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Tra. 11 PATENTEIYII Eva: 378 FASENACIONALI  
Act. 411 PRESENTACION Folios: 165



**Industria y Comercio**

SUPERINTENDENCIA

DELEGATURA PROPIEDAD INDUSTRIAL

SOLICITUD  
REGISTRO DE PATENTE DE INVENCION  
PCT

EXPEDIENTE No \_\_\_\_\_

TITULO APARATO Y MÉTODO DE FABRICACIÓN  
DE ARTÍCULO ABSORBENTE

CLASIFICACION INTERNACIONAL \_\_\_\_\_

SOLICITANTE UNICHARM CORPORATION

DOMICILIO Japón

APODERADO DARIO CARDENAS NAVAS

BOGOTA D.C. \_\_\_\_\_



No. 11-122080-00000-0000

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Tra. 11 PATENTEIYII Eva: 378 FASENACIONALI  
Act. 411 PRESENTACION Follos: 165

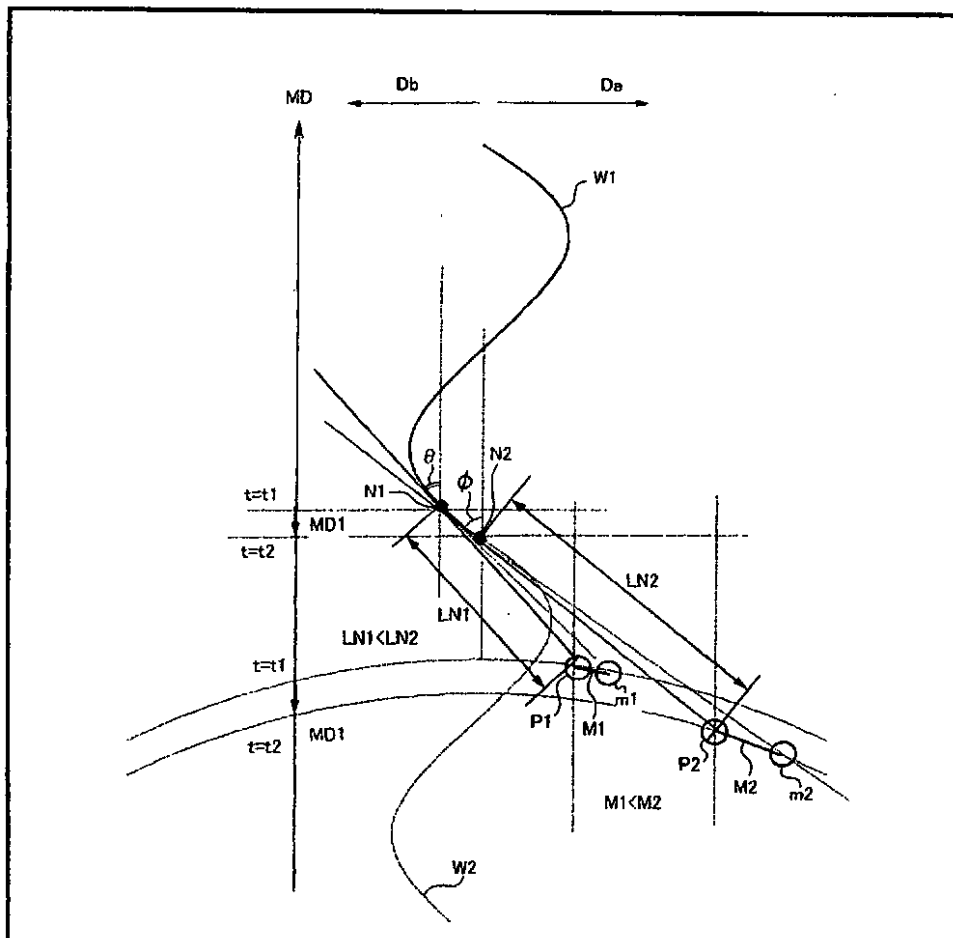
**FORMULARIO UNICO DE SOLICITUD DE PATENTE  
PCT  
ENTRADA EN FASE NACIONAL**

|                                                                                                                                                                                     |                                                                                                                                                                                                                                                                               |                                                        |                                                                                                                                                                                                                 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>① SOLICITUD DE:</b>                                                                                                                                                              |                                                                                                                                                                                                                                                                               |                                                        |                                                                                                                                                                                                                 |
| <input checked="" type="checkbox"/> Patente de Invención                                                                                                                            |                                                                                                                                                                                                                                                                               | <input type="checkbox"/> Patente de Modelo de Utilidad |                                                                                                                                                                                                                 |
| <input checked="" type="checkbox"/> Capítulo I                                                                                                                                      |                                                                                                                                                                                                                                                                               | <input type="checkbox"/> Capítulo II                   |                                                                                                                                                                                                                 |
| <b>② SOLICITANTE</b>                                                                                                                                                                | Nombre: <b>UNICHARM CORPORATION</b>                                                                                                                                                                                                                                           |                                                        | <b>IDENTIFICACION</b><br><input type="checkbox"/> NIT <input type="checkbox"/> NIT<br><input type="checkbox"/> Otro <input checked="" type="checkbox"/> Otro<br>Cual<br>Número                                  |
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| <b>⑤ PCT (86)</b><br>Solicitud Internacional No. <u>PCT/JP2010/053736</u> Fecha <u>02.03.2010</u><br>Publicación Internacional No. <u>WO 2010/101279 A1</u> Fecha <u>10.09.2010</u> |                                                                                                                                                                                                                                                                               |                                                        |                                                                                                                                                                                                                 |
| <b>⑥ Título(54): APARATO Y MÉTODO DE FABRICACIÓN DE ARTÍCULO ABSORBENTE</b>                                                                                                         |                                                                                                                                                                                                                                                                               |                                                        |                                                                                                                                                                                                                 |
| <b>⑦ Clasificación Internacional (51):</b>                                                                                                                                          |                                                                                                                                                                                                                                                                               |                                                        |                                                                                                                                                                                                                 |
| <b>⑧ Prioridad</b><br><br>SI <input checked="" type="checkbox"/> NO <input type="checkbox"/>                                                                                        | (33)País de Origen                                                                                                                                                                                                                                                            | (32)Fecha                                              | (31)N° de Solicitud                                                                                                                                                                                             |
|                                                                                                                                                                                     | JP                                                                                                                                                                                                                                                                            | 02.03.2009                                             | 2009-048652                                                                                                                                                                                                     |
| <b>⑨ Comprobante de Pago No.: 11-0090497 Fecha 14.09.2011</b>                                                                                                                       |                                                                                                                                                                                                                                                                               |                                                        |                                                                                                                                                                                                                 |

10 ANEXOS

- ☒ Comprobante de pago de la tasa de presentación de la solicitud.
- ☒ Documento que acredita la existencia y representación legal cuando el solicitante sea persona jurídica.
- ☒ Poderes, si fuere el caso. Presentado Exp 11-119943
- ☐ Documento de cesión del inventor al solicitante o a su causante.
- ☒ Traducción de la solicitud internacional al castellano (Resumen, descripción, reivindicaciones, dibujos)
- ☐ Copia del examen preliminar internacional efectuado por la Autoridad Internacional de Examen Preliminar (IPEA)
- ☐ Traducción del examen preliminar internacional efectuado por la IPEA.
- ☐ De ser el caso, copia del contrato de acceso.
- ☐ De ser el caso, documento que acredite la licencia o autorización de uso de conocimientos tradicionales de las comunidades indígenas.
- ☐ De ser el caso, certificado de depósito del material biológico.
- ☒ Arte final 12x12.
- ☐ De ser el caso, información sobre otras solicitudes de patente o títulos obtenidos en el extranjero por el mismo titular o su causante, relacionadas parcial o totalmente con la invención de esta solicitud.
- ☐ De ser el caso, modificaciones efectuadas a la solicitud internacional.
- ☒ Prioridad No.  
<http://www.wipo.int/patentscope/search/en/detail.jsf?sessionId=F199BB3AE95DF40C583A915F77155B58.wapp1?docId=WO2010101279&recNum=1&tab=PCTDocuments&maxRec=&office=&prevFilter=&sortOption=&queryString=>
- ☐ Recibo de reivindicaciones adicionales

11 FIGURA CARACTERISTICA



12

Solicito la Concesión de la patente

NOMBRE: DARIO CARDENAS NAVAS

FIRMA:

*[Handwritten signature]*

16 C.G. 17066629 BTA TP. 1.250 C.S.J. *[Handwritten initials]*

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RECIBO DE CAJA

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RECIBIDO DE : CARDENAS & CARDENAS ABOGADOS PI LTDA

NI 830.083.491

\*\*\* Soporte del Pago \*\*\*

| TIPO PAGO    | BANCO           | CUENTA    | No. PAGO  | FECHA PAGO | VR. PAGO     |
|--------------|-----------------|-----------|-----------|------------|--------------|
| CONSIGNACION | BANCO DE BOGOTA | 062754387 | 411763531 | 14/09/2011 | 5.559.000.00 |

\*\*\* Conceptos Pagados \*\*\*

| CANT. | RENTISTICO              | CONCEPTO                                   | Vr. UNIDITARIO | Vr. CONCEPTO |
|-------|-------------------------|--------------------------------------------|----------------|--------------|
| 1     | 50005-01-01 SOLICITUDES | 1 TRAMITES DE SOL. DE PATENTE DE INVENCIÓN | 571.000.00     | 571.000.00   |
|       |                         |                                            |                | \$571.000.00 |

SON: \*\*QUINIENTOS SETENTA Y UN MIL PESOS MONEDA CORRIENTE\*\*

Responsable: \_\_\_\_\_  
\*\*\*\*\*  
Recibo de Caja Aplicado al Expediente No. \_\_\_\_\_

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CARDENAS & CARDENAS  
ABOGADOS



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SUPERINTENDENCIA

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(71) Solicitante(s) UNICHARM CORPORATION

(72) Inventor(es) Hiroki Yamamoto

(74) Apoderado: DARIO CARDENAS NAVAS

|                |                    |            |           |
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No. de solicitud PCT/JP2010/053736

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(57) Resumen:

4



**Industria y Comercio**

**SUPERINTENDENCIA**

**SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO**  
**DIVISION DE NUEVAS CREACIONES**  
**EXTRACTO PARA PUBLICACIÓN**  
**SOLICITUD DE PATENTE DE INVENCION**

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|                                                                            |                    | (72) Inventor(es) <b>Hiroki Yamamoto</b>        |           |
|                                                                            |                    | (74) Apoderado: <b>DARIO CARDENAS NAVAS</b>     |           |
| (54) Título: <b>APARATO Y MÉTODO DE FABRICACIÓN DE ARTÍCULO ABSORBENTE</b> |                    |                                                 |           |

**Resumen:**

El aparato para fabricar un artículo absorbente incluye el brazo 220 que posee la porción terminal anterior 222 que alimenta el elemento elástico 6a'. la porción terminal anterior 222 se desplaza alternativamente en una primera dirección y una segunda dirección, de modo que el elemento elástico 6' se ponga en contacto con una trama transportada en una dirección predeterminada con un conjunto de componentes que constituye una porción del artículo absorbente 1 y se coloca en una forma de onda predeterminada. En este caso, en una vista en planta de la trama 7, una distancia entre el brazo 220 y un punto de contacto se amplía cuando el punto de contacto supera una posición sobre la forma de onda predeterminada donde un ángulo entre la dirección predeterminada y una línea tangente a la forma de onda predeterminada se amplía.



JUN-079

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**APARATO Y MÉTODO DE FABRICACIÓN DE ARTÍCULO ABSORBENTE****Campo técnico**

La presente revelación se refiere a un aparato y método de fabricación de un artículo absorbente en el cual una unidad guía configurada para orientar un elemento elástico se usa para colocar el elemento elástico sobre una trama transportada en una dirección predeterminada con un conjunto de componentes que constituyen una porción de un artículo absorbente.

**Arte previo**

En el proceso convencional de fabricación de artículos absorbentes, se usa comúnmente un método en el cual se disponen elementos elásticos tipo hebra (goma) en porciones a ser procesadas en las regiones que rodean las piernas y una región de entrepierna que conforman un artículo absorbente de modo que las regiones que rodean las piernas y la región de entrepierna calcen mejor en el usuario del artículo absorbente (por ejemplo un cuerpo humano).

Específicamente, en el proceso de fabricación, los elementos elásticos tipo hebra se colocan en ondas sobre una trama con un conjunto de componentes como una lámina inferior y una lámina de absorción para formar artículos absorbentes. En otras palabras, los elementos elásticos tipo hebra se colocan en ondas sobre la trama transportada por un sistema transportador transversal donde los artículos absorbentes a formar están dispuestos con la dirección longitudinal de cada uno de ellos transversal (dirección CD) transversal a la dirección de transporte (dirección MD) de la trama. De esta forma, el artículo absorbente tiene frunces que calzan en las formas de las regiones que rodean las piernas y la región de entrepierna puede formarse de manera continua.

Según se ha descrito, como método para colocar elementos elásticos tipo hebra en forma de onda sobre una trama transportada, se conoce un método en el cual un elemento orientador que guía las posiciones de alimentación de los elementos elásticos sobre una trama propulsada por una leva (ver el Documento Patentario 1, por ejemplo).

JUN-079

Asimismo se conoce un método en el cual un elemento orientador que guía las posiciones de alimentación de los elementos elásticos sobre una trama se desplaza alternativamente en una dirección transversal que cruza una dirección de transporte de la trama (consultar el Documento Patentario 2, por ejemplo).

No es realista en términos del diseño de un aparato poner un elemento orientador en contacto con un punto de contacto para alinear el punto de contacto con la posición de alimentación de un elemento elástico orientado por el elemento guía. En este caso, el punto de contacto es aquél en el cual un elemento elástico y una trama se mantienen entre rodillos de compresión provistos por arriba y por debajo de la trama como consecuencia de lo cual entran en contacto entre sí. Por esta razón, en general se provee cierta distancia entre el punto de contacto y la posición de alimentación. En otras palabras, la distancia ha de ser considerada cuando se diseña el perfil de un dispositivo que desplaza el elemento orientador.

Los inventores han descubierto que, en la técnica conocida, el aparato convencional mencionado para fabricar un artículo absorbente tiene el siguiente problema.

Específicamente, para colocar un elemento elástico con precisión en una posición deseada sobre una trama transportada a alta velocidad, el perfil de un dispositivo como una leva debe tener un diseño complicado en consideración de la distancia entre un punto de contacto y la posición de alimentación.

La presente invención ha sido concebida en base a las circunstancias precedentes. En consecuencia, constituye un objeto de la presente invención proveer un aparato y un método de fabricación de un artículo absorbente capaces de colocar un elemento elástico en una posición deseada sobre una trama transportada a alta velocidad sin un diseño elaborado de perfil.

Lista de Citas

[Documentos Patentarios]

[Documento Patentario 1]

Publicación de Solicitud de Patente Japonesa Números Hei

JUN-079

3-33201 (p. 4, Figuras 6 y 7)

[Documento Patentario 2]

Publicación de Solicitud de Patente Japonesa Números 2006-141642 (p. 10, la Figura 1)

### **Resumen**

Con el fin de solucionar el problema antes descrito, la presente invención tiene los siguientes aspectos.

En un aspecto de la presente invención se provee un aparato para fabricar un artículo absorbente, el aparato incluye una unidad guía que posee una pieza de alimentación configurada para alimentar un elemento elástico y que está configurada para orientar el elemento elástico, la unidad guía desplaza la pieza de alimentación alternativamente en una primera dirección y una segunda dirección, de modo que el elemento elástico se ponga en contacto con una trama transportada en una dirección predeterminada con un conjunto de componentes que constituyen una porción del artículo absorbente y se disponga en una forma de onda predeterminada, la primera dirección se extiende desde una porción central de la trama hasta una primera porción terminal en una dirección transversal que cruza la dirección predeterminada, la segunda dirección se extiende desde la porción central hasta una segunda porción terminal opuesta a la primera porción terminal, el aparato comprende un controlador de velocidad configurado para controlar la velocidad del elemento elástico que es alimentado desde la pieza de alimentación, en tanto el controlador de velocidad mantiene la velocidad del elemento elástico a una velocidad constante distinta de una velocidad de transporte de la trama transportada en la dirección predeterminada, y en una vista en planta de la trama, la distancia entre la pieza de alimentación y el punto de contacto donde el elemento elástico se pone en contacto con la trama se agranda cuando el punto de contacto supera una posición en la forma de onda predeterminada donde el ángulo entre la dirección predeterminada y una línea tangente a la forma de onda predeterminada se agranda.

De acuerdo a un aspecto de la presente invención, es posible proveer un aparato y un método de fabricación de un

JUN-079

artículo absorbente capaces de colocar con facilidad un elemento elástico en una posición deseada sobre una trama transportada a alta velocidad a lo largo de una forma de onda predeterminada.

### **Breve descripción de los dibujos**

[Figura 1] la Figura 1 es una vista en perspectiva que ilustra un artículo absorbente de acuerdo a una o más realizaciones.

[Figura 2] la Figura 2 es una vista que ilustra parte de un método de fabricación de un artículo absorbente de acuerdo a una o más realizaciones.

[Figura 3] la Figura 3 es una vista en perspectiva que ilustra un aparato de fijación de elementos elásticos de acuerdo a una o más realizaciones.

[Figura 4] la Figura 4 es una vista superior (vista sobre la flecha A en la Figura 3) que ilustra el aparato de fijación de elementos elásticos de acuerdo a una o más realizaciones.

[Figura 5] la Figura 5 es una vista lateral (vista sobre la flecha B en la Figura 3) que ilustra el aparato de fijación de elementos elásticos de acuerdo a una o más realizaciones.

[Figura 6] la Figura 6 es una vista esquemática que ilustra cómo se coloca un frunce de pierna anterior en la vista superior (la vista sobre la flecha A en la Figura 3) que se ilustra en la Figura 4.

[Figura 7] la Figura 7 es un diagrama en bloque que ilustra la configuración del aparato de fijación de elementos elásticos de acuerdo a una o más realizaciones.

### **Descripción detallada**

En adelante se describirán un transportador y un método de fabricación de un artículo absorbente de acuerdo a la presente invención con referencia a los dibujos que se acompañan.

Adviértase que, en la siguiente descripción de los dibujos, las mismas referencias denotan los mismos elementos y porciones. Además, debe advertirse que los dibujos son

JUN-079

esquemáticos y no están a escala salvo indicación en contrario.

En consecuencia, las dimensiones específicas y similares deben determinarse en consideración a la siguiente descripción. Por otra parte, los dibujos no necesariamente reflejan las relaciones de dimensiones y proporciones de los componentes reales.

En primer lugar, se explicará la configuración de un artículo absorbente de acuerdo a una realización con referencia al dibujo. La Figura 1 es una vista en perspectiva que ilustra el artículo absorbente 1 de acuerdo a una o más realizaciones. En la realización ilustrada particularmente, el artículo absorbente 1 es un pañal descartable tipo bombacha para adultos.

Según se ilustra en la Figura 1, el artículo absorbente 1 sustancialmente incluye una lámina superior permeable a los líquidos 2, una lámina inferior 3, y un absorbente 4.

La lámina superior 2 se pone en contacto con la piel de una persona que usa el artículo absorbente 1 (en adelante, denominado "usuario"). La lámina inferior 3 se provee fuera de la lámina superior 2. El absorbente 4 se provee entre la lámina superior 2 y la lámina inferior 3, y absorbe la excreción del usuario.

Adviértase que una lámina impermeable a los líquidos (no se ilustra) se provee entre la lámina inferior 3 y el absorbente 4. En otras palabras, el absorbente 4 se provee entre la lámina superior 2 y la lámina impermeable.

La lámina superior 2 está hecha de una trama no tejida o una película plástica perforada. La lámina inferior 3 está hecha de una trama no tejida. El absorbente 4 está hecho de, por ejemplo, pulpa molida o una mezcla de pulpa molida y partículas de polímero superabsorbente. La lámina impermeable está hecha de, por ejemplo, un plástico, una trama no tejida, o una lámina mixta de una película plástica y una trama no tejida.

El artículo absorbente 1 posee una región de línea de cintura anterior 10 que calza en la cintura anterior de un usuario, una región de línea de cintura posterior 20 que calza en la cintura posterior del usuario, y una región de

JUN-079

entrepierna 30 que calza en la entrepierna del usuario.

La región de línea de cintura anterior 10 y la región de línea de cintura posterior 20 están unidas mediante las porciones de empalme 40. Se proveen los frunces de cintura 5 hechos de una goma tipo hebra estirable o similar sobre un borde periférico completo de la región de línea de cintura anterior 10 y la región de línea de cintura posterior 20. Los frunces de cintura 5 incluyen un frunce de cintura anterior 5a que se dispone en la región de línea de cintura anterior 10 y un frunce de cintura posterior 5b que se dispone en la región de línea de cintura posterior 20. Además, se forma una región de abertura de cintura 50 entre el frunce de cintura anterior 5a y el frunce de cintura posterior 5b.

La región de línea de cintura anterior 10 y la región de línea de cintura posterior 20 son estirables en la dirección de transporte MD (la dirección MD) de una primera trama 7A que constituye la lámina superior 2 y una segunda trama 7B que constituye la lámina de la superficie inferior 3 (ver la Figura 2). Por ejemplo, para hacer la región de línea de cintura anterior 10 y la región de línea de cintura posterior 20 estirables en la dirección de transporte MD, la región de línea de cintura anterior 10 y la región de línea de cintura posterior 20 pueden estar provistas de los frunces de cintura 5 o estar constituidas por una lámina estirable desde el inicio.

La región de entrepierna 30 se provee entre la región de línea de cintura anterior 10 y la región de línea de cintura posterior 20. Los frunces de pierna 6 hechos de una goma tipo hebra estirable o similar se proveen sobre ambos lados de la región de entrepierna 30. Cada uno de los frunces de pierna 6 incluye un frunce de pierna anterior 6a dispuesto cerca de la región de línea de cintura anterior 10 y un frunce de pierna posterior 6b dispuesto cerca de la región de línea de cintura posterior 20. Las aberturas que circundan las piernas 60 se forman entre el frunce de pierna anterior 6a y el frunce de pierna posterior 6b y sobre cada lado de la región de entrepiernas 30.

La región de entrepierna 30 es estirable en la dirección

JUN-079

transversal CD (la dirección CD) que cruza la dirección de transporte MD de la trama. Por ejemplo, para tornar la región de entrepierna 30 estirable en la dirección transversal CD, la región de entrepierna 30 puede estar provista del frunce de pierna 6, o puede estar en si misma constituida por una lámina estirable desde el inicio.

En la Figura 1, las regiones Sk muestran las porciones a calzar en las regiones inguinales del usuario cuando el usuario usa el pañal. A continuación se describirán los detalles de un método para colocar el frunce de pierna anterior 6a en la región Sk.

En segundo lugar, se explicará una configuración de un método de fabricación de un artículo absorbente de acuerdo a esta realización con referencia al dibujo. La Figura 2 es un diagrama que explica parte del método de fabricación de un artículo absorbente de acuerdo a esta realización.

Según se ilustra en la Figura 2, el método de fabricación de un artículo absorbente incluye al menos una etapa de colocación de componentes, una etapa de formación de circundado de las piernas, una etapa de plegado, una etapa de empalme y una etapa de corte.

Adviértase que, entre cada una de las dos etapas, se ejecuta una etapa de transporte que usa un transportador no ilustrado (por ejemplo un transportador a cinta) para transportar la primera trama permeable a los líquidos 7A, la segunda trama impermeable a los líquidos 7B, y una tercera trama 7C en la dirección de transporte MD (una dirección predeterminada). La primera trama permeable a los líquidos 7A constituye la lámina superior 2, la segunda trama impermeable a los líquidos 7B constituye la lámina inferior 3, y una tercera trama 7C está hecha de, por ejemplo, el mismo material que la segunda trama 7B y constituye la lámina inferior 3.

En la etapa de colocación de componentes S1, los componentes que van a constituir el artículo absorbente 1, como el elemento elástico, la tercera trama 7C, la lámina impermeable (no ilustrada), y el absorbente 4, se colocan sobre la segunda trama 7B.

Específicamente, en primer lugar, los elementos

JUN-079

elásticos 5' que constituyen los frunces de cintura 5 se colocan linealmente en un estado estirado en las porciones que corresponden a la región de línea de cintura anterior 10 y la región de línea de cintura posterior 20 sobre la segunda trama 7B. En otras palabras, un elemento elástico 5a' que constituye el frunce de cintura anterior 5a y un elemento elástico 5b' que constituye el frunce de cintura posterior 5b se colocan en las porciones que corresponden a la región de línea de cintura anterior 10 y la región de línea de cintura posterior 20 sobre la segunda trama 7B. En consecuencia, los frunces de cintura 5 (el frunce de cintura anterior 5a y el frunce de cintura posterior 5b) se forman en las porciones que corresponden a la región de línea de cintura anterior 10 y la región de línea de cintura posterior 20 sobre la segunda trama 7B.

En segundo lugar, la tercera trama 7C se coloca sobre la segunda trama 7B. Al mismo tiempo, en las porciones que corresponden a la región de entrepiernas 30 sobre la segunda trama 7B y la tercera trama 7C, los elementos elásticos 6' que constituyen los frunces de pierna 6 se colocan en un estado de estiramiento mientras oscilan en la dirección transversal CD a ciclos predeterminados. Luego de ello, los elementos elásticos 6' son mantenidos entre la segunda trama 7B y la tercera trama 7C para formar los frunces de pierna 6 (el frunce de pierna anterior 6a y el frunce de pierna posterior 6b).

Adviértase que la segunda trama 7B y la tercera trama 7C que sostienen los elementos elásticos 6' entre ellas son comprimidas por un rodillo de compresión superior 130A y un rodillo de compresión inferior 130B.

El elemento elástico 6a' que constituye el frunce de pierna anterior 6a y el elemento elástico 6b' que constituye el frunce de pierna posterior 6b forman una porción anular grande 6c y una porción anular chica 6d cuyo tamaño en la dirección transversal CD es menor que la porción anular grande 6c.

Según se ha descrito, los elementos elásticos 6' se colocan entre la segunda trama 7B y la tercera trama 7C, y luego la segunda trama 7B y la tercera trama 7C son

JUN-079

comprimidas por el rodillo de compresión superior 130A y el rodillo de compresión inferior 130B. Si la posición donde se supone que la porción anular chica 6d se formará no es comprimida, los elementos elásticos 6' no se fijan en las posiciones predeterminadas sobre la trama. Los elementos elásticos 6' se colocan en un estado de estiramiento, y así se contraen para formar sustancialmente líneas rectas desplazadas de las formas predeterminadas, sobre la trama en posiciones donde los elementos elásticos 6' no se fijan. De esta manera, se forma la porción anular chica 6d.

De manera similar, esto es aplicable al caso en el cual no se aplica un adhesivo a las posiciones predeterminadas. Específicamente, los elementos elásticos 6' no están fijos sobre la trama en las posiciones en las cuales el adhesivo no se aplicará, de modo que también se forme una porción anular chica 6d.

En tercer lugar, la lámina impermeable (no ilustrada) y el absorbente 4 se colocan sobre la segunda trama 7B y la tercera trama 7C que sostienen los elementos elásticos 6' entre ellas para disponerla en la dirección de transporte MD a intervalos regulares. Adviértase que la lámina impermeable puede colocarse sobre la segunda trama 7B y la tercera trama 7C con el absorbente 4 unido entre ellas de antemano o sobre la segunda trama 7B y la tercera trama 7C con el absorbente 4 separado.

En cuarto lugar, la primera trama 7A que constituye la lámina superior 2 se coloca sobre la segunda trama 7B y la tercera trama 7C sobre la cual se colocan los componentes que constituyen el artículo absorbente 1.

Adviértase que, en la etapa de colocación de componentes S1, el orden de primero a cuarto no es indispensable y puede modificarse en la medida de lo necesario.

En la etapa de formación de circundado de las piernas S2, las aberturas que circundan las piernas 60 (llamadas orificios para las piernas) se forman luego de la etapa de colocación de componentes S1 cortando, a lo largo de la circunferencia externa de la porción anular grande 6c, la segunda trama 7B y la primera trama 7A (en adelante denominada trama compuesta 7) que alojan los componentes

JUN-079

entre ellas.

En la etapa de plegado S3, la trama compuesta 7 es plegada en dos partes, luego de la etapa de formación de circundado de las piernas S2, a lo largo de la línea central CL que se extiende en la dirección de transporte MD a través del centro de la dirección transversal CD de la trama compuesta 7. En otras palabras, un borde lateral 10A de la trama compuesta 7 que corresponde a la región de línea de cintura anterior 10 y un borde lateral 20A de la trama compuesta 7 que corresponde a la región de línea de cintura posterior 20 se colocan uno sobre el otro en un estado de concordancia entre si.

En la etapa de empalme S4 luego de la etapa de plegado S3, las dos partes plegadas de la trama 7 se unen entre si a través de un tratamiento ultrasónico o tratamiento por calor en regiones predeterminadas 40A que corresponden a las porciones de empalme 40 del artículo absorbente 1. La región predeterminada 40A es una región sobre ambos lados, en la dirección de transporte MD, de una línea fantasma SL que indica una posición a cortar que se extiende en la dirección transversal CD de la trama.

En la etapa de corte S5, la trama compuesta 7 con las dos partes plegadas unidas en las regiones predeterminadas 40A se corta a lo largo de las líneas fantasmas SL luego de la etapa de empalme S4. En consecuencia, se fabrica el artículo absorbente 1.

En adelante, la configuración de un aparato de fijación de elementos elásticos (un aparato para fabricar un artículo absorbente) usado en la etapa de fijación de componentes antes descripta se detalla con referencia a los dibujos. La Figura 3 es una vista en perspectiva que ilustra el aparato de fijación de elementos elásticos de acuerdo a la realización. La Figura 4 es una vista superior (una vista sobre la flecha A en la Figura 3) que ilustra el aparato de fijación de elementos elásticos de acuerdo a la realización. La Figura 5 es una vista lateral (una vista sobre la flecha B en la Figura 3) que ilustra el aparato de fijación de elementos elásticos de acuerdo a la realización.

Según se ilustra en las Figuras 3 a 5, el aparato de

JUN-079

fijación de elementos elásticos 100 coloca los elementos elásticos 6' que constituyen los frunces de pierna 6 entre la segunda trama 7B y la tercera trama 7C haciendo que los elementos elásticos 6' oscilen en la dirección transversal CD a ciclos predeterminados. En otras palabras, el aparato de fijación de elementos elásticos 100 coloca los elementos elásticos 6' en un estado curvo entre la segunda trama 7B y la tercera trama 7C, de modo que los frunces de pierna 6 (el frunce de pierna anterior 6a y el frunce de pierna posterior 6b) se formen.

La Figura 7 es un diagrama en bloque para ilustrar la configuración del aparato de fijación de elementos elásticos 100. El aparato de fijación de elementos elásticos 100 al menos incluye un mecanismo de alimentación de trama superior 101 y un mecanismo de alimentación de trama inferior 102 (no ilustrado en la Figura 3 y ver la Figura 7), los mecanismos de alimentación de frunces 103 y 104 (no ilustrados en la Figura 3 y ver la Figura 7), un mecanismo de aplicación 110, un mecanismo de orientación oscilante 120 (una unidad de brazo guía), y un mecanismo de rodillo de compresión 130.

Los mecanismos de alimentación de trama alimentan continuamente las tramas respectivamente de los rodillos de trama. Específicamente, los mecanismos de alimentación de trama incluyen un mecanismo de alimentación de trama superior 101 que alimenta continuamente la tercera trama 7C desde un rodillo de tercera trama 7C' y un mecanismo de alimentación de trama inferior 102 que alimenta continuamente la segunda trama 7B de un rodillo de segunda trama 7B'.

El mecanismo de alimentación de trama superior 101 y el mecanismo de alimentación de trama inferior 102 continuamente alimentan la segunda trama 7B y la tercera trama 7C hacia el mecanismo de rodillo de compresión 130 respectivamente a través de los rodillos 140A y 140B que giran sobre un eje de rotación (no ilustrado) en la dirección transversal CD.

Los mecanismos de alimentación de frunces continuamente alimentan los elementos elásticos 6' que constituyen los frunces de pierna 6 respectivamente desde los rodillos de trama. Específicamente, los mecanismos de alimentación de frunces incluyen un mecanismo de alimentación de frunce

JUN-079

anterior 103 que alimenta continuamente el elemento elástico 6a' que constituye el frunce de pierna anterior 6a desde el correspondiente rodillo de trama (no ilustrado) y un mecanismo de alimentación de frunce posterior 104 que alimenta continuamente el elemento elástico 6b' que constituye el frunce de pierna posterior 6b desde el correspondiente rodillo de trama (no ilustrado).

El mecanismo de alimentación de frunce anterior 103 y el mecanismo de alimentación de frunce posterior 104 continuamente alimentan los frunces de pierna 6 hacia el mecanismo de rodillo de compresión 130 respectivamente a través de los rodillos de alimentación 150A y 150B que giran sobre el eje de rotación en la dirección transversal CD y a través de los rodillos de ramificación 151A y 151B que respectivamente separan el elemento elástico 6a' y el elemento elástico 6b' en hebras.

Según se ilustra en la Figura 7, el aparato de fijación de elementos elásticos 100 posee un controlador de velocidad 105 configurado para controlar la velocidad de alimentación del frunce de pierna anterior 6a desde el mecanismo de alimentación de frunce anterior 103 y la velocidad de alimentación del frunce de pierna posterior 6b del mecanismo de alimentación de frunce posterior 104. El controlador de velocidad 105 mantiene la velocidad de alimentación del elemento elástico 6a' que constituye el frunce de pierna anterior 6a y es alimentado desde el mecanismo de alimentación de frunce anterior 103 a una velocidad constante distinta de una velocidad de transporte ( $V_1$ ) de la trama. Además, el controlador de velocidad mantiene la velocidad de alimentación del elemento elástico 6b' que constituye el frunce de pierna posterior 6b y es alimentado desde el mecanismo de alimentación de frunce posterior 104 a una velocidad constante diferente de la velocidad de transporte ( $V_1$ ) de la trama.

Específicamente, el controlador de velocidad 105 mantiene las velocidades de alimentación de los elementos elásticos 6a' y 6b' a una velocidad constante inferior a la velocidad de transporte ( $V_1$ ) de la trama. Además, el controlador de velocidad 105 controla un servomotor (a ser

JUN-079

descripto a continuación) en el mecanismo de orientación oscilante 120.

El mecanismo de aplicación de adhesivo 110 es un dispositivo vaporizador que aplica un adhesivo (por ejemplo un adhesivo de fusión en caliente) sobre la trama. Específicamente, el mecanismo de aplicación de adhesivo 110 posee un mecanismo de aplicación de adhesivo superior 110A que aplica un adhesivo sobre la tercera trama 7C y un mecanismo de aplicación de adhesivo inferior 110B que aplica un adhesivo sobre la segunda trama 7B.

Adviértase que el mecanismo de aplicación de adhesivo superior 110A aplica un adhesivo sobre una superficie de la tercera trama 7C además de la porción central de la misma. Contrariamente, el mecanismo de aplicación de adhesivo inferior 110B aplica un adhesivo sobre una superficie completa de la segunda trama 7B.

El mecanismo de orientación oscilante 120 hace que los elementos elásticos 6' que constituyen los frunces de pierna 6 oscilen a ciclos predeterminados en la dirección transversal CD. El mecanismo de orientación oscilante 120 posee un primer mecanismo de orientación oscilante 200A que hace que el elemento elástico 6a' que constituye el frunce de pierna anterior 6a oscile y un segundo elemento orientador oscilante 200B que hace que el elemento elástico 6b' que constituye el frunce de pierna posterior 6b oscile. A continuación se describirá en detalle el mecanismo de orientación oscilante 120.

El mecanismo de rodillo de compresión 130 presiona la segunda trama 7B y la tercera trama 7C con los elementos elásticos 6' mantenidos entre la segunda trama 7B y la tercera trama 7C. Específicamente, el mecanismo de rodillo de compresión 130 posee un rodillo de compresión superior 130A que se pone en contacto con la tercera trama 7C y un rodillo de compresión inferior 130B que se pone en contacto con la segunda trama 7B.

El rodillo de compresión superior 130A gira sobre un eje de rotación 131A a lo largo la dirección transversal CD. De manera similar, el rodillo de compresión inferior 130B gira sobre un eje de rotación 130B en la dirección transversal CD.

JUN-079

Los elementos elásticos 6' son orientados por el mecanismo de orientación oscilante 120 a una posición en la cual el rodillo de compresión superior 130A y el rodillo de compresión inferior 130B están más cercanos entre si.

En adelante, la configuración del mecanismo de orientación oscilante 120 que es característica de la presente invención se describe con referencia a las Figuras 3 a 5.

El primer mecanismo de orientación oscilante 200A y el segundo mecanismo de orientación oscilante 200B poseen básicamente la misma configuración con la salvedad de las longitudes de los brazos 220. Esto se describe a continuación. Por esta razón, el primer mecanismo de orientación oscilante 200A y el segundo mecanismo de orientación oscilante 200B son colectivamente descriptos como el mecanismo de orientación oscilante 120.

Según se ilustra en las Figuras 3 a 5, el mecanismo de orientación oscilante 120 incluye a motor 210 que posee un pivote 211, un brazo 220 que guía el elemento elástico 6' a una posición predeterminada en la dirección transversal CD entre la segunda trama 7B y la tercera trama 7C, el pivote 211, y una porción terminal base 221 del brazo 220.

El motor 210 incluye un servomotor que provee un grado predeterminado de magnificación de estiramiento al elemento elástico 6' de acuerdo a la velocidad de transporte (V1) de la trama y que es operado por un controlador programado para ser capaz de colocar el elemento elástico 6' bajo una disposición deseada.

Adviértase que el programa para operar el motor 210 del primer mecanismo de orientación oscilante 200A es diferente del programa para operar el motor 210 del segundo mecanismo de orientación oscilante 200B. En otras palabras, dicha magnificación de estiramiento y disposición en el frunce de pierna anterior 6a son diferentes respecto del frunce de pierna posterior 6b.

El motor 210 se fija a una placa base 213 a través de un soporte 212 (ver la Figura 4). El motor 210 está configurado de modo que la posición del mismo sobre la placa base 213 pueda ser desplazable en la dirección transversal CD en la

JUN-079

medida de lo necesario. Adviértase que la distancia D1 es diferente de la distancia D2, en tanto la distancia D1 es una distancia entre el mecanismo de rodillo de compresión 130 y la placa base 213 sobre la cual el motor 210 del primer mecanismo de orientación oscilante 200A se fija, y la distancia D2 es una distancia entre el mecanismo de rodillo de compresión 130 y la placa base 213 sobre la cual el motor 210 del segundo mecanismo de orientación oscilante 200B se fija.

El brazo 220 posee una forma de placa que se ahúsa gradualmente desde la porción terminal base 211 hacia una porción terminal anterior 222. Es preferible que el brazo 220 se disponga horizontalmente (ver la Figura 5).

El brazo 220 está hecho de una placa de acero. Por ejemplo, el brazo 220 está hecho de una placa de acero inoxidable.

La porción terminal anterior 222 del brazo 220 se pliega hacia la cara opuesta a la cara donde se dispone el motor 210 con respecto al brazo 220. La porción terminal anterior 222 del brazo 220 posee un orificio de inserción 223 en el cual se inserta el frunce de pierna 6.

En la presente realización, los brazos 220 del primer mecanismo de orientación oscilante 200A y el segundo mecanismo de orientación oscilante 200B son de distinta longitud. La longitud L1 del brazo 220 del primer mecanismo de orientación oscilante 200A es mayor que la longitud L2 del brazo 220 del segundo mecanismo de orientación oscilante 200B. En tanto, las distancias desde las porciones terminales anteriores 222 del primer mecanismo de orientación oscilante 200A y el segundo mecanismo de orientación oscilante 200B al mecanismo de rodillo de compresión 130 son iguales entre si. En consecuencia, la relación entre la distancia D1 y la distancia D2 puede expresarse como  $D2 > D1$ .

Por ejemplo, la longitud L1 del brazo 220 del primer mecanismo de orientación oscilante 200A es 450 mm (ver las Figuras 5 y 6). Por otra parte, la longitud L2 del brazo 220 del segundo mecanismo de orientación oscilante 200B es 600 mm (ver las Figuras 5 y 6).

Adviértase que la longitud del brazo 220 significa en la

presente una longitud desde la porción terminal anterior 222 del brazo 220 al pivote 211 del brazo 220.

El peso del brazo 220 del primer mecanismo de orientación oscilante 200A es 300 g, mientras que el peso del brazo 220 del segundo mecanismo de orientación oscilante 200B es 400 g.

La amplitud SW1 de la porción terminal anterior 222 del primer mecanismo de orientación oscilante 200A en la dirección transversal CD es 200 mm (ver la Figura 4). Por otra parte, la amplitud SW2 de la porción terminal anterior 222 del brazo 220 del segundo mecanismo de orientación oscilante 200B en la dirección transversal CD es 350 mm (ver la Figura 4).

En adelante, se describirá el funcionamiento del aparato de fijación de elementos elásticos 100 de acuerdo a la realización con referencia a las Figuras 3 a 5.

El mecanismo de alimentación de trama superior alimenta la tercera trama 3C desde un rodillo de tercera trama 7C', y el rodillo 140A cambia la dirección de desplazamiento de la trama. El mecanismo de aplicación de adhesivo superior 110A aplica un adhesivo sobre la superficie, orientada a la segunda trama 7B, de la tercera trama 7C cuya dirección de desplazamiento se cambia. En este momento, el mecanismo de aplicación de adhesivo superior 110A aplica el adhesivo sobre la superficie de la tercera trama 7C excepto sobre la porción central de la misma. La tercera trama 7C sobre la cual se aplica el adhesivo es suministrada entre el rodillo de compresión superior 130A y el rodillo de compresión inferior 130B desde arriba.

De manera similar, el mecanismo de alimentación de trama inferior alimenta la segunda trama 7B del rodillo de segunda trama 7B', y el rodillo 140B cambia la dirección de desplazamiento de la trama. El mecanismo de aplicación de adhesivo inferior 110B aplica el adhesivo sobre la superficie, orientada hacia la tercera trama 7C, de la segunda trama 7B cuya dirección de desplazamiento se cambia. La segunda trama 7B sobre la cual se aplica el adhesivo es suministrada entre el rodillo de compresión superior 130A y el rodillo de compresión inferior 130B desde abajo.

El mecanismo de alimentación de frunce anterior alimenta el elemento elástico 6a' del rodillo de trama (no se ilustra), y el rodillo de alimentación 150A cambia la dirección de desplazamiento del elemento elástico. El rodillo de ramificación 151A separa en hebras el elemento elástico 6a' girado por el rodillo de alimentación 150A. El primer mecanismo guía de oscilación 200A hace que las hebras del elemento elástico 6a' oscilen a ciclos predeterminados en la dirección transversal CD. En consecuencia, el elemento elástico 6a' se coloca en un estado curvo entre la segunda trama 7B y la tercera trama 7C, de modo que se forme el frunce de pierna anterior 6a.

De manera similar, el mecanismo de alimentación de frunce posterior alimenta el elemento elástico 6b' desde el rodillo de trama (no ilustrado), y el rodillo de alimentación 150B gira la dirección de desplazamiento del elemento elástico 6b'. El rodillo de ramificación 151B separa en hebras el elemento elástico 6b' que gira por acción del rodillo de alimentación 150B. El segundo mecanismo de orientación oscilante 200B hace que las hebras del elemento elástico 6b' oscilen a ciclos predeterminados en la dirección transversal CD. En consecuencia, el elemento elástico 6b' se coloca en un estado curvo entre la segunda trama 7B y la tercera trama 7C, de modo que el frunce de pierna posterior 6b se forme.

El rodillo de compresión superior 130A y el rodillo de compresión inferior 130B comprimen la segunda trama 7B y la tercera trama 7C, sobre la cual se aplica el adhesivo, con los elementos elásticos 6a' y 6b' mantenidos entre la segunda trama 7B y la tercera trama 7C. Por esta razón, los elementos elásticos 6a' y 6b' se pegan entre la segunda trama 7B y la tercera trama 7C mientras tales elementos elásticos 6a' y 6b' son oscilados por el mecanismo de orientación oscilante 120. En consecuencia, se forma la porción anular grande 6c. Por otra parte, a pesar que los elementos elásticos 6a' y 6b' se colocan entre la segunda trama 7B y tercera trama 7C, los elementos elásticos 6a' y 6b' generan una fuerza de recuperación para formar la porción anular chica 6d dado que el adhesivo no se aplica a la porción

JUN-079

central de la tercera trama 7C.

La operación del mecanismo de orientación oscilante 120 se describe en detalle con referencia a las Figuras 4 y 6. El primer mecanismo de orientación oscilante 200A y el segundo mecanismo de orientación oscilante 200B son controlados de manera similar. Por ello, la descripción hace referencia al primer mecanismo de orientación oscilante 200A y el elemento elástico 6a' que se coloca a través del primer mecanismo de orientación oscilante 200A.

En la Figura 4, el mecanismo de orientación oscilante 120 posee la porción terminal anterior 222 desde la cual se alimenta el elemento elástico 6a'. la porción terminal anterior 222 es alternativamente desplazada por el brazo 220 que orienta el elemento elástico 6a' en una primera dirección Da que se extiende desde la porción central de la segunda trama 7B (la tercera trama 7C) transportada en la dirección de transporte MD a una primera porción terminal 7a en la dirección transversal CD y una segunda dirección Db que se extiende desde la porción central de la segunda trama 7B (la tercera trama 7C) hasta una segunda porción terminal 7b opuesta a la primera porción terminal. Al ocurrir esto, el elemento elástico 6a' se pone en contacto con la segunda trama 7B y la tercera trama 7C para quedar entre ellas y formar un frunce en onda (una forma de onda predeterminada).

En la Figura 4, la línea central GL muestra la línea central del frunce en onda en la dirección transversal CD. En la realización, el ciclo de la amplitud del elemento elástico 6a' en la segunda dirección Db sobre la trama es más corta que en la primera dirección Da cuando la línea central GL se usa como referencia.

El centro móvil ML de la porción terminal anterior 222 se desplaza hacia el ciclo más corto de amplitud, es decir la segunda dirección Db con respecto a la línea central GL.

En la realización, la porción terminal anterior 222 constituye una pieza de alimentación 300 y el mecanismo de orientación oscilante 120 constituye una unidad de orientación 310. Además, la dirección de transporte MD es una dirección predeterminada.

La Figura 6 es una vista esquemática para ilustrar el

JUN-079

elemento elástico 6a' que se coloca sobre la trama y el funcionamiento de la porción terminal anterior 222 que coloca el elemento elástico 6a', en la vista superior (la vista sobre la flecha A en la Figura 3) que se ilustra en la Figura 4. La forma de onda que se ilustra en la Figura 6 muestra la forma de onda del elemento elástico 6a' colocada entre la segunda trama 7B y la tercera trama 7C, y además corresponde al frunce en onda del frunce de pierna anterior 6a que se ilustra en la Figura 4. La porción de línea continua W1 muestra la forma de onda del elemento elástico 6a' que se ha colocado entre la segunda trama 7B y la tercera trama 7C. La porción de línea punteada W2 muestra la posición en la cual se supone que se colocará el elemento elástico 6a'.

En la realización, en la vista en planta de la trama compuesta 7, un punto de contacto N1 es la posición en la cual el elemento elástico 6a' se pone en contacto con la segunda trama 7B y la tercera trama 7C en el momento t1. La porción terminal anterior 222 está al menos en la posición de alimentación P1 sobre una línea tangente en el punto de contacto N1. En este momento, la distancia entre la porción terminal anterior 222 (es decir la posición de alimentación P1) y el punto de contacto N1 se expresa por una distancia de alimentación LN1.

En general, cuando la porción terminal anterior 222 se coloca en la posición de alimentación P1 sobre la línea tangente al frunce en onda en el punto de contacto N1, el elemento elástico 6a' puede colocarse a lo largo de la forma de onda del frunce. Sin embargo, en la realización, cuando la porción terminal anterior 222 se desplaza en la primera dirección Da, la porción terminal anterior 222 se coloca en una posición marginal m1 más cercana a la primera porción terminal 7a que la posición de alimentación P1 sobre la línea tangente al frunce en onda en el punto de contacto N1. De manera similar, cuando la porción terminal anterior 222 se desplaza en la segunda dirección Db, la porción terminal anterior 222 se coloca en una posición marginal m2 más cercana a la segunda porción terminal 7b que una posición de alimentación (no ilustrada) sobre una línea tangente al frunce en onda en el punto de contacto.

JUN-079

En la Figura 6, un punto de contacto N2 es una posición en la cual el elemento elástico 6a' se pone en contacto con la segunda trama 7B y la tercera trama 7C en el momento t2. El punto de contacto se desplaza en la dirección de transporte MD a través de una distancia MD1 desde la posición en el momento t1. Adviértase que la dirección ilustrada por la flecha MD1 muestra la dirección de desplazamiento del punto de contacto y la porción terminal anterior 222 (la posición de alimentación) con respecto a la segunda trama 7B y la tercera trama 7C. La porción terminal anterior 222 está al menos en la posición de alimentación P2 sobre la línea tangente al frunce en onda en el punto de contacto N2.

En este momento, un ángulo  $\phi$  entre la línea tangente al frunce en onda en el punto de contacto N2 y la dirección de transporte MD se amplía. En otras palabras, el punto de contacto N2 corresponde a un punto de inflexión en la línea curva que ilustra la forma de onda del frunce. En la realización, cuando el punto de contacto supera la posición en la cual el ángulo entre la dirección de transporte MD y la línea tangente al frunce en onda se amplía (es decir el punto de contacto N2), una distancia (una distancia de alimentación LN2) entre la porción terminal anterior 222 y el punto de contacto se amplía.

En otras palabras, cuando el punto de contacto supera la posición en la cual el ángulo entre la dirección de transporte MD y la línea tangente al frunce en onda se amplía (es decir el punto de contacto N2), la distancia de alimentación LN2 es mayor que la distancia de alimentación LN1.

Cuando se desplaza en la primera dirección Da, la porción terminal anterior 222 se coloca en la posición marginal m2 que se dispone más cercana a la primera porción terminal 7a que la posición de alimentación P2 sobre la línea tangente al frunce en onda en el punto de contacto N2. De manera similar, cuando se desplaza en la segunda dirección Db, la porción terminal anterior 222 se coloca en la posición marginal m1 que se dispone más cercana a la segunda porción terminal 7b que la posición de alimentación (no ilustrada) sobre la línea tangente al frunce en onda en el punto de

JUN-079

contacto.

Por otra parte, en la realización, a medida que el punto de contacto se desplaza desde la posición en la cual el punto de contacto está en una posición donde la línea tangente al frunce en onda en el punto de contacto y la dirección de transporte MD se vuelven paralelas entre si a la posición en la cual el ángulo entre la línea tangente y la dirección de transporte MD se amplía, la distancia M entre la posición sobre la línea tangente en el punto de contacto y la posición marginal se agranda en forma gradual. En otras palabras, en la Figura 6, la distancia marginal M1 es menor que la distancia marginal M2.

Contrariamente, a medida que el punto de contacto se desplaza desde la posición donde el ángulo entre la línea tangente al frunce en onda en el punto de contacto y la dirección de transporte MD se amplía a la posición donde la línea tangente y la dirección de transporte MD son paralelas entre si, la distancia M entre la posición sobre la línea tangente al frunce en onda en el punto de contacto y la posición marginal se reduce en forma gradual (no ilustrada).

En la realización, es preferible que la trayectoria de la porción terminal anterior en movimiento 222 sea una línea curva proyectada al menos en la dirección de transporte MD. Específicamente, en la realización, la porción terminal anterior 222 se coloca en el brazo que posee el pivote en una posición predeterminada con respecto a la trama (la forma de onda del frunce). En otras palabras, la porción terminal anterior muestra una trayectoria en arco circular que cruza la dirección de transporte MD.

Específicamente, en la realización, el mecanismo de orientación oscilante 120 es la denominada unidad de brazo oscilante que incluye el motor 210 con el pivote 211, el brazo 220 que guía el elemento elástico 6a' hasta una posición predeterminada en la dirección transversal CD entre la segunda trama 7B y la tercera trama 7C, el pivote 211, y una porción terminal base 221 del brazo 220.

La porción terminal anterior 222 que alimenta el elemento elástico 6a' se provee sobre el extremo anterior del brazo 220. El brazo 220 se acopla al motor 210 que posee el

JUN-079

pivote 211. En consecuencia, la posición de alimentación P1 y la posición marginal m1 a la cual la porción terminal anterior 222 se dispone se colocan sobre el arco que abarca la longitud del brazo 220 como un radio de un círculo que centra el pivote 211 en el momento t1. De manera similar, la posición de alimentación P2 y la posición marginal m2 se colocan sobre el arco que abarca la longitud del brazo 220 como un radio de un círculo que centra el pivote 211 en el momento t2.

En la presente realización, tal como se ilustra en la Figura 4, el ciclo de la amplitud del elemento elástico 6a' hacia la segunda porción terminal 7b sobre la trama es más corto que aquél hacia la primera porción terminal 7a sobre la trama cuando la línea central L en la dirección transversal CD del frunce en onda se usa como referencia. Por otra parte, el centro móvil de la porción terminal anterior 222 se desplaza de la línea central L hacia la porción curva del ciclo más corto de la amplitud.

Además, es preferible que la relación W/L de la amplitud W del elemento elástico 6a' en la primera dirección Da o la segunda dirección Db sobre la trama compuesta 7 a la longitud L del brazo 220 oscile entre 0.25 y 0.70.

Además, en la realización, la forma de onda del elemento elástico colocado por el primer mecanismo de orientación oscilante 200A y la forma de onda del elemento elástico colocado por el segundo mecanismo de orientación oscilante 200B son distintas entre si. Además, la longitud del brazo 220 provisto en el primer mecanismo de orientación oscilante 200A y la longitud del brazo 220 provisto en el segundo mecanismo de orientación oscilante 200B son distintas entre si.

Según se ha descrito, en la realización, el artículo absorbente 1 es un pañal, y las porciones del frunce en onda en las cuales el ángulo entre la dirección de transporte MD y la línea tangente al frunce en onda son más grandes corresponden a las regiones inguinales en las regiones que rodean las piernas del pañal.

Específicamente, tal como se ilustra en la Figura 4, el frunce en onda del elemento elástico 6a' colocado por el

JUN-079

primer mecanismo de orientación oscilante 200A corresponde a la forma de onda del frunce de pierna anterior 6a. Cada una de las regiones Sk que se ilustran en la Figura 4 es una porción en la cual el ángulo entre la dirección de transporte MD y la línea tangente al frunce en onda se amplía y calza en la región inguinal del usuario cuando el usuario usa el pañal.

De acuerdo al aparato de fijación de elementos elásticos 100, en la vista en planta de la trama compuesta 7, la distancia (la distancia de alimentación) entre la porción terminal anterior 222 y el punto de contacto en la dirección transversal CD se agranda cuando el punto de contacto supera la posición en la cual el ángulo entre la dirección de transporte MD y la línea tangente al frunce en onda se amplía.

En otras palabras, las porciones terminales anteriores 222 se colocan en una posición adicional en la vista en planta de la trama compuesta 7 cuando el punto de contacto supera la posición en la cual el ángulo entre la dirección de transporte MD y la tangente al frunce en onda se amplía. El elemento elástico 6a' es estirado por la porción terminal anterior 222 más allá de una posición predeterminada, y luego, mientras se contrae, se acerca a la trama y toca la trama, por medio de lo cual adopta con facilidad la forma de onda del frunce.

Así, de acuerdo al aparato de fijación de elementos elásticos 100, el elemento elástico tipo hebra 6a' puede ser fácilmente colocado a lo largo del frunce en onda predeterminado en una posición deseada sobre la trama transportada a alta velocidad sin un diseño de perfil elaborado.

En general, cuando un elemento elástico se coloca en un frunce en onda sobre una trama, no resulta realista en términos de diseño del dispositivo poner en contacto una posición de alimentación de un elemento elástico con un punto de contacto para alinear el punto de contacto con la posición de alimentación de un elemento elástico. En este caso, el punto de contacto es aquél en el cual un elemento elástico y una trama se ponen en contacto entre sí. Por esta razón, se provee cierta distancia entre el punto de contacto y la posición de alimentación del elemento elástico 6a'.

JUN-079

Cuando el elemento elástico ha de colocarse con precisión a lo largo de la forma de onda del frunce, sólo es necesario que la posición de alimentación del elemento elástico 6 al menos se disponga sobre una extensión de la línea tangente al frunce en onda en el punto de contacto.

Además, si la distancia desde la posición de alimentación del elemento elástico al punto de contacto es grande, el rango dentro del cual el elemento elástico puede disponerse a lo largo del frunce en onda es amplio aún cuando la posición de alimentación no se disponga con precisión sobre la línea tangente al frunce en onda en el punto de contacto de la forma de onda del frunce.

En la vista en planta de la trama compuesta 7, el aparato de fijación de elementos elásticos 100 puede tener una tolerancia mayor cuando el punto de contacto supera la posición en la cual el ángulo entre la dirección de transporte MD y la línea tangente al frunce en onda se amplía. La razón es que la distancia entre la posición de alimentación del elemento elástico y el punto de contacto se agranda.

Así, de acuerdo al aparato de fijación de elementos elásticos 100, el elemento elástico tipo hebra 6a' puede colocarse con facilidad a lo largo del frunce en onda predeterminado en una posición deseada sobre la trama transportada a alta velocidad sin un diseño de perfil elaborado.

En el aparato de fijación de elementos elásticos 100, cuando la porción terminal anterior 222 que es la posición de alimentación del elemento elástico 6a' se desplaza en la primera dirección Da, la porción terminal anterior 222 se coloca en la posición marginal m1 más cerca de la primera porción terminal 7a que la línea tangente al frunce en onda en el punto de contacto de la forma de onda del frunce. Además, cuando la porción terminal anterior 222 se desplaza en la segunda dirección Db, la porción terminal anterior 222 se coloca en la posición marginal más cerca de la segunda porción terminal 7b que la línea tangente al frunce en onda en el punto de contacto de la forma de onda del frunce.

Además, a medida que el punto de contacto se desplaza

JUN-079

desde la posición en la cual la línea tangente y la dirección de transporte MD se vuelven paralelas entre si a la posición en la cual el ángulo entre la línea tangente y la dirección de transporte MD se amplía, la distancia M entre la posición sobre la línea tangente al frunce en onda en el punto de contacto y la posición marginal ml se agranda en forma gradual. Contrariamente, a medida que el punto de contacto se desplaza desde la posición en la cual el ángulo entre la línea tangente y la dirección de transporte MD se amplía a la posición en la cual la línea tangente y la dirección de transporte MD se tornan paralelas entre si, la distancia entre la posición sobre la línea tangente al frunce en onda en el punto de contacto y la posición marginal ml se acorta gradualmente

Según se ha descrito, en el aparato de fijación de elementos elásticos 100, la distancia desde la posición de alimentación del elemento elástico 6a' al punto de contacto puede ser mayor cerca de la posición en la cual el ángulo entre la línea tangente y la dirección de transporte MD se amplía. En consecuencia, el aparato de fijación de elementos elásticos 100 puede tener una tolerancia mayor.

Así, de acuerdo al aparato de fijación de elementos elásticos 100, el elemento elástico tipo hebra 6a' puede colocarse con facilidad a lo largo del frunce en onda predeterminado en una posición deseada sobre la trama transportada a alta velocidad sin un diseño de perfil elaborado.

En el aparato de fijación de elementos elásticos 100, el ciclo de la amplitud del elemento elástico 6a' en la segunda dirección Db sobre la trama es más corto que en la primera dirección Da cuando la línea central GL en la dirección transversal CD del frunce en onda (la forma de onda predeterminada) se usa como referencia. Además, el centro móvil ML de la porción terminal anterior 222 se desplaza de la línea central GL hacia el ciclo más corto de amplitud, es decir la segunda dirección Db.

Con esta configuración, la diferencia entre las distancias móviles del porción extremo anterior 222 en la primera dirección Da y la segunda dirección Db puede

JUN-079

reducirse. Como resultado de ello, la posición de alimentación del elemento elástico 6a' puede seguir el frunce en onda con mayor precisión.

En la realización, la trayectoria de la porción terminal anterior en movimiento 222 es al menos una línea curva proyectada en la dirección de transporte MD, de modo que la porción terminal anterior 222 provista sobre el extremo anterior del brazo 220 se desplace sobre la línea curva proyectada en la dirección de transporte MD. Por esta razón, se genera una diferencia en la distancia entre la porción terminal anterior 222 y el punto de contacto no solamente en la dirección transversal CD sino también en la dirección de transporte MD. Así, la distancia desde la posición de alimentación del elemento elástico 6a' al punto de contacto (la distancia de alimentación) puede alargarse en la dirección de transporte MD, de modo que la tolerancia pueda ampliarse aún más.

Así, el elemento elástico tipo hebra 6a' puede colocarse con facilidad a lo largo del frunce en onda predeterminado en una posición deseada sobre la trama transportada a alta velocidad sin un diseño de perfil elaborado.

En la realización, el mecanismo de orientación oscilante 120 posee el motor 210 que tiene el pivote 211, el brazo 220 que guía el elemento elástico 6' hasta una posición predeterminada en la dirección transversal CD entre la segunda trama 7B y la tercera trama 7C, el pivote 211, y una porción terminal base 221 del brazo 220.

Según se ha descrito, cuando el brazo 220 rota, la porción terminal anterior 222 provista sobre el extremo anterior del brazo 220 muestra una trayectoria en arco circular. Por esta razón, sobre ambas caras del arco circular, se genera una diferencia en la distancia entre la posición de alimentación y el punto de contacto no solamente en la dirección transversal CD sino además en la dirección de transporte MD. Así, la distancia desde la posición de alimentación del elemento elástico 6a' al punto de contacto (la distancia de alimentación) puede alargarse en la dirección de transporte MD, de modo que la tolerancia pueda ampliarse aún más.

JUN-079

En consecuencia, el elemento elástico tipo hebra 6a' puede colocarse con facilidad a lo largo del frunce en onda predeterminado en una posición deseada sobre la trama transportada a alta velocidad sin un diseño de perfil elaborado.

En la realización, el valor de la distancia desde la posición de alimentación al punto de contacto (la distancia de alimentación) puede ser adecuadamente establecido fijando la relación  $W/L$  de la amplitud  $W$  del elemento elástico en la primera dirección  $Da$  o la segunda dirección  $Db$  sobre la trama respecto de la longitud  $L$  del brazo 220 en 0.25 a 0.70. Así, el elemento elástico 6a' puede colocarse a lo largo del frunce en onda sin un diseño de perfil elaborado.

En la realización, el mecanismo de orientación oscilante 120 incluye un par del primer mecanismo de orientación oscilante 200A y el segundo mecanismo de orientación oscilante 200B. La forma de onda del elemento elástico 6a' formada el primer mecanismo de orientación oscilante 200A es diferente de la forma de onda del elemento elástico 6a' formada por el segundo mecanismo de orientación oscilante 200B. Además, la longitud del brazo provisto en el primer mecanismo de orientación oscilante 200A es diferente de la longitud del brazo provisto en el segundo mecanismo de orientación oscilante 200B.

Con esta configuración, los elementos elásticos pueden ser colocados a lo largo de los diferentes frunces en forma de onda sobre una trama transportada en la dirección de transporte MD a una velocidad de transporte  $V1$ .

En la realización, el artículo absorbente 1 es un pañal, y las porciones del frunce en onda a las cuales el ángulo entre la dirección de transporte MD y la línea tangente al frunce en onda se amplía corresponden a las regiones inguinales en las regiones que rodean las piernas del pañal. El calce cómodo o no del artículo absorbente 1 en el cuerpo del usuario está determinado por las regiones que corresponden a las regiones inguinales del pañal. Así, las regiones son las porciones más importantes.

El aparato de fijación de elementos elásticos 100 puede extender la distancia desde la posición de alimentación al

JUN-079

punto de contacto cuando el elemento elástico 6a' se coloca en la posición en la cual el ángulo entre la línea tangente y la dirección de transporte MD se amplía, es decir las regiones Sk que corresponden a las regiones inguinales. Así, es posible ampliar la tolerancia.

En consecuencia, el elemento elástico 6a' puede ser precisamente colocado en la posición que corresponde a la región inguinal que exige la mayor precisión, sin un diseño de perfil elaborado.

Por otra parte, tal como se ilustra en la Figura 7, en el aparato de fijación de elementos elásticos 100, el controlador de velocidad 105 mantiene la velocidad de alimentación del elemento elástico 6a' que constituye el frunce de pierna anterior 6a que se alimenta desde el mecanismo de alimentación de frunce anterior 103 y la velocidad de alimentación del elemento elástico 6b' que constituye el frunce de pierna posterior 6b que se alimenta desde el mecanismo de alimentación de frunce posterior 104 a una velocidad constante diferente de la velocidad de transporte (V1) de la trama.

Con esta configuración, los elementos elásticos 6a' y 6b' se colocan entre la segunda trama 7B y la tercera trama 7C y son comprimidos por el mecanismo de rodillo de compresión 130. En este momento, los elementos elásticos 6a' y 6b' se encuentran bajo el esfuerzo de tensión causado por la diferencia entre la velocidad de transporte y la velocidad de alimentación.

En tanto la velocidad de alimentación sea constante, a medida que la diferencia entre las distancias de alimentación LN1 y LN2 es mayor, la diferencia entre el esfuerzo de tensión del elemento elástico en la posición de alimentación P1 y el esfuerzo de tensión del elemento elástico en la posición de alimentación P2 aumenta. Cuando hay una diferencia en el esfuerzo de tensión por posición, el artículo absorbente no calzará cómodamente en el usuario.

El mecanismo de orientación oscilante 120 es una unidad de brazo oscilante. A medida que la distancia entre cualquier punto sobre la trayectoria de la porción terminal anterior oscilante 222 y el punto de contacto (N1 o N2) es

JUN-079

mayor, la diferencia entre las distancias de alimentación atribuible a la diferencia de posición de la porción terminal anterior 222 sobre la trayectoria (es decir la diferencia entre las distancias de alimentación L1 y L2) se reduce.

En consecuencia, es preferible que la distancia entre cualquier punto sobre la trayectoria de la porción terminal anterior oscilante 222 y el punto de contacto (N1 o N2) sea grande. En consecuencia para el aparato de fijación de elementos elásticos 100, la distancia entre el punto de contacto (N1 o N2) y la posición de alimentación del elemento elástico 6a' o 6b' (es decir la porción terminal anterior 222) puede ser ampliada.

En consecuencia, el elemento elástico 6a' que constituye el frunce de pierna anterior 6a y el elemento elástico 6b' que constituye el frunce de pierna posterior 6b pueden colocarse entre la segunda trama 7B y la tercera trama 7C con el esfuerzo de tensión de los elementos elásticos 6a' y 6b' menos modificable.

Según se ha descripto, los detalles de la presente invención han sido revelados a través de la realización de la presente invención. Debe entenderse que la descripción y los dibujos que integran esta revelación no limitan la presente invención. En base a lo revelado, los expertos en el arte podrán concebir con facilidad varias realizaciones, ejemplos y técnicas de operación alternativas.

Por ejemplo, la realización de la presente invención puede modificarse de la siguiente manera. Específicamente, el método de fabricación de un artículo absorbente y el aparato de fijación de elementos elásticos son aplicables no solamente a un artículo absorbente 1 (o pañal descartable) que incluye una región de línea de cintura anterior 10, una región de línea de cintura posterior 20, una región de entrepierna 30 y similares, sino además a varios artículos que incluyen batas descartables para uso médico y artículos descartables para deportes.

Además, la descripción contempla que el elemento elástico como componente que constituye el artículo absorbente 1 es una goma tipo hebra estirable o similar. Sin embargo, el elemento elástico no se limita a ello y puede ser

JUN-079

una goma como una goma planta o goma tipo lámina.

Además, el elemento elástico no debe ser necesariamente de goma y puede ser una trama recuperable o estirable como poliéster o poliuretano u otra trama estirable además de las mencionadas. Por otra parte, estas telas pueden ser retorcidas para ser usadas como el elemento elástico.

Además, la descripción contempla el caso en el cual las longitudes de los brazos 220 del primer mecanismo de orientación oscilante 200A y el segundo mecanismo de orientación oscilante 200B son distintas entre si. Sin embargo, la presente invención no se limita a esta configuración y las longitudes pueden ser iguales.

En la realización, el primer mecanismo de orientación oscilante 200A y el segundo mecanismo de orientación oscilante 200B están diseñados con los brazos 220 cuyas áreas móviles se superponen parcialmente entre si. Sin embargo, los brazos 220 pueden estar dispuestos de modo que las áreas móviles de los mismos no se superpongan entre si. La distancia entre el primer mecanismo de orientación oscilante 200A y el segundo mecanismo de orientación oscilante 200B a lo ancho de la trama es ajustable en la medida de lo necesario de acuerdo a las formas del artículo absorbente (o pañal descartable). Por ejemplo, el frunce de pierna anterior 6a y el frunce de pierna posterior 6b pueden ser transportados manteniendo una distancia predeterminada entre ellos.

Además, la descripción contempla el caso en el cual el programa que opera el motor 210 del primer mecanismo de orientación oscilante 200A es diferente del programa que opera el motor 210 del segundo mecanismo de orientación oscilante 200B. Sin embargo, la presente invención no se limita a esta configuración, y estos programas pueden ser iguales. En otras palabras, la magnificación de estiramiento predeterminada y el diseño del frunce de pierna anterior 6a pueden ser iguales a los del frunce de pierna posterior 6b.

Además, la descripción contempla el caso en el cual la porción terminal anterior 222 del brazo 220 posee el orificio de inserción 223 en el cual se inserta el frunce de pierna 6. Sin embargo, la presente invención no se limita a esta

JUN-079

configuración, y sólo es necesario que oriente el frunce de pierna 6. Por ejemplo, es posible formar un canal en U en el brazo 220. En la realización, la descripción contempla el caso en el cual el mecanismo de orientación oscilante 120 incluye el motor 210 que posee el pivote 211, el brazo 220 que orienta el elemento elástico 6' a una posición predeterminada en la dirección transversal CD entre la segunda trama 7B y la tercera trama 7C, el pivote 211, y la porción terminal base 221 del brazo 220. Sin embargo, la presente invención no se limita a la configuración en la cual el brazo 220 oscila sobre el pivote 211.

Por ejemplo, la presente invención puede tener un mecanismo en el cual una unidad guía con la posición de alimentación del elemento elástico 6a' pueda desplazarse dentro del rango regulado por un riel de deslizamiento en arco circular, un nervio en arco circular, un canal de leva en arco circular, un seguido de leva, o similar. En este caso, los ejemplos de medios de transmisión aplicables incluyen una correa de sincronización, un enlace, y un servo lineal en arco circular.

Según se ha descripto, la presente invención naturalmente incluye varias realizaciones que no están descriptas. En consecuencia, el alcance técnico de la presente invención debe determinarse solamente a través de las reivindicaciones que se acompañan basadas en la descripción precedente.

Que incorporada por completo como referencia la Solicitud de Patente Japonesa 2009-048652 (presentada en 2 de Marzo de 2009).

#### **Aplicabilidad industrial**

En consecuencia, de acuerdo a la presente invención, es posible proveer un aparato y un método de fabricación de un artículo absorbente capaces de colocar un elemento elástico en una posición deseada sobre una trama transportada a alta velocidad sin un diseño de perfil elaborado.

[Listado de referencias]

1 artículo absorbente

JUN-079

- 2 lámina superior
- 3 lámina inferior
- 4 absorbente
- 5 frunce de cintura
- 5a frunce de cintura anterior
- 5b frunce de cintura posterior
- 5', 5a', 5b' elemento elástico
- 6 frunce de pierna
- 6a frunce de pierna anterior
- 6b frunce de pierna posterior
- 6c porción anular grande
- 6d porción anular chica
- 6', 6a', 6b' elemento elástico
- 7 trama compuesta
- 7A primera trama
- 7B segunda trama
- 7B' rodillo de segunda trama
- 7C tercera trama
- 7C' rodillo de tercera trama
- 10 región de línea de cintura anterior
- 10A borde lateral
- 20 región de línea de cintura posterior
- 20A borde lateral
- 30 región de entrepierna
- 40 porción de empalme
- 40A región predeterminada
- 50 región de abertura de cintura
- 60 región de aberturas que circundan las piernas
- 100 aparato de fijación de elementos elásticos
- 101 mecanismo de alimentación de trama superior
- 102 mecanismo de alimentación de trama inferior
- 103 mecanismo de alimentación de frunce anterior
- 104 mecanismo de alimentación de frunce posterior
- 105 controlador de velocidad
- 110 mecanismo de aplicación de adhesivo
- 110A mecanismo de aplicación de adhesivo superior
- 110B mecanismo de aplicación de adhesivo inferior
- 120, 120A mecanismo de orientación oscilante (unidad de brazo guía)

JUN-079

130 mecanismo de rodillo de compresión  
130A rodillo de compresión superior  
130B rodillo de compresión inferior  
131A, 131B eje de rotación  
140A, 140B rodillo de respaldo  
150A, 150B rodillo de alimentación  
151A, 151B rodillo de ramificación  
200A primer mecanismo orientador oscilante  
200B segundo mecanismo orientador oscilante  
210 motor  
211 pivote  
212 soporte  
213 placa base  
220, 220A brazo  
221 porción terminal base  
222 porción terminal anterior



### Reivindicaciones

1. Un aparato para fabricar un artículo absorbente, el aparato incluye una unidad guía que posee una pieza de alimentación configurada para alimentar un elemento elástico y que está configurada para orientar el elemento elástico, la unidad guía desplaza la pieza de alimentación alternativamente en una primera dirección y una segunda dirección, de modo que el elemento elástico se ponga en contacto con una trama transportada en una dirección predeterminada con un conjunto de componentes que constituye una porción del artículo absorbente y se coloca en una forma de onda predeterminada, la primera dirección se extiende desde una porción central de la trama a una primera porción terminal en una dirección transversal que cruza la dirección predeterminada, la segunda dirección se extiende desde la porción central a una segunda porción terminal opuesta a la primera porción terminal,

caracterizado porque el aparato comprende:

un controlador de velocidad configurado para controlar una velocidad del elemento elástico que es alimentado desde la pieza de alimentación, en tanto

el controlador de velocidad mantiene la velocidad del elemento elástico a una velocidad constante distinta de una velocidad de transporte de la trama transportada en la dirección predeterminada, y

en una vista en planta de la trama, una distancia entre la pieza de alimentación y un punto de contacto donde el elemento elástico se pone en contacto con la trama se amplía cuando el punto de contacto supera una posición sobre la forma de onda predeterminada donde un ángulo entre la dirección predeterminada y una línea tangente a la forma de onda predeterminada se amplía.

2. El aparato para fabricar un artículo absorbente de acuerdo a la Reivindicación 1, caracterizado porque

la pieza de alimentación se coloca en una posición marginal más cerca de la primera porción terminal que una posición sobre la línea tangente a la forma de onda predeterminada en el punto de contacto cuando se desplaza en

JUN-079

la primera dirección,

la pieza de alimentación se coloca en una posición marginal más cerca de la segunda porción terminal que una posición sobre la línea tangente a la forma de onda predeterminada en el punto de contacto cuando se desplaza en la segunda dirección,

y, a medida que el punto de contacto se desplaza desde la posición en la cual la línea tangente y la dirección predeterminada se tornan paralelas entre si a la posición en la cual el ángulo entre la línea tangente y la dirección predeterminada se amplía, la distancia entre la posición sobre la línea tangente a la forma de onda predeterminada en el punto de contacto y la posición marginal se agranda en forma gradual.

3. El aparato para fabricar un artículo absorbente de acuerdo a la Reivindicación 1, caracterizado porque

la pieza de alimentación se coloca en una posición marginal más cerca de la primera porción terminal que una posición sobre la línea tangente a la forma de onda predeterminada en el punto de contacto cuando se desplaza en la primera dirección,

la pieza de alimentación se coloca en una posición marginal más cerca de la segunda porción terminal que una posición sobre la línea tangente a la forma de onda predeterminada en el punto de contacto cuando se desplaza en la segunda dirección,

y, a medida que el punto de contacto se desplaza desde la posición en la cual el ángulo entre la línea tangente y la dirección predeterminada se amplía a la posición en la cual la línea tangente y la dirección predeterminada se tornan paralelas entre si, la distancia entre la posición sobre la línea tangente a la forma de onda predeterminada en el punto de contacto y la posición marginal se reduce en forma gradual.

4. El aparato para fabricar un artículo absorbente de acuerdo a la Reivindicación 1, caracterizado porque

cualquiera de los ciclos de amplitud del elemento elástico en la primera dirección y la segunda dirección sobre

JUN-079

la trama es más corto que el otro de los ciclos de amplitud cuando la línea central de la forma de onda predeterminada en la dirección transversal se usa como referencia, y

un centro móvil de la pieza de alimentación se desplaza hacia el ciclo más corto de la amplitud con respecto a la línea central.

5. El aparato para fabricar un artículo absorbente de acuerdo a la Reivindicación 1, caracterizado porque la trayectoria de la pieza de alimentación forma una línea curva proyectada al menos en la dirección predeterminada.

6. El aparato para fabricar un artículo absorbente de acuerdo a la Reivindicación 1, caracterizado porque la unidad guía comprende:

la pieza de alimentación configurada para alimentar el elemento elástico a una posición predeterminada en la dirección transversal que cruza la dirección predeterminada sobre la trama;

un brazo que posee la pieza de alimentación sobre una porción terminal del mismo; y

un motor que posee un pivote provisto en una porción terminal base del brazo, el motor hace oscilar el brazo en la dirección transversal a ciclos predeterminados.

7. El aparato para fabricar un artículo absorbente de acuerdo a la Reivindicación 6, caracterizado porque la relación  $W/L$  de la amplitud  $W$  del elemento elástico en la primera dirección o la segunda dirección sobre la trama respecto de la longitud  $L$  del brazo oscila entre 0.25 y 0.70.

8. El aparato para fabricar un artículo absorbente de acuerdo a la Reivindicación 6, caracterizado porque

la unidad guía incluye un par de una primera unidad guía y una segunda unidad de orientación,

una forma de onda del elemento elástico formado por la primera unidad guía es diferente de una forma de onda del elemento elástico formado por la segunda unidad de orientación, y

JUN-079

la longitud del brazo provisto en la primera unidad guía es diferente de la longitud del brazo provisto en la segunda unidad de orientación.

9. El aparato para fabricar un artículo absorbente de acuerdo a la Reivindicación 1, caracterizado porque

el artículo absorbente es un pañal, y una posición sobre la forma de onda predeterminada donde el ángulo entre la dirección predeterminada y la línea tangente a la forma de onda predeterminada se amplía corresponde a una región inguinal en una región que circunda las piernas del pañal.

10. Un método de fabricación de un artículo absorbente, caracterizado porque comprende: usar una unidad guía que posee una pieza de alimentación configurada para alimentar un elemento elástico y que está configurada para orientar el elemento elástico; y en consecuencia desplazar la pieza de alimentación alternativamente en una primera dirección y una segunda dirección, de modo que el elemento elástico se ponga en contacto con una trama transportada en una dirección predeterminada con un conjunto de componentes que constituye una porción del artículo absorbente y se coloca en una forma de onda predeterminada, la primera dirección se extiende desde una porción central de la trama a una primera porción terminal en una dirección transversal que cruza la dirección predeterminada, la segunda dirección se extiende desde la porción central a una segunda porción terminal opuesta a la primera porción terminal, en tanto

la velocidad del elemento elástico que se alimenta desde la pieza de alimentación se mantienen en una velocidad constante distinta de una velocidad de transporte de la trama transportada en la dirección predeterminada, y

en una vista en planta de la trama, una distancia entre la pieza de alimentación y un punto de contacto donde el elemento elástico se pone en contacto con la trama se amplía cuando el punto de contacto supera una posición sobre la forma de onda predeterminada donde un ángulo entre la dirección predeterminada y una línea tangente a la forma de onda predeterminada se amplía.



**Resumen de la invención**

El aparato para fabricar un artículo absorbente incluye el brazo 220 que posee la porción terminal anterior 222 que alimenta el elemento elástico 6a'. la porción terminal anterior 222 se desplaza alternativamente en una primera dirección y una segunda dirección, de modo que el elemento elástico 6' se ponga en contacto con una trama transportada en una dirección predeterminada con un conjunto de componentes que constituye una porción del artículo absorbente 1 y se coloca en una forma de onda predeterminada. En este caso, en una vista en planta de la trama 7, una distancia entre el brazo 220 y un punto de contacto se amplía cuando el punto de contacto supera una posición sobre la forma de onda predeterminada donde un ángulo entre la dirección predeterminada y una línea tangente a la forma de onda predeterminada se amplía.



FIG. 1

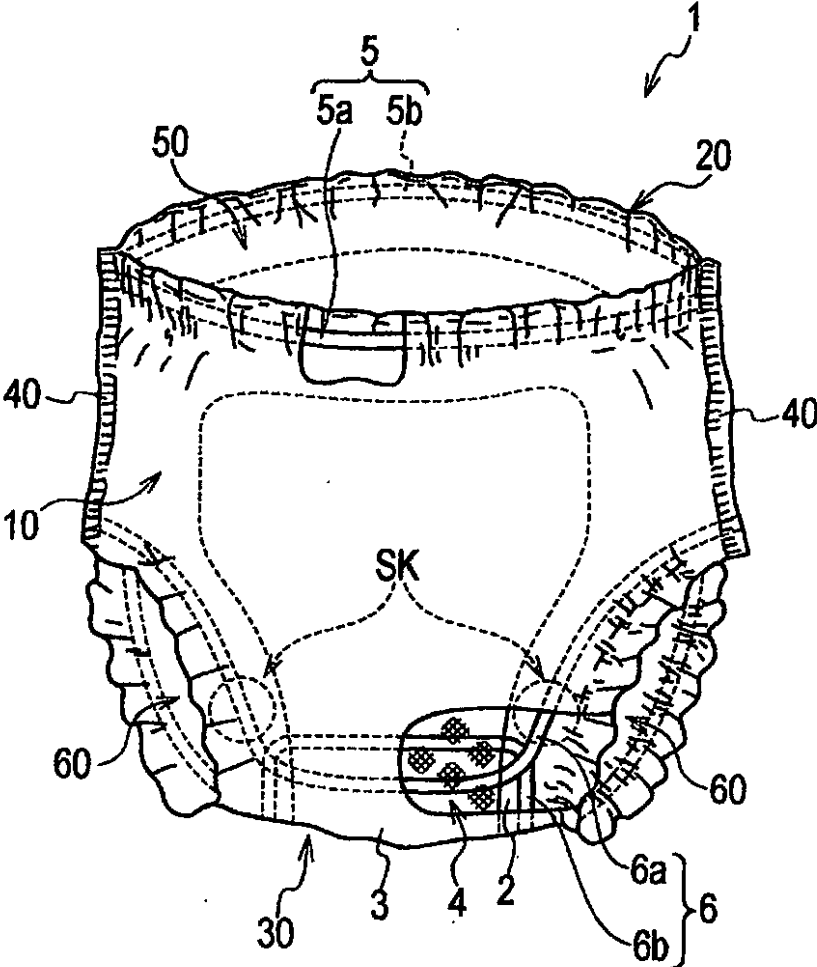


FIG. 2

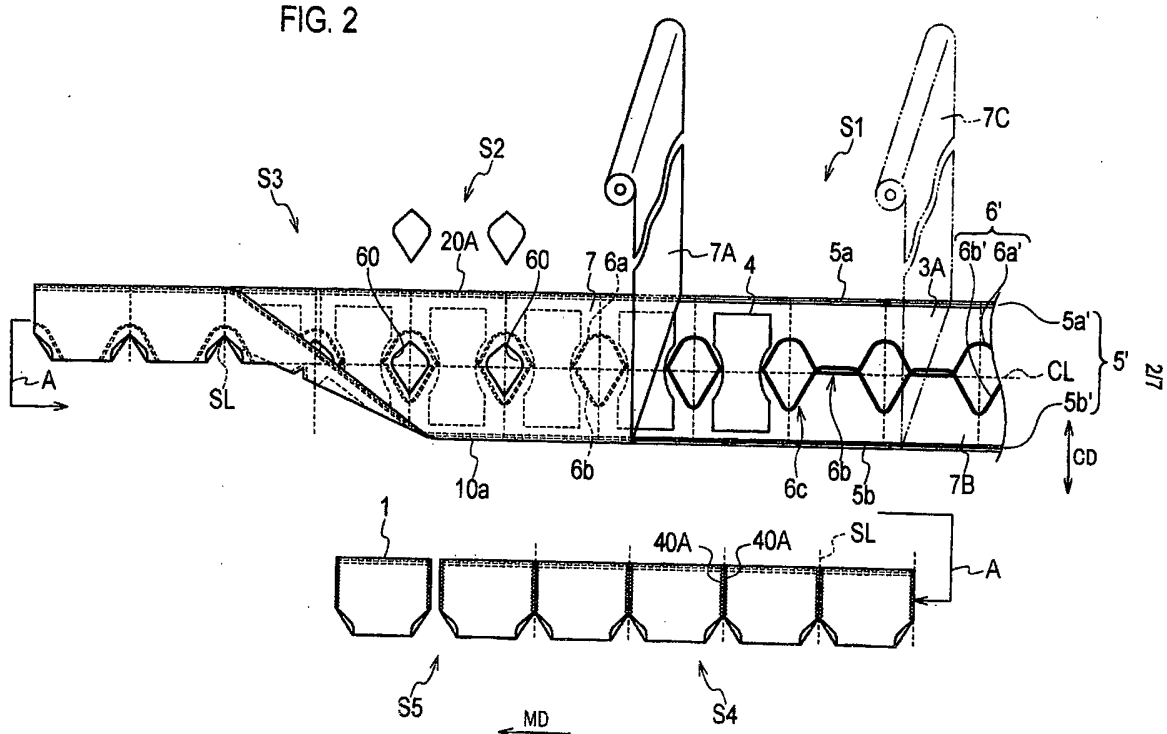




FIG. 4

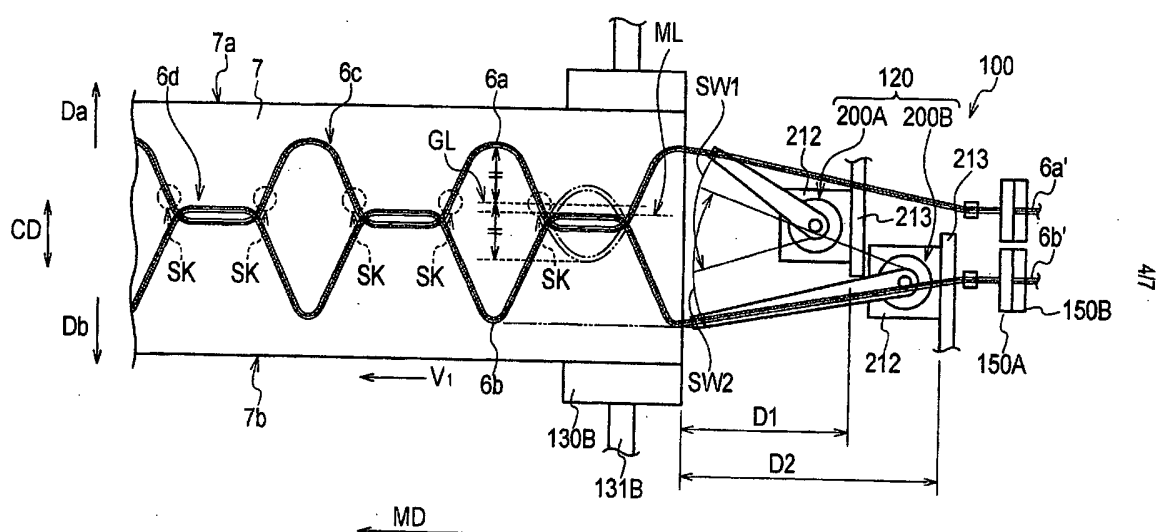
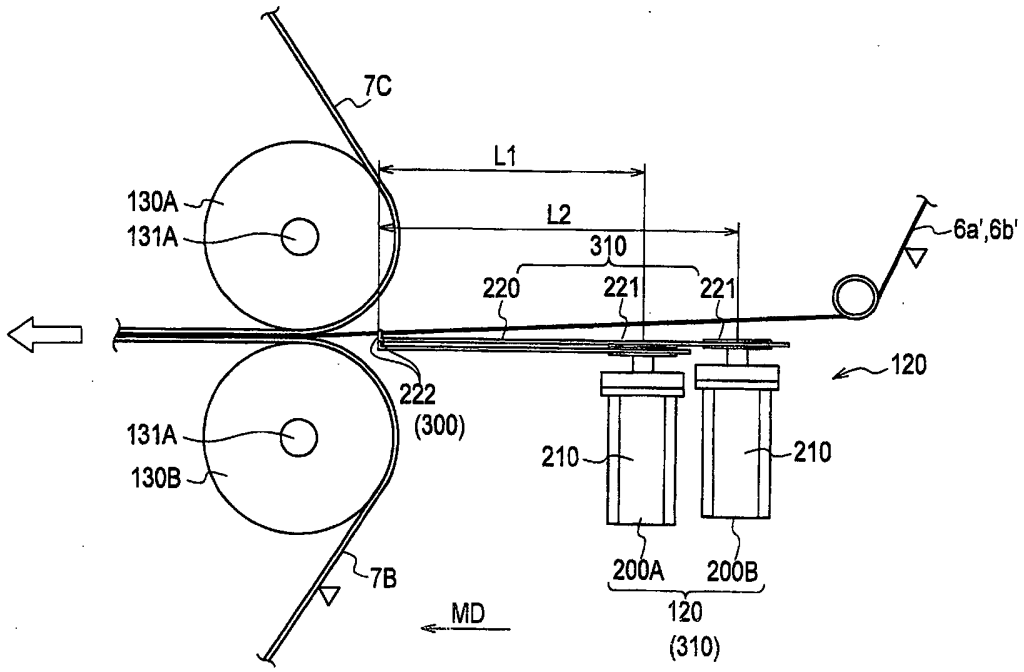


FIG. 5



6/7

FIG. 6

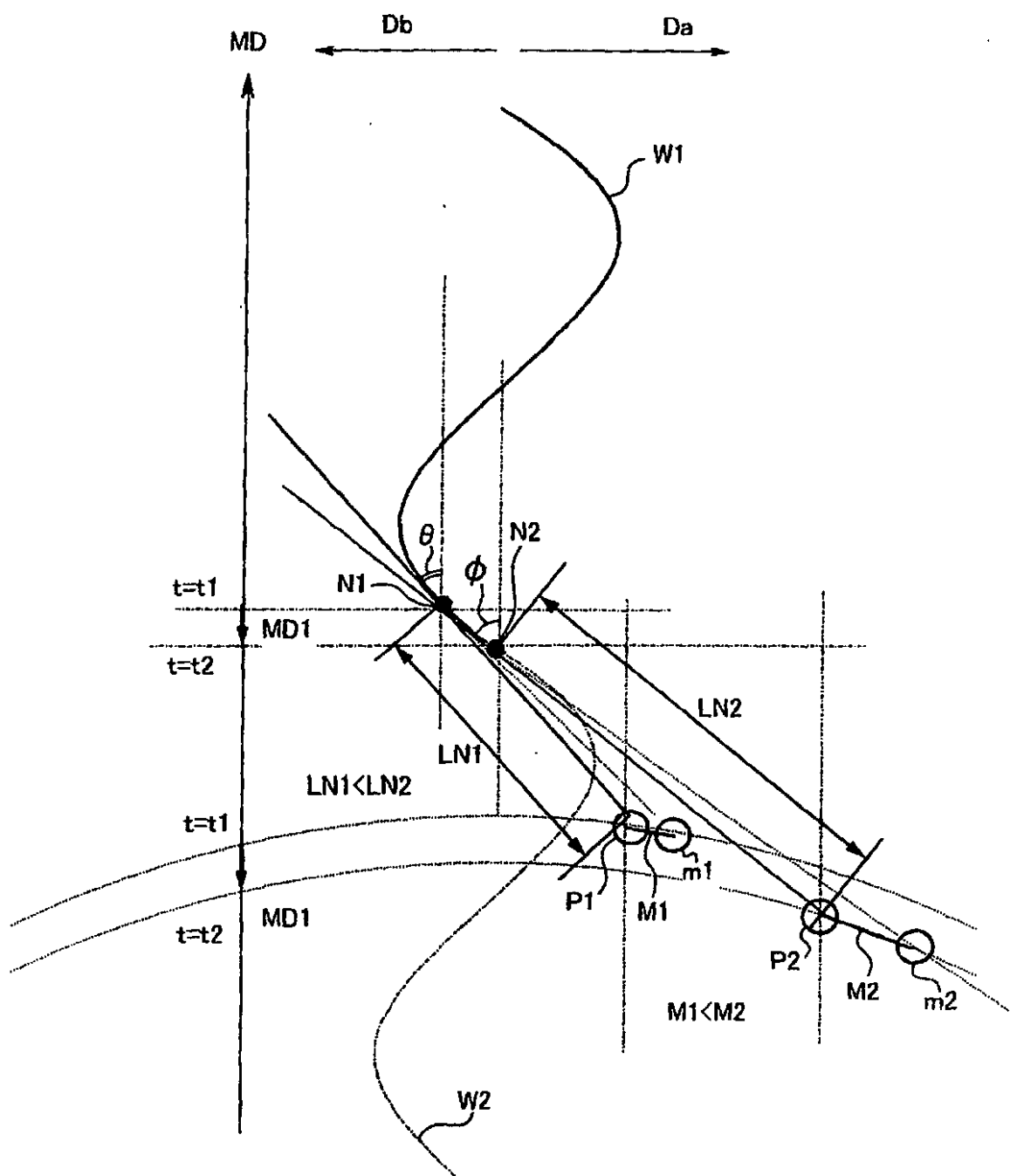
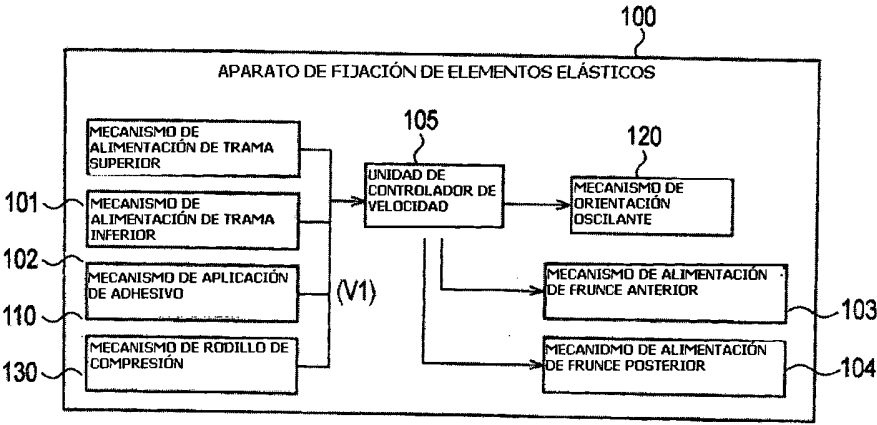


FIG.7





**DESCRIPTION**5 **Title of Invention**

APPARATUS AND METHOD FOR MANUFACTURING ABSORBENT ARTICLE

**Technical Field**

10 The present disclosure relates to an apparatus and a method of manufacturing an absorbent article in which a guide unit configured to guide an elastic member is used to place the elastic member on a web being conveyed in a predetermined direction with a continuum of components constituting one portion of an absorbent article.

15

**Background Art**

In the conventional process of manufacturing absorbent articles, such as disposable diapers, widely used is a method in which string-like elastic members (rubber) are arranged in portions to be processed into leg-surrounding regions and a crotch region which constitute an absorbent article so that the leg-surrounding regions and the crotch region should be more fitted to a person to wear the absorbent article (for example, a human body).

25 Specifically, in the manufacturing process, the string-like elastic members are placed in waveforms on a web with continua of components such as a back sheet and an absorption sheet to form absorbent articles. In other words, the string-like elastic members are placed in waveforms on the web conveyed by a crosswise conveyor system in which absorbent articles to be formed are arranged with a longitudinal direction of each of the absorbent articles going in a cross direction (a CD direction) which intersects a conveyance direction (an MD direction) of the

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web. In this way, the absorbent article having gathers to be fitted to the shapes of the leg-surrounding regions and the crotch region can be continuously formed.

As described above, as a method for placing string-like elastic members in waveforms on a web being conveyed, there is known a method in which a guide member guiding feeding positions of elastic members onto a web is driven by a cam (see Patent Literature 1, for example).

There is also known a method in which a guide member guiding feeding positions of elastic members onto a web is reciprocally moved in a cross direction intersecting a conveyance direction of the web (see Patent Literature 2, for example).

It is not realistic in terms of the layout of an apparatus to bring a guide member into contact with a nip point to align the nip point with the feeding position of a elastic member guided by the guide member. Here, the nip point is that at which an elastic member and a web are held between press rollers provided above and below the web and thereby come in contact with each other. For this reason, a certain distance is generally provided between the nip point and the feeding position. In other words, the distance has to be considered when the profile of a device moving the guide member is designed.

The inventors have discovered that, in the known technique, the aforementioned conventional apparatus for manufacturing an absorbent article has the following problem.

Specifically, to place aan elastic member accurately in a desired position on a web being conveyed at high speed, the profile of a device such as a cam has to be elaborately designed in consideration of a distance between a nip point and a feeding position.

The present invention has been made in view of the

foregoing circumstances. Accordingly, an object of the present invention is to provide an apparatus and a method of manufacturing an absorbent article that are capable of placing a elastic member in a desired position on a web being conveyed at high speed without elaborate profile designing.

#### Citation List

~~{Patent Literatures}~~

+

#### Patent Literature

PTL 1

——: Japanese Patent Application Publication No. Hei 3-33201 (p. 4, Figs. 6 and 7)

~~{Patent Literature}~~ PTL 2

——: Japanese Patent Application Publication No. 2006-141642 (p. 10, Fig. 1)

#### Summary

To solve the above-described problem, the present invention has the following aspects.

In a aspect of the present invention provides an apparatus for manufacturing an absorbent article, the apparatus including a guide unit that has a feeding part configured to feed a elastic member and that is configured to guide the elastic member, the guide unit moving the feeding part alternately in a first direction and a second direction, so that the elastic member is brought into contact with a web being conveyed in a predetermined direction with a continuum of components constituting one portion of the absorbent article and is placed in a predetermined waveform, the first direction extending from a center portion of the web to a first end portion in a cross direction intersecting the predetermined direction,

the second direction extending from the center portion to a second end portion opposite to the first end portion, the apparatus comprising a speed controller configured to control a speed of the elastic member which is fed from the feeding part, wherein the speed controller maintains the speed of the elastic member in a constant speed different from a conveyance velocity of the web being conveyed in the predetermined direction, and in a plan view of the web, a distance between the feeding part and a nip point where the elastic member is brought into contact with the web becomes largest when the nip point goes beyond a position on the predetermined waveform where an angle between the predetermined direction and a tangent line to the predetermined waveform becomes largest.

According to the aspect of the present invention, there can be provided an apparatus and a method of manufacturing an absorbent article that are capable of easily placing a elastic member in a desired position on a web being conveyed at high speed along a predetermined waveform.

#### **Brief Description of ~~THE~~ Drawings**

[Fig. 1] Fig. 1 is a perspective view showing an absorbent article according to one or more embodiments.

[Fig. 2] Fig. 2 is a view for illustrating part of a method of manufacturing an absorbent article according to one or more embodiments.

[Fig. 3] Fig. 3 is a perspective view showing ~~a~~an elastic member attaching apparatus according to one or more embodiments.

[Fig. 4] Fig. 4 is a top view (a view on arrow A in Fig. 3) showing the elastic member attaching apparatus according to one or more embodiments.

[Fig. 5] Fig. 5 is a side view (a view on arrow B in Fig.

3) showing the elastic member attaching apparatus according to one or more embodiments.

[Fig. 6] Fig. 6 is a schematic view showing how a front leg gather is placed in the top view (the view on arrow A in

Fig. 3) shown in Fig. 4.

[Fig. 7] Fig. 7 is a block diagram showing the configuration of the elastic member attaching apparatus according to one or more embodiments.

## 10 Detailed Description

Hereinafter, a conveyor and a method of manufacturing an absorbent article according to the present invention will be described with reference to the accompanying drawings.

15 Note that, in the following description of the drawings, same reference signs denote same elements and portions. In addition, it should be noted that the drawings are schematic and are not to scale unless otherwise specified.

20 Therefore, specific dimensions and the like should be determined by taking the following description into consideration. Moreover, the drawings do not necessarily reflect the real-life dimensional relationships and ratios of components.

25 In the first place, a configuration of an absorbent article according to an embodiment will be explained with reference to the drawing. Fig. 1 is a perspective view showing the absorbent article 1 according to one or more embodiments. In the particularly illustrated embodiment,  
30 the absorbent article 1 is a disposable pants-type diaper for adults.

As shown in Fig. 1, the absorbent article 1 substantially includes a liquid-permeable top sheet 2, a back sheet 3, and an absorber 4.

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The top sheet 2 is to come in contact with the skin of a person to wear the absorbent article 1 (hereinafter, called a "wearer"). The back sheet 3 is provided outside the top sheet 2. The absorber 4 is provided between the top sheet 2 and the back sheet 3, and absorbs excretion from the wearer.

Note that a liquid-impermeable waterproof sheet (unillustrated) is provided between the back sheet 3 and the absorber 4. In other words, the absorber 4 is provided between the top sheet 2 and the waterproof sheet.

The top sheet 2 is made of a nonwoven fabric or a perforated plastic film. The back sheet 3 is made of a nonwoven fabric. The absorber 4 is made of, for example, ground pulp or a mixture of ground pulp and superabsorbent polymer particles. The waterproof sheet is made of, for example, a plastic, a nonwoven fabric, or a mixed sheet of a plastic film and a nonwoven fabric.

The absorbent article 1 has a front waistline region 10 to be fitted to the front waist of a wearer, a back waistline region 20 to be fitted to the back waist of the wearer, and a crotch region 30 to be fitted to the crotch of the wearer.

The front waistline region 10 and the back waistline region 20 are joined together by joint portions 40. Waist gathers 5 made of a stretchable string-like rubber or the like are provided to an entire peripheral edge of the front waistline region 10 and the back waistline region 20. The waist gathers 5 include a front waist gather 5a which is positioned in the front waistline region 10 and a back waist gather 5b which is positioned in the back waistline region 20. In addition, a waist opening region 50 is formed between the front waist gather 5a and the back waist gather 5b.

The front waistline region 10 and the back waistline

region 20 are stretchable in the conveyance direction MD (the MD direction) of a first web 7A constituting the top sheet 2 and a second web 7B constituting the back surface sheet 3 (see Fig. 2). For example, to make the front waistline region 10 and the back waistline region 20 stretchable in the conveyance direction MD, the front waistline region 10 and the back waistline region 20 may be provided with the waist gathers 5 or may themselves be made of a stretchable sheet from the beginning.

The crotch region 30 is provided between the front waistline region 10 and the back waistline region 20. Leg gathers 6 made of a stretchable string-like rubber or the like are provided on both sides of the crotch region 30. Each of the leg gathers 6 includes a front leg gather 6a positioned close to the front waistline region 10 and a back leg gather 6b positioned close to the back waistline region 20. A leg-surrounding openings 60 is formed between the front leg gather 6a and the back leg gather 6b and on each side of the crotch regions 30.

The crotch region 30 is stretchable in the cross direction CD (the CD direction) intersecting the conveyance direction MD of the web. For example, to make the crotch region 30 stretchable in the cross direction CD, the crotch region 30 may be provided with the leg gather 6, or may itself be made of a stretchable sheet from the beginning.

In Fig. 1, regions Sk show portions to be fitted to the inguinal regions of the wearer when the wearer wears the diaper. The details of a method for placing the front leg gather 6a in the region Sk will be described later.

Secondly, a configuration of a method of manufacturing an absorbent article according to this embodiment will be explained with reference to the drawing. Fig. 2 is a diagram for explaining part of the method of manufacturing an absorbent article according to this embodiment.

As shown in Fig. 2, the method of manufacturing an absorbent article includes at least a component placing step, a leg-surrounding forming step, a folding step, a joining step and a cutting step.

5        Note that, between each two of the steps, performed is a conveying step using an unillustrated conveyor (e.g. a belt conveyor) of conveying the liquid-permeable first web 7A, the liquid-impermeable second web 7B, and a third web 7C in the conveyance direction MD (a predetermined  
10        direction). The liquid-permeable first web 7A constitutes the top sheet 2, the liquid-impermeable second web 7B constitutes the back sheet 3, and a third web 7C is made of, for example, the same material as that of the second web 7B and constitutes the back sheet 3.

15        In the component placing step S1, components to constitute the absorbent article 1, such as the elastic member, the third web 7C, the waterproof sheet (unillustrated), and the absorber 4, are placed on the second web 7B.

20        Specifically, in the first place, elastic members 5' constituting the waist gathers 5 are linearly placed in a stretched state in portions corresponding to the front waistline region 10 and the back waistline region 20 on the second web 7B. In other words, a elastic member 5a'  
25        constituting the front waist gather 5a and a elastic member 5b' constituting the back waist gather 5b are placed in portions corresponding to the front waistline region 10 and the back waistline region 20 on the second web 7B. Accordingly, the waist gathers 5 (the front waist gather 5a  
30        and the back waist gather 5b) are formed in the portions corresponding to the front waistline region 10 and the back waistline region 20 on the second web 7B.

Secondly, the third web 7C is placed on the second web 7B. At the same time, in portions corresponding to the

crotch regions 30 on the second web 7B and the third web 7C, the elastic members 6' constituting the leg gathers 6 are placed in a stretched state while swinging in the cross direction CD at predetermined cycles. After that, the  
5 elastic members 6' are held between the second web 7B and the third web 7C to form the leg gathers 6 (the front leg gather 6a and the back leg gather 6b).

Note that the second web 7B and the third web 7C holding the elastic members 6' therebetween are pressed by  
10 an upper press roll 130A and a lower press roll 130B.

The elastic member 6a' constituting the front leg gather 6a and the elastic member 6b' constituting the back leg gather 6b form a large ring portion 6c and a small ring portion 6d whose size in the cross direction CD is smaller  
15 than the large ring portion 6c.

As described above, the elastic members 6' are placed between the second web 7B and the third web 7C, and then the second web 7B and the third web 7C are pressed by the upper press roll 130A and the lower press roll 130B. If the  
20 position where the small ring portion 6d is supposed to be formed is not pressed, the elastic members 6' are not fixed in predetermined positions on the web. The elastic members 6' are placed in a stretched state, and thus are contracted to form substantially straight lines shifted from the  
25 predetermined forms placed, on the web in positions where the elastic members 6' are not fixed. In this manner, the small ring portion 6d is formed.

Similarly, this is applicable to the case where an adhesive is not applied to the predetermined positions.  
30 Specifically, the elastic members 6' are not fixed on the web in positions where an adhesive is not supposed to be applied, so that a small ring portion 6d is similarly formed.

Thirdly, the waterproof sheet (unillustrated) and the

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absorber 4 are placed on the second web 7B and the third web 7C holding the elastic members 6' therebetween so as to be arranged in the conveyance direction MD at regular intervals. Note that the waterproof sheet may be placed on the second web 7B and the third web 7C with the absorber 4 being joined therewith in advance or may be placed on the second web 7B and the third web 7C with the absorber 4 being separated therefrom.

Fourthly, the first web 7A constituting the top sheet 2 is placed on the second web 7B and the third web 7C on which the components constituting the absorbent article 1 are placed.

Note that, in the component placing step S1, the order from first to fourth is not necessarily required and may be changed as needed.

In the leg-surrounding forming step S2, leg-surrounding openings 60 (so-called leg holes) are formed after the component placing step S1 by cutting, along the internal circumference of the large ring portion 6c, the second web 7B and the first web 7A (hereinafter referred to as a composite web 7) which hold the components therebetween.

In the folding step S3, the composite web 7 is folded into two parts, after the leg-surrounding forming step S2, along the center line CL extending in the conveyance direction MD through the center of the cross direction CD of the composite web 7. In other words, a side edge 10A of the composite web 7 which corresponds to the front waistline region 10 and a side edge 20A of the composite web 7 which corresponds to the back waistline region 20 are placed one upon another in a state of matching each other.

In the joining step S4 after the folding step S3, the two folded parts of the web 7 are joined together through ultrasonic treatment or heat treatment at predetermined

regions 40A corresponding to the joint portions 40 of the absorbent article 1. The predetermined region 40A is a region on both sides, in the conveyance direction MD, of an phantom line SL indicating a to-be-cut position extending  
5 in the cross direction CD of the web.

In the cutting step S5, the composite web 7 with the two folded parts joined at the predetermined regions 40A is cut along the phantom lines SL after the joining step S4. . Thereby, the absorbent article 1 is manufactured.

10 Hereinafter, the configuration of a elastic member attaching apparatus (an apparatus for manufacturing an absorbent article) used in the above-described component attaching step is described with reference to the drawings. Fig. 3 is a perspective view showing the elastic member  
15 attaching apparatus according to the embodiment. Fig. 4 is a top view (a view on arrow A in Fig. 3) showing the elastic member attaching apparatus according to the embodiment. Fig. 5 is a side view (a view on arrow B in Fig. 3) showing the elastic member attaching apparatus according  
20 to the embodiment.

As shown in Figs. 3 to 5, the elastic member attaching apparatus 100 places the elastic members 6' constituting the leg gathers 6 between the second web 7B and the third web 7C by causing the elastic members 6' to swing in the  
25 cross direction CD at predetermined cycles. In other words, the elastic member attaching apparatus 100 places the elastic members 6' in a curved state between the second web 7B and the third web 7C, so that the leg gathers 6 (the front leg gather 6a and the back leg gather 6b) are formed.

30 Fig. 7 is a block diagram for illustrating the configuration of the elastic member attaching apparatus 100. The elastic member attaching apparatus 100 at least includes upper web feeding mechanism 101 and lower web feeding mechanism 102 (unillustrated in Fig. 3 and see Fig.

7), gather feeding mechanisms 103 and 104 (unillustrated in Fig. 3 and see Fig. 7), an applying mechanism 110, a swing guide mechanism 120 (a guide arm unit), and a press roll mechanism 130.

5       The web feeding mechanisms continuously feeds the webs respectively from web rolls. Specifically, the web feeding mechanisms include an upper web feeding mechanism 101 continuously feeding the third web 7C from a third web roll 7C' and a lower web feeding mechanism 102 continuously  
10       feeding the second web 7B from a second web roll 7B'.

      The upper web feeding mechanism 101 and the lower web feeding mechanism 102 continuously feed the second web 7B and the third web 7C toward the press roll mechanism 130 respectively through rollers 140A and 140B rotating about a  
15       rotation axis (unillustrated) in the cross direction CD.

      The gather feeding mechanisms continuously feed the elastic members 6' constituting the leg gathers 6 respectively from web rolls. Specifically, the gather feeding mechanisms include a front gather feeding mechanism  
20       103 continuously feeding the elastic member 6a' constituting the front leg gather 6a from the corresponding web roll (unillustrated) and a back gather feeding mechanism 104 continuously feeding the elastic member 6b' constituting the back leg gather 6b from the corresponding  
25       web roll (unillustrated).

      The front gather feeding mechanism 103 and the back gather feeding mechanism 104 continuously feed the leg gathers 6 toward the press roll mechanism 130 respectively through feed rolls 150A and 150B which rotate about the  
30       rotation axis in the cross direction CD and through branch rolls 151A and 151B which respectively separate the elastic member 6a' and the elastic member 6b' into strings.

      As shown in Fig. 7, the elastic member attaching apparatus 100 has a speed controller 105 configured to

control a speed of feeding the front leg gather 6a from the front gather feeding mechanism 103 and a speed of feeding the back leg gather 6b from the back gather feeding mechanism 104. The speed controller 105 maintains the speed of feeding the elastic member 6a' constituting the front leg gather 6a and being fed from the front gather feeding mechanism 103 in a constant speed different from a conveyance velocity (V1) of the web. Also, the speed controller maintains the speed of feeding the elastic member 6B' constituting the back leg gather 6b and being fed from the back gather feeding mechanism 104 in a constant speed different from the conveyance velocity (V1) of the web.

Specifically, the speed controller 105 maintains the speeds of feeding the elastic members 6a' and 6b' in a constant speed lower than the conveyance velocity (V1) of the web. Also, the speed controller 105 controls a servomotor (to be described later) in the swing guide mechanism 120.

The adhesive applying mechanism 110 is a spraying device applying an adhesive (e.g. a hot melt adhesive) onto the web. Specifically, the adhesive applying mechanism 110 has an upper adhesive applying mechanism 110A applying an adhesive onto the third web 7C and a lower adhesive applying mechanism 110B applying an adhesive onto the second web 7B.

Note that the upper adhesive applying mechanism 110A applies an adhesive onto a surface of the third web 7C other than the center portion thereof. In contrast, the lower adhesive applying mechanism 110B applies an adhesive onto an entire surface of the second web 7B.

The swing guide mechanism 120 causes the elastic members 6' constituting the leg gathers 6 to swing at predetermined cycles in the cross direction CD. The swing

guide mechanism 120 has a first swing guide mechanism 200A causing the elastic member 6a' constituting the front leg gather 6a to swing and a second swing guide member 200B causing the elastic member 6b' constituting the back leg gather 6b to swing. The detail of the swing guide mechanism 120 will be given later.

The press roll mechanism 130 presses the second web 7B and the third web 7C with the elastic members 6' being held between the second web 7B and the third web 7C.

Specifically, the press roll mechanism 130 has an upper press roll 130A coming in contact with the third web 7C and a lower press roll 130B coming in contact with the second web 7B.

The upper press roll 130A rotates about a rotation axis 131A along the cross direction CD. Similarly, the lower press roll 130B rotates about a rotation axis 130B in the cross direction CD. The elastic members 6' are guided by the swing guide mechanism 120 to a position where the upper press roll 130A and the lower press roll 130B are closest to each other.

Hereinafter, the configuration of the swing guide mechanism 120 which is characteristic to the present invention is described with reference to Figs. 3 to 5.

The first swing guide mechanism 200A and the second swing guide mechanism 200B have basically the same configuration except the lengths of arm members 220. This is described later. For this reason, the first swing guide mechanism 200A and the second swing guide mechanism 200B are collectively described as the swing guide mechanism 120.

As shown in Figs. 3 to 5, the swing guide mechanism 120 includes a motor 210 having a pivot 211, an arm member 220 which guides the elastic member 6' to a predetermined position in the cross direction CD between the second web 7B and the third web 7C, the pivot 211, and a base end

portion 221 of the arm member 220.

The motor 210 includes a servomotor which provides a predetermined extent of a stretching magnification to the elastic member 6' according to the conveyance velocity (V1) of the web and which is operated by a controller programmed to be capable of placing the elastic member 6' in a desired layout.

Note that a program to operate the motor 210 of the first swing guide mechanism 200A is different from a program to operate the motor 210 of the second swing guide mechanism 200B. In other words, the predetermined stretching magnification and layout in the front leg gather 6a are different from those of the back leg gather 6b.

The motor 210 is attached to a base plate 213 through a bracket 212 (see Fig. 4). The motor 210 is configured so that the position thereof on the base plate 213 may be movable in the cross direction CD as needed. Note that a distance D1 is different from a distance D2, where the distance D1 is a distance between the press roll mechanism 130 and the base plate 213 on which the motor 210 of the first swing guide mechanism 200A is attached, and the distance D2 is a distance between the press roll mechanism 130 and the base plate 213 on which the motor 210 of the second swing guide mechanism 200B is attached.

The arm member 220 has a plate shape which is gradually tapered from the base end portion 211 toward a tip end portion 222. It is preferable that the arm member 220 be horizontally placed (see Fig. 5).

The arm member 220 is made of a metal steel plate. For example, the arm member 220 is made of a stainless steel plate.

The tip end portion 222 of the arm member 220 is bent toward the side opposite to the side where the motor 210 is positioned with respect to the arm member 220. The tip end

portion 222 of the arm member 220 has an insertion hole 223 into which the leg gather 6 is inserted.

In the present embodiment, the arm members 220 of the first swing guide mechanism 200A and the second swing guide mechanism 200B are different in length. The length L1 of the arm member 220 of the first swing guide mechanism 200A is larger than the length L2 of the arm member 220 of the second swing guide mechanism 200B. Meanwhile, the distances from the tip end portions 222 of the first swing guide mechanism 200A and the second swing guide mechanism 200B to the press roll mechanism 130 are equal to each other. Therefore, the relationship between the distance D1 and the distance D2 can be expressed by  $D2 > D1$ .

For example, the length L1 of the arm member 220 of the first swing guide mechanism 200A is 450 mm (see Figs. 5 and 6). On the other hand, the length L2 of the arm member 220 of the second swing guide mechanism 200B is 600 mm (see Figs. 5 and 6).

Note that the length of the arm member 220 means herein a length from the tip end portion 222 of the arm member 220 to the pivot 211 of the arm member 220.

A weight of the arm member 220 of the first swing guide mechanism 200A is 300 g, while a weight of the arm member 220 of the second swing guide mechanism 200B is 400 g.

An amplitude SW1 of the tip end portion 222 of the first swing guide mechanism 200A in the cross direction CD is 200 mm (see Fig. 4). On the other hand, an amplitude SW2 of the tip end portion 222 of the arm member 220 of the second swing guide mechanism 200B in the cross direction CD is 350 mm (see Fig. 4).

Hereinafter, the operation of the elastic member attaching apparatus 100 according to the embodiment is described with reference to Figs. 3 to 5.

The upper web feeding mechanism feeds the third web 3C from a third web roll 7C', and the roller 140A changes the moving direction of the web. The upper adhesive applying mechanism 110A applies an adhesive onto the surface, facing the second web 7B, of the third web 7C whose moving direction is changed. At this time, the upper adhesive applying mechanism 110A applies the adhesive onto the surface of the third web 7C except the center portion thereof. The third web 7C onto which the adhesive is applied is supplied between the upper press roll 130A and the lower press roll 130B from above.

Similarly, the lower web feeding mechanism feeds the second web 7B from the second web roll 7B', and the roller 140B changes the moving direction of the web. The lower adhesive applying mechanism 110B applies the adhesive onto the surface, facing the third web 7C, of the second web 7B whose moving direction is changed. The second web 7B onto which the adhesive is applied is supplied between the upper press roll 130A and the lower press roll 130B from below.

The front gather feeding mechanism feeds the elastic member 6a' from the web roll (unillustrated), and the feed roll 150A turns the moving direction of the elastic member. The branch roll 151A separates into strings the elastic member 6a' turned by the feed roll 150A. The first swinging guide mechanism 200A causes the strings of the elastic member 6a' to swing at predetermined cycles in the cross direction CD. Accordingly, the elastic member 6a' is placed in a curved state between the second web 7B and the third web 7C, so that the front leg gather 6a is formed.

Similarly, the back gather feeding mechanism feeds the elastic member 6b' from the web roll (unillustrated), and the feed roll 150B turns the moving direction of the elastic member 6b'. The branch roll 151B separates into strings the elastic member 6b' which is turned by the feed

roll 150B. The second swinging guide mechanism 200B causes the strings of the elastic member 7b' to swing at predetermined cycles in the cross direction CD. Accordingly, the elastic member 6b' is placed in a curved state between the second web 7B and the third web 7C, so that the back leg gather 6b is formed.

The upper press roll 130A and the lower press roll 130B press the second web 7B and the third web 7C, onto which the adhesive is applied, with the elastic members 6a' and 6b' being held between the second web 7B and the third web 7C. For this reason, the elastic members 6a' and 6b' are bonded between the second web 7B and the third web 7C in a state where the elastic members 6a' and 6b' are swung by the swing guide mechanism 120. Consequently, the large ring portion 6c is formed. On the other hand, even though the elastic members 6a' and 6b' are placed between the second web 7B and third web 7C, the elastic members 6a' and 6b' generate restoring force to form the small ring portion 6d because the adhesive is not applied to the center portion of the third web 7C.

The operation of the swing guide mechanism 120 is described in detail with reference to Figs. 4 and 6. The first swing guide mechanism 200A and the second swing guide mechanism 200B are similarly controlled. Thus, the description is given by using the first swing guide mechanism 200A and the elastic member 6a' which is placed by the first swing guide mechanism 200A.

In Fig. 4, the swing guide mechanism 120 has the tip end portion 222 from which the elastic member 6a' is fed. The tip end portion 222 is alternately moved by the arm member 220 guiding the elastic member 6a' in a first direction Da extending from the center portion of the second web 7B (the third web 7C) being conveyed in the conveyance direction MD to a first end portion 7a in the

cross direction CD and a second direction Db extending from the center portion of the second web 7B (the third web 7C) to a second end portion 7b opposite to the first end portion. In doing so, the elastic member 6a' is brought  
5 into contact with the second web 7B and the third web 7C in a way to be therebetween to form a gather waveform (a predetermined waveform).

In Fig. 4, the center line GL shows the center line of the gather waveform in the cross direction CD. In the  
10 embodiment, the cycle of the amplitude of the elastic member 6a' in the second direction Db on the web is shorter than that in the first direction Da when the center line GL is used as a reference.

The moving center ML of the tip end portion 222 is  
15 displaced toward the shorter cycle of amplitude, i.e. the second direction Db with respect to the center line GL.

In the embodiment, the tip end portion 222 constitutes a feeding part 300 and the swing guide mechanism 120 constitutes a guide unit 310. Also, the conveyance  
20 direction MD is a predetermined direction.

Fig. 6 is a schematic view for illustrating the elastic member 6a' which is placed on the web and the operation of the tip end portion 222 which places the elastic member 6a', in the top view (the view on arrow A in  
25 Fig. 3) shown in Fig. 4. The waveform shown in Fig. 6 shows the waveform of the elastic member 6a' placed between the second web 7B and the third web 7C, and also corresponds to the gather waveform of the front leg gather 6a shown in Fig. 4. The solid line portion W1 shows the waveform of the  
30 elastic member 6a' which have been already placed between the second web 7B and the third web 7C. The dashed line portion W2 shows the position at which the elastic member 6a' is supposed to be placed.

In the embodiment, in the plan view of the composite

web 7, a nip point N1 is the position where the elastic member 6a' is brought into contact with the second web 7B and the third web 7C at time t1. The tip end portion 222 is at least in the feeding position P1 on a tangent line at the nip point N1. At this time, a distance between the tip end portion 222 (i.e. the feeding position P1) and the nip point N1 is expressed by a feeding distance LN1.

In general, when the tip end portion 222 is placed in the feeding position P1 on the tangent line to the gather waveform at the nip point N1, the elastic member 6a' can be placed along the gather waveform. However, in the embodiment, when the tip end portion 222 moves in the first direction Da, the tip end portion 222 is placed in a marginal position m1 which is positioned closer to the first end portion 7a than the feeding position P1 on the tangent line to the gather waveform at the nip point N1. Similarly, when the tip end portion 222 moves in the second direction Db, the tip end portion 222 is placed in a marginal position m2 which is positioned closer to the second end portion 7b than a feeding position (unillustrated) on a tangent line to the gather waveform at a nip point.

In Fig. 6, a nip point N2 is a position where the elastic member 6a' is brought into contact with the second web 7B and the third web 7C at time t2. The nip point moves in the conveyance direction MD by a distance MD1 from the position at time t1. Note that the direction shown by arrow MD1 shows the moving direction of the nip point and the tip end portion 222 (the feeding position) with respect to the second web 7B and the third web 7C. The tip end portion 222 is at least in the feeding position P2 on the tangent line to the gather waveform at the nip point N2.

At this time, an angle  $\phi$  between the tangent line to the gather waveform at the nip point N2 and the conveyance

direction MD becomes largest. In other words, the nip point N2 corresponds to an inflection point in the curved line showing the gather waveform. In the embodiment, when the nip point goes beyond the position where the angle between the conveyance direction MD and the tangent line to the gather waveform becomes largest (i.e. the nip point N2), a distance (a feeding distance LN2) between the tip end portion 222 and the nip point becomes largest.

In other words, when the nip point goes beyond the position where the angle between the conveyance direction MD and the tangent line to the gather waveform becomes largest (i.e. the nip point N2), the feeding distance LN2 is larger than the feeding distance LN1.

When moving in the first direction Da, the tip end portion 222 is placed in the marginal position m2 which is positioned closer to the first end portion 7a than the feeding position P2 on the tangent line to the gather waveform at the nip point N2. Similarly, when moving in the second direction Db, the tip end portion 222 is placed in the marginal position m1 which is positioned closer to the second end portion 7b than the feeding position (unillustrated) on the tangent line to the gather waveform at the nip point.

Moreover, in the embodiment, as the nip point moves from the position where the nip point is in a position where the tangent line to the gather waveform at the nip point and the conveyance direction MD becomes parallel with each other to the position where the angle between the tangent line and the conveyance direction MD becomes largest, a distance M between the position on the tangent line at the nip point and the marginal position becomes gradually larger. In other words, in Fig. 6, the marginal distance M1 is smaller than the marginal distance M2.

In contrast, as the nip point moves from the position

where the angle between the tangent line to the gather waveform at the nip point and the conveyance direction MD becomes largest to the position where the tangent line and the conveyance direction MD are parallel with each other, the distance M between the position on the tangent line to the gather waveform at the nip point and the marginal position becomes gradually smaller (unillustrated).

In the embodiment, it is preferable that the trajectory of the moving tip end portion 222 be a curved line projected at least in the conveyance direction MD. Specifically, in the embodiment, the tip end portion 222 is placed in the arm having the pivot in a predetermined position with respect to the web (the gather waveform). In other words, the tip end portion depicts a circular-arc trajectory intersecting the conveyance direction MD.-

Specifically, in the embodiment, the swing guide mechanism 120 is a so-called swing arm unit that includes the motor 210 having the pivot 211, the arm member 220 which guides the elastic member 6a' to a predetermined position in the cross direction CD between the second web 7B and the third web 7C, the pivot 211, and a base end portion 221 of the arm member 220.

The tip end portion 222 feeding the elastic member 6a' is provided on the tip end of the arm member 220. The arm member 220 is coupled to the motor 210 having the pivot 211. Accordingly, the feeding position P1 and the marginal position m1 at which the tip end portion 222 is positioned are placed on the arc taking the length of the arm member 220 as a radius of a circle centering the pivot 211 at time t1. Similarly, the feeding position P2 and the marginal position m2 are placed on the arc taking the length of the arm member 220 as a radius of a circle centering the pivot 211 at time t2.

In the present embodiment, as shown in Fig. 4, the

cycle of the amplitude of the elastic member 6a' toward the second end portion 7b on the web is shorter than that toward the first end portion 7a on the web when the center line L in the cross direction CD of the gather waveform is used as a reference. Moreover, the moving center of the tip end portion 222 is displaced from the center line L to the curved portion of the shorter cycle of the amplitude.

Furthermore, it is preferable that a ratio  $W/L$  of the amplitude  $W$  of the elastic member 6a' in the first direction Da or the second direction Db on the composite web 7 to the length  $L$  of the arm member 220 be 0.25 to 0.70.

Also, in the embodiment, the waveform of the elastic member placed by the first swing guide mechanism 200A and the waveform of the elastic member placed by the second swing guide mechanism 200B are different from each other. Furthermore, the length of the arm member 220 provided in the first swing guide mechanism 200A and the length of the arm member 220 provided in the second swing guide mechanism 200B are different from each other.

As described above, in the embodiment, the absorbent article 1 is a wearing-type diaper, and portions of the gather waveform at which the angle between the conveyance direction MD and the tangent line to the gather waveform is largest correspond to the inguinal regions in the leg-surrounding regions of the diaper.

Specifically, as shown in Fig. 4, the gather waveform of the elastic member 6a' placed by the first swing guide mechanism 200A corresponds to the waveform of the front leg gather 6a. Each of the regions Sk shown in Fig. 4 is a portion where the angle between the conveyance direction MD and the tangent line to the gather waveform is largest and is fitted to the inguinal region of the wearer when the wearer wears the diaper.

According to the elastic member attaching apparatus

100, in the plan view of the composite web 7, the distance (the feeding distance) between the tip end portion 222 and the nip point in the cross direction CD becomes larger when the nip point goes beyond the position where the angle

5 between the conveyance direction MD and the tangent line to the gather waveform becomes largest.

In other words, the tip end portions 222 is placed in a further position in the plan view of the composite web 7 when the nip point goes beyond the position where the angle  
10 between the conveyance direction MD and the tangent to the gather waveform becomes largest. The elastic member 6a' is stretched by the tip end portion 222 further than a predetermined position, and then, while contracting, comes close to the web and touches the web, thereby being easily  
15 placed in the gather waveform.

Thus, according to the elastic member attaching apparatus 100, the string-like elastic member 6a' can be easily placed along the predetermined gather waveform in a desired position on the web being conveyed at high speed  
20 without elaborate profile designing.

In general, when a elastic member is placed in a gather waveform on a web, it is not realistic in terms of device layout to bring a feeding position of a elastic member into contact with a nip point to align the nip point  
25 with the feeding position of a elastic member. Here, the nip point is that at which a elastic member and a web come in contact with each other. For this reason, a certain distance is provided between the nip point and the feeding position of the elastic member 6a'.

30 When the elastic member is to be accurately placed along the gather waveform, it is only needed that the feeding position of the elastic member 6 is at least placed on an extension of the tangent line to the gather waveform at the nip point.

In addition, if the distance from the feeding position of the elastic member to the nip point is large, a range within which the elastic member can be placed along the gather waveform is wide even though the feeding position is not accurately placed on the tangent line to the gather waveform at the nip point of the gather waveform.

In the plan view of the composite web 7, the elastic member attaching apparatus 100 can have a wider tolerance when the nip point goes beyond the position where the angle between the conveyance direction MD and the tangent line to the gather waveform becomes largest. The reason is that the distance between the feeding position of the elastic member and the nip point becomes larger.

Thus, according to the elastic member attaching apparatus 100, the string-like elastic member 6a' can be easily placed along the predetermined gather waveform in a desired position on the web being conveyed at high speed without elaborate profile designing.

In the elastic member attaching apparatus 100, when the tip end portion 222 which is the feeding position of the elastic member 6a' is moving in the first direction Da, the tip end portion 222 is placed in the marginal position m1 closer to the first end portion 7a than the tangent line to the gather waveform at the nip point of the gather waveform. Also, when the tip end portion 222 is moving in the second direction Db, the tip end portion 222 is placed in the marginal position closer to the second end portion 7b than the tangent line to the gather waveform at the nip point of the gather waveform.

Furthermore, as the nip point moves from the position where the tangent line and the conveyance direction MD becomes parallel with each other to the position where the angle between the tangent line and the conveyance direction MD becomes largest, the distance M between the position on

the tangent line to the gather waveform at the nip point and the marginal position ml becomes gradually larger. In contrast, as the nip point moves from the position where the angle between the tangent line and the conveyance direction MD becomes largest to the position where the tangent line and the conveyance direction MD becomes parallel with each other, the distance between the position on the tangent line to the gather waveform at the nip point and the marginal position ml becomes gradually shorter.

As described above, in the elastic member attaching apparatus 100, the distance from the feeding position of the elastic member 6a' to the nip point can be larger in a vicinity of the position where the angle between the tangent line and the conveyance direction MD becomes largest. Accordingly, the elastic member attaching apparatus 100 can have a wider tolerance.

Thus, according to the elastic member attaching apparatus 100, the string-like elastic member 6a' can be easily placed along the predetermined gather waveform in a desired position on the web being conveyed at high speed without elaborate profile designing.

In the elastic member attaching apparatus 100, the cycle of the amplitude of the elastic member 6a' in the second direction Db on the web is shorter than that in the first direction Da when the center line GL in the cross direction CD of the gather waveform (the predetermined waveform) is used as a reference. In addition, the moving center ML of the tip end portion 222 is displaced from the center line GL toward the shorter cycle of amplitude, i.e. the second direction Db.

With this configuration, the difference between the moving distances of the tip end portion 222 in the first direction Da and the second direction Db can be reduced. As a result, the feeding position of the elastic member 6a'

can follow the gather waveform more accurately.

In the embodiment, the trajectory of the moving tip end portion 222 is at least a curved line projected in the conveyance direction MD, so that the tip end portion 222 provided on the tip end of the arm member 220 moves on the curved line projected in the conveyance direction MD. For this reason, a difference is caused in the distance between the tip end portion 222 and the nip point not only in the cross direction CD but also in the conveyance direction MD. Thus, the distance from the feeding position of the elastic member 6a' to the nip point (the feeding distance) can be lengthened in the conveyance direction MD, so that the tolerance can be further widened.

Thus, the string-like elastic member 6a' can be easily placed along the predetermined gather waveform in a desired position on the web being conveyed at high speed without elaborate profile designing.

In the embodiment, the swing guide mechanism 120 has the motor 210 having the pivot 211, the arm member 220 which guides the elastic member 6' to a predetermined position in the cross direction CD between the second web 7B and the third web 7C, the pivot 211, and a base end portion 221 of the arm member 220.

As described above, when the arm member 220 rotates, the tip end portion 222 provided on the tip end of the arm member 220 depicts the circular-arc trajectory. For this reason, on the both sides of the circular-arc, a difference is caused in the distance between the feeding position and the nip point not only in the cross direction CD but also in the conveyance direction MD. Thus, the distance from the feeding position of the elastic member 6a' to the nip point (the feeding distance) can be lengthened in the conveyance direction MD, so that the tolerance can be further widened.

Accordingly, the string-like elastic member 6a' can be

easily placed along the predetermined gather waveform in a desired position on the web being conveyed at high speed without elaborate profile designing.

5 In the embodiment, a value of the distance from the feeding position to the nip point (the feeding distance) can be properly set by setting the ratio  $W/L$  of the amplitude  $W$  of the elastic member in the first direction  $D_a$  or the second direction  $D_b$  on the web to the length  $L$  of the arm member 220 to be 0.25 to 0.70. Thus, the elastic member 6a' can be placed along the gather waveform without elaborate profile designing.

10 In the embodiment, the swing guide mechanism 120 includes a pair of the first swing guide mechanism 200A and the second swing guide mechanism 200B. The waveform of the elastic member 6a' formed by the first swing guide mechanism 200A is different from the waveform of the elastic member 6a' formed by the second swing guide mechanism 200B. In addition, the length of the arm member provided in the first swing guide mechanism 200A is different from the length of the arm member provided in the second swing guide mechanism 200B.

With this configuration, elastic members can be placed along different gather waveforms on one web conveyed in the conveyance direction MD at a conveyance velocity  $V_1$ .

25 In the embodiment, the absorbent article 1 is a wearing-type diaper, and portions of the gather waveform at which the angle between the conveyance direction MD and the tangent line to the gather waveform becomes largest correspond to the inguinal regions in the leg-surrounding regions of the diaper. Whether or not the absorbent article 1 is comfortably fitted to the wearer is determined by the regions corresponding to the inguinal regions of the diaper. Thus, the regions are the most important portions.

The elastic member attaching apparatus 100 can extend

the distance from the feeding position to the nip point when the elastic member 6a' is placed at the position where the angle between the tangent line and the conveyance direction MD becomes largest, i.e. the regions Sk

5 corresponding to the inguinal regions. Thus, the tolerance can be widened.

Accordingly, the elastic member 6a' can be accurately placed at the position corresponding to the inguinal region which requires the highest precision, without elaborate  
10 profile designing.

Moreover, as shown in Fig. 7, in the elastic member attaching apparatus 100, the speed controller 105 maintains the feeding speed of the elastic member 6a' constituting the front leg gather 6a which is fed from the front gather  
15 feeding mechanism 103 and the feeding speed of the elastic member 6b' constituting the back leg-gather 6b which is fed from the back gather feeding mechanism 104 in a constant speed different from the conveyance velocity (V1) of the web.

20 With this configuration, the elastic members 6a' and 6b' are placed between the second web 7B and the third web 7C and are pressed by the press roll mechanism 130. At this time, the elastic members 6a' and 6b' are under tensile stress caused by the difference between the conveyance  
25 velocity and the feeding speed.

Provided that the feeding speed is constant, as the difference between the feeding distances LN1 and LN2 is larger, the difference between the tensile stress of the elastic member in the feeding position P1 and the tensile  
30 stress of the elastic member in the feeding position P2 becomes larger. When there is a difference in the tensile stress by position, the absorbent article is prevented from being comfortably fitted to the wearer.

The swing guide mechanism 120 is a swinging arm unit.

As the distance between any point on the trajectory of the swinging tip end portion 222 and the nip point (N1 or N2) is larger, the difference between the feeding distances which is attributable to the positional difference of the tip end portion 222 on the trajectory (i.e. the difference between the feeding distances L1 and L2) becomes smaller.

Accordingly, it is preferable that the distance between any point on the trajectory of the swinging tip end portion 222 and the nip point (N1 or N2) be large.

10 Accordingly to the elastic member attaching apparatus 100, the distance between the nip point (N1 or N2) and the feeding position of the elastic member 6a' or 6b' (i.e. the tip end portion 222) can be lengthened.

Accordingly, the elastic member 6a' constituting the front leg gather 6a and the elastic member 6b' constituting the back leg gather 6b can be placed between the second web 7B and the third web 7C with the tensile stress of the elastic members 6a' and 6b' being less changeable.

As described above, the details of the present invention have been disclosed through the embodiment of the present invention. It should not be understood that the description and drawings which constitute part of this disclosure limit the present invention. Based on this disclosure, those skilled in the art may easily come up with various alternative embodiments, examples and operation techniques.

For example, the embodiment of the present invention can be modified as follows. Specifically, the method of manufacturing an absorbent article and the elastic member attaching apparatus are applicable not only to an absorbent article 1 (or a so-called disposable diaper) including a front waistline region 10, a back waistline region 20, a crotch region 30 and the like, but also to various articles including disposable gowns for medical use and disposable

wears for sports.

In addition, the description has been given of the case where the elastic member as a component constituting the absorbent article 1 is a stretchable string-like rubber or the like. However, the elastic member is not limited to this and may be a rubber such as a flat rubber or a sheet-like rubber.

Also, the elastic member is not necessarily a rubber and may be a recoverable or stretchable fabric such as polyester or polyurethane or another stretchable fabric other than these fabrics. Moreover, these fabrics may be twisted together to be used as the elastic member.

In addition, the description has been given of the case where the lengths of the arm members 220 of the first swing guide mechanism 200A and the second swing guide mechanism 200B are different from each other. However, the present invention is not limited to this configuration and the lengths may be equal.

In the embodiment, the first swing guide mechanism 200A and the second swing guide mechanism 200B are designed to have the arm members 220 whose movable areas partially overlap with each other. However, the arm members 220 may be arranged in a way that the movable areas of the arm members 220 do not overlap with each other. The distance between the first swing guide mechanism 200A and the second swing guide mechanism 200B in the width direction of the web is adjustable as needed according to the shapes of the absorbent article (or a disposable diaper). For example, the front leg gather 6a and the back leg gather 6b may be conveyed with a predetermined distance therebetween being kept.

In addition, the description has been given of the case where the program operating the motor 210 of the first swing guide mechanism 200A is different from the program

operating the motor 210 of the second swing guide mechanism 200B. However, the present invention is not limited to this configuration, and these programs may be equal. In other words, the predetermined stretching magnification and  
5 layout of the front leg gather 6b may be equal to those of the back leg gather 6b.

Furthermore, the description has been given of the case where the tip end portion 222 of the arm member 220 has the insertion hole 223 into which the leg gather 6 is  
10 inserted. However, the present invention is not limited to this configuration, and is only needed to be designed to guide the leg gather 6. For example, a U-letter shape groove may be formed in the arm member 220.

In the embodiment, the description has been given of  
15 the case where the swing guide mechanism 120 includes the motor 210 having the pivot 211, the arm member 220 guiding the elastic member 6' to a predetermined position in the cross direction CD between the second web 7B and the third web 7C, the pivot 211, and the base end portion 221 of the  
20 arm member 220. However, the present invention is not limited to the configuration in which the arm member 220 swings about the pivot 211.

For example, the present invention may have a mechanism in which a guide unit having the feeding position  
25 of the elastic member 6a' is movable within the range regulated by a circular-arc slide rail, a circular-arc rib, a circular-arc cam groove, a cam follower, or the like. In this case, the examples of applicable driving means include a timing belt, a link, and a circular-arc linear servo.

30 As described above, the present invention naturally includes various embodiments which are not described herein. Accordingly, the technical scope of the present invention should be determined only by the matters to define the invention in the scope of claims regarded as appropriate

based on the description.

The entire content of Japanese Patent Application  
2009-048652\_(filed on March 2, 2009) is incorporated herein  
by reference.

5

### **Industrial Applicability**

Therefore, according to the present invention, it is possible to provide an apparatus and a method of manufacturing an absorbent article that are capable of  
10 placing a elastic member in a desired position on a web being conveyed at high speed without elaborate profile designing.

### **Reference Signs List**

- |    |              |                    |
|----|--------------|--------------------|
| 15 | 1            | absorbent article  |
|    | 2            | top sheet          |
|    | 3            | back sheet         |
|    | 4            | absorber           |
|    | 5            | waist gather       |
| 20 | 5a           | front waist gather |
|    | 5b           | back waist gather  |
|    | 5', 5a', 5b' | elastic member     |
|    | 6            | leg gather         |
|    | 6a           | front leg gather   |
| 25 | 6b           | back leg gather    |
|    | 6c           | large ring portion |
|    | 6d           | small ring portion |
|    | 6', 6a', 6b' | elastic member     |
|    | 7            | composite web      |
| 30 | 7A           | first web          |
|    | 7B           | second web         |
|    | 7B'          | second web roll    |
|    | 7C           | third web          |
|    | 7C'          | third web roll     |

- 10 front waistline region
- 10A side edge
- 20 back waistline region
- 20A side edge
- 5 30 crotch region
- 40 joint portion
- 40A predetermined region
- 50 waist opening region
- 60 leg-surrounding ~~opening region~~ openings
- 10 100 elastic member attaching apparatus
- 101 upper web feeding mechanism
- 102 lower web feeding mechanism
- 103 front gather feeding mechanism
- 104 back gather feeding mechanism
- 15 105 speed controller
- 110 adhesive applying mechanism
- 110A upper adhesive applying mechanism
- 110B lower adhesive applying mechanism
- 120, 120A swing guide mechanism (guide arm unit)
- 20 130 press roll mechanism
- 130A upper press roll
- 130B lower press roll
- 131A, 131B rotation axis
- 140A, 140B backup roll
- 25 150A, 150B feed roll
- 151A, 151B branch roll
- 200A first swing guide mechanism
- 200B second swing guide mechanism
- 210 motor
- 30 211 pivot
- 212 bracket
- 213 base plate
- 220, 220A arm member
- 221 base end portion

222 tip end portion



**CLAIMS**

[Claim 1]

An apparatus for manufacturing an absorbent article,  
5 the apparatus including a guide unit that has a feeding  
part configured to feed a elastic member and that is  
configured to guide the elastic member, the guide unit  
moving the feeding part alternately in a first direction  
and a second direction, so that the elastic member is  
10 brought into contact with a web being conveyed in a  
predetermined direction with a continuum of components  
constituting one portion of the absorbent article and is  
placed in a predetermined waveform, the first direction  
extending from a center portion of the web to a first end  
15 portion in a cross direction intersecting the predetermined  
direction, the second direction extending from the center  
portion to a second end portion opposite to the first end  
portion,

the apparatus comprising:

20 a speed controller configured to control a speed of  
the elastic member which is fed from the feeding part,  
wherein

the speed controller maintains the speed of the  
elastic member in a constant speed different from a  
25 conveyance velocity of the web being conveyed in the  
predetermined direction, and

in a plan view of the web, a distance between the  
feeding part and a nip point where the elastic member is  
brought into contact with the web becomes largest when the  
30 nip point goes beyond a position on the predetermined  
waveform where an angle between the predetermined direction  
and a tangent line to the predetermined waveform becomes  
largest.

## [Claim 2]

The apparatus for manufacturing an absorbent article according to claim 1, wherein

the feeding part is placed in a marginal position  
5 closer to the first end portion than a position on the tangent line to the predetermined waveform at the nip point when moving in the first direction,

the feeding part is placed in a marginal position closer to the second end portion than a position on the  
10 tangent line to the predetermined waveform at the nip point when moving in the second direction,

and, as the nip point moves from the position where the tangent line and the predetermined direction become parallel with each other to the position where the angle  
15 between the tangent line and the predetermined direction becomes largest, a distance between the position on the tangent line to the predetermined waveform at the nip point and the marginal position becomes gradually larger.

## 20 [Claim 3]

The apparatus for manufacturing an absorbent article according to claim 1, wherein

the feeding part is placed in a marginal position closer to the first end portion than a position on the  
25 tangent line to the predetermined waveform at the nip point when moving in the first direction,

the feeding part is placed in a marginal position closer to the second end portion than a position on the tangent line to the predetermined waveform at the nip point  
30 when moving in the second direction,

and, as the nip point moves from the position where the angle between the tangent line and the predetermined direction becomes largest to the position where the tangent line and the predetermined direction become parallel with

each other, a distance between the position on the tangent line to the predetermined waveform at the nip point and the marginal position becomes gradually smaller.

5 [Claim 4]

The apparatus for manufacturing an absorbent article according to claim 1, wherein

any one of cycles of amplitude of the elastic member in the first direction and the second direction on the web  
10 is shorter than the other one of the cycles of amplitude when the center line of the predetermined waveform in the cross direction is used as a reference, and

a moving center of the feeding part is displaced toward the shorter cycle of the amplitude with respect to  
15 the center line.

[Claim 5]

The apparatus for manufacturing an absorbent article according to claim 1, wherein a trajectory of the feeding  
20 part forms a curved line projected at least in the predetermined direction.

[Claim 6]

The apparatus for manufacturing an absorbent article according to claim 1, wherein the guide unit comprises:  
25

the feeding part configured to feed the elastic member to a predetermined position in the cross direction intersecting the predetermined direction on the web;

an arm member having the feeding part on an end  
30 portion thereof; and

a motor having a pivot provided in a base end portion of the arm member, the motor swinging the arm member in the cross direction at predetermined cycles.

## [Claim 7]

The apparatus for manufacturing an absorbent article according to claim 6, wherein a ratio  $W/L$  of the amplitude  $W$  of the elastic member in any one of the first direction  
5 and the second direction on the web to a length  $L$  of the arm member is 0.25 to 0.70.

## [Claim 8]

The apparatus for manufacturing an absorbent article  
10 according to claim 6, wherein

the guide unit includes a pair of a first guide unit and a second guide unit,

a waveform of the elastic member formed by the first guide unit is different from a waveform of the elastic  
15 member formed by the second guide unit, and

a length of the arm member provided in the first guide unit is different from a length of the arm member provided in the second guide unit.

## 20 [Claim 9]

The apparatus for manufacturing an absorbent article according to claim 1, wherein

the absorbent article is a wearing-type diaper, and a position on the predetermined waveform where the angle  
25 between the predetermined direction and the tangent line to the predetermined waveform becomes largest corresponds to an inguinal region in a leg-surrounding region of the diaper.

## 30 [Claim 10]

A method of manufacturing an absorbent article, comprising: using a guide unit that has a feeding part configured to feed a elastic member and that is configured to guide the elastic member; and thereby moving the feeding

part alternately in a first direction and a second direction, so that the elastic member is brought into contact with a web being conveyed in a predetermined direction with a continuum of components constituting one  
5 portion of the absorbent article and is placed in a predetermined waveform, the first direction extending from a center portion of the web to a first end portion in a cross direction intersecting the predetermined direction, the second direction extending from the center portion to a  
10 second end portion opposite to the first end portion, wherein

a speed of the elastic member which is fed from the feeding part is maintained in a constant speed different from a conveyance velocity of the web being conveyed in the  
15 predetermined direction, and

in a plan view of the web, a distance between the feeding part and a nip point where the elastic member is brought into contact with the web becomes largest when the nip point goes beyond a position on the predetermined  
20 waveform where an angle between the predetermined direction and a tangent line to the predetermined waveform becomes largest.

70

INGLES  
RESUMEN

ABSTRACT

The apparatus for manufacturing an absorbent article includes the arm member 220 having the tip end portion 222 feeding the elastic member 6a'. The tip end portion 222 moves alternately in a first direction and a second direction, so that the elastic member 6' is brought into contact with a web being conveyed in a predetermined direction with a continuum of components constituting one portion of the absorbent article 1 and is placed in a predetermined waveform. Here, in a plan view of the web 7, a distance between the arm member 220 and a nip point becomes largest when the nip point goes beyond a position on the predetermined waveform where an angle between the predetermined direction and a tangent line to the predetermined waveform becomes largest.







FIG. 3

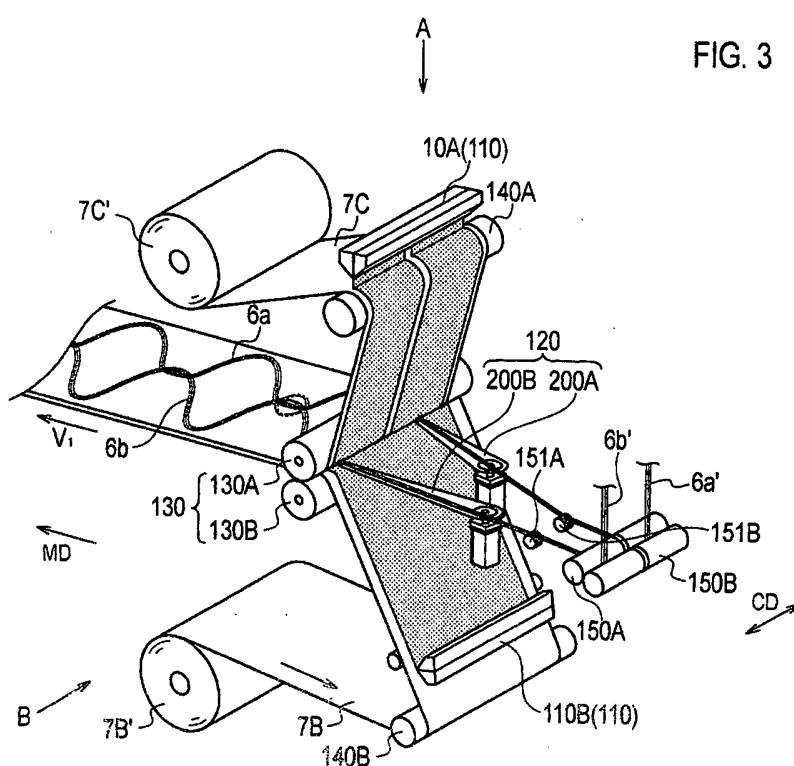


FIG. 4

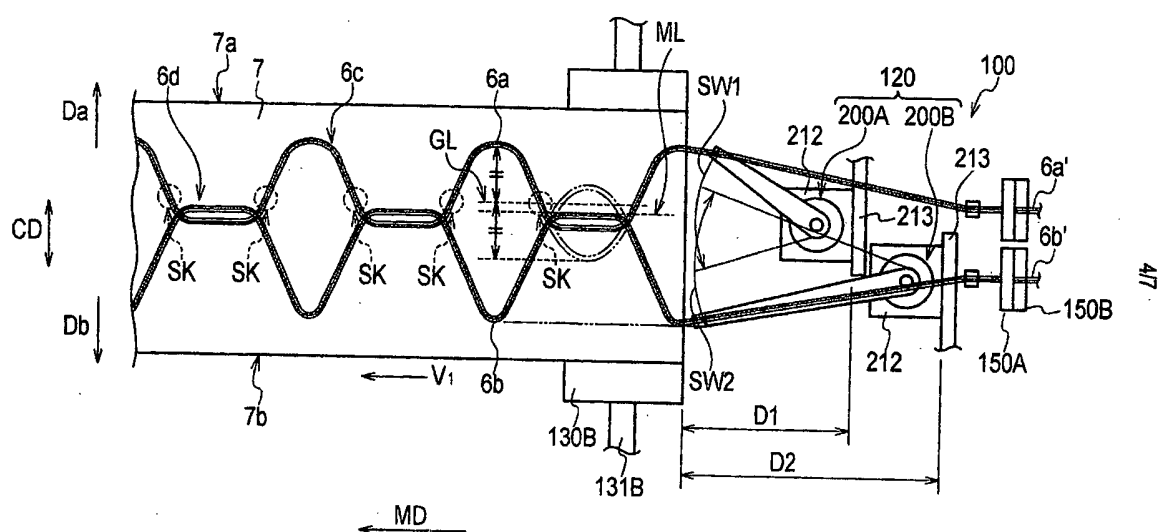
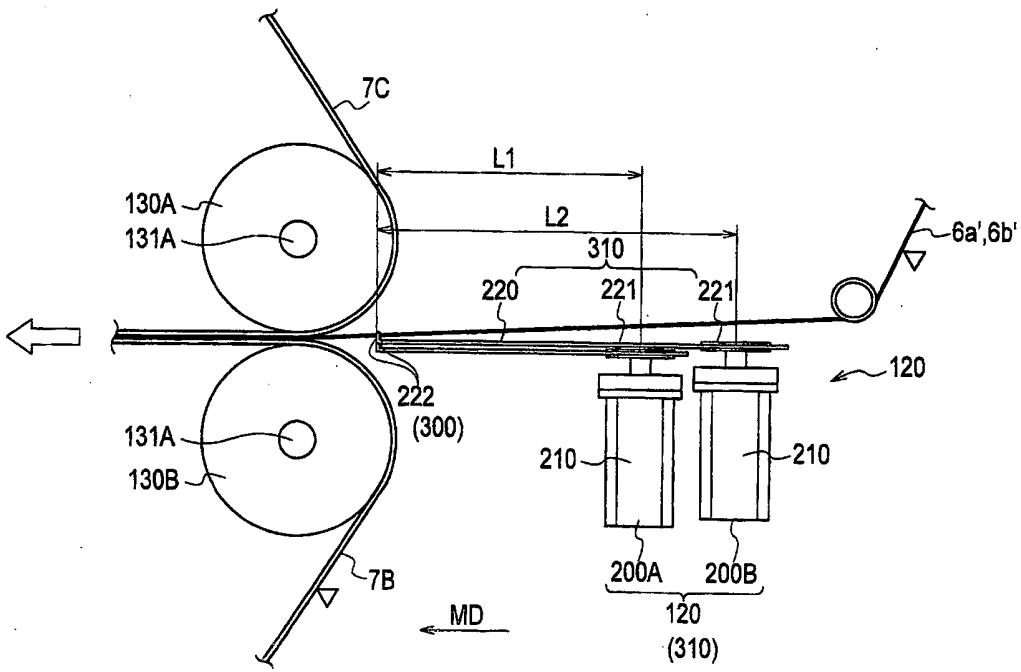


FIG. 5



6/7

FIG. 6

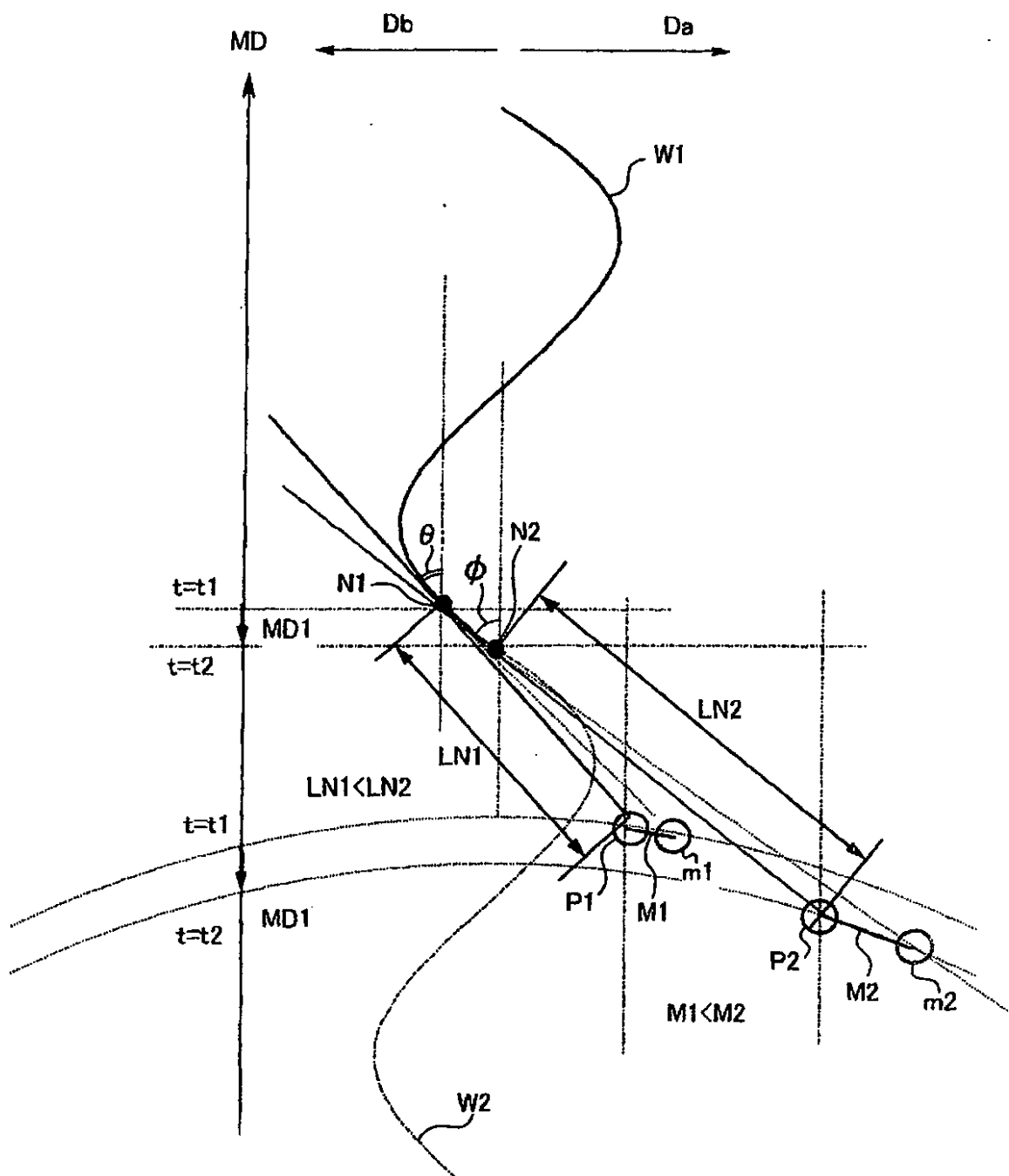
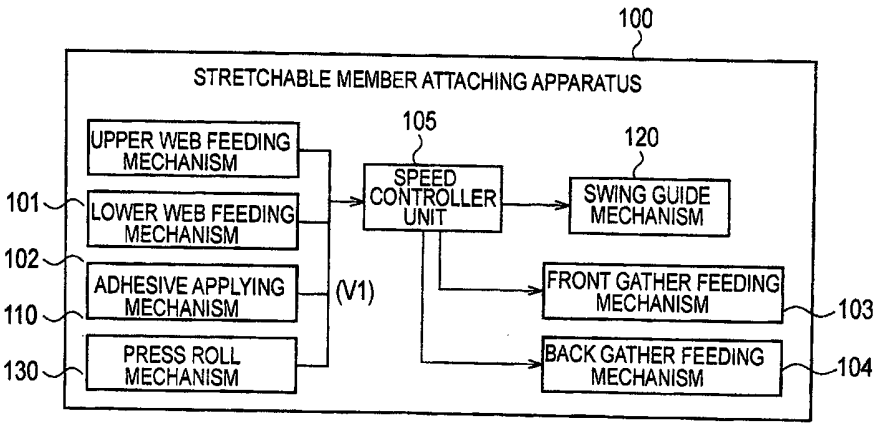


FIG. 7



7/7



## PATENT COOPERATION TREATY

From the  
INTERNATIONAL SEARCHING AUTHORITY

To:  
MIYOSHI, Hidekazu

Toranomon Kotohira  
Tower, 2-8, Toranomon  
1-chome, Minato-ku, Tokyo  
1050001 Japan

PCT

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY  
(PCT Rule 43*bis*.1)

Date of mailing  
(day/month/year) 20.07.2010

Applicant's or agent's file reference  
JUN-079-PCT

FOR FURTHER ACTION  
See paragraph 2 below

International application No.  
PCT/JP2010/053736

International filing date (day/month/year)  
02.03.2010

Priority date (day/month/year)  
02.03.2009

Int.Cl. A61F13/15 (2006.01) i, A61F13/49 (2006.01) i

Applicant  
UNICHARM CORPORATION

1. This opinion contains indications relating to the following items:

- |                                     |              |                                                                                                                                                                               |
|-------------------------------------|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input checked="" type="checkbox"/> | Box No. I    | Basis of the opinion                                                                                                                                                          |
| <input type="checkbox"/>            | Box No. II   | Priority                                                                                                                                                                      |
| <input type="checkbox"/>            | Box No. III  | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability                                                                              |
| <input type="checkbox"/>            | Box No. IV   | Lack of unity of invention                                                                                                                                                    |
| <input checked="" type="checkbox"/> | Box No. V    | Reasoned statement under Rule 43 <i>bis</i> .1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| <input checked="" type="checkbox"/> | Box No. VI   | Certain documents cited                                                                                                                                                       |
| <input type="checkbox"/>            | Box No. VII  | Certain defects in the international application                                                                                                                              |
| <input type="checkbox"/>            | Box No. VIII | Certain observations on the international application                                                                                                                         |

## 2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

|                                    |            |
|------------------------------------|------------|
| Date of completion of this opinion | 06.07.2010 |
|------------------------------------|------------|

Name and mailing address of the ISA/JP

Authorized officer

|    |      |
|----|------|
| 3B | 3938 |
|----|------|

Japan Patent Office

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Telephone No. +81-3-3581-1101 Ext. 3320

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/JP2010/053736

| Box No. I | Basis of this opinion                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.        | With regard to the <b>language</b> , this opinion has been established on the basis of:<br><input checked="" type="checkbox"/> the international application in the language in which it was filed.<br><input type="checkbox"/> a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).                                                                                                                                                           |
| 2.        | <input type="checkbox"/> This opinion has been established taking into account the <b>rectification of an obvious mistake</b> authorized by or notified to this Authority under Rule 91 (Rule 43 bis.1(b)).                                                                                                                                                                                                                                                                                                                                                                |
| 3.        | With regard to any <b>nucleotide and/or amino acid sequence</b> disclosed in the international application, this opinion has been established on the basis of a sequence listing filed or furnished:<br>a. (means)<br><input type="checkbox"/> on paper<br><input type="checkbox"/> in electronic form<br>b. (time)<br><input type="checkbox"/> in the international application as filed<br><input type="checkbox"/> together with the international application in electronic form<br><input type="checkbox"/> subsequently to this Authority for the purposes of search |
| 4.        | <input type="checkbox"/> In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.                                                                                                                                                                                                               |
| 5.        | Additional comments:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/JP2010/053736

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

|                               |        |      |     |
|-------------------------------|--------|------|-----|
| Novelty (N)                   | Claims | 1-10 | YES |
|                               | Claims |      | NO  |
| Inventive step (IS)           | Claims |      | YES |
|                               | Claims | 1-10 | NO  |
| Industrial applicability (IA) | Claims | 1-10 | YES |
|                               | Claims |      | NO  |

2. Citations and explanations:

D1: JP 2004-159866 A (UNI-CHARM CORPORATION) 2004.06.10  
& US 2006/0185135 A1 & EP 1563817 A1 & WO 2004/043318 A1  
D2: JP 6-502091 A (PEAUDOUCE) 1994.03.10  
& US 5779689 A & EP 554345 A1 & WO 92/007531 A1

The subject matters of independent claims 1 and 10 do not appear to involve an inventive step in view of the document 1 cited in the ISR and the document 2 cited in the same.

D1 discloses that a swing guide mechanism is a swing arm unit that includes an arm member which guides an elastic member, and that the elastic member is placed along a gather waveform (Paragraphs [ 0001] , [ 0016] -[ 0024] , Figs. 3-4). The technical feature "a distance between a feeding part and a nip point where the elastic member is brought into contact with a web becomes largest when the nip point goes beyond a position on the gather waveform becomes largest at an inflection point in the curved line showing the gather waveform" is virtually suggested by D1 considering the swing guide mechanism.

D2 discloses that the speed of elastic member is different from the conveyance velocity of the web, and that the desired elongation for the elastic member is obtained by appropriately adjusting the speed difference. Therefore, the skilled person in the art would easily conceive the idea of applying the feature in D2 to the invention disclosed in D1.

The subject matters of dependent claims 2-9 do not appear to involve an inventive step in view of the document 1 cited in the ISR and the document 2 cited in the same.

The features of the claims 2-3 are virtually suggested by D1 considering the swing guide mechanism.

D1 also discloses the features of the claims 5-6(Paragraph [ 0021] ).

D1 also discloses that the elastic members may be curved in an appropriate pattern or laid to cross one another, and that the length of the second arm may be different from the length of the first arm (Paragraphs [ 0015] , [ 0024] ). The constituent features specified claims 4, 7-9 are mere workshop modifications.

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/JP2010/053736

Box No. VI Certain documents cited

1. Certain published documents (Rules 43 bis.1 and 70.10)

| Application No.<br>Patent No. | Publication date<br>(day/month/year) | Filing date<br>(day/month/year) | Priority date (valid claim)<br>(day/month/year) |
|-------------------------------|--------------------------------------|---------------------------------|-------------------------------------------------|
| JP 2010-115282 A<br>「E, A」    | 27.05.2010                           | 11.11.2008                      |                                                 |
| JP 2010-115284 A<br>「E, A」    | 27.05.2010                           | 11.11.2008                      |                                                 |

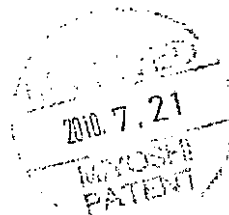
2. Non-written disclosures (Rules 43 bis.1 and 70.9)

| Kind of non-written disclosure | Date of non-written disclosure<br>(day/month/year) | Date of written disclosure<br>referring to non-written disclosure<br>(day/month/year) |
|--------------------------------|----------------------------------------------------|---------------------------------------------------------------------------------------|
|--------------------------------|----------------------------------------------------|---------------------------------------------------------------------------------------|

# PATENT COOPERATION TREATY PCT

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)



|                                                      |                                                         |                                                                     |
|------------------------------------------------------|---------------------------------------------------------|---------------------------------------------------------------------|
| Applicant's or agent's file reference<br>JUN-079-PCT | FOR FURTHER ACTION                                      | see Form PCT/ISA/220<br>as well as, where applicable, item 5 below. |
| International application No.<br>PCT/JP2010/053736   | International filing date(day/month/year)<br>02.03.2010 | (Earliest) Priority Date (day/month/year)<br>02.03.2009             |
| Applicant<br>UNICHARM CORPORATION                    |                                                         |                                                                     |

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 3 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

### 1. Basis of the report

a. With regard to the language, the international search was carried out on the basis of:

☒ the international application in the language in which it was filed.

☐ a translation of the international application into \_\_\_\_\_ which is the language of  
a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6bis(a)).

c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☐ Certain claims were found **unsearchable** (see Box No. II).

3. ☐ **Unity of invention is lacking** (see Box No. III).

4. With regard to the title,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the abstract,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the drawings,

a. the figure of the drawings to be published with the abstract is Figure No. 6

☒ as suggested by the applicant.

☐ as selected by this Authority, because the applicant failed to suggest a figure.

☐ as selected by this Authority, because this figure better characterizes the invention.

b. ☐ none of the figures is to be published with the abstract.

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2010/053736

| A. CLASSIFICATION OF SUBJECT MATTER                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                             |                                                    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|
| Int.Cl. A61F13/15 (2006.01) i, A61F13/49 (2006.01) i                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                             |                                                    |
| According to International Patent Classification (IPC) or to both national classification and IPC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                             |                                                    |
| B. FIELDS SEARCHED                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                             |                                                    |
| Minimum documentation searched (classification system followed by classification symbols)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                             |                                                    |
| Int.Cl. A61F13/15, A61F13/49                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                             |                                                    |
| Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched<br>Published examined utility model applications of Japan 1922-1996<br>Published unexamined utility model applications of Japan 1971-2010<br>Registered utility model specifications of Japan 1996-2010<br>Published registered utility model applications of Japan 1994-2010                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                             |                                                    |
| Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                             |                                                    |
| C. DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                             |                                                    |
| Category*                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Citation of document, with indication, where appropriate, of the relevant passages                                                                          | Relevant to claim No.                              |
| Y                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | JP 2004-159866 A (UNI-CHARM CORPORATION)<br>2004.06.10, Paragraphs [0014]-[0030] ; Figs. 1-7<br>& US 2006/0185135 A1 & EP 1563817 A1<br>& WO 2004/043318 A1 | 1-10                                               |
| Y                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | JP 6-502091 A (PEAUDOUCÉ) 1994.03.10,<br>page 5, lower left column<br>& US 5779689 A & EP 554345 A1 & WO 92/007531 A1                                       | 1-10                                               |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | JP 6-327716 A (JAPAN ABSORBENT TECHNOLOGY<br>INSTITUTE) 1994.11.29,<br>Paragraph [0029] & EP 626161 A1                                                      | 1-10                                               |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | JP 9-564 A (KAO CORPORATION) 1997.01.07,<br>Claims (No Family)                                                                                              | 1-10                                               |
| <input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                             |                                                    |
| * Special categories of cited documents:<br>"A" document defining the general state of the art which is not considered to be of particular relevance<br>"E" earlier application or patent but published on or after the international filing date<br>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)<br>"O" document referring to an oral disclosure, use, exhibition or other means<br>"P" document published prior to the international filing date but later than the priority date claimed<br>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention<br>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone<br>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art<br>"&" document member of the same patent family |                                                                                                                                                             |                                                    |
| Date of the actual completion of the international search                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                             | Date of mailing of the international search report |
| 06.07.2010                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                             | 20.07.2010                                         |
| Name and mailing address of the ISA/IP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                             | Authorized officer                                 |
| Japan Patent Office                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                             | Naoko Nakao                                        |
| 3-4-3, Kasumigaseki, Chiyoda-ku, Tokyo 100-8915, Japan                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                             | Telephone No. +81-3-3581-1101 Ext. 3320            |

INTERNATIONAL SEARCH REPORT

International application No.  
PCT/JP2010/053736

| C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT |                                                                                                                    |                       |
|-------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|-----------------------|
| Category*                                             | Citation of document, with indication, where appropriate, of the relevant passages                                 | Relevant to claim No. |
| E, A                                                  | JP 2010-115282 A (UNI-CHARM CORPORATION)<br>2010.05.27, Paragraphs [0011]-[0127]; Figs. 1-6<br>& WO 2010/055853 A1 | 1-10                  |
| E, A                                                  | JP 2010-115284 A (UNI-CHARM CORPORATION)<br>2010.05.27, Paragraphs [0050]-[0072]; Figs. 1-7<br>& WO 2010/055843    | 1-10                  |

## PATENT COOPERATION TREATY

WO 2010/101279  
PCT/JP2010/053736

From the INTERNATIONAL BUREAU

**PCT**

SECOND AND SUPPLEMENTARY NOTICE  
INFORMING THE APPLICANT OF THE  
COMMUNICATION OF THE INTERNATIONAL  
APPLICATION (TO DESIGNATED OFFICES  
WHICH APPLY THE 30 MONTH TIME  
LIMIT UNDER ARTICLE 22(1))

(PCT Rule 47.1(c))

To:

MIYOSHI, Hidekazu  
Toranomon Kotohira Tower, 2-8, Toranomon 1-chome,  
Minato-ku, Tokyo  
1050001  
JAPON

Date of mailing (day/month/year)

07 July 2011 (07.07.2011)

Applicant's or agent's file reference  
JUN-079-PCT**IMPORTANT NOTICE**

International application No.

PCT/JP2010/053736

International filing date (day/month/year)

02 March 2010 (02.03.2010)

Priority date (day/month/year)

02 March 2009 (02.03.2009)

Applicant

UNICHARM CORPORATION et al

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PCT

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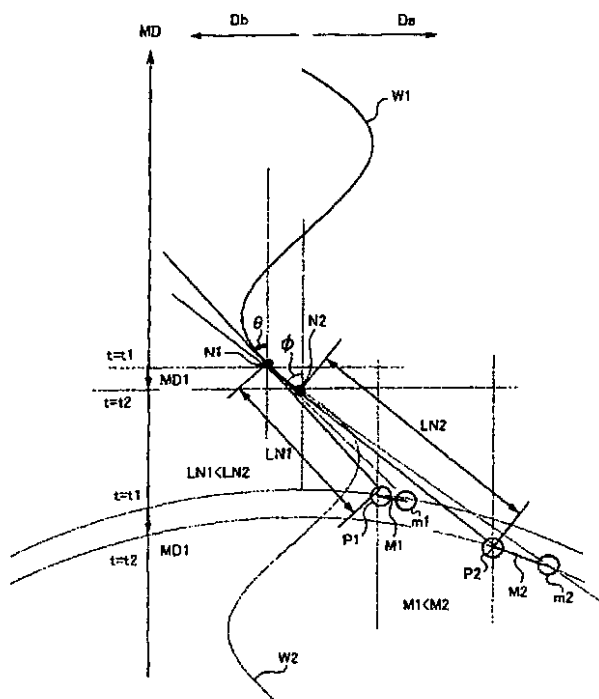
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(54) Title: APPARATUS AND METHOD FOR MANUFACTURING ABSORBENT ARTICLE

FIG. 6



(57) Abstract: The apparatus for manufacturing an absorbent article includes the arm member 220 having the tip end portion 222 feeding the elastic member 6a'. The tip end portion 222 moves alternately in a first direction and a second direction, so that the elastic member 6a' is brought into contact with a web being conveyed in a predetermined direction with a continuum of components constituting one portion of the absorbent article 1 and is placed in a predetermined waveform. Here, in a plan view of the web 7, a distance between the arm member 220 and a nip point becomes largest when the nip point goes beyond a position on the predetermined waveform where an angle between the predetermined direction and a tangent line to the predetermined waveform becomes largest.

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**DESCRIPTION****Title of Invention**

APPARATUS AND METHOD FOR MANUFACTURING ABSORBENT ARTICLE

5

**Technical Field**

The present disclosure relates to an apparatus and a method of manufacturing an absorbent article in which a guide unit configured to guide an elastic member is used to place the elastic member on a web being conveyed in a predetermined direction with a continuum of components constituting one portion of an absorbent article.

10

**Background Art**

In the conventional process of manufacturing absorbent articles, such as disposable diapers, widely used is a method in which string-like elastic members (rubber) are arranged in portions to be processed into leg-surrounding regions and a crotch region which constitute an absorbent article so that the leg-surrounding regions and the crotch region should be more fitted to a person to wear the absorbent article (for example, a human body).

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Specifically, in the manufacturing process, the string-like elastic members are placed in waveforms on a web with continua of components such as a back sheet and an absorption sheet to form absorbent articles. In other words, the string-like elastic members are placed in waveforms on the web conveyed by a crosswise conveyor

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system in which absorbent articles to be formed are arranged with a longitudinal direction of each of the absorbent articles going in a cross direction (a CD direction) which intersects a conveyance direction (an MD direction) of the web. In this way, the absorbent article  
5 having gathers to be fitted to the shapes of the leg-surrounding regions and the crotch region can be continuously formed.

As described above, as a method for placing string-like elastic members in waveforms on a web being conveyed,  
10 there is known a method in which a guide member guiding feeding positions of elastic members onto a web is driven by a cam (see Patent Literature 1, for example).

There is also known a method in which a guide member  
15 guiding feeding positions of elastic members onto a web is reciprocally moved in a cross direction intersecting a conveyance direction of the web (see Patent Literature 2, for example).

It is not realistic in terms of the layout of an  
20 apparatus to bring a guide member into contact with a nip point to align the nip point with the feeding position of a elastic member guided by the guide member. Here, the nip point is that at which an elastic member and a web are held between press rollers provided above and below the  
25 web and thereby come in contact with each other. For this reason, a certain distance is generally provided between the nip point and the feeding position. In other words, the distance has to be considered when the profile of a device moving the guide member is designed.

The inventors have discovered that, in the known technique, the aforementioned conventional apparatus for manufacturing an absorbent article has the following problem.

5           Specifically, to place an elastic member accurately in a desired position on a web being conveyed at high speed, the profile of a device such as a cam has to be elaborately designed in consideration of a distance between a nip point and a feeding position.

10           The present invention has been made in view of the foregoing circumstances. Accordingly, an object of the present invention is to provide an apparatus and a method of manufacturing an absorbent article that are capable of placing a elastic member in a desired position on a web  
15 being conveyed at high speed without elaborate profile designing.

#### Citation List

#### 20 Patent Literature

PTL 1: Japanese Patent Application Publication No. Hei 3-33201 (p. 4, Figs. 6 and 7)

PTL 2: Japanese Patent Application Publication No. 2006-141642 (p. 10, Fig. 1)

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#### Summary

To solve the above-described problem, the present invention has the following aspects.

In a aspect of the present invention provides an

apparatus for manufacturing an absorbent article, the apparatus including a guide unit that has a feeding part configured to feed a elastic member and that is configured to guide the elastic member, the guide unit moving the feeding part alternately in a first direction and a second direction, so that the elastic member is brought into contact with a web being conveyed in a predetermined direction with a continuum of components constituting one portion of the absorbent article and is placed in a predetermined waveform, the first direction extending from a center portion of the web to a first end portion in a cross direction intersecting the predetermined direction, the second direction extending from the center portion to a second end portion opposite to the first end portion, the apparatus comprising a speed controller configured to control a speed of the elastic member which is fed from the feeding part, wherein the speed controller maintains the speed of the elastic member in a constant speed different from a conveyance velocity of the web being conveyed in the predetermined direction, and in a plan view of the web, a distance between the feeding part and a nip point where the elastic member is brought into contact with the web becomes largest when the nip point goes beyond a position on the predetermined waveform where an angle between the predetermined direction and a tangent line to the predetermined waveform becomes largest.

According to the aspect of the present invention, there can be provided an apparatus and a method of manufacturing an absorbent article that are capable of

easily placing a elastic member in a desired position on a web being conveyed at high speed along a predetermined waveform.

#### 5 Brief Description of Drawings

[Fig. 1] Fig. 1 is a perspective view showing an absorbent article according to one or more embodiments.

[Fig. 2] Fig. 2 is a view for illustrating part of a method of manufacturing an absorbent article according to one or more embodiments.

[Fig. 3] Fig. 3 is a perspective view showing an elastic member attaching apparatus according to one or more embodiments.

[Fig. 4] Fig. 4 is a top view (a view on arrow A in Fig. 3) showing the elastic member attaching apparatus according to one or more embodiments.

[Fig. 5] Fig. 5 is a side view (a view on arrow B in Fig. 3) showing the elastic member attaching apparatus according to one or more embodiments.

[Fig. 6] Fig. 6 is a schematic view showing how a front leg gather is placed in the top view (the view on arrow A in Fig. 3) shown in Fig. 4.

[Fig. 7] Fig. 7 is a block diagram showing the configuration of the elastic member attaching apparatus according to one or more embodiments.

#### Detailed Description

Hereinafter, a conveyor and a method of manufacturing an absorbent article according to the

present invention will be described with reference to the accompanying drawings.

Note that, in the following description of the drawings, same reference signs denote same elements and portions. In addition, it should be noted that the drawings are schematic and are not to scale unless otherwise specified.

Therefore, specific dimensions and the like should be determined by taking the following description into consideration. Moreover, the drawings do not necessarily reflect the real-life dimensional relationships and ratios of components.

In the first place, a configuration of an absorbent article according to an embodiment will be explained with reference to the drawing. Fig. 1 is a perspective view showing the absorbent article 1 according to one or more embodiments. In the particularly illustrated embodiment, the absorbent article 1 is a disposable pants-type diaper for adults.

As shown in Fig. 1, the absorbent article 1 substantially includes a liquid-permeable top sheet 2, a back sheet 3, and an absorber 4.

The top sheet 2 is to come in contact with the skin of a person to wear the absorbent article 1 (hereinafter, called a "wearer"). The back sheet 3 is provided outside the top sheet 2. The absorber 4 is provided between the top sheet 2 and the back sheet 3, and absorbs excretion from the wearer.

Note that a liquid-impermeable waterproof sheet

(unillustrated) is provided between the back sheet 3 and the absorber 4. In other words, the absorber 4 is provided between the top sheet 2 and the waterproof sheet.

The top sheet 2 is made of a nonwoven fabric or a perforated plastic film. The back sheet 3 is made of a nonwoven fabric. The absorber 4 is made of, for example, ground pulp or a mixture of ground pulp and superabsorbent polymer particles. The waterproof sheet is made of, for example, a plastic, a nonwoven fabric, or a mixed sheet of a plastic film and a nonwoven fabric.

The absorbent article 1 has a front waistline region 10 to be fitted to the front waist of a wearer, a back waistline region 20 to be fitted to the back waist of the wearer, and a crotch region 30 to be fitted to the crotch of the wearer.

The front waistline region 10 and the back waistline region 20 are joined together by joint portions 40. Waist gathers 5 made of a stretchable string-like rubber or the like are provided to an entire peripheral edge of the front waistline region 10 and the back waistline region 20. The waist gathers 5 include a front waist gather 5a which is positioned in the front waistline region 10 and a back waist gather 5b which is positioned in the back waistline region 20. In addition, a waist opening region 50 is formed between the front waist gather 5a and the back waist gather 5b.

The front waistline region 10 and the back waistline region 20 are stretchable in the conveyance direction MD (the MD direction) of a first web 7A constituting the top

sheet 2 and a second web 7B constituting the back surface sheet 3 (see Fig. 2). For example, to make the front waistline region 10 and the back waistline region 20 stretchable in the conveyance direction MD, the front  
5 waistline region 10 and the back waistline region 20 may be provided with the waist gathers 5 or may themselves be made of a stretchable sheet from the beginning.

The crotch region 30 is provided between the front waistline region 10 and the back waistline region 20. Leg  
10 gathers 6 made of a stretchable string-like rubber or the like are provided on both sides of the crotch region 30. Each of the leg gathers 6 includes a front leg gather 6a positioned close to the front waistline region 10 and a back leg gather 6b positioned close to the back waistline  
15 region 20. A leg-surrounding openings 60 is formed between the front leg gather 6a and the back leg gather 6b and on each side of the crotch regions 30.

The crotch region 30 is stretchable in the cross direction CD (the CD direction) intersecting the  
20 conveyance direction MD of the web. For example, to make the crotch region 30 stretchable in the cross direction CD, the crotch region 30 may be provided with the leg gather 6, or may itself be made of a stretchable sheet from the beginning.

25 In Fig. 1, regions Sk show portions to be fitted to the inguinal regions of the wearer when the wearer wears the diaper. The details of a method for placing the front leg gather 6a in the region Sk will be described later.

Secondly, a configuration of a method of

manufacturing an absorbent article according to this embodiment will be explained with reference to the drawing. Fig. 2 is a diagram for explaining part of the method of manufacturing an absorbent article according to this  
5 embodiment.

As shown in Fig. 2, the method of manufacturing an absorbent article includes at least a component placing step, a leg-surrounding forming step, a folding step, a joining step and a cutting step.

10 Note that, between each two of the steps, performed is a conveying step using an unillustrated conveyor (e.g. a belt conveyor) of conveying the liquid-permeable first web 7A, the liquid-impermeable second web 7B, and a third web 7C in the conveyance direction MD (a predetermined  
15 direction). The liquid-permeable first web 7A constitutes the top sheet 2, the liquid-impermeable second web 7B constitutes the back sheet 3, and a third web 7C is made of, for example, the same material as that of the second web 7B and constitutes the back sheet 3.

20 In the component placing step S1, components to constitute the absorbent article 1, such as the elastic member, the third web 7C, the waterproof sheet (unillustrated), and the absorber 4, are placed on the second web 7B.

25 Specifically, in the first place, elastic members 5' constituting the waist gathers 5 are linearly placed in a stretched state in portions corresponding to the front waistline region 10 and the back waistline region 20 on the second web 7B. In other words, a elastic member 5a'

constituting the front waist gather 5a and an elastic member 5b' constituting the back waist gather 5b are placed in portions corresponding to the front waistline region 10 and the back waistline region 20 on the second web 7B. Accordingly, the waist gathers 5 (the front waist gather 5a and the back waist gather 5b) are formed in the portions corresponding to the front waistline region 10 and the back waistline region 20 on the second web 7B.

Secondly, the third web 7C is placed on the second web 7B. At the same time, in portions corresponding to the crotch regions 30 on the second web 7B and the third web 7C, the elastic members 6' constituting the leg gathers 6 are placed in a stretched state while swinging in the cross direction CD at predetermined cycles. After that, the elastic members 6' are held between the second web 7B and the third web 7C to form the leg gathers 6 (the front leg gather 6a and the back leg gather 6b).

Note that the second web 7B and the third web 7C holding the elastic members 6' therebetween are pressed by an upper press roll 130A and a lower press roll 130B.

The elastic member 6a' constituting the front leg gather 6a and the elastic member 6b' constituting the back leg gather 6b form a large ring portion 6c and a small ring portion 6d whose size in the cross direction CD is smaller than the large ring portion 6c.

As described above, the elastic members 6' are placed between the second web 7B and the third web 7C, and then the second web 7B and the third web 7C are pressed by the upper press roll 130A and the lower press roll 130B.

If the position where the small ring portion 6d is supposed to be formed is not pressed, the elastic members 6' are not fixed in predetermined positions on the web. The elastic members 6' are placed in a stretched state, and thus are contracted to form substantially straight lines shifted from the predetermined forms placed, on the web in positions where the elastic members 6' are not fixed. In this manner, the small ring portion 6d is formed.

Similarly, this is applicable to the case where an adhesive is not applied to the predetermined positions. Specifically, the elastic members 6' are not fixed on the web in positions where an adhesive is not supposed to be applied, so that a small ring portion 6d is similarly formed.

Thirdly, the waterproof sheet (unillustrated) and the absorber 4 are placed on the second web 7B and the third web 7C holding the elastic members 6' therebetween so as to be arranged in the conveyance direction MD at regular intervals. Note that the waterproof sheet may be placed on the second web 7B and the third web 7C with the absorber 4 being joined therewith in advance or may be placed on the second web 7B and the third web 7C with the absorber 4 being separated therefrom.

Fourthly, the first web 7A constituting the top sheet 2 is placed on the second web 7B and the third web 7C on which the components constituting the absorbent article 1 are placed.

Note that, in the component placing step S1, the

order from first to fourth is not necessarily required and may be changed as needed.

In the leg-surrounding forming step S2, leg-surrounding openings 60 (so-called leg holes) are formed after the component placing step S1 by cutting, along the internal circumference of the large ring portion 6c, the second web 7B and the first web 7A (hereinafter referred to as a composite web 7) which hold the components therebetween.

In the folding step S3, the composite web 7 is folded into two parts, after the leg-surrounding forming step S2, along the center line CL extending in the conveyance direction MD through the center of the cross direction CD of the composite web 7. In other words, a side edge 10A of the composite web 7 which corresponds to the front waistline region 10 and a side edge 20A of the composite web 7 which corresponds to the back waistline region 20 are placed one upon another in a state of matching each other.

In the joining step S4 after the folding step S3, the two folded parts of the web 7 are joined together through ultrasonic treatment or heat treatment at predetermined regions 40A corresponding to the joint portions 40 of the absorbent article 1. The predetermined region 40A is a region on both sides, in the conveyance direction MD, of a phantom line SL indicating a to-be-cut position extending in the cross direction CD of the web.

In the cutting step S5, the composite web 7 with the two folded parts joined at the predetermined regions 40A

is cut along the phantom lines SL after the joining step S4. Thereby, the absorbent article 1 is manufactured.

Hereinafter, the configuration of a elastic member attaching apparatus (an apparatus for manufacturing an absorbent article) used in the above-described component attaching step is described with reference to the drawings. Fig. 3 is a perspective view showing the elastic member attaching apparatus according to the embodiment. Fig. 4 is a top view (a view on arrow A in Fig. 3) showing the elastic member attaching apparatus according to the embodiment. Fig. 5 is a side view (a view on arrow B in Fig. 3) showing the elastic member attaching apparatus according to the embodiment.

As shown in Figs. 3 to 5, the elastic member attaching apparatus 100 places the elastic members 6' constituting the leg gathers 6 between the second web 7B and the third web 7C by causing the elastic members 6' to swing in the cross direction CD at predetermined cycles. In other words, the elastic member attaching apparatus 100 places the elastic members 6' in a curved state between the second web 7B and the third web 7C, so that the leg gathers 6 (the front leg gather 6a and the back leg gather 6b) are formed.

Fig. 7 is a block diagram for illustrating the configuration of the elastic member attaching apparatus 100. The elastic member attaching apparatus 100 at least includes upper web feeding mechanism 101 and lower web feeding mechanism 102 (unillustrated in Fig. 3 and see Fig. 7), gather feeding mechanisms 103 and 104 (unillustrated

in Fig. 3 and see Fig. 7), an applying mechanism 110, a swing guide mechanism 120 (a guide arm unit), and a press roll mechanism 130.

The web feeding mechanisms continuously feeds the  
5 webs respectively from web rolls. Specifically, the web feeding mechanisms include an upper web feeding mechanism 101 continuously feeding the third web 7C from a third web roll 7C' and a lower web feeding mechanism 102 continuously feeding the second web 7B from a second web  
10 roll 7B'.

The upper web feeding mechanism 101 and the lower web feeding mechanism 102 continuously feed the second web 7B and the third web 7C toward the press roll mechanism 130 respectively through rollers 140A and 140B rotating  
15 about a rotation axis (unillustrated) in the cross direction CD.

The gather feeding mechanisms continuously feed the elastic members 6' constituting the leg gathers 6 respectively from web rolls. Specifically, the gather  
20 feeding mechanisms include a front gather feeding mechanism 103 continuously feeding the elastic member 6a' constituting the front leg gather 6a from the corresponding web roll (unillustrated) and a back gather feeding mechanism 104 continuously feeding the elastic  
25 member 6b' constituting the back leg gather 6b from the corresponding web roll (unillustrated).

The front gather feeding mechanism 103 and the back gather feeding mechanism 104 continuously feed the leg gathers 6 toward the press roll mechanism 130 respectively

through feed rolls 150A and 150B which rotate about the rotation axis in the cross direction CD and through branch rolls 151A and 151B which respectively separate the elastic member 6a' and the elastic member 6b' into strings.

5       As shown in Fig. 7, the elastic member attaching apparatus 100 has a speed controller 105 configured to control a speed of feeding the front leg gather 6a from the front gather feeding mechanism 103 and a speed of feeding the back leg gather 6b from the back gather feeding mechanism 104. The speed controller 105 maintains the speed of feeding the elastic member 6a' constituting the front leg gather 6a and being fed from the front gather feeding mechanism 103 in a constant speed different from a conveyance velocity (V1) of the web. Also, the speed controller maintains the speed of feeding the elastic member 6b' constituting the back leg gather 6b and being fed from the back gather feeding mechanism 104 in a constant speed different from the conveyance velocity (V1) of the web.

20       Specifically, the speed controller 105 maintains the speeds of feeding the elastic members 6a' and 6b' in a constant speed lower than the conveyance velocity (V1) of the web. Also, the speed controller 105 controls a servomotor (to be described later) in the swing guide mechanism 120.

The adhesive applying mechanism 110 is a spraying device applying an adhesive (e.g. a hot melt adhesive) onto the web. Specifically, the adhesive applying mechanism 110 has an upper adhesive applying mechanism

110A applying an adhesive onto the third web 7C and a lower adhesive applying mechanism 110B applying an adhesive onto the second web 7B.

Note that the upper adhesive applying mechanism 110A  
5 applies an adhesive onto a surface of the third web 7C other than the center portion thereof. In contrast, the lower adhesive applying mechanism 110B applies an adhesive onto an entire surface of the second web 7B.

The swing guide mechanism 120 causes the elastic  
10 members 6' constituting the leg gathers 6 to swing at predetermined cycles in the cross direction CD. The swing guide mechanism 120 has a first swing guide mechanism 200A causing the elastic member 6a' constituting the front leg gather 6a to swing and a second swing guide member 200B  
15 causing the elastic member 6b' constituting the back leg gather 6b to swing. The detail of the swing guide mechanism 120 will be given later.

The press roll mechanism 130 presses the second web 7B and the third web 7C with the elastic members 6' being  
20 held between the second web 7B and the third web 7C. Specifically, the press roll mechanism 130 has an upper press roll 130A coming in contact with the third web 7C and a lower press roll 130B coming in contact with the second web 7B.

25 The upper press roll 130A rotates about a rotation axis 131A along the cross direction CD. Similarly, the lower press roll 130B rotates about a rotation axis 130B in the cross direction CD. The elastic members 6' are guided by the swing guide mechanism 120 to a position

125

where the upper press roll 130A and the lower press roll 130B are closest to each other.

Hereinafter, the configuration of the swing guide mechanism 120 which is characteristic to the present  
5 invention is described with reference to Figs. 3 to 5.

The first swing guide mechanism 200A and the second swing guide mechanism 200B have basically the same configuration except the lengths of arm members 220. This is described later. For this reason, the first swing  
10 guide mechanism 200A and the second swing guide mechanism 200B are collectively described as the swing guide mechanism 120.

As shown in Figs. 3 to 5, the swing guide mechanism 120 includes a motor 210 having a pivot 211, an arm member  
15 220 which guides the elastic member 6' to a predetermined position in the cross direction CD between the second web 7B and the third web 7C, the pivot 211, and a base end portion 221 of the arm member 220.

The motor 210 includes a servomotor which provides a  
20 predetermined extent of a stretching magnification to the elastic member 6' according to the conveyance velocity (V1) of the web and which is operated by a controller programmed to be capable of placing the elastic member 6' in a desired layout.

25 Note that a program to operate the motor 210 of the first swing guide mechanism 200A is different from a program to operate the motor 210 of the second swing guide mechanism 200B. In other words, the predetermined stretching magnification and layout in the front leg

gather 6a are different from those of the back leg gather 6b.

The motor 210 is attached to a base plate 213 through a bracket 212 (see Fig. 4). The motor 210 is  
5 configured so that the position thereof on the base plate 213 may be movable in the cross direction CD as needed. Note that a distance D1 is different from a distance D2, where the distance D1 is a distance between the press roll mechanism 130 and the base plate 213 on which the motor  
10 210 of the first swing guide mechanism 200A is attached, and the distance D2 is a distance between the press roll mechanism 130 and the base plate 213 on which the motor 210 of the second swing guide mechanism 200B is attached.

The arm member 220 has a plate shape which is  
15 gradually tapered from the base end portion 211 toward a tip end portion 222. It is preferable that the arm member 220 be horizontally placed (see Fig. 5).

The arm member 220 is made of a metal steel plate. For example, the arm member 220 is made of a stainless  
20 steel plate.

The tip end portion 222 of the arm member 220 is bent toward the side opposite to the side where the motor 210 is positioned with respect to the arm member 220. The tip end portion 222 of the arm member 220 has an insertion  
25 hole 223 into which the leg gather 6 is inserted.

In the present embodiment, the arm members 220 of the first swing guide mechanism 200A and the second swing guide mechanism 200B are different in length. The length L1 of the arm member 220 of the first swing guide

mechanism 200A is larger than the length L2 of the arm member 220 of the second swing guide mechanism 200B.

Meanwhile, the distances from the tip end portions 222 of the first swing guide mechanism 200A and the second swing guide mechanism 200B to the press roll mechanism 130 are equal to each other. Therefore, the relationship between the distance D1 and the distance D2 can be expressed by  $D2 > D1$ .

For example, the length L1 of the arm member 220 of the first swing guide mechanism 200A is 450 mm (see Figs. 5 and 6). On the other hand, the length L2 of the arm member 220 of the second swing guide mechanism 200B is 600 mm (see Figs. 5 and 6).

Note that the length of the arm member 220 means herein a length from the tip end portion 222 of the arm member 220 to the pivot 211 of the arm member 220.

A weight of the arm member 220 of the first swing guide mechanism 200A is 300 g, while a weight of the arm member 220 of the second swing guide mechanism 200B is 400 g.

An amplitude SW1 of the tip end portion 222 of the first swing guide mechanism 200A in the cross direction CD is 200 mm (see Fig. 4). On the other hand, an amplitude SW2 of the tip end portion 222 of the arm member 220 of the second swing guide mechanism 200B in the cross direction CD is 350 mm (see Fig. 4).

Hereinafter, the operation of the elastic member attaching apparatus 100 according to the embodiment is described with reference to Figs. 3 to 5.

The upper web feeding mechanism feeds the third web 3C from a third web roll 7C', and the roller 140A changes the moving direction of the web. The upper adhesive applying mechanism 110A applies an adhesive onto the surface, facing the second web 7B, of the third web 7C whose moving direction is changed. At this time, the upper adhesive applying mechanism 110A applies the adhesive onto the surface of the third web 7C except the center portion thereof. The third web 7C onto which the adhesive is applied is supplied between the upper press roll 130A and the lower press roll 130B from above.

Similarly, the lower web feeding mechanism feeds the second web 7B from the second web roll 7B', and the roller 140B changes the moving direction of the web. The lower adhesive applying mechanism 110B applies the adhesive onto the surface, facing the third web 7C, of the second web 7B whose moving direction is changed. The second web 7B onto which the adhesive is applied is supplied between the upper press roll 130A and the lower press roll 130B from below.

The front gather feeding mechanism feeds the elastic member 6a' from the web roll (unillustrated), and the feed roll 150A turns the moving direction of the elastic member. The branch roll 151A separates into strings the elastic member 6a' turned by the feed roll 150A. The first swinging guide mechanism 200A causes the strings of the elastic member 6a' to swing at predetermined cycles in the cross direction CD. Accordingly, the elastic member 6a' is placed in a curved state between the second web 7B and

the third web 7C, so that the front leg gather 6a is formed.

Similarly, the back gather feeding mechanism feeds the elastic member 6b' from the web roll (unillustrated), and the feed roll 150B turns the moving direction of the elastic member 6b'. The branch roll 151B separates into strings the elastic member 6b' which is turned by the feed roll 150B. The second swinging guide mechanism 200B causes the strings of the elastic member 7b' to swing at predetermined cycles in the cross direction CD.

Accordingly, the elastic member 6b' is placed in a curved state between the second web 7B and the third web 7C, so that the back leg gather 6b is formed.

The upper press roll 130A and the lower press roll 130B press the second web 7B and the third web 7C, onto which the adhesive is applied, with the elastic members 6a' and 6b' being held between the second web 7B and the third web 7C. For this reason, the elastic members 6a' and 6b' are bonded between the second web 7B and the third web 7C in a state where the elastic members 6a' and 6b' are swung by the swing guide mechanism 120. Consequently, the large ring portion 6c is formed. On the other hand, even though the elastic members 6a' and 6b' are placed between the second web 7B and third web 7C, the elastic members 6a' and 6b' generate restoring force to form the small ring portion 6d because the adhesive is not applied to the center portion of the third web 7C.

The operation of the swing guide mechanism 120 is described in detail with reference to Figs. 4 and 6. The

first swing guide mechanism 200A and the second swing guide mechanism 200B are similarly controlled. Thus, the description is given by using the first swing guide mechanism 200A and the elastic member 6a' which is placed  
5 by the first swing guide mechanism 200A.

In Fig. 4, the swing guide mechanism 120 has the tip end portion 222 from which the elastic member 6a' is fed. The tip end portion 222 is alternately moved by the arm member 220 guiding the elastic member 6a' in a first  
10 direction Da extending from the center portion of the second web 7B (the third web 7C) being conveyed in the conveyance direction MD to a first end portion 7a in the cross direction CD and a second direction Db extending from the center portion of the second web 7B (the third  
15 web 7C) to a second end portion 7b opposite to the first end portion. In doing so, the elastic member 6a' is brought into contact with the second web 7B and the third web 7C in a way to be therebetween to form a gather waveform (a predetermined waveform).

20 In Fig. 4, the center line GL shows the center line of the gather waveform in the cross direction CD. In the embodiment, the cycle of the amplitude of the elastic member 6a' in the second direction Db on the web is shorter than that in the first direction Da when the  
25 center line GL is used as a reference.

The moving center ML of the tip end portion 222 is displaced toward the shorter cycle of amplitude, i.e. the second direction Db with respect to the center line GL.

In the embodiment, the tip end portion 222

constitutes a feeding part 300 and the swing guide mechanism 120 constitutes a guide unit 310. Also, the conveyance direction MD is a predetermined direction.

Fig. 6 is a schematic view for illustrating the elastic member 6a' which is placed on the web and the operation of the tip end portion 222 which places the elastic member 6a', in the top view (the view on arrow A in Fig. 3) shown in Fig. 4. The waveform shown in Fig. 6 shows the waveform of the elastic member 6a' placed between the second web 7B and the third web 7C, and also corresponds to the gather waveform of the front leg gather 6a shown in Fig. 4. The solid line portion W1 shows the waveform of the elastic member 6a' which have been already placed between the second web 7B and the third web 7C. The dashed line portion W2 shows the position at which the elastic member 6a' is supposed to be placed.

In the embodiment, in the plan view of the composite web 7, a nip point N1 is the position where the elastic member 6a' is brought into contact with the second web 7B and the third web 7C at time t1. The tip end portion 222 is at least in the feeding position P1 on a tangent line at the nip point N1. At this time, a distance between the tip end portion 222 (i.e. the feeding position P1) and the nip point N1 is expressed by a feeding distance LN1.

In general, when the tip end portion 222 is placed in the feeding position P1 on the tangent line to the gather waveform at the nip point N1, the elastic member 6a' can be placed along the gather waveform. However, in the embodiment, when the tip end portion 222 moves in the

first direction Da, the tip end portion 222 is placed in a marginal position m1 which is positioned closer to the first end portion 7a than the feeding position P1 on the tangent line to the gather waveform at the nip point N1.

5 Similarly, when the tip end portion 222 moves in the second direction Db, the tip end portion 222 is placed in a marginal position m2 which is positioned closer to the second end portion 7b than a feeding position (unillustrated) on a tangent line to the gather waveform  
10 at a nip point.

In Fig. 6, a nip point N2 is a position where the elastic member 6a' is brought into contact with the second web 7B and the third web 7C at time t2. The nip point moves in the conveyance direction MD by a distance MD1  
15 from the position at time t1. Note that the direction shown by arrow MD1 shows the moving direction of the nip point and the tip end portion 222 (the feeding position) with respect to the second web 7B and the third web 7C. The tip end portion 222 is at least in the feeding  
20 position P2 on the tangent line to the gather waveform at the nip point N2.

At this time, an angle  $\phi$  between the tangent line to the gather waveform at the nip point N2 and the conveyance direction MD becomes largest. In other words, the nip  
25 point N2 corresponds to an inflection point in the curved line showing the gather waveform. In the embodiment, when the nip point goes beyond the position where the angle between the conveyance direction MD and the tangent line to the gather waveform becomes largest (i.e. the nip point

N2), a distance (a feeding distance LN2) between the tip end portion 222 and the nip point becomes largest.

In other words, when the nip point goes beyond the position where the angle between the conveyance direction MD and the tangent line to the gather waveform becomes  
5 largest (i.e. the nip point N2), the feeding distance LN2 is larger than the feeding distance LN1.

When moving in the first direction Da, the tip end portion 222 is placed in the marginal position m2 which is  
10 positioned closer to the first end portion 7a than the feeding position P2 on the tangent line to the gather waveform at the nip point N2. Similarly, when moving in the second direction Db, the tip end portion 222 is placed in the marginal position m1 which is positioned closer to  
15 the second end portion 7b than the feeding position (unillustrated) on the tangent line to the gather waveform at the nip point.

Moreover, in the embodiment, as the nip point moves from the position where the nip point is in a position  
20 where the tangent line to the gather waveform at the nip point and the conveyance direction MD becomes parallel with each other to the position where the angle between the tangent line and the conveyance direction MD becomes largest, a distance M between the position on the tangent  
25 line at the nip point and the marginal position becomes gradually larger. In other words, in Fig. 6, the marginal distance M1 is smaller than the marginal distance M2.

In contrast, as the nip point moves from the position where the angle between the tangent line to the

gather waveform at the nip point and the conveyance direction MD becomes largest to the position where the tangent line and the conveyance direction MD are parallel with each other, the distance M between the position on  
5 the tangent line to the gather waveform at the nip point and the marginal position becomes gradually smaller (unillustrated).

In the embodiment, it is preferable that the trajectory of the moving tip end portion 222 be a curved  
10 line projected at least in the conveyance direction MD. Specifically, in the embodiment, the tip end portion 222 is placed in the arm having the pivot in a predetermined position with respect to the web (the gather waveform). In other words, the tip end portion depicts a circular-arc  
15 trajectory intersecting the conveyance direction MD.

Specifically, in the embodiment, the swing guide mechanism 120 is a so-called swing arm unit that includes the motor 210 having the pivot 211, the arm member 220 which guides the elastic member 6a' to a predetermined  
20 position in the cross direction CD between the second web 7B and the third web 7C, the pivot 211, and a base end portion 221 of the arm member 220.

The tip end portion 222 feeding the elastic member 6a' is provided on the tip end of the arm member 220. The  
25 arm member 220 is coupled to the motor 210 having the pivot 211. Accordingly, the feeding position P1 and the marginal position m1 at which the tip end portion 222 is positioned are placed on the arc taking the length of the arm member 220 as a radius of a circle centering the pivot

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211 at time t1. Similarly, the feeding position P2 and the marginal position m2 are placed on the arc taking the length of the arm member 220 as a radius of a circle centering the pivot 211 at time t2.

5 In the present embodiment, as shown in Fig. 4, the cycle of the amplitude of the elastic member 6a' toward the second end portion 7b on the web is shorter than that toward the first end portion 7a on the web when the center line L in the cross direction CD of the gather waveform is  
10 used as a reference. Moreover, the moving center of the tip end portion 222 is displaced from the center line L to the curved portion of the shorter cycle of the amplitude.

Furthermore, it is preferable that a ratio W/L of the amplitude W of the elastic member 6a' in the first  
15 direction Da or the second direction Db on the composite web 7 to the length L of the arm member 220 be 0.25 to 0.70.

Also, in the embodiment, the waveform of the elastic member placed by the first swing guide mechanism 200A and  
20 the waveform of the elastic member placed by the second swing guide mechanism 200B are different from each other. Furthermore, the length of the arm member 220 provided in the first swing guide mechanism 200A and the length of the arm member 220 provided in the second swing guide  
25 mechanism 200B are different from each other.

As described above, in the embodiment, the absorbent article 1 is a wearing-type diaper, and portions of the gather waveform at which the angle between the conveyance direction MD and the tangent line to the gather waveform

is largest correspond to the inguinal regions in the leg-surrounding regions of the diaper.

Specifically, as shown in Fig. 4, the gather waveform of the elastic member 6a' placed by the first  
5 swing guide mechanism 200A corresponds to the waveform of the front leg gather 6a. Each of the regions Sk shown in Fig. 4 is a portion where the angle between the conveyance direction MD and the tangent line to the gather waveform is largest and is fitted to the inguinal region of the  
10 wearer when the wearer wears the diaper.

According to the elastic member attaching apparatus 100, in the plan view of the composite web 7, the distance (the feeding distance) between the tip end portion 222 and the nip point in the cross direction CD becomes larger  
15 when the nip point goes beyond the position where the angle between the conveyance direction MD and the tangent line to the gather waveform becomes largest.

In other words, the tip end portions 222 is placed in a further position in the plan view of the composite  
20 web 7 when the nip point goes beyond the position where the angle between the conveyance direction MD and the tangent to the gather waveform becomes largest. The elastic member 6a' is stretched by the tip end portion 222 further than a predetermined position, and then, while  
25 contracting, comes close to the web and touches the web, thereby being easily placed in the gather waveform.

Thus, according to the elastic member attaching apparatus 100, the string-like elastic member 6a' can be easily placed along the predetermined gather waveform in a

desired position on the web being conveyed at high speed without elaborate profile designing.

In general, when a elastic member is placed in a gather waveform on a web, it is not realistic in terms of device layout to bring a feeding position of a elastic member into contact with a nip point to align the nip point with the feeding position of a elastic member. Here, the nip point is that at which a elastic member and a web come in contact with each other. For this reason, a certain distance is provided between the nip point and the feeding position of the elastic member 6a'.

When the elastic member is to be accurately placed along the gather waveform, it is only needed that the feeding position of the elastic member 6 is at least placed on an extension of the tangent line to the gather waveform at the nip point.

In addition, if the distance from the feeding position of the elastic member to the nip point is large, a range within which the elastic member can be placed along the gather waveform is wide even though the feeding position is not accurately placed on the tangent line to the gather waveform at the nip point of the gather waveform.

In the plan view of the composite web 7, the elastic member attaching apparatus 100 can have a wider tolerance when the nip point goes beyond the position where the angle between the conveyance direction MD and the tangent line to the gather waveform becomes largest. The reason is that the distance between the feeding position of the

elastic member and the nip point becomes larger.

Thus, according to the elastic member attaching apparatus 100, the string-like elastic member 6a' can be easily placed along the predetermined gather waveform in a  
5 desired position on the web being conveyed at high speed without elaborate profile designing.

In the elastic member attaching apparatus 100, when the tip end portion 222 which is the feeding position of the elastic member 6a' is moving in the first direction Da,  
10 the tip end portion 222 is placed in the marginal position m1 closer to the first end portion 7a than the tangent line to the gather waveform at the nip point of the gather waveform. Also, when the tip end portion 222 is moving in the second direction Db, the tip end portion 222 is placed  
15 in the marginal position closer to the second end portion 7b than the tangent line to the gather waveform at the nip point of the gather waveform.

Furthermore, as the nip point moves from the position where the tangent line and the conveyance  
20 direction MD becomes parallel with each other to the position where the angle between the tangent line and the conveyance direction MD becomes largest, the distance M between the position on the tangent line to the gather waveform at the nip point and the marginal position m1  
25 becomes gradually larger. In contrast, as the nip point moves from the position where the angle between the tangent line and the conveyance direction MD becomes largest to the position where the tangent line and the conveyance direction MD becomes parallel with each other,

the distance between the position on the tangent line to the gather waveform at the nip point and the marginal position m1 becomes gradually shorter.

As described above, in the elastic member attaching apparatus 100, the distance from the feeding position of the elastic member 6a' to the nip point can be larger in a vicinity of the position where the angle between the tangent line and the conveyance direction MD becomes largest. Accordingly, the elastic member attaching apparatus 100 can have a wider tolerance.

Thus, according to the elastic member attaching apparatus 100, the string-like elastic member 6a' can be easily placed along the predetermined gather waveform in a desired position on the web being conveyed at high speed without elaborate profile designing.

In the elastic member attaching apparatus 100, the cycle of the amplitude of the elastic member 6a' in the second direction Db on the web is shorter than that in the first direction Da when the center line GL in the cross direction CD of the gather waveform (the predetermined waveform) is used as a reference. In addition, the moving center ML of the tip end portion 222 is displaced from the center line GL toward the shorter cycle of amplitude, i.e. the second direction Db.

With this configuration, the difference between the moving distances of the tip end portion 222 in the first direction Da and the second direction Db can be reduced. As a result, the feeding position of the elastic member 6a' can follow the gather waveform more accurately.

In the embodiment, the trajectory of the moving tip end portion 222 is at least a curved line projected in the conveyance direction MD, so that the tip end portion 222 provided on the tip end of the arm member 220 moves on the curved line projected in the conveyance direction MD. For this reason, a difference is caused in the distance between the tip end portion 222 and the nip point not only in the cross direction CD but also in the conveyance direction MD. Thus, the distance from the feeding position of the elastic member 6a' to the nip point (the feeding distance) can be lengthened in the conveyance direction MD, so that the tolerance can be further widened.

Thus, the string-like elastic member 6a' can be easily placed along the predetermined gather waveform in a desired position on the web being conveyed at high speed without elaborate profile designing.

In the embodiment, the swing guide mechanism 120 has the motor 210 having the pivot 211, the arm member 220 which guides the elastic member 6' to a predetermined position in the cross direction CD between the second web 7B and the third web 7C, the pivot 211, and a base end portion 221 of the arm member 220.

As described above, when the arm member 220 rotates, the tip end portion 222 provided on the tip end of the arm member 220 depicts the circular-arc trajectory. For this reason, on the both sides of the circular-arc, a difference is caused in the distance between the feeding position and the nip point not only in the cross direction CD but also in the conveyance direction MD. Thus, the

distance from the feeding position of the elastic member 6a' to the nip point (the feeding distance) can be lengthened in the conveyance direction MD, so that the tolerance can be further widened.

5        Accordingly, the string-like elastic member 6a' can be easily placed along the predetermined gather waveform in a desired position on the web being conveyed at high speed without elaborate profile designing.

10        In the embodiment, a value of the distance from the feeding position to the nip point (the feeding distance) can be properly set by setting the ratio  $W/L$  of the amplitude  $W$  of the elastic member in the first direction  $Da$  or the second direction  $Db$  on the web to the length  $L$  of the arm member 220 to be 0.25 to 0.70. Thus, the  
15        elastic member 6a' can be placed along the gather waveform without elaborate profile designing.

20        In the embodiment, the swing guide mechanism 120 includes a pair of the first swing guide mechanism 200A and the second swing guide mechanism 200B. The waveform of the elastic member 6a' formed by the first swing guide mechanism 200A is different from the waveform of the elastic member 6a' formed by the second swing guide mechanism 200B. In addition, the length of the arm member provided in the first swing guide mechanism 200A is  
25        different from the length of the arm member provided in the second swing guide mechanism 200B.

With this configuration, elastic members can be placed along different gather waveforms on one web conveyed in the conveyance direction MD at a conveyance

velocity  $V_1$ .

In the embodiment, the absorbent article 1 is a wearing-type diaper, and portions of the gather waveform at which the angle between the conveyance direction MD and the tangent line to the gather waveform becomes largest correspond to the inguinal regions in the leg-surrounding regions of the diaper. Whether or not the absorbent article 1 is comfortably fitted to the wearer is determined by the regions corresponding to the inguinal regions of the diaper. Thus, the regions are the most important portions.

The elastic member attaching apparatus 100 can extend the distance from the feeding position to the nip point when the elastic member 6a' is placed at the position where the angle between the tangent line and the conveyance direction MD becomes largest, i.e. the regions Sk corresponding to the inguinal regions. Thus, the tolerance can be widened.

Accordingly, the elastic member 6a' can be accurately placed at the position corresponding to the inguinal region which requires the highest precision, without elaborate profile designing.

Moreover, as shown in Fig. 7, in the elastic member attaching apparatus 100, the speed controller 105 maintains the feeding speed of the elastic member 6a' constituting the front leg gather 6a which is fed from the front gather feeding mechanism 103 and the feeding speed of the elastic member 6b' constituting the back leg-gather 6b which is fed from the back gather feeding mechanism 104

in a constant speed different from the conveyance velocity (V1) of the web.

With this configuration, the elastic members 6a' and 6b' are placed between the second web 7B and the third web 7C and are pressed by the press roll mechanism 130. At this time, the elastic members 6a' and 6b' are under tensile stress caused by the difference between the conveyance velocity and the feeding speed.

Provided that the feeding speed is constant, as the difference between the feeding distances LN1 and LN2 is larger, the difference between the tensile stress of the elastic member in the feeding position P1 and the tensile stress of the elastic member in the feeding position P2 becomes larger. When there is a difference in the tensile stress by position, the absorbent article is prevented from being comfortably fitted to the wearer.

The swing guide mechanism 120 is a swinging arm unit. As the distance between any point on the trajectory of the swinging tip end portion 222 and the nip point (N1 or N2) is larger, the difference between the feeding distances which is attributable to the positional difference of the tip end portion 222 on the trajectory (i.e. the difference between the feeding distances L1 and L2) becomes smaller.

Accordingly, it is preferable that the distance between any point on the trajectory of the swinging tip end portion 222 and the nip point (N1 or N2) be large. Accordingly to the elastic member attaching apparatus 100, the distance between the nip point (N1 or N2) and the feeding position of the elastic member 6a' or 6b' (i.e.

the tip end portion 222) can be lengthened.

Accordingly, the elastic member 6a' constituting the front leg gather 6a and the elastic member 6b' constituting the back leg gather 6b can be placed between the second web 7B and the third web 7C with the tensile stress of the elastic members 6a' and 6b' being less changeable.

As described above, the details of the present invention have been disclosed through the embodiment of the present invention. It should not be understood that the description and drawings which constitute part of this disclosure limit the present invention. Based on this disclosure, those skilled in the art may easily come up with various alternative embodiments, examples and operation techniques.

For example, the embodiment of the present invention can be modified as follows. Specifically, the method of manufacturing an absorbent article and the elastic member attaching apparatus are applicable not only to an absorbent article 1 (or a so-called disposable diaper) including a front waistline region 10, a back waistline region 20, a crotch region 30 and the like, but also to various articles including disposable gowns for medical use and disposable wears for sports.

In addition, the description has been given of the case where the elastic member as a component constituting the absorbent article 1 is a stretchable string-like rubber or the like. However, the elastic member is not limited to this and may be a rubber such as a flat rubber

or a sheet-like rubber.

Also, the elastic member is not necessarily a rubber and may be a recoverable or stretchable fabric such as polyester or polyurethane or another stretchable fabric  
5 other than these fabrics. Moreover, these fabrics may be twisted together to be used as the elastic member.

In addition, the description has been given of the case where the lengths of the arm members 220 of the first swing guide mechanism 200A and the second swing guide  
10 mechanism 200B are different from each other. However, the present invention is not limited to this configuration and the lengths may be equal.

In the embodiment, the first swing guide mechanism 200A and the second swing guide mechanism 200B are  
15 designed to have the arm members 220 whose movable areas partially overlap with each other. However, the arm members 220 may be arranged in a way that the movable areas of the arm members 220 do not overlap with each other. The distance between the first swing guide  
20 mechanism 200A and the second swing guide mechanism 200B in the width direction of the web is adjustable as needed according to the shapes of the absorbent article (or a disposable diaper). For example, the front leg gather 6a and the back leg gather 6b may be conveyed with a  
25 predetermined distance therebetween being kept.

In addition, the description has been given of the case where the program operating the motor 210 of the first swing guide mechanism 200A is different from the program operating the motor 210 of the second swing guide

mechanism 200B. However, the present invention is not limited to this configuration, and these programs may be equal. In other words, the predetermined stretching magnification and layout of the front leg gather 6b may be  
5 equal to those of the back leg gather 6b.

Furthermore, the description has been given of the case where the tip end portion 222 of the arm member 220 has the insertion hole 223 into which the leg gather 6 is inserted. However, the present invention is not limited  
10 to this configuration, and is only needed to be designed to guide the leg gather 6. For example, a U-letter shape groove may be formed in the arm member 220.

In the embodiment, the description has been given of the case where the swing guide mechanism 120 includes the  
15 motor 210 having the pivot 211, the arm member 220 guiding the elastic member 6' to a predetermined position in the cross direction CD between the second web 7B and the third web 7C, the pivot 211, and the base end portion 221 of the arm member 220. However, the present invention is not  
20 limited to the configuration in which the arm member 220 swings about the pivot 211.

For example, the present invention may have a mechanism in which a guide unit having the feeding position of the elastic member 6a' is movable within the  
25 range regulated by a circular-arc slide rail, a circular-arc rib, a circular-arc cam groove, a cam follower, or the like. In this case, the examples of applicable driving means include a timing belt, a link, and a circular-arc linear servo.

As described above, the present invention naturally includes various embodiments which are not described herein. Accordingly, the technical scope of the present invention should be determined only by the matters to  
5 define the invention in the scope of claims regarded as appropriate based on the description.

The entire content of Japanese Patent Application 2009-048652 (filed on March 2, 2009) is incorporated herein by reference.

10

#### **Industrial Applicability**

Therefore, according to the present invention, it is possible to provide an apparatus and a method of manufacturing an absorbent article that are capable of  
15 placing a elastic member in a desired position on a web being conveyed at high speed without elaborate profile designing.

#### **Reference Signs List**

- 20 1 absorbent article  
2 top sheet  
3 back sheet  
4 absorber  
5 waist gather  
25 5a front waist gather  
5b back waist gather  
5', 5a', 5b' elastic member  
6 leg gather  
6a front leg gather

40

- 6b back leg gather
- 6c large ring portion
- 6d small ring portion
- 6', 6a', 6b' elastic member
- 5 7 composite web
- 7A first web
- 7B second web
- 7B' second web roll
- 7C third web
- 10 7C' third web roll
- 10 front waistline region
- 10A side edge
- 20 back waistline region
- 20A side edge
- 15 30 crotch region
- 40 joint portion
- 40A predetermined region
- 50 waist opening region
- 60 leg-surrounding openings
- 20 100 elastic member attaching apparatus
- 101 upper web feeding mechanism
- 102 lower web feeding mechanism
- 103 front gather feeding mechanism
- 104 back gather feeding mechanism
- 25 105 speed controller
- 110 adhesive applying mechanism
- 110A upper adhesive applying mechanism
- 110B lower adhesive applying mechanism
- 120, 120A swing guide mechanism (guide arm unit)

- 130 press roll mechanism
- 130A upper press roll
- 130B lower press roll
- 131A, 131B rotation axis
- 5 140A, 140B backup roll
- 150A, 150B feed roll
- 151A, 151B branch roll
- 200A first swing guide mechanism
- 200B second swing guide mechanism
- 10 210 motor
- 211 pivot
- 212 bracket
- 213 base plate
- 220, 220A arm member
- 15 221 base end portion
- 222 tip end portion

## CLAIMS

[Claim 1]

An apparatus for manufacturing an absorbent article,  
5 the apparatus including a guide unit that has a feeding  
part configured to feed an elastic member and that is  
configured to guide the elastic member, the guide unit  
moving the feeding part alternately in a first direction  
and a second direction, so that the elastic member is  
10 brought into contact with a web being conveyed in a  
predetermined direction with a continuum of components  
constituting one portion of the absorbent article and is  
placed in a predetermined waveform, the first direction  
extending from a center portion of the web to a first end  
15 portion in a cross direction intersecting the  
predetermined direction, the second direction extending  
from the center portion to a second end portion opposite  
to the first end portion,

the apparatus comprising:

20 a speed controller configured to control a speed of  
the elastic member which is fed from the feeding part,  
wherein

the speed controller maintains the speed of the  
elastic member in a constant speed different from a  
25 conveyance velocity of the web being conveyed in the  
predetermined direction, and

in a plan view of the web, a distance between the  
feeding part and a nip point where the elastic member is  
brought into contact with the web becomes largest when the

nip point goes beyond a position on the predetermined waveform where an angle between the predetermined direction and a tangent line to the predetermined waveform becomes largest.

5

[Claim 2]

The apparatus for manufacturing an absorbent article according to claim 1, wherein

the feeding part is placed in a marginal position  
10 closer to the first end portion than a position on the tangent line to the predetermined waveform at the nip point when moving in the first direction,

the feeding part is placed in a marginal position  
closer to the second end portion than a position on the  
15 tangent line to the predetermined waveform at the nip point when moving in the second direction,

and, as the nip point moves from the position where the tangent line and the predetermined direction become parallel with each other to the position where the angle  
20 between the tangent line and the predetermined direction becomes largest, a distance between the position on the tangent line to the predetermined waveform at the nip point and the marginal position becomes gradually larger.

25 [Claim 3]

The apparatus for manufacturing an absorbent article according to claim 1, wherein

the feeding part is placed in a marginal position closer to the first end portion than a position on the

tangent line to the predetermined waveform at the nip point when moving in the first direction,

the feeding part is placed in a marginal position closer to the second end portion than a position on the  
5 tangent line to the predetermined waveform at the nip point when moving in the second direction,

and, as the nip point moves from the position where the angle between the tangent line and the predetermined direction becomes largest to the position where the  
10 tangent line and the predetermined direction become parallel with each other, a distance between the position on the tangent line to the predetermined waveform at the nip point and the marginal position becomes gradually smaller.

15

[Claim 4]

The apparatus for manufacturing an absorbent article according to claim 1, wherein

any one of cycles of amplitude of the elastic member  
20 in the first direction and the second direction on the web is shorter than the other one of the cycles of amplitude when the center line of the predetermined waveform in the cross direction is used as a reference, and

a moving center of the feeding part is displaced  
25 toward the shorter cycle of the amplitude with respect to the center line.

[Claim 5]

The apparatus for manufacturing an absorbent article

according to claim 1, wherein a trajectory of the feeding part forms a curved line projected at least in the predetermined direction.

5 [Claim 6]

The apparatus for manufacturing an absorbent article according to claim 1, wherein the guide unit comprises:

the feeding part configured to feed the elastic member to a predetermined position in the cross direction  
10 intersecting the predetermined direction on the web;

an arm member having the feeding part on an end portion thereof; and

a motor having a pivot provided in a base end portion of the arm member, the motor swinging the arm  
15 member in the cross direction at predetermined cycles.

[Claim 7]

The apparatus for manufacturing an absorbent article according to claim 6, wherein a ratio W/L of the amplitude  
20 W of the elastic member in any one of the first direction and the second direction on the web to a length L of the arm member is 0.25 to 0.70.

[Claim 8]

25 The apparatus for manufacturing an absorbent article according to claim 6, wherein

the guide unit includes a pair of a first guide unit and a second guide unit,

a waveform of the elastic member formed by the first

guide unit is different from a waveform of the elastic member formed by the second guide unit, and

a length of the arm member provided in the first guide unit is different from a length of the arm member  
5 provided in the second guide unit.

[Claim 9]

The apparatus for manufacturing an absorbent article according to claim 1, wherein

10 the absorbent article is a wearing-type diaper, and  
a position on the predetermined waveform where the angle between the predetermined direction and the tangent line to the predetermined waveform becomes largest corresponds to an inguinal region in a leg-surrounding  
15 region of the diaper.

[Claim 10]

A method of manufacturing an absorbent article, comprising: using a guide unit that has a feeding part  
20 configured to feed a elastic member and that is configured to guide the elastic member; and thereby moving the feeding part alternately in a first direction and a second direction, so that the elastic member is brought into contact with a web being conveyed in a predetermined  
25 direction with a continuum of components constituting one portion of the absorbent article and is placed in a predetermined waveform, the first direction extending from a center portion of the web to a first end portion in a cross direction intersecting the predetermined direction,

the second direction extending from the center portion to a second end portion opposite to the first end portion, wherein

5 a speed of the elastic member which is fed from the feeding part is maintained in a constant speed different from a conveyance velocity of the web being conveyed in the predetermined direction, and

10 in a plan view of the web, a distance between the feeding part and a nip point where the elastic member is brought into contact with the web becomes largest when the nip point goes beyond a position on the predetermined waveform where an angle between the predetermined direction and a tangent line to the predetermined waveform becomes largest.

FIG. 1

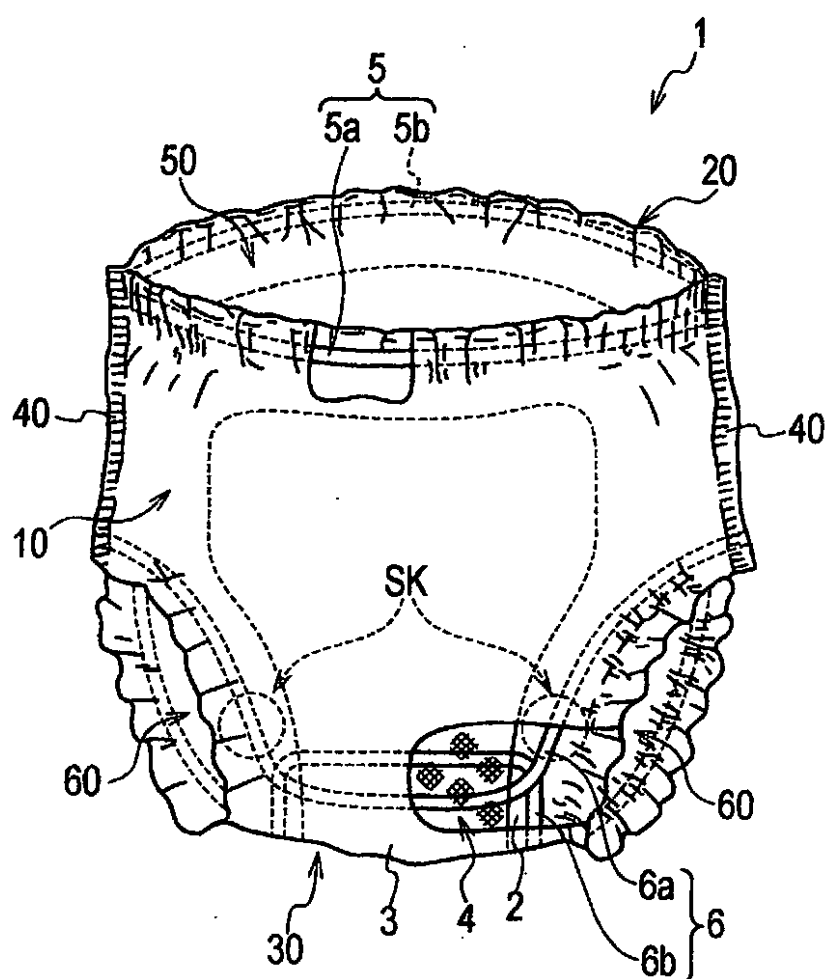




FIG. 3

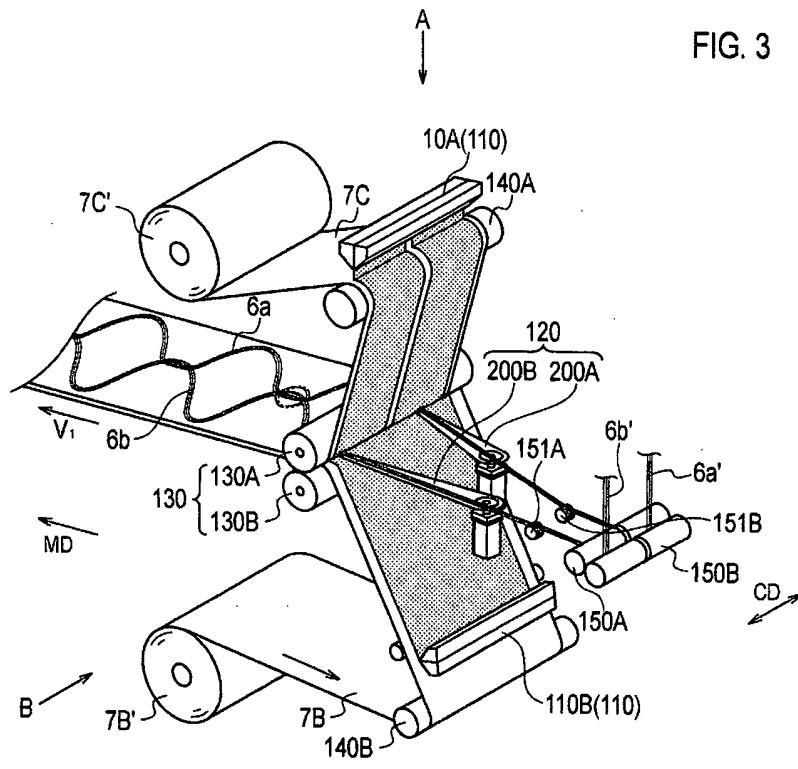


FIG. 4

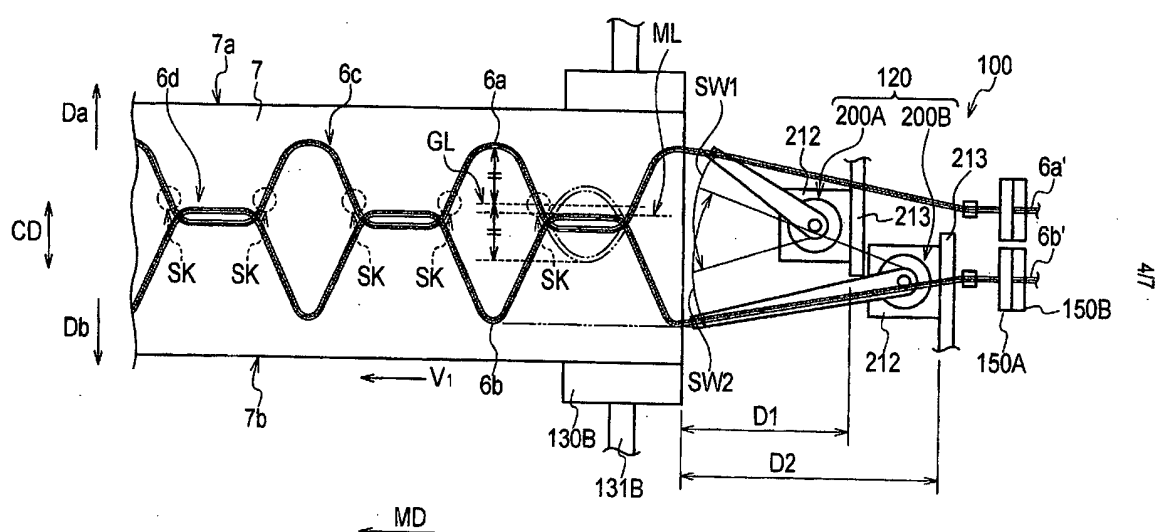
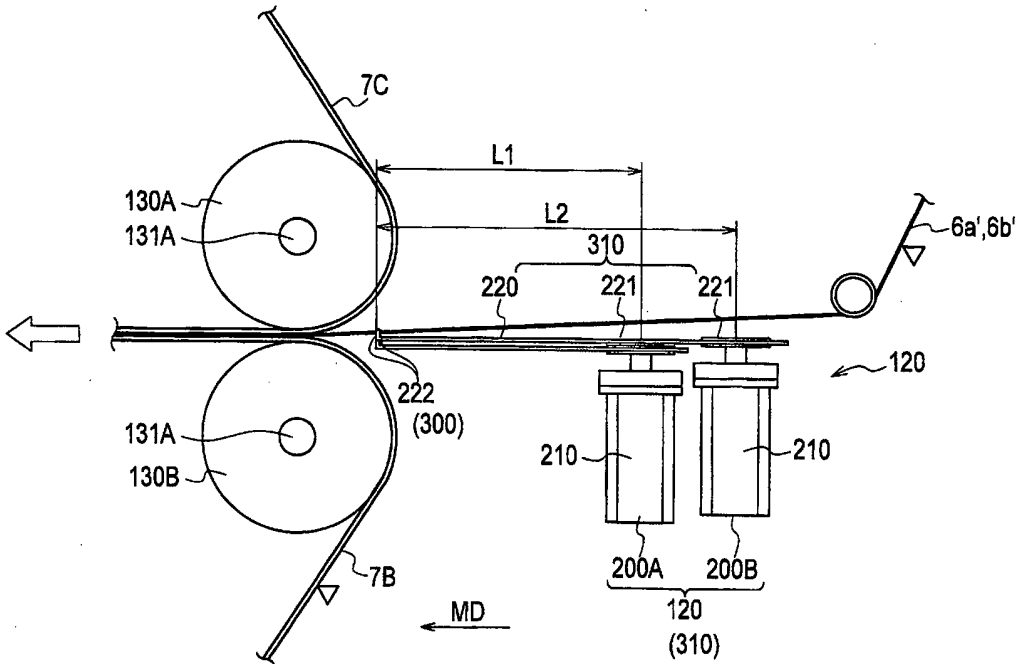


FIG. 5



6/7

FIG. 6

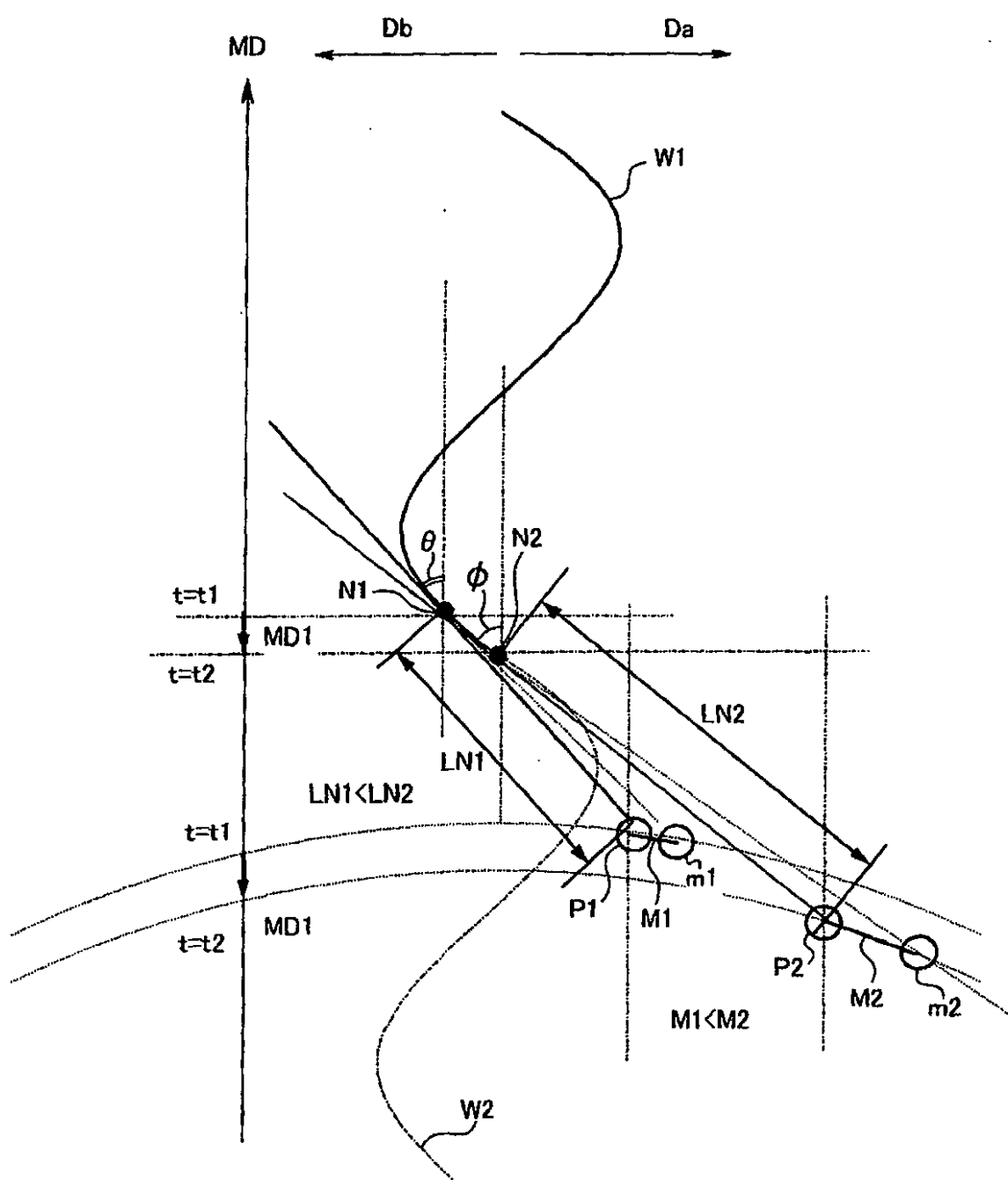
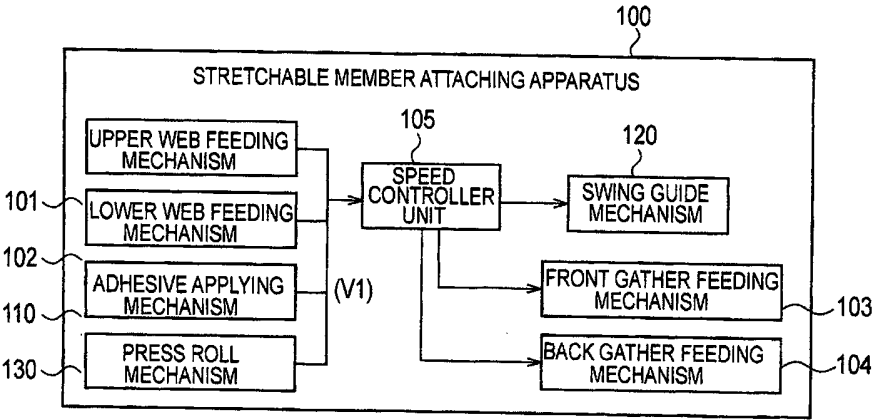
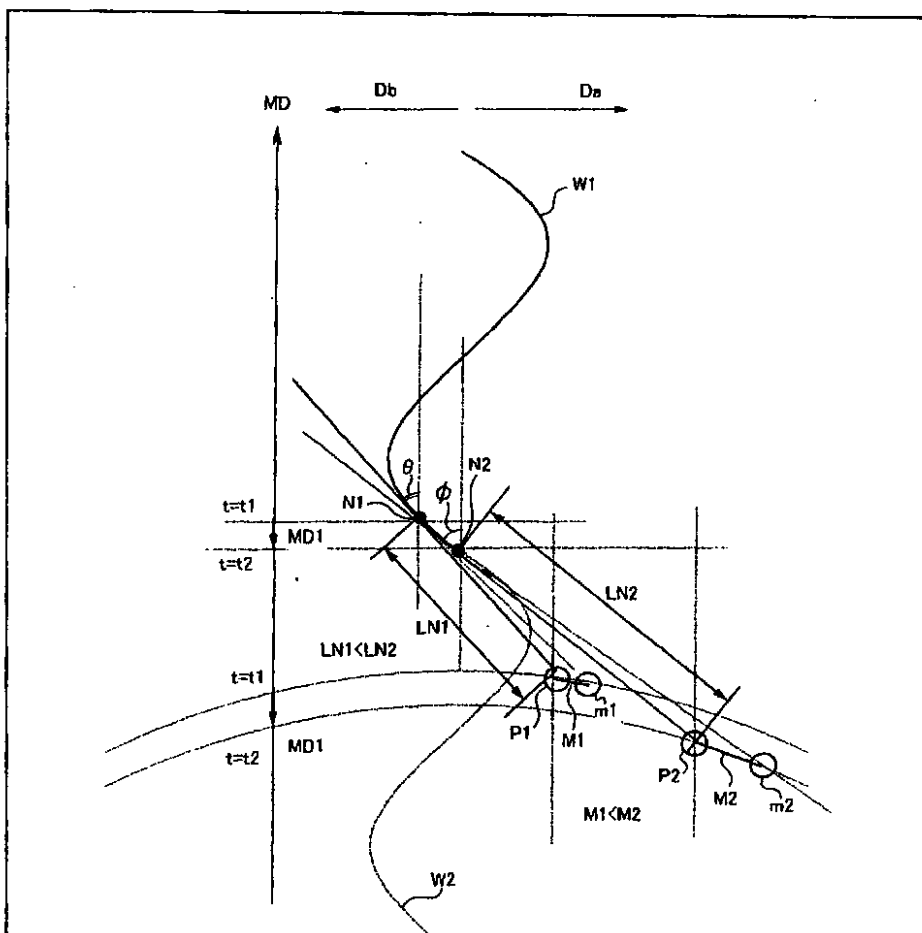
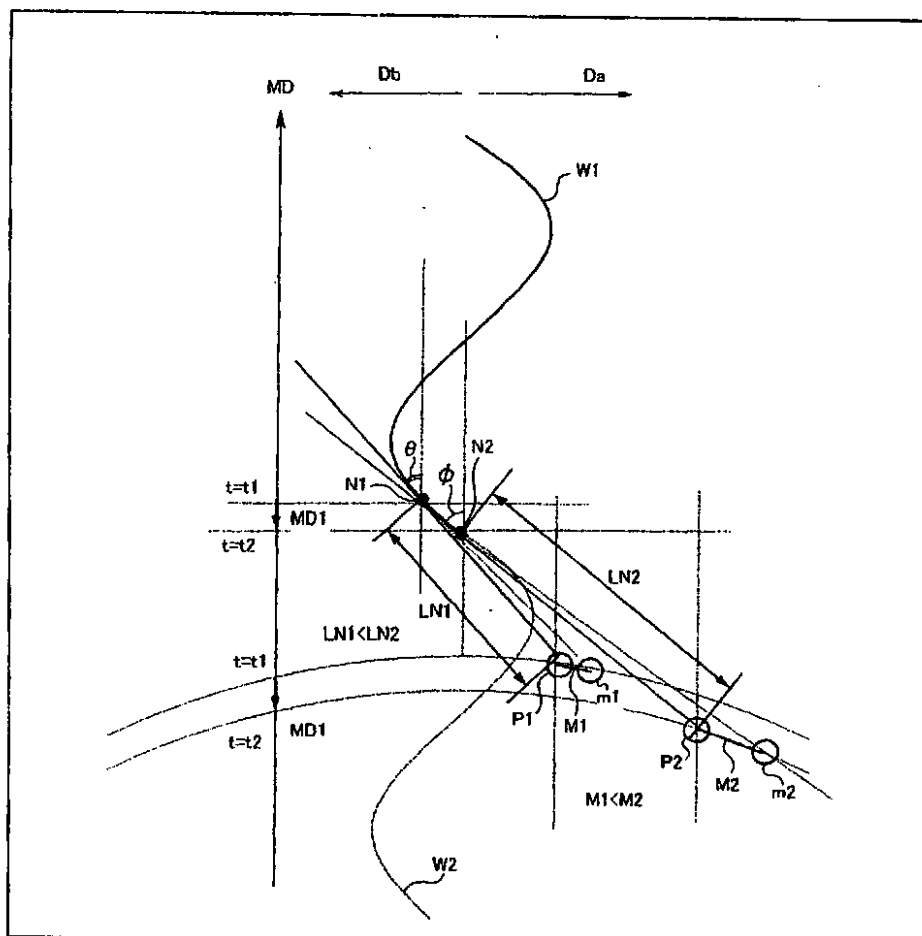


FIG. 7



7/7









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