menstruation, therefore, it has an effect of absorbing and concealing vaginal discharge to thereby prevent an undergarment from being stained. However, when a small amount of menstrual blood is adhered thereto immediately after the beginning of menstruation, the dark color may possibly conceal such menstrual blood. In this case, because a wearer cannot notice the beginning of menstruation immediately, she cannot replace the panty liner with a common sanitary napkin timely. As a result, a large amount of menstrual blood that exceeds absorption capacity of the thin panty liner may adhere to the wearer's private parts and surroundings to give her an unpleasant feeling. Furthermore, such menstrual blood may possibly leak out of the panty liner to adhere to not only the undergarment but also underwear. That is, the panty liner that is intended to prevent the colored undergarment from being stained may lead to menstrual blood stains on the undergarment and the underwear instead.

[0017] In order to prevent this situation, it is possible to increase the absorption capacity of body fluids. In this case, however, because the thickness, weight and area of the panty liner need be increased for increasing the absorption capacity, the panty liner is not so simple, a sanitary napkin or a conventional vaginal discharge absorbing liner. Such a thick, heavy and large panty liner is not suitable for use as a substitute for a crotch portion.

[0018] In the panty liner using the cotton spunlaced sheet colored in green and the panty liner in which a color can be seen through the top-sheet, the color varies in each product and also varies for different products, as set forth above. Therefore, the concealability of vaginal discharge and the visibility of adhered menstrual blood at the beginning of menstruation vary for different products. In addition, the concealability and the visibility may easily vary in each panty liner depending on a location to which vaginal discharge and menstrual blood adhere.

SUMMARY OF THE INVENTION

[0019] The present invention has been worked out in view of the shortcomings in the prior art set forth above. It is therefore an object of the present invention to provide an absorbent article suitable for use with an undergarment that matches in color with the article, of which a top-sheet adhered to a body surface is uniformly colored so that vaginal discharge can be effectively concealed and adhered menstrual blood can be immediately noticed at the beginning of menstruation.

[0020] According to a first aspect of the present invention, there is provided a colored absorbent article to be attached to an inner side of an undergarment matching in color with the article.

[0021] The absorbent article having a body surface for facing the skin of a wearer and a garment surface for facing the inner side of the undergarment, the absorbent article comprising a top-sheet appearing on the body surface, the top-sheet being a nonwoven fabric formed of only colored fibers that are at least one kind of fibers selected from synthetic resin fibers, semi-synthetic fibers and regenerated fibers, wherein [0022] when measured for the body surface of the absorbent article, a Munsell value is in a range of 5.7 to 9.3.

[0023] According to a second aspect of the present invention, there is provided a colored absorbent article to be attached to an inner side of an undergarment matching in color with the article.

[0024] The absorbent article having a body surface for facing the skin of a wearer and a garment surface for facing the inner side of the undergarment, the absorbent article comprising a top-sheet appearing on the body surface, the top-sheet being a colored synthetic resin sheet, wherein

[0025] when measured for the body surface of the absorbent article, a Munsell value is in a range of 5.7 to 9.3.

[0026] According to a third aspect of the present invention, there is provided a colored absorbent article to be attached to an inner side of an undergarment matching in color with the article.

[0027] The absorbent article having a body surface for facing the skin of a wearer and a garment surface for facing the inner side of the undergarment, the absorbent article comprising a top-sheet appearing on the body surface, the top-sheet being a composite of a nonwoven fabric and a colored synthetic resin sheet, the nonwoven fabric being formed of only colored fibers that are at least one kind of fibers selected from synthetic resin fibers, semi-synthetic fibers and regenerated fibers, wherein

[0028] when measured for the body surface of the absorbent article, a Munsell value is in a range of 5.7 to 9.3.

[0029] In the present invention, because the top-sheet is a nonwoven fabric formed of only colored fibers that are at least one kind of fibers selected from synthetic resin fibers, semi-synthetic fibers and regenerated fibers, a colored synthetic resin sheet or a combination thereof, a color appearing on the body surface of the absorbent article can be made uniform. In addition, the value of 5.7 to 9.3. Therefore, vaginal discharge adhered to the body surface of absorbent article becomes less noticeable, providing an excellent concealability of vaginal discharge. When menstruation begins thereon, water on the other hand, menstrual blood adhered to the body surface is not absorbed in the absorbent article, can be recovered immediately, so that the beginning of menstruation can be noticed in an early stage.

Thus, the absorbent article is suitable for use as a substitute for a crotch portion of an undergarment or an exchangeable crotch portion of an undergarment. Moreover, if an absorbent article having a color analogous or similar to that of an undergarment is chosen and worn, the absorbent article becomes less noticeable in a state attached to a crotch portion of the undergarment as if the absorbent article is an integral part of the crotch portion.

[0030] The colored fibers may be fibers containing a coloring agent or fibers having a coloring agent applied thereon. The synthetic resin fibers, the semi-synthetic fibers and the regenerated fibers can contain a coloring agent. In addition, since the synthetic resin fibers, the semi-synthetic fibers and the regenerated fibers have a smooth fiber surface, a coloring agent can be uniformly applied to the fiber surface. Therefore, the topsheet can be uniformly colored, and the color can be stabilized between different products.

[0031] Examples of the colored synthetic resin sheet include a film manufactured from a synthetic resin containing a coloring agent and processed to have liquid passage holes, a net like sheet manufactured from a synthetic resin containing a coloring agent to have relatively large liquid passage holes, and a formed resin sheet manufactured from a synthetic resin containing a coloring agent to have interconnected cells through which liquid can pass. Alternatively, the colored synthetic resin sheet may be a synthetic resin film that is coated with a coloring agent by printing. In any case, a synthetic resin sheet can be given a uniform color.

[0032] Particularly when the colored fibers are fibers containing a coloring agent and the colored synthetic resin sheet is a synthetic resin film containing a coloring agent, hue and value of the colored sheet can be easily adjusted depending on the amount and kind of coloring agent to be contained in the synthetic resin. In addition, since the contained coloring agent never drops from the sheet, it is safe for the human body and can be prevented from adhering to an undergarment. Since the absorbent article is less noticeable when attached to an undergarment, the undergarment may possibly be washed together with the absorbent article. However, since the contained coloring agent never drops from the sheet even when the absorbent article is washed by mistake, the undergarment can be prevented from staining.

[0033] In the case where the topsheet is composed of the nonwoven fabric formed of only colored fibers and the colored synthetic resin sheet, only a central portion of the topsheet may be formed from the nonwoven fabric and side portions of the topsheet may be formed from the synthetic resin sheet. Conversely, the central portion may be formed from the synthetic resin sheet and the side portions may be formed from the nonwoven fabric. It is also possible to use a laminate of the nonwoven fabric and the synthetic resin sheet.

[0034] Beneath the topsheet, it is possible to provide an intermediate sheet that is a nonwoven fabric comprising colored fibers. If an intermediate sheet having a color analogous, similar or identical to that of the topsheet is disposed beneath the topsheet, the hue and value of the entire absorbent article can be easily adjusted, so that the value can be easily adjusted to an optimal degree within the range of 5.7 to 9.3. For example, when the value of the topsheet alone is bright, the value of a laminate of the topsheet and the intermediate sheet can be made darker than

that of the topsheet alone within the above-mentioned range. As a result, the concealability of vaginal discharge absorbed in the absorbent article can be enhanced. On the other hand, since the body surface of the absorbent article has a subtle color, a small amount of menstrual blood adhered to the topsheet can be made noticeable. Also in this case, the colored fibers of the intermediate sheet may be at least one kind of fibers that are selected from synthetic resin fibers, semi-synthetic fibers and regenerated fibers and contain a coloring agent. Alternatively, the colored fibers of the intermediate sheet may be at least one kind of fibers that are selected from synthetic resin fibers, semi-synthetic fibers and regenerated fibers and have a coloring agent applied thereon by printing or the like.

[0035] When a sheet of uncolored fibers is provided beneath the topsheet, the topsheet preferably has a basis weight of 25 to 75 g/m². If the basis weight of the colored topsheet is set within the above-mentioned range, the value of the body surface can be easily set within the range of 5.7 to 9.3 even when the sheet of uncolored fibers, such as an absorbent sheet that is white or having a material color of natural fibers, is present beneath the topsheet. When a sheet of uncolored fibers is provided beneath the topsheet and the intermediate sheet, the topsheet and the intermediate sheet preferably have a total basis weight of 25 to 75 g/m².

[0036] When measured for one surface of the topsheet alone, a Munsell value is preferably in a range of 5.7 to 9.3. If the value of the topsheet alone is set within the above-mentioned range, the value of the body surface of the entire absorbent article can be easily set within the range of 5.7 to 9.3. For example, even if a sheet beneath the topsheet has a value outside the above-mentioned range, the value of the body surface can be set within the above-mentioned range by increasing the basis weight of the topsheet or providing the colored intermediate sheet beneath the topsheet.

[0037] As has been described hereinabove, the absorbent article of the present invention is suitable for use as a panty liner for absorbing vaginal discharge.

BRIEF DESCRIPTION OF THE DRAWINGS

[0038] The present invention will be understood more fully from the detailed description given hereinafter and from the accompanying drawings of the preferred embodiment of the present invention, which, however, should not be taken to be limitative to the invention, but are for explanation and understanding only.

[0039] In the drawings:

[0040] FIG. 1 is a perspective view showing a panty liner according to a first embodiment of the present invention;

[0041] FIG. 2 is a sectional view taken along line II-II of FIG. 1;

[0042] FIG. 3 is a perspective view showing a panty liner according to a second embodiment of the present invention; and

[0043] FIG. 4 is a half-sectional view taken along line IV-IV of FIG. 3.

DESCRIPTION OF THE PREFERRED EMBODIMENT

[0044] The present invention will be discussed hereinafter in detail with reference to the preferred embodiments according to

the present invention with reference to the accompanying drawings. In the following description, numerous specific details are set forth in order to provide a thorough understanding of the present invention. It will be obvious, however, to those skilled in the art that the present invention may be practiced without these specific details. In other instances, well-known structures are not shown in detail in order to avoid unnecessary obscurity of the present invention.

[0045] FIG. 1 is a perspective view showing a panty liner 1 as a colored absorbent article according to a first embodiment of the present invention; and FIG. 2 is a sectional view of the panty liner 1 taken along line II-II of FIG. 1.

[0046] The panty liner 1 of FIGS. 1 and 2 is a thin absorbent article, which is to be worn by women while being attached to an inner side of a crotch portion of an undergarment (e.g., panties) for absorbing body fluids such as vaginal discharge. As used herein, the term "vaginal discharge" refers to a small amount of fluid that flows out of the vagina each day, carrying out old cells that have lined the vagina. This discharge is usually clear or milky. It should be noted that the absorbent article and components thereof have two surfaces, of which one surface that is intended to be directed toward the crotch of a wearer is called "body surface," while the other surface that is on the opposite side is called "garment surface". The panty liner 1 is suitable for use with an undergarment that matches in color with the panty liner 1. In other words, a panty liner 1 of a color that is analogous, similar or identical to that of an undergarment is to be chosen for use. The given color can be recognized as viewed at least from the side of a body surface 40 of the panty liner 1. The term "colored" as used herein refers to a state where a color other than white is given to an object. Therefore, the concept of colorless does not include a state where an object is colored white only with a white pigment or the like.

[0047] The panty liner 1 is to be used as a substitute for a crotch portion of an undergarment or an exchangeable crotch portion of an undergarment. For such use, the panty liner 1 is of thin type of which the thickness is preferably in the range of 0.25 mm to 5 mm, more preferably in the range of 0.5 mm to 3.5 mm. The width of the panty liner 1 is in the range of 0.5 g to 4 g, preferably in the range of 0.75 g to 3 g, most preferably in the range of 1 g to 2 g. If the thickness and the weight are greater than the above-mentioned upper limits, a wearer tends to feel that something is wrong with an undergarment when such a heavy or thick panty liner is used as a substitute for a crotch portion of the undergarment. If they are less than the above-mentioned lower limits, on the other hand, since the absorption capacity of vaginal discharge and so on decreases, a wearer tends to be afraid that vaginal discharge may not be absorbed by the panty liner. In addition, it is difficult to manufacture such an excessively thin panty liner.

[0048] In order that the panty liner 1 attached to a crotch portion of an undergarment can be felt like an integral part of the crotch portion of the undergarment, the maximum longitudinal dimension between front and rear end edges of the panty liner 1 is in the range of 75 mm to 200 mm, preferably in the range of 90 mm to 170 mm, most preferably in the range of 100 mm to 150 mm. On the other hand, the transverse dimension between left and right side edges at a location along or near a transverse line extending centrally

of the panty liner 1 (where the width of the panty liner becomes the smallest if it is of an hourglass shape, as shown in FIG. 1) is preferably in the range of 30 mm to 80 mm, more preferably in the range of 40 mm to 60 mm, most preferably in the range of 45 mm to 55 mm. Within the above-mentioned range, the panty liner 1 can cover the discharging parts (private parts) of the wearer's body without projecting from a crotch portion of an undergarment.

[0049] The entire panty liner 1 preferably has a Gurley stiffness from 10 to 300 mg. The Gurley stiffness is more preferably from 30 to 250 mg, most preferably from 50 to 200 mg. If it is greater than the above-mentioned upper limit, the panty liner 1 attached to the crotch portion of the undergarment may possibly be felt stiff by a wearer. If it is less than the above-mentioned lower limit, the panty liner may possibly be twisted or displaced when the crotch portion of the undergarment is deformed. If it is less than the above-mentioned lower limit, moreover, the panty liner 1 becomes too soft to manufacture.

[0050] The Gurley stiffness is expressed by a value measured by using a Gurley flexibility tester: type 311 manufactured by YASUDA SEIKI SEISAKUSHO LTD. according to the manual attached to the tester. It should be noted that measurement is performed using a test sample having a width of 25.4 mm.

[0051] Preferably, nonwoven fabric appears on the body surface 40 of the panty liner 1 as in the following embodiment. In this case, the surface texture becomes analogous to that of the material of the undergarment.

[0052] The panty liner 1 of FIG. 1 has right and left side edges 2 and 3 extending in a longitudinal direction (X-direction) and front and rear end edges 4 and 5 extending in a transverse direction (Y-direction). The right and left side edges 2, 3 are inwardly curved and the front and rear end edges 4, 5 are outwardly curved, so that the panty liner 1 is of an hourglass shape as viewed from above.

[0053] As shown in FIG. 2, the panty liner 1 is of a laminated structure having four sheets: a liquid-impermeable backsheet 11, an absorbent sheet 12 laid on the backsheet 11 and having an ability to absorb and retain liquid, a liquid-permeable intermediate sheet 13 laid on the absorbent sheet 12, and a liquid-permeable topsheet 14 laid on the intermediate sheet 13.

[0054] As viewed from above, the backsheet 11, the absorbent sheet 12, the intermediate sheet 13 and the topsheet 14 are of the same shape and size as the panty liner 1, so that right and left side edges and front and rear end edges of the individual sheets 11, 12, 13 and 14 coincide with the edges 2, 3, 4 and 5 of the panty liner 1, respectively.

[0055] After the backsheet 11, the absorbent sheet 12, the intermediate sheet 13 and the topsheet 14 are stacked, the panty liner 1 is formed with a round seal 20 extending continuously along but inwardly spaced 1 to 4 mm apart from the right side edge 2, the left side edge 3, the front end edge 4 and the rear end edge 5. This round seal 20 has a width of about 1 to 3 mm, wherein the four sheets are joined together under pressure using a hot melt type adhesive or the like.

[0056] On a garment surface of the backsheet 11, there is applied a pair of pressure-sensitive adhesive layers 15, 15

equally spaced apart from a longitudinally extending center line D14 of the panty liner 1. As shown in FIG. 2, a release paper 16 is adhered to a surface of the pressure sensitive adhesive layers 15, 15'. The release paper 16 is peeled from the pressure sensitive adhesive layers 15, 15' by a wearer of the panty liner 1 to expose the pressure sensitive adhesive layers 15, 15'. Then, the panty liner 1 is adhered by applying the pressure sensitive adhesive layers 15, 15' to an inner side of a crotch portion of an undergarment. Thus, the panty liner 1 is used as a part of (substitute for) a crotch portion of an undergarment.

[0057] As shown in FIG. 1, the topsheet 14 is formed with liquid passage holes 14a that are dotted over a region having a constant width W1 and extending along the centerline C14 over the entire length of the topsheet 14. The region having the liquid passage holes 14a is called "central liquid passage region 30".

[0058] In the central liquid passage region 30, the liquid passage holes 14a are regularly arranged. Each liquid passage hole 14a is of a circular shape. Both a longitudinal pitch P1 and a transverse pitch P2 of the liquid passage holes 14a are in the range of 2 to 5 mm. An opening diameter of the liquid passage hole 14a is about 0.5 to 1 mm on a plane, flush with the body surface of the topsheet 14. The area ratio of the liquid passage holes 14a to the central liquid passage region 30 is in the range of 8 to 30%.

[0059] The width W1 of the central liquid passage region 30 in which the liquid passage holes 14a are uniformly distributed is preferably in the range of 10 to 40 mm. Within the above-mentioned range, the vaginal opening of a wearer can be suitably covered with the central liquid passage region 30 so that body fluids such as vaginal discharge can be received mainly by the central liquid passage region 30.

[0060] These liquid passage holes 14a can be formed by subjecting the topsheet 14 to a secondary mechanical process. With the top sheet 14 as a substrate, the mechanical process of the body surface 40 of the panty liner 1 becomes analogous to that of a crotch portion of an undergarment, so that the panty liner 1 can be felt as if as an integral part of the crotch portion of the undergarment. In an alternative, the topsheet 14 may be cut and folded to form the intermediate sheet 13 that will be described in detail later. In a secondary mechanical process, in another alternative, the topsheet 14 may be pre-embossed to have a large number of recesses. Such a crotch-embossed topsheet 14 is suitable for use as a substitute for a crotch portion of an undergarment because it can provide not only a soft feel to the touch but also an appearance analogous to that of a crotch.

[0061] Before subjected to such a secondary mechanical process for construction, i.e., the thickness of the topsheet 14 is preferably in the range of 0.05 to 0.2 mm, and preferably in the range of 0.1 to 0.15 mm, and is preferably in the range of 0.2 to 0.3 mm. The bending resistance of the topsheet 14 alone, when measured in accordance with A-method (45° cantilever method) of JIS (Japanese Industrial Standard) 1-1996, is 19.1 (1996) is preferably equal to or less than 85 mm, more preferably equal to or less than 80 mm, must be lower limit is 0 mm. If the bending resistance is in excess of the above-mentioned range, the panty liner 1 will be felt too hard to be a substitute for a crotch portion of an undergarment. If the bending resistance is in the above-

mentioned range, on the other hand, the panty liner 1 can be felt as an integral part of a crotch portion of an undergarment.

[0062] The intermediate sheet 13 is corrugated to have ribs and valleys extending in the longitudinal direction. These ribs and valleys are arranged such that a peak-to-peak distance between adjacent ribs is about 1 to 3 mm. The thickness of the corrugated intermediate sheet 13 (i.e., a distance between the parent surface of the intermediate sheet 13 at a location where the bottoms of the valleys are in contact with the absorbent sheet 12 and the body surface of the intermediate sheet 13 at a location where the peaks of the ribs are in contact with the topsheet 14) is about 0.5 to 1.5 mm. If the intermediate sheet 13 is thus corrugated, the panty liner 1 can provide a soft feel when worn.

[0063] In the panty liner 1, the topsheet 14 forms the body surface 40. Body fluid such as vaginal discharge given to the body surface 40 and collected by the topsheet 14 mainly passes through the liquid passage holes 14a and then permeates and passes through the intermediate sheet 13. Thus, the body fluid is absorbed and retained by the absorbent sheet 12. The body fluid such as vaginal discharge absorbed and retained by the absorbent sheet 12 is blocked by the liquid-impermeable backsheet 11 so as not to leak out to an undergarment.

[0064] As viewed from on the side of the body surface 40, the panty liner 1 has a color other than white. This color may be pink, light blue, or so on, the like, that an analogous, similar or identical color that is readily not women's taste, about undergarment. In addition, a color can be chosen one that matches in color with an undergarment intended to be worn. When the material on the surface of the topsheet 14 alone, a Munsell value is in the range of 5.7 to 9.3.

[0065] Also when measured for the body surface 40 of the finished panty liner 1 in a dry state where no body fluid such as vaginal discharge is given to the body surface, a Munsell value is in the range of 5.7 to 9.3.

[0066] In the embodiment shown, although the body surface 40 is partially processed to have the central liquid passage region 30 dotted with the liquid passage holes 14a, both the value of the topsheet 14 alone and the value of the finished panty liner 1 are in the range of 5.7 to 9.3 in both the central liquid passage region 30 and the remaining regions of the body surface 40. Also in the case where the topsheet 14 is corrugated to have ribs and valleys or pre-embossed to have a large number of recesses, values measured for the corrugated region and the pre-embossed region are in the above-mentioned range.

[0067] In the case where the Munsell value measures for the body surface 40 of the panty liner 1 is in the range of 5.7 to 9.3, as set forth above, there is little difference between the value of the topsheet 14 alone, adhered to or permeating and a value of vaginal discharge, adhered to or permeating through the topsheet 14. Therefore, the color of vaginal discharge becomes obscure. If menstruation occurs during wear of the panty liner 1, on the other hand, since the difference between the value of the body surface 40 before adhered to or permeating and a value of menstrual blood adhered to or permeating through the topsheet 14 is large, the menstrual blood can be recognized immediately.

[0068] Thus, since vaginal discharge adhered to the topsheet 14 appears not on the body surface 40 of the panty liner

1 is less noticeable, a stain on the body surface 40 of the panty liner 1 becomes less noticeable during a period other than menstruation. On the other hand, a small amount of menstrual blood adhered to the topsheet 14 can easily be recognized. In addition, since the value measured for the body surface 40 of the finished panty liner 1 (the term "finished" means a state where all the sheets of the panty liner 1 are laminated as shown in FIGS. 1 and 2) is also in the above-mentioned range, vaginal discharge absorbed by the absorbent sheet 12 via the intermediate sheet 13 can be concealed, while even menstrual blood having reached to the intermediate sheet 13 on the absorbent sheet 12 can be made noticeable.

[0069] The value of the body surface 40 of the finished panty liner 1 can be adjusted within the above-mentioned range by using the topsheet 14 colored to have a predetermined value and by choosing an appropriate sheet combination beneath the topsheet 14.

[0070] In the panty liner 1 constructed as shown in FIGS. 1 and 2, the topsheet 14 and the intermediate sheet 13 are colored, but the absorbent sheet 12 is uncolored (i.e., the absorbent sheet 12 is white or has a natural color of fibers). [0071] Here, as the total basis weight of a stack of the colored topsheet 14 and the colored intermediate sheet 13 is slightly increased or the basis weight of the topsheet 14 is increased without providing the intermediate sheet 13, the value of the body surface 40 of the finished panty liner 1 will be shifted to a lower degree and made darker than the value of the topsheet 14 alone. Therefore, the topsheet 14 itself can be made slightly brighter with the finished panty liner 1 than the topsheet 14 alone. In this case, the effect of concealing vaginal discharge or urine permeating through the intermediate sheet 13 and the absorbent sheet 12 can be enhanced. Here, menstrual blood permeating inside can be made noticeable by setting the value of the finished panty liner 1 within the above-mentioned range, as set forth above, and furthermore, because the topsheet 14 is relatively thicker, menstrual blood adhered to the topsheet 14 can be made more noticeable. Therefore, the beginning of menstruation can be sensed in an early stage.

[0072] As the topsheet 14 is made thinner without providing the intermediate sheet 13 or the total basis weight of the topsheet 14 and the intermediate sheet 13 is slightly decreased, on the other hand, the underlying absorbent sheet 12 that is white or has a natural color of fibers can be seen more easily through the topsheet 14. In this case, by setting the value of the topsheet 14 to be slightly darker within the above-mentioned preferred range, the value of the body surface 40 of the finished panty liner 1 can be adjusted to be lighter within the above-mentioned range. As a result, vaginal discharge, adhered to or permeating through the topsheet 14, can be made less noticeable, while menstrual blood, absorbed by the absorbent sheet 12, can be made noticeable.

[0073] Thus, hue and value of the topsheet 14 alone and hue and value of the finished panty liner 1 can be arbitrarily set by setting the value of the topsheet 14 alone within the above-mentioned range, deciding whether or not one or more intermediate sheets 13 will be used, adjusting the basis weight of the topsheet 14 or the total basis weight of the topsheet 14 and the intermediate sheet 13, and deciding whether or not the underlying sheet such as the absorbent sheet 12 will be colored other than white.

[0074] Since a stain such as vaginal discharge on the panty liner 1 is less noticeable and the beginning of menstruation can be sensed by a wearer in an early stage, a wearer can replace the panty liner 1 with a sanitary napkin in an early stage after the beginning of menstruation. Therefore, menstrual blood can be effectively prevented from being given to the panty liner 1 in an amount in excess of the absorption and retention capacity of the panty liner 1, leaking out of it, and blurring an undergarment and so on.

[0075] As used herein, the "Munsell color system" refers to the Renotation Munsell system that is the color specification system created by Albert H. Munsell and then revised by the Colorimetric Committee of the Optical Society of America.

[0076] According to the Munsell color system, color is expressed by three attributes: Hue, Value, and Chroma. The "hue" means the attribute of color which can be found in the spectrum of light. In the Munsell color system, red (R), yellow (Y), green (G), blue (B), and purple (P) are selected as five principle hues, and yellowed (YR), green yellow (GY), blue green (BG), purple blue (PB), and red purple (RP) are arranged therebetween as five intermediate hues. In these ten hues, degree of each hue is expressed in equally spaced relation such that the maximum degree of a chroma is 10. The "value" means the attribute of visual sensation which can express the magnitude of luminous reflectance (reflectance with respect to lightness) of an object surface. In the Munsell color system, the value is expressed in equally spaced relation such that black that can completely absorb light is 0 and white that can completely reflect light is 10. The "chroma" means sharpness of color. In the Munsell color system, achromatic color is 0 and the maximum chroma increases in equally spaced relation as the sharpness increases.

[0077] As used herein, the "undergarment color" means a range of hue within 3° degrees for example, an analogous color with respect to 30° in the range of 100 to 100° on the other hand, the "similar color" means a range of hue within 3° degrees for example, a similar color with respect to 30° in the range of 30° to 30° on the other hand.

[0078] Hue, value and chroma can be determined by using a measuring device. In the present invention, the value and chroma are determined by using a colorimeter (CR-300) manufactured by MINOLTA Co., Ltd.

[0079] In the panty liner 1 of this embodiment, not only the topsheet 14 and the intermediate sheet 13 are colored, but also the backsheet 11 is colored to have an analogous or similar color to that of the topsheet 14.

[0080] If the backsheet 11 is colored to have an analogous or similar color (preferably an identical color) to that of the topsheet 14 both the body surface and the bottom surface of the panty liner 1 can match in color with an undergarment. When attached to a crotch portion of the undergarment, therefore, the panty liner 1 can look like an integral part of the crotch portion of the undergarment. In addition, even if a part of the panty liner 1 projects from the crotch portion, it is less noticeable that the panty liner 1 is worn.

[0081] In order to set the value of the body surface 40 of the finished panty liner 1 within the range of 5.7 to 9.3, hue for pink type is preferably set in the range of 50 to 90, hue for light blue type is preferably set in the range of 30 to 60.