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EXPEDIENTE No _____

TITULO APARATO DE UNIÓN Y MÉTODO DE
FABRICACIÓN DE ARTÍCULO ABSORBENTE

CLASIFICACION INTERNACIONAL _____

SOLICITANTE UNICHARM CORPORATION

DOMICILIO Japón

APODERADO DARIO CARDENAS NAVAS

BOGOTA D.C. _____

PETITO

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

**Industria y Comercio**
SUPERINTENDENCIA

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SOLICITUD DE:

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Patente de Invención

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Patente de Modelo de Utilidad

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Capítulo I

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Capítulo II

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SOLICITANTE

Nombre: **UNICHARM CORPORATION**Dirección: 182, Shimobun, Kinsei-cho, Shikokuchuo-shi,
Ehime 799-0111, Japón

Nacionalidad o Domicilio: Japón

Lugar de Constitución: Japón

Teléfono: 3137800 Fax: 3122410

E-mail: general@cardenasycardenas.com

IDENTIFICACION

☐

NIT

☐

NIT

☐

Otro

☒

Otro

Cuál
Número

③

REPRESENTANTE
O APODERADONombre: **DARIO CARDENAS NAVAS**

Dirección: Carrera 7 No 71-52 Torre B Piso 9

Teléfono: 3137800 Fax: 3122410

E-Mail: general@cardenasycardenas.com

IDENTIFICACION

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C.C.

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Otro

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Otro

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INVENTOR(ES)
(72)

Nombre: Hiroki YAMAMOTO

Dirección: c/o Technical Center of UNICHARM CORPORATION, 1531-7,
Wadahama, Toyohama-cho, Kanonji-shi, Kagawa 769-1602 Japón

Nacionalidad o Domicilio: Japón

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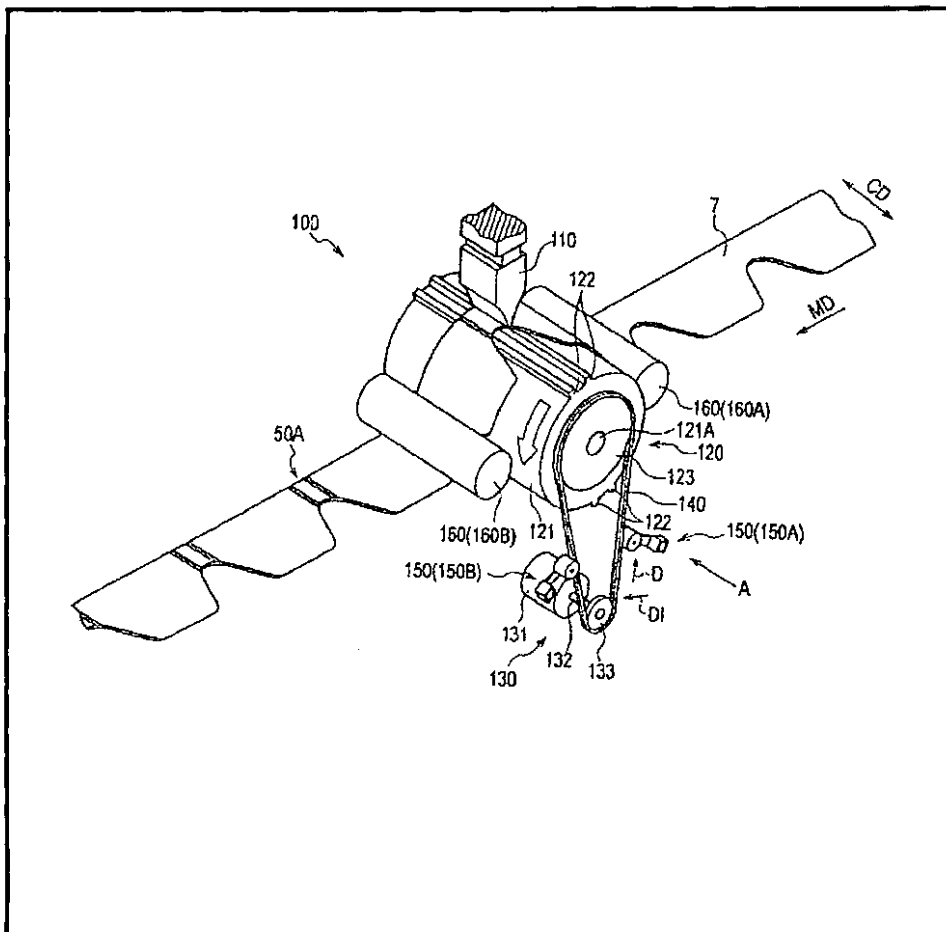
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Fecha

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. Exp 11-119943
- ☒ 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?docId=WO2010101287&recNum=1&tab=PCTDocuments&maxRec=&office=&prevFilter=&sortOption=&queryString=>
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11 FIGURA CARACTERISTICA



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NOMBRE: DARIO CARDENAS NAVAS

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CARDENAS & CARDENAS
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(71) Solicitante(s) UNICHARM CORPORATION

(72) Inventor(es) Hiroki Yamamoto

(74) Apoderado: DARIO CARDENAS NAVAS

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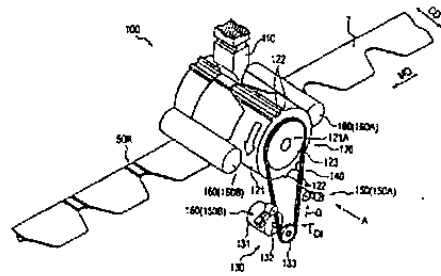
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(71) Solicitante(s) UNICHARM CORPORATION			
(72) Inventor(es) Hiroki Yamamoto			
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(54) Título: APARATO DE UNIÓN Y MÉTODO DE FABRICACIÓN DE ARTÍCULO ABSORBENTE

(57) Resumen:
El método 100 incluye un dispositivo de vibración ultrasónica 110 configurado para aplicar vibración ultrasónica a la región predeterminada 50A, un rodillo del yunque 120 que enfrenta el dispositivo de vibración ultrasónica 110 con la continua superpuesta de las porciones de cintura anterior y las porciones de cintura posterior interpuesta entre ellos, y que incluye una proyección 122 configurada para presionar el continuo en la región predeterminada 50A entre el rodillo del yunque 120 y el dispositivo de vibración ultrasónica 110, un motor 130 configurado para rotar el rodillo del yunque 120, una cinta 140 configurada para conectar el rodillo del yunque 120 y el motor 130 y para ser impulsada por el motor 130, y un mecanismo de compresión 150 configurado para presionar la cinta 140 en una dirección transversal perpendicular a una dirección impulsora de la cinta 140.

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				(74) Apoderado: DARIO CARDENAS NAVAS		
(54) Título: APARATO DE UNIÓN Y MÉTODO DE FABRICACIÓN DE ARTÍCULO ABSORBENTE						

Resumen:

El método 100 incluye un dispositivo de vibración ultrasónica 110 configurado para aplicar vibración ultrasónica a la región predeterminada 50A, un rodillo del yunque 120 que enfrenta el dispositivo de vibración ultrasónica 110 con la continua superpuesta de las porciones de cintura anterior y las porciones de cintura posterior interpuesta entre ellos, y que incluye una proyección 122 configurada para presionar el continuo en la región predeterminada 50A entre el rodillo del yunque 120 y el dispositivo de vibración ultrasónica 110, un motor 130 configurado para rotar el rodillo del yunque 120, una cinta 140 configurada para conectar el rodillo del yunque 120 y el motor 130 y para ser impulsada por el motor 130, y un mecanismo de compresión 150 configurado para presionar la cinta 140 en una dirección transversal perpendicular a una dirección impulsora de la cinta 140.

ESPAÑOL
DESCRIPCIÓN

**APARATO DE UNIÓN Y MÉTODO DE FABRICACIÓN DE ARTÍCULO
ABSORBENTE**

Campo técnico

La presente descripción se refiere a un aparato de unión para unir dos o más capas superpuestas, y un método de fabricación de un artículo absorbente.

Antecedentes en la técnica

Un artículo absorbente, tal como un pañal desechable de tipo pantalón, incluye: una porción de cintura anterior para ajustar a la cintura anterior del portador; una porción de cintura posterior para ajustar a la cintura posterior del portador; y una porción de la entrepierna para ajustar a la entrepierna del portador. Aquí, las regiones que rodean las piernas, en las cuales se insertan las piernas del portador están formadas a ambos lados de la porción de la entrepierna.

La porción de cintura anterior y la porción de cintura posterior están unidas entre sí en una región que se extiende desde una porción de borde de una abertura de cintura para ajustarse alrededor del cuerpo del portador en cada región que rodea la pierna. La publicación de la solicitud de patente del Japón N.º Hei 5-15551 describe una técnica para unir una red en sus regiones predeterminadas regiones, en donde las porciones de unión de la porción de cintura anterior y la porción de cintura posterior se forman, al crear un aparato de unión que aplica vibración ultrasónica a las regiones predeterminadas (por ejemplo, ver bibliografía de patentes 1).

En general, el aparato de unión incluye: un dispositivo de vibración ultrasónica que aplica vibración ultrasónica a las regiones predeterminadas del continuo de los componentes del pañal durante el desplazamiento; un rodillo del yunque que incluye proyecciones para presionar el continuo en las regiones predeterminadas entre el rodillo del yunque y el dispositivo de vibración ultrasónica; un motor que hace rotar el rodillo del yunque; y una cinta (conector) que conecta el

rodillo del yunque y el motor.

En el aparato de unión con la configuración antes mencionada, el impulso del motor en asociación con el desplazamiento del continuo hace rotar el rodillo del yunque a través de la cinta. Luego, un cuerno ultrasónico provisto en el dispositivo de vibración ultrasónica y una de las proyecciones del rodillo del yunque actúan en conjunto para pinzar el continuo en cada región predeterminada a cierto intervalo (es decir, el intervalo correspondiente a una distancia entre cada una de las regiones predeterminadas adyacentes). Por lo tanto, el continuo en la región predeterminada es sometido a vibración ultrasónica y se une.

Los inventores descubrieron que, en el aparato de unión antes mencionado conocido, si bien el motor continúa impulsando la cinta para que haga rotar el rodillo del yunque, la velocidad de rotación del rodillo del yunque se reduce temporariamente cuando el cuerno ultrasónico del dispositivo de vibración ultrasónica entra en contacto con cada proyección del rodillo del yunque. Esto induce un problema de aflojamiento de la cinta entre el motor y el rodillo del yunque, y causa el desprendimiento de la cinta respecto del rodillo del yunque o el motor.

Además, la velocidad de rotación del rodillo del yunque cambia drásticamente cuando el cuerno ultrasónico entra en contacto con la proyección. Esto da por resultado una unión no uniforme de las regiones predeterminadas, es decir, una unión no uniforme de las porciones de unión de la porción de cintura anterior y la porción de cintura posterior.

Es conveniente proveer un aparato de unión y un método de fabricación de artículo absorbentes capaces de obtener una unión más uniforme en sus regiones predeterminadas, en donde se deben formar las porciones de unión de una porción de cintura anterior y una porción de cintura posterior, y de impedir en forma confiable que un conector tal como una cinta se desprenda de un rodillo del yunque o un motor, en un caso en el cual el rodillo del yunque y el motor estén conectados entre sí a través del conector.

Lista de referencias

[Bibliografía de patentes]

[Bibliografía de patente 1]

Publicación de solicitud de patente del Japón N.º Hei 5-15551 (páginas 2 y 3, y Fig. 4)

Síntesis

Para solucionar el problema antes descrito, la presente invención tiene los siguientes aspectos. Un aspecto de la presente invención provee un aparato de unión que se usa para la fabricación de un artículo absorbente y que une un continuo de porciones de cintura anterior y un continuo de porciones de cintura posterior en una región predeterminada, en donde se forma una porción de unión de cada una de las porciones de cintura anterior y cada una de las porciones de cintura posterior, después de superponer el continuo de las porciones de cintura anterior y el continuo de las porciones de cintura posterior alimentados en forma continua, en donde el continuo se prepara para formar un artículo absorbente. El aparato de unión incluye un dispositivo de vibración ultrasónica configurado para aplicar vibración ultrasónica a la región predeterminada, un rodillo del yunque que enfrenta al dispositivo de vibración ultrasónica con la superposición continua de las porciones de cintura anterior y las porciones de cintura posterior interpuestas entre ellas, y que incluye una proyección configurada para presionar el continuo en la región predeterminada entre el rodillo del yunque y el dispositivo de vibración ultrasónica, un motor configurado para hacer rotar el rodillo del yunque, un conector configurado para conectar el rodillo del yunque y el motor y para ser impulsado por el motor, y un mecanismo de compresión configurado para comprimir el conector en una dirección transversal perpendicular respecto de una dirección impulsora del conector.

El aspecto de la presente invención puede proveer un aparato de unión y un método de fabricación de un artículo absorbente capaz de lograr una unión más uniforme en sus

regiones predeterminadas, en donde se deben formar las porciones de unión de una porción de cintura anterior y una porción de cintura posterior, y de impedir en forma confiable que conector tal como una cinta se desprenda de un rodillo del yunque o un motor, en un caso en el cual el rodillo del yunque y el motor se conectan entre sí a través del conector.

Breve descripción de los dibujos

La Fig. 1 es una vista en perspectiva parcialmente recortada un artículo absorbente de acuerdo con una o más formas de realización.

La Fig. 2 es un diagrama para explicar una parte relevante de un método de fabricación de artículos absorbentes de acuerdo con una o más formas de realización.

La Fig. 3 es una vista en perspectiva de un aparato de unión de acuerdo con una o más formas de realización.

La Fig. 4 es una vista lateral del aparato de unión de la FIG. 3.

La Fig. 5 es una vista perspectiva aumentada de tamaño de los mecanismos de compresión de acuerdo con una o más formas de realización.

Las partes (a) y (b) de la Fig. 6 son vistas esquemáticas de una polea del lado del yunque y de los mecanismos de compresión en diferentes posiciones de acuerdo con una o más formas de realización.

La Fig. 7 es una vista esquemática de un rodillo del yunque y mecanismos de compresión de un aparato de unión de acuerdo con un ejemplo modificado.

Descripción detallada

A continuación, se describe un aparato de unión y un método de fabricación de artículos absorbentes de acuerdo con una o más formas de realización de la presente invención con referencia a los dibujos acompañantes. Nótese que en la siguiente descripción de los dibujos, los signos de referencia iguales, o similares denotan elementos y porciones iguales o similares. Además, cabe destacar que los dibujos

son esquemáticos y no en escala, a menos que se especifique otra cosa.

En consecuencia, las dimensiones específicas y similares se deben determinar en consideración con la siguiente descripción. Además, los dibujos no necesariamente reflejan las relaciones de dimensiones de la vida real y las proporciones de los componentes. Primero, una configuración de un artículo absorbente 1 de acuerdo con una o más formas de realización se explicará con referencia a la Fig. 1 que es una perspectiva parcialmente recortada del artículo absorbente 1. En esta forma de realización particularmente ilustrada, el artículo absorbente 1 es un pañal desechable para adultos de tipo pantalón.

Tal como se muestra en la Fig. 1, el artículo absorbente 1 incluye principalmente una lámina superior 2, una lámina posterior 3, un absorbente 4 y una lámina impermeable 5.

La lámina superior 2 está adaptada para entrar en contacto con la piel de una persona que usa el artículo absorbente 1 (en adelante, "portador"). La lámina superior 2 está fabricada de una lámina permeable a líquidos tal como una tela no urdida o película de plástico perforada. La lámina posterior 3 se coloca por fuera de la lámina superior 2 (con un lado opuesto al portador). La lámina posterior 3 está fabricada de una tela no urdida, o similares.

El absorbente 4 se provee entre la lámina superior 2 y la lámina posterior 3, para absorber la excreción eliminada por el portador. El absorbente 4 está fabricado de una mezcla de pulpa molida y partículas de polímero superabsorbente, o similares. La lámina impermeable 5 se provee entre la lámina posterior 3 y el absorbente 4, para bloquear la filtración de la excreción del portador hacia el exterior del artículo absorbente 1. La lámina impermeable 5 está fabricada de una lámina impermeable a líquidos.

El artículo absorbente 1 así configurado incluye, en combinación, una porción de cintura anterior 10 para ajustar a la cintura anterior del portador, una porción de cintura posterior 20 para ajustar a la cintura posterior del portador,

y una porción de la entrepierna 30 para ajustar a la entrepierna del portador. Incidentalmente, las aberturas que rodean las piernas 40 en las cuales se insertan las piernas del portador se forman a ambos lados de la porción de la entrepierna 30.

La porción de cintura anterior 10 y la porción de cintura posterior 20 se unen entre sí mediante porciones de unión 50, y así forman una abertura de cintura 60 que se ajusta alrededor del cuerpo del portador. Un frunce de cintura 6A fabricado de una banda de goma que se estira o similares se provee en todo el borde periférico de la porción de cintura anterior 10 y la porción de cintura posterior 20.

Por ejemplo, para fabricar la porción de cintura anterior 10 y la porción de cintura posterior 20 que se estira en la dirección transversal perpendicular a la dirección de adelante hacia atrás desde la porción de cintura anterior 10 hacia la porción de cintura posterior 20, la porción de cintura anterior 10 y la porción de cintura posterior 20 pueden estar provistas del frunce de cintura 6A, o ambas pueden estar fabricadas de una lámina que se estira.

La porción de la entrepierna 30 se provee entre la porción de cintura anterior 10 y la porción de cintura posterior 20. Se proveen frunces de pierna 6B fabricados de bandas de goma que se estiran o similares a ambos lados de la porción de la entrepierna 30.

Por ejemplo, para poder estirar la porción de la entrepierna 30 en la dirección que rodea la pierna del artículo absorbente 1, la porción de la entrepierna 30 puede estar provista de frunces de pierna 6B, o estar fabricada de una lámina que se estira.

En segundo lugar, se explicará un método de fabricación de artículos absorbentes de acuerdo con una o más formas de realización, con referencia a la Fig. 2, la cual es un diagrama para explicar una parte relevante del método de fabricación del artículo absorbente.

Tal como se muestra en la Fig. 2, el método de fabricación de artículos absorbentes incluye al menos una

etapa formadora de la línea de cintura S1, una etapa de transferencia del absorbente S2, una etapa formadora de la abertura que rodea la pierna S3, una etapa de plegado S4, una etapa de unión S5 y una etapa de corte S6.

En la etapa formadora de la línea de cintura S1, se colocan frunces (un frunce de cintura 6A y/o un frunce de pierna 6B) entre una red 7A y una red 7B, y así se forma una red 7 preparada para formar la porción de cintura anterior 10 y la porción de cintura posterior 20.

Nótese que la red 7 (redes 7A, 7B) durante el desplazamiento se estira en una dirección cruzada CD (dirección de ancho) perpendicular a una dirección de desplazamiento MD (dirección de la máquina) de la red 7. Además, la red 7 es asimétrica con respecto a una línea central CL que divide en dos mitades un ancho en la dirección cruzada CD de la red 7 y se extiende en la dirección de desplazamiento MD de la red 7.

En la etapa de transferencia del absorbente S2, un elemento de la porción de la entrepierna 30A para formar la porción de la entrepierna 30 es transferido a la red 7, más específicamente, entre la porción de cintura anterior 10 y la porción de cintura posterior 20 después de la etapa formadora de la línea de cintura S1. Aquí, el elemento de la porción de la entrepierna 30A incluye la lámina posterior 3 y el absorbente 4.

En la etapa formadora de la abertura que rodea la pierna S3, las aberturas que rodean la pierna 40 (denominadas agujeros para las piernas) se forman al cortar la red 7 (redes 7A, 7B) después de la etapa de transferencia del absorbente S2. Aquí, la formación de la abertura que rodea la pierna 40 no necesariamente implica cortar sólo la red 7A y la red 7B, sino que puede incluir el corte, junto con la red 7A y la red 7B, de la lámina posterior 3 que constituye el elemento de la porción de la entrepierna 30A.

Nótese que la etapa de transferencia del absorbente S2 y la etapa formadora del elemento que rodea la pierna S3 se pueden llevar a cabo en orden inverso.

En la etapa de plegado S4, la red 7 se pliega en dos partes a lo largo de una línea de plegamiento que se extiende en la dirección de desplazamiento MD de la red 7 al llevar un borde lateral 10A de la porción de cintura anterior 10 hacia un borde lateral 20A de la porción de cintura posterior 20, después de la etapa formadora de la abertura que rodea la pierna S3.

Nótese que, en esta forma de realización particularmente ilustrada, la línea de plegamiento es la línea central CL. Sin embargo, la línea de plegamiento no necesariamente es la línea central CL, y se puede cambiar desde la línea central CL hacia cualquiera del primer borde lateral 10A y el segundo borde lateral 20A.

En la etapa de unión S5, un aparato de unión 100 que se describe más adelante aplica tratamiento ultrasónico después de la etapa de plegado S4 a las regiones predeterminadas 50A de la red plegada 7, es decir, a las regiones predeterminadas 50A en las cuales se forman las porciones de unión 50 de la porción de cintura anterior 10 y la porción de cintura posterior 20. Por lo tanto, se une la red 7 en las regiones predeterminadas 50A. La región predeterminada 50A se extiende, en la dirección de desplazamiento MD, a través de una línea imaginaria SL que se extiende en la dirección cruzada CD y que representa una línea de corte de la red 7.

En la etapa de corte S6, la red 7 unida en las regiones predeterminadas 50A se corta a lo largo de las líneas imaginarias SL después de la etapa de unión S5. Así se fabrica el artículo absorbente 1.

A continuación se explicará una configuración del aparato de unión 100 usado en la etapa de unión S5 descrita con anterioridad, con referencia a las Fig. 3-5. La Fig. 3 es una vista en perspectiva del aparato de unión 100 de acuerdo con una o más formas de realización. La Fig. 4 es una vista lateral (tal como se visualiza en la dirección de una flecha A de la Fig. 3) del aparato de unión 100 de la Fig. 3. La Fig. 5 es una vista en perspectiva aumentada de tamaño de los mecanismos de compresión 150 de acuerdo con una o más formas

de realización.

Tal como se muestra en las Fig. 3 a 5, el aparato de unión 100 se usa para la fabricación del artículo absorbente 1, y una un continuo de las porciones de cintura anterior 10 y un continuo de las porciones de cintura posterior 20 en las regiones predeterminadas 50A, en donde se deben formar las porciones de unión 50 de la porción de cintura anterior 10 y la porción de cintura posterior 20, después de superponer estos continuos alimentados continuamente. En adelante, el continuo de las porciones de cintura anterior 10 y el continuo de las porciones de cintura posterior 20 se denominan en conjunto simplemente la "red 7".

Para ser más específico, el aparato de unión 100 incluye un dispositivo de vibración ultrasónica 110, un rodillo del yunque 120, un motor 130, una cinta 140 (conector), los mecanismos de compresión 150 y rodillos de guía 160.

El dispositivo de vibración ultrasónica 110 actúa sobre una de las proyecciones 122 del rodillo del yunque 120 que se describirá más adelante para enganchar la red 7 en cada región predeterminada 50A, y así aplica vibración ultrasónica a la región predeterminada 50A. El dispositivo de vibración ultrasónica 110 incluye un vibrador ultrasónico 111, un reforzador 112 y un cuerno ultrasónico 113.

El vibrador ultrasónico 111 provee vibración ultrasónica al cuerno ultrasónico 113 a través del reforzador 112. Aquí, el vibrador ultrasónico 111 está conectado al reforzador 112.

El reforzador 112 amplifica la vibración ultrasónica provista por el vibrador ultrasónico 111. El reforzador 112 está fijado a un brazo de presión 114 que ajusta la altura del cuerno ultrasónico 113. El reforzador 112 transmite la vibración ultrasónica amplificada al cuerno ultrasónico 113.

El cuerno ultrasónico 113 presiona la red 7 en cada región predeterminada 50A contra el rodillo del yunque 120, y aplica la vibración ultrasónica a la región predeterminada 50A. En otras palabras, el cuerno ultrasónico 113 trabaja sobre una de las proyecciones 122 del rodillo del yunque 120 para enganchar la red 7 en cada región predeterminada 50A. El

cuerno ultrasónico 113 está conectado al brazo de presión 114 a través del reforzador 112.

El rodillo del yunque 120 dirige la red 7 en la dirección de desplazamiento MD a la vez que soporta la red 7. El rodillo del yunque 120 enfrenta el dispositivo de vibración ultrasónica 110 con la red 7 interpuesta entre ellos. El rodillo del yunque 120 incluye un cuerpo principal del yunque 121 y las proyecciones 122.

El cuerpo principal del yunque 121 tiene la forma de un cilindro, y rota alrededor de su eje central 121A en la dirección de desplazamiento MD. En una de las caras terminales del cuerpo principal del yunque 121, se provee una polea del lado del yunque 123 que se fija al eje central 121A y alrededor del cual se engancha la cinta 140. En consecuencia, la polea del lado del yunque 123 rota a la misma velocidad que el cuerpo principal del yunque 121.

Cada proyección 122 sobresale del cuerpo principal del yunque 121 hacia fuera en dirección radial respecto del cuerpo principal del yunque 121. La proyección 122 presiona la red 7 en cada una región predeterminada 50A contra el dispositivo de vibración ultrasónica 110 (cuerno ultrasónico 113). En otras palabras, en cada región predeterminada 50A, La proyección 122 actúa sobre el dispositivo de vibración ultrasónica 110 para enganchar la red 7.

El motor 130 hace rotar el rodillo del yunque 120. El motor 130 se dispone del lado del rodillo del yunque 120 de la red 7 (bajo el rodillo del yunque 120 en los dibujos), y se dispone más alejado de la red 7 que el rodillo del yunque 120. El motor 130 incluye un cuerpo principal del motor 131 y un eje de rotación 132. El cuerpo principal del motor 131 incluye: un rotor (no mostrado) que rota alrededor de su eje; un estator (no mostrado) que trabaja con el rotor para generar torque; y un cojinete (no mostrado) que soporta el eje de rotación 132.

El eje de rotación 132 transmite la rotación del rotor hacia afuera, es decir, hacia la cinta 140. En un extremo del eje de rotación 132, se provee una polea del lado del motor

133 que se fija al eje de rotación 132 y alrededor del cual se engancha la cinta 140. En consecuencia, la polea del lado del motor 133 rota a la misma velocidad que el eje de rotación 132 por la rotación del eje de rotación 132.

La cinta 140 es una cinta sinfín. La cinta 140 conecta el rodillo del yunque 120 (polea del lado del yunque 123) y el motor 130 (polea del lado del motor 133), y es impulsada por el motor 130. Por lo tanto, la cinta 140 puede transmitir la rotación del motor 130 al rodillo del yunque 120.

Los mecanismos de compresión 150 presionan constantemente la cinta 140 en las respectivas direcciones transversas a la dirección impulsora D de la cinta 140, por ejemplo, en direcciones cruzadas DI cada una perpendicular respecto de la dirección impulsora D de la cinta 140. Cuando se visualizan en la dirección axial del rodillo del yunque 120 (ver Fig. 4), los mecanismos de compresión 150 presionan cada uno la cinta 140 hacia una línea imaginaria L que conecta el centro del eje central 121A del rodillo del yunque 120 y el centro del eje de rotación 132 del motor 130. En otras palabras, los mecanismos de compresión 150 presionan la cinta 140 hacia adentro desde la parte externa de la cinta 140.

Los mecanismos de compresión 150 incluyen un primer mecanismo de compresión 150A y un segundo mecanismo de compresión 150B. El primer mecanismo de compresión 150A se dispone para colindar con la cinta 140 en una región en la cual la cinta 140 se desplaza desde el motor 130 hasta el rodillo del yunque 120 en la dirección impulsora D. El segundo mecanismo de compresión 150B se dispone para colindar con la cinta 140 en una región en la cual la cinta 140 se desplaza desde el rodillo del yunque 120 hasta el motor 130 en la dirección impulsora D.

Los mecanismos de compresión 150 (primero y segundo mecanismo de compresión 150A y 150B) incluyen cada uno una porción rotatoria 151, una porción móvil 152 y un brazo 153. La porción rotatoria 151 colinda sobre la cinta 140, y rota con la rotación de la cinta 140 alrededor de un eje (no

numerado) provisto hacia el brazo 153. La porción rotatoria 151 está conectada con la porción móvil 152 con el brazo 153 interpuesto entre ellos. La porción móvil 152 es una unidad de suspensión general que desplaza (por ejemplo, en forma sesgada) la porción rotatoria 151 en la correspondiente dirección cruzada DI. La porción rotatoria 151 y el brazo 153 rotan alrededor de la porción móvil 152.

El mecanismo de compresión 150 (el primer y el segundo mecanismo de compresión 150A y 150B) hace presión de modo tal que la cinta 140 está ubicada más cerca de la línea imaginaria L que una línea tangente común a la polea del lado del yunque 123 y la polea del lado del motor 133.

Los rodillos de guía 160 soportan la red 7, y cambian la dirección de desplazamiento MD de la red 7. Los rodillos de guía 160 incluyen un primer rodillo de guía 160A y un segundo rodillo de guía 160B. El primer rodillo de guía 160A guía la red 7 entre el rodillo del yunque 120 y el cuerno ultrasónico 113. El segundo rodillo de guía 160B guía parte de la red 7, cuya región predeterminada 50A ha sido sometida a vibración ultrasónica, hasta el siguiente proceso.

En adelante, se describirá brevemente una operación del aparato de unión 100 de acuerdo con una o más formas de realización con referencia a las Fig. 3 a 6. Las partes (a) y (b) de la Fig. 6 son vistas esquemáticas del rodillo del yunque 120 y los mecanismos de compresión 150 en diferentes posiciones de acuerdo con una o más formas de realización.

Tal como se muestra en las Fig. 3 a 6, en el aparato de unión 100, el rodillo del yunque 120 rota en asociación con el desplazamiento de la red 7. Para decirlo de otro modo, el impulso del motor 130 hace rotar el rodillo del yunque 120 a través de la cinta 140. En este evento, la porción rotatoria 151 de cada uno de los mecanismos de compresión 150 es desplazada (en forma sesgada) por la correspondiente porción móvil 152 en la correspondiente dirección cruzada DI, y por lo tanto presiona la cinta 140 en la dirección cruzada DI. En adelante, se describirá brevemente una operación del primero y segundo mecanismo de compresión 150A y 150B. Primero, por una parte,

el contacto entre el cuerno ultrasónico 113 y cada proyección 122 con la red 7 interpuesta entre ellos afloja la cinta 140 en una porción en la cual la cinta 140 se desplaza desde el motor 130 hasta el rodillo del yunque 120 en la dirección impulsora D (ver parte (b) de la Fig. 6). En este estado, la porción rotatoria 151 del primer mecanismo de compresión 150A se desplaza más cerca de la línea imaginaria L que en un estado normal en donde el cuerno ultrasónico 113 y la proyección 122 no están en contacto entre sí (ver parte (a) de la Fig. 6). En consecuencia, el primer mecanismo de compresión 150A presiona la cinta 140 hacia línea imaginaria L, y en consecuencia es capaz de mantener constante la tensión de la cinta 140.

Además, la liberación del contacto entre el cuerno ultrasónico 113 y la proyección 122 aprieta la cinta 140 en la porción en la cual la cinta 140 se desplaza desde el motor 130 hasta el rodillo del yunque 120 en la dirección impulsora D (ver parte (a) de la Fig. 6). En este estado, la porción rotatoria 151 del primer mecanismo de compresión 150A se desplaza más lejos de la línea imaginaria L que en el estado en el cual el cuerno ultrasónico 113 y la proyección 122 están en contacto entre sí (ver parte (b) de la Fig. 6). En consecuencia, el primer mecanismo de compresión 150A vuelve a un estado anterior a la presión de la cinta 140. El primer mecanismo de compresión 150A vuelve al estado que está unido a la cinta 140.

Por otra parte, el contacto entre el cuerno ultrasónico 113 y la proyección 122 aprieta la cinta 140 en una porción en la cual la cinta 140 se desplaza desde el rodillo del yunque 120 hasta el motor 130 en la dirección impulsora D (ver parte (b) de la Fig. 6). En este estado, la porción rotatoria 151 del segundo mecanismo de compresión 150B se desplaza más lejos de la línea imaginaria L que en el estado normal (ver parte (a) de la Fig. 6). En consecuencia, el segundo mecanismo de compresión 150B está en un estado previo a la presión de la cinta 140. El segundo mecanismo de compresión 150B vuelve al estado que está unido a la cinta

140.

Además, la liberación del contacto entre el cuerno ultrasónico 113 y la proyección 122 afloja la cinta 140 en la porción en la cual la cinta 140 se desplaza desde el rodillo del yunque 120 hasta el motor 130 en la dirección impulsora D (ver parte (a) de la Fig. 6). En este estado, la porción rotatoria 151 del segundo mecanismo de compresión 150B se desplaza más cerca de la línea imaginaria L que el estado en el cual el cuerno ultrasónico 113 y la proyección 122 están en contacto entre sí (ver parte (b) de la Fig. 6). En consecuencia, el segundo mecanismo de compresión 150B presiona la cinta 140 hacia la línea imaginaria L, y en consecuencia es capaz de mantener constante la tensión de la cinta 140.

En la configuración anterior, el cuerno ultrasónico 113 y una de las proyecciones 122 actúan en conjunto para enganchar la red 7 en cada región predeterminada 50A a cierto intervalo (es decir, el intervalo correspondiente a una distancia entre cada una de las regiones predeterminadas adyacentes 50A). Por lo tanto, el cuerno ultrasónico 113 aplica vibración ultrasónica generada por el vibrador ultrasónico 111 a la región predeterminada 50A. De esta manera, la red 7 en las regiones predeterminadas 50A, en donde las porciones de unión 50 de la porción de cintura anterior 10 y la porción de cintura posterior 20 se forman, es sometida a vibración ultrasónica y unida.

En el aparato de unión 100 y el método de fabricación de artículos absorbentes de acuerdo con la(s) forma(s) de realización descrita(s) hasta ahora, los mecanismos de compresión 150 presionan la cinta 140 en las respectivas direcciones cruzadas DI, cada una perpendicular a la dirección impulsora D de la cinta 140. Esto impide que la cinta 140 se afloje entre el motor 130 y el rodillo del yunque 120 cuando el cuerno ultrasónico 113 entra en contacto con cada proyección 122 y, por lo tanto impide que la velocidad de rotación del rodillo del yunque 120 se reduzca temporariamente cuando ocurre el contacto entre el cuerno y

la proyección. Además, esto impide que se modifique drásticamente velocidad de rotación del rodillo del yunque 120 cuando el cuerno ultrasónico 113 entra en contacto con la proyección 122. Estos efectos permiten mantener la cinta 140 tensionada.

En consecuencia, es posible mantener tensionada la cinta 140, para unir las regiones predeterminadas 50A en la dirección de transporte de la red 7 en cierto intervalo, y de evitar con seguridad que la cinta 140 se salga de la polea del yunque 120 y el motor 130.

Los inventores son conscientes de una técnica conocida en la cual se provee un eje (similar al eje 121A) acoplado a la polea del lado del yunque 123 con un material de goma interpuesto entre el eje y la polea del lado del yunque 123, a fin de amortiguar el impacto del contacto entre el cuerno ultrasónico 113 y cada proyección 122, e impedir, en lo posible, que la cinta 140 se desprenda del rodillo del yunque 120 o del motor 130. Sin embargo, esta técnica no es adecuada para el control fino del torque del rodillo del yunque 120. Para lograrlo, el rodillo del yunque 120 se hace rotar a través de la cinta 140 en esta forma de realización. En consecuencia, el torque del rodillo del yunque 120 se puede controlar finamente.

En el aparato de unión 100 y el método de fabricación de artículos absorbentes de acuerdo con la(s) forma(s) de realización descrita(s), los mecanismos de compresión 150 presionan constantemente la cinta 140 desde el primer mecanismo de compresión 150A y/o el segundo mecanismo de compresión 150B. En otras palabras, cada porción móvil 152 sesga constantemente la correspondiente porción rotatoria 151 en la correspondiente dirección cruzada DI. En consecuencia, los mecanismos de compresión 150 presionan constantemente la cinta 140 en las respectivas direcciones cruzadas DI con independencia de que se reduzca o no la rotación del rodillo del yunque 120. Esta disposición permite mantener la cinta 140 tensionada e impide en forma más confiable que la cinta 140 se desprenda del rodillo del yunque 120 o el motor 130.

En el aparato de unión 100 y el método de fabricación de artículos absorbentes de acuerdo con la(s) forma(s) de realización descrita(s), los mecanismos de compresión 150 se disponen para colindar sobre la cinta 140 en la región en la cual la cinta 140 se desplaza desde el motor 130 hasta el rodillo del yunque 120 en la dirección impulsora D y la región en la cual la cinta 140 se desplaza desde el rodillo del yunque 120 hasta el motor 130 en la dirección impulsora D, respectivamente. Con esta disposición, los mecanismos de compresión 150 presionan la cinta 140 en las respectivas direcciones cruzadas DI de estas regiones, en donde la cinta 140 tiene probabilidad de aflojarse. Como consecuencia, la cinta 140 se puede mantener pensionada en forma confiable.

En el aparato de unión 100 y el método de fabricación de artículos absorbentes de acuerdo con la(s) forma(s) de realización descrita(s), los mecanismos de compresión 150 comprimen cada uno la cinta 140 hacia la línea imaginaria L, tal como se observa en la dirección axial del rodillo del yunque 120 (ver la Fig. 4). En otras palabras, los mecanismos de compresión 150 presionan la cinta 140 hacia adentro desde el lado externo de la cinta 140. Dicha forma de presionar la cinta 140 hace que sea más fácil enganchar la cinta 140 alrededor de la polea del lado del yunque 123 o la polea del lado del motor 133 que una forma en la cual los mecanismos de compresión 150 presionan la cinta 140 hacia fuera desde el lado interno de la cinta 140. En consecuencia, se puede impedir en forma más confiable que la cinta 140 se desprenda del rodillo del yunque 120 o el motor 130.

En el aparato de unión 100 y el método de fabricación de artículos absorbentes de acuerdo con la(s) forma(s) de realización descrita(s), los mecanismos de compresión 150 incluyen el primer mecanismo de compresión 150A y el segundo mecanismo de compresión 150B. Esto permite que la cinta 140 rote mientras que se suprime mejor el aflojamiento de la cinta 140 sobre cada uno del lado del primer mecanismo de compresión 150A y el lado del segundo mecanismo de compresión 150B, que en un caso en el cual sólo se dispone uno del

primero y el segundo mecanismo de compresión 150A y 150B. Esta disposición reduce el grado de aflojamiento de la cinta 140, es decir, cuánto se afloja la cinta 140. Como consecuencia, se puede impedir en forma más confiable que la cinta 140 se desprenda del rodillo del yunque 120 o el motor 130.

Nótese que no necesariamente se proveen el primer y el segundo mecanismo de compresión 150A y 150B. Por ejemplo, en cambio se puede proveer sólo uno del primero y el segundo mecanismo de compresión 150A y 150B. En este caso, es particularmente preferido elegir el segundo mecanismo de compresión 150B con el cual es más probable que la cinta 140 se mantenga tensionada. Sin embargo, está dentro del alcance de la invención proveer sólo el primer mecanismo de compresión 150B.

En consecuencia, uno o más de los aspectos descritos con anterioridad puede proveer un aparato de unión y un método de fabricación de artículos absorbentes que sea capaz de lograr una unión más uniforme en regiones predeterminadas, en donde se forman las porciones de unión de una porción de cintura anterior y una porción de cintura posterior, y impedir en forma confiable que un conector, tal como un cinto, se desprenda del rodillo del yunque o un motor, en donde el rodillo del yunque y el motor están conectados entre sí a través del conector.

Ejemplos modificados

El aparato de unión 100 de acuerdo con la descripción anterior se puede modificar de la siguiente manera. La Fig. 7 es una vista esquemática de un rodillo del yunque 120 y mecanismos de compresión 150 de un aparato de unión 100A de acuerdo con un ejemplo modificado. Aquí, se provee la descripción principalmente para las diferencias respecto de la descripción anterior, en donde los signos de referencia iguales o similares denotan elementos iguales o similares.

En el aparato de unión 100 de acuerdo con la descripción anterior, los mecanismos de compresión 150 presionan la cinta

140 hacia el interior desde el lado externo de la cinta 140. En contraste, en el aparato de unión 100A de acuerdo con el ejemplo modificado, los mecanismos de compresión 150 presionan la cinta 140 hacia fuera desde el lado interno de la cinta 140, tal como se muestra en la Fig. 7. Para ser más específico, tal como se observa en la dirección axial del rodillo del yunque 120, los mecanismos de compresión 150 presionan la cinta 140 en las respectivas direcciones de desplazamiento respecto de la línea imaginaria L.

En la Fig. 7, se proveen el primero y el segundo mecanismo de compresión 150A y 150B. Alternativamente, por ejemplo, sólo se provee uno del primero y el segundo mecanismo de compresión 150A y 150B. En este caso, es particularmente preferible proveer el segundo mecanismo de compresión 150B con el cual es más probable mantener pensionada la cinta 140. Sin embargo se incluye dentro del alcance de la invención para proveer sólo el primer mecanismo de compresión 150B.

Otras formas de realización

Tal como se describió con anterioridad, se han descrito ejemplos de varias formas de realización de la presente invención. Se debe entender que la descripción y los dibujos que constituyen parte de la presente descripción no limitan la presente invención. Sobre la base de la presente descripción, los expertos en la técnica podrán fácilmente hallar diversas formas de realización, ejemplos y técnicas de operación alternativas.

Por ejemplo, se pueden visualizar las siguientes formas de realización adicionales. Específicamente, el artículo absorbente 1 se ha descrito de manera tal que incluya, en combinación, la porción de cintura anterior 10, la porción de cintura posterior 20 y la porción de la entrepierna 30. El artículo absorbente 1 no se limita a esta configuración, pero se puede formar totalmente como una única unidad. En este caso, es innecesario agregar que se emplea un método de fabricación diferente de un artículo absorbente.

El aparato de unión en la descripción anterior ha sido descrito para unir porciones de cintura anterior y posterior. Sin embargo, el aparato de unión no se limita a dicho uso. Por ejemplo, el aparato de unión se puede usar para unir cualesquiera dos o más capas, por ejemplo, dos redes separadas, o dos partes de la misma red (por ejemplo, una red plegada 7 después de las etapas S4 en la Fig.2), etc. Las redes y/o las partes de red no son necesariamente porciones de cinturas anterior y posterior de artículos de indumentaria, sino que pueden ser cualesquiera dos o más componentes de dichos artículos de indumentaria. Por ejemplo, se pueden unir una porción de cintura y una porción posterior (para llevar un ajustador de cinta adhesiva) mediante el aparato de unión en algunas formas de realización.

Además, se ha provisto la descripción para el aparato de unión 100 usado en la fabricación de pañales desechables de tipo pantalón. Sin embargo, el aparato de unión 100 no se limita a dicho uso. El aparato de unión 100 se puede usar para fabricar diversos productos que incluyen pañales desechables de tipo abierto, toallitas higiénicas, revestimientos de paños, batas desechables para uso médico y artículos de indumentaria desechables para deportes, por ejemplo.

Además, se ha descrito la cinta 140 como conector. Sin embargo, el conector no se limita a la cinta 140. El conector puede ser cualquier conector tensionable, por ejemplo, una cadena en general. En este caso, se emplea una rueda dentada, o similares para enganchar la cadena en cada una de la polea del lado del yunque 123 y la polea del lado del motor 133.

Además, se han descrito los mecanismos de compresión 150 como ejerciendo constante presión sobre la cinta 140 en las respectivas direcciones cruzadas DI. Sin embargo, los mecanismos de compresión 150 no se limitan a dicha configuración.

Además, se han descrito las porciones móviles 152 como sesgando continuamente las respectivas porciones rotativas 151 en las respectivas direcciones cruzadas DI. Sin embargo,

las porciones móviles 152 no se limitan a dicha configuración.

Las porciones rotativas 151 se han descrito como desplazadas (sesgadas) en las respectivas direcciones cruzadas DI. Sin embargo, los desplazamientos de las porciones rotatorias 151 no se limitan a dicha configuración. Por ejemplo, las porciones móviles 152 se pueden fijar, y las porciones rotatorias 151 se sesgan en un desplazamiento rotatorio alrededor de las porciones móviles 152, contra la cinta 140. Alternativamente, las porciones rotatorias 151 se pueden sesgar tanto en las respectivas direcciones cruzadas DI (mediante las porciones móviles 152) y en el desplazamiento rotatorio alrededor de las porciones móviles 152.

Tal como se describió con anterioridad, la presente invención incluye naturalmente diversas formas de realización que no se describen en la presente. En consecuencia, el alcance técnico de la presente invención sólo se debería determinar por las cuestiones que definen la invención en el alcance de las reivindicaciones consideradas apropiadas sobre la base de la descripción.

La totalidad de los contenidos de las solicitudes de patente del Japón 2009-048436 (presentada el 2 de marzo de 2009) y 2010-042135 (presentada el 26 de febrero de 2010) se incorpora a la presente por referencia.

APLICABILIDAD INDUSTRIAL

En consecuencia, de acuerdo con la presente invención, como es posible proporcionar un aparato de unión y un método de fabricación de un artículo absorbente que son capaces de lograr una unión más uniforme al unir sus regiones predeterminadas, donde se han de formar porciones de unión de una porción de cintura anterior y una porción de cintura posterior, y de evitar de forma confiable que un conector como una cinta se salga de un rodillo del yunque o un, en un caso en que el rodillo del yunque y el motor estén conectados entre sí por medio del conector, es de utilidad en la tecnología de fabricación de artículos absorbentes.

Listado de signos de referencia

- 1 artículo absorbente
- 2 lámina superior
- 3 lámina posterior
- 4 absorbente
- 5 lámina impermeable
- 6 frunce
- 6A frunce de cintura
- 6B frunce de pierna
- 7, 7A, 7B red
- 10 porción de cintura anterior
- 10A borde lateral
- 20 porción de cintura posterior
- 20A borde lateral
- 30 porción de la entrepierna
- 40 aberturas que rodean la pierna
- 50 porción de unión
- 50A región predeterminada
- 60 aberturas de la cintura
- 100, 100A aparato de unión
- 110 dispositivo de vibración ultrasónica
- 111 vibrador ultrasónico
- 112 reforzador
- 113 cuerno ultrasónico
- 114 brazo de presión
- 120 rodillo del yunque
- 121 cuerpo principal del yunque
- 122 proyección
- 123 polea del lado del yunque
- 130 motor
- 131 cuerpo principal del motor
- 132 eje de rotación
- 133 polea del lado del motor
- 140 cinta (conector)
- 150 mecanismo de compresión
- 150A primer mecanismo de compresión

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150B segundo mecanismo de compresión

151 porción rotatoria

152 porción móvil

153 brazo

160 rodillo de guía

160A primer rodillo de guía

160B segundo rodillo de guía

REIVINDICACIONES

1. Un aparato de unión para unir dos o más capas, caracterizado porque el aparato de unión comprende:

un dispositivo de vibración ultrasónica configurado para aplicar vibración ultrasónica a una región predeterminada en donde se deben unir las capas;

un rodillo del yunque que enfrenta el dispositivo de vibración ultrasónica, y que incluye una proyección configurada para presionar la región predeterminada de las capas contra el dispositivo de vibración ultrasónica;

un motor configurado para rotar el rodillo del yunque;

un conector configurado para conectar el rodillo del yunque y el motor, y ser impulsado por el motor; y

un mecanismo de compresión configurado para presionar el conector en una dirección transversal respecto de una dirección impulsora del conector.

2. El aparato de unión de acuerdo con reivindicación 1, caracterizado porque

el mecanismo de compresión incluye:

una porción rotatoria configurada para colindar sobre el conector y para ser rotado en conjunción con el conector; y

una porción móvil configurada para desplazar la porción rotatoria en la dirección transversal.

3. El aparato de unión de acuerdo con una cualquiera de las reivindicaciones 1 y 2, caracterizado porque el mecanismo de compresión se dispone en una región en la cual el conector se desplaza desde el motor hasta el rodillo del yunque en la dirección impulsora.

4. El aparato de unión de acuerdo con una cualquiera de las reivindicaciones 1 a 3, caracterizado porque el mecanismo de compresión se dispone en una región en la cual el conector se desplaza desde el rodillo del yunque hasta motor en la dirección impulsora.

5. El aparato de unión de acuerdo con una cualquiera de las reivindicaciones 1 a 4, caracterizado porque el mecanismo de compresión es configurado para presionar, tal como se observa en una dirección axial del rodillo del yunque, el conector hacia una línea imaginaria que conecta un centro de un eje de rotación del rodillo del yunque y un centro de un eje de rotación del motor.

6. El aparato de unión de acuerdo con una cualquiera de las reivindicaciones 1 a 5, caracterizado porque el mecanismo de compresión presiona constantemente el conector.

7. Un método de fabricación de un artículo absorbente caracterizado porque tiene al menos una porción de cintura anterior y una porción de cintura posterior, en donde el método comprende la etapa de

hacer que un aparato de unión una un continuo de las porciones de cintura anterior y un continuo de las porciones de cintura posterior en una región predeterminada, en donde una porción de unión de cada una de las porciones de cintura anterior y cada una de las porciones de cintura posterior se forman, después de superponer el continuo de las porciones de cintura anterior y el continuo de la porciones de cintura posterior con alimentación continua, en donde

el aparato de unión incluye:

un dispositivo de vibración ultrasónica configurado para aplicar vibración ultrasónica a la región predeterminada;

un rodillo del yunque enfrenta el dispositivo de vibración ultrasónica con la continua superpuesta de las porciones de cintura anterior y las porciones de cintura posterior interpuestas entre sí, y que incluye una proyección configurada para presionar el continuo en la región predeterminada entre el rodillo del yunque y el dispositivo de vibración ultrasónica;

un motor configurado para rotar el rodillo del yunque;

un conector configurado para conectar el rodillo del

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yunque y el motor, y para ser impulsado por el motor; y

un mecanismo de compresión configurado para presionar el conector en una dirección transversal perpendicular a una dirección impulsora del conector.

26
RESUMEN

El método 100 incluye un dispositivo de vibración ultrasónica 110 configurado para aplicar vibración ultrasónica a la región predeterminada 50A, un rodillo del yunque 120 que enfrenta el dispositivo de vibración ultrasónica 110 con la continua superpuesta de las porciones de cintura anterior y las porciones de cintura posterior interpuesta entre ellos, y que incluye una proyección 122 configurada para presionar el continuo en la región predeterminada 50A entre el rodillo del yunque 120 y el dispositivo de vibración ultrasónica 110, un motor 130 configurado para rotar el rodillo del yunque 120, una cinta 140 configurada para conectar el rodillo del yunque 120 y el motor 130 y para ser impulsada por el motor 130, y un mecanismo de compresión 150 configurado para presionar la cinta 140 en una dirección transversal perpendicular a una dirección impulsora de la cinta 140.

FIG. 1

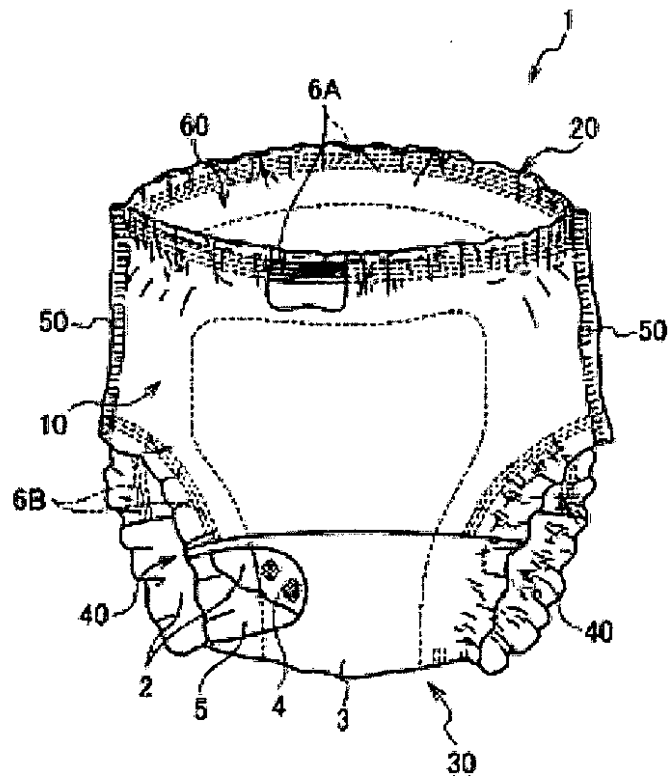


FIG. 2

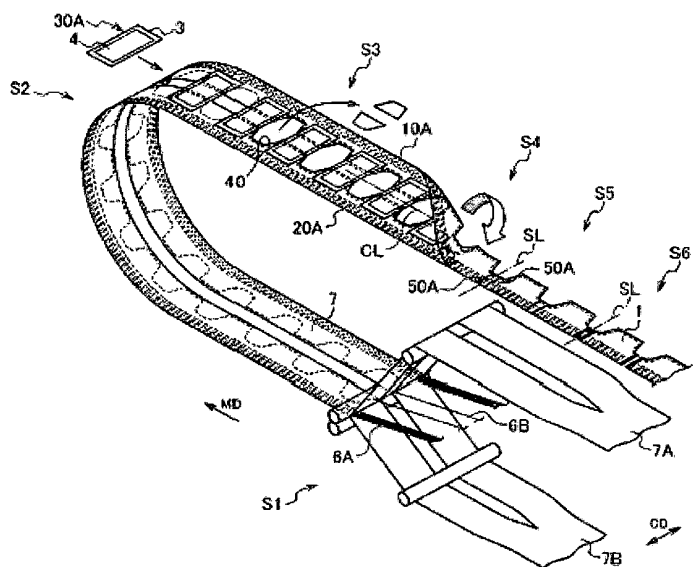


FIG. 3

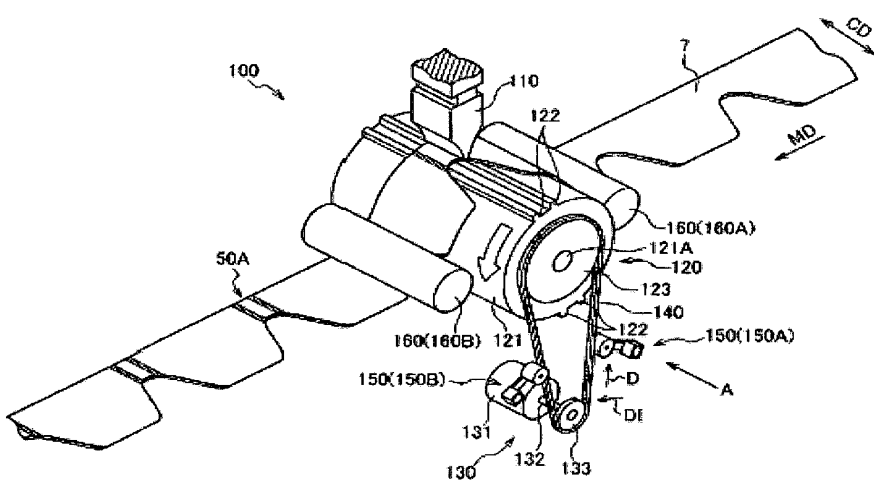


FIG. 4

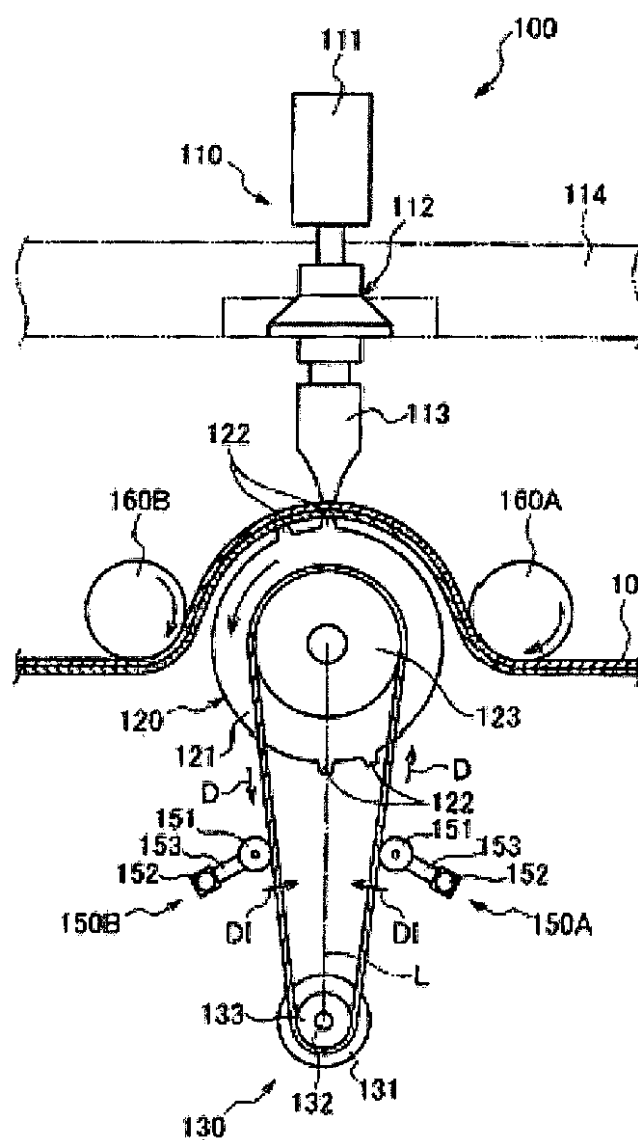


FIG. 5

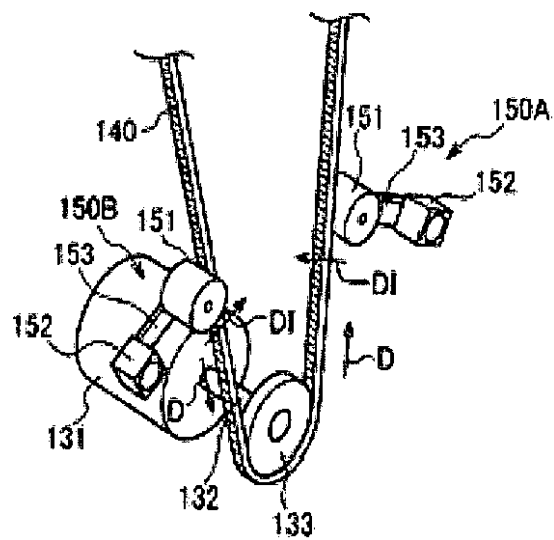


FIG. 6

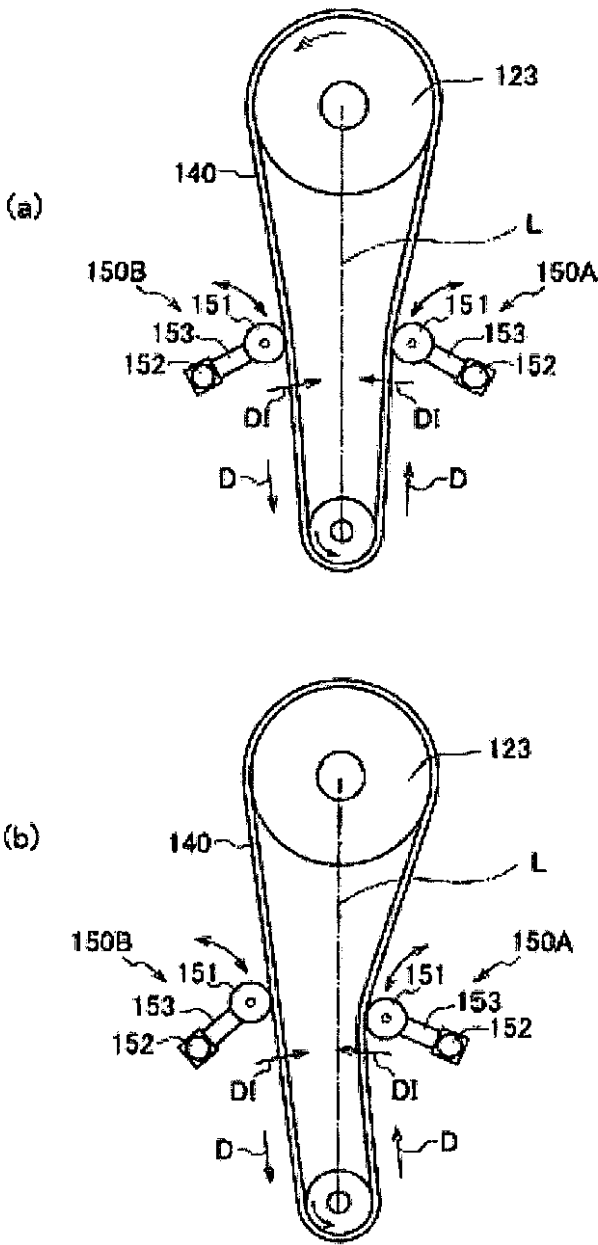
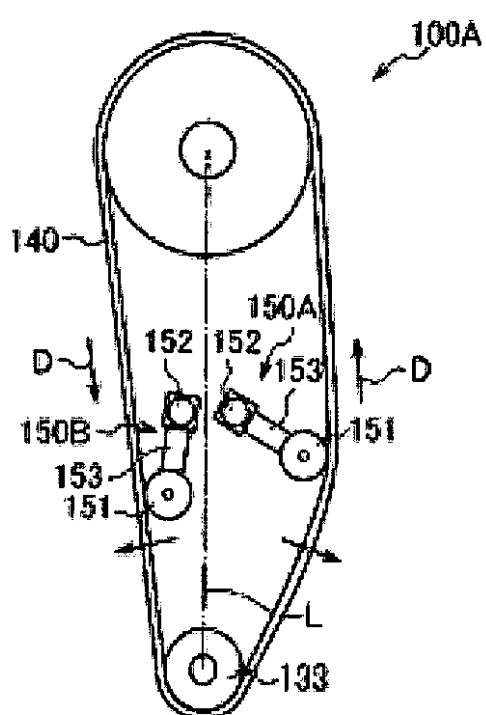


FIG. 7



DESCRIPTION**Title of Invention**

JOINING APPARATUS AND METHOD OF MANUFACTURING ABSORBENT ARTICLE

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Technical Field

The present disclosure relates to a joining apparatus for joining two or more superimposed layers, and a method of manufacturing an absorbent article.

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Background Art

An absorbent article, such as a pants-type disposable diaper, includes: a front waistline portion to be fitted to the front waist of a wearer; a back waistline portion to be fitted to the back waist of the wearer; and a crotch portion to be fitted to the crotch of the wearer. Here, leg-surrounding regions into which the legs of the wearer are inserted are formed at both sides of the crotch portion.

The front waistline portion and the back waistline portion are joined to each other in a region extending from an edge portion of a waist opening to be fit around the body of the wearer to each leg-surrounding region. Japanese Patent Application Publication No. Hei 5-15551 discloses a technique of joining a web in predetermined regions thereof, where joint portions of the front waistline portion and the back waistline portion are to be formed, by causing a joining apparatus to apply ultrasonic vibration to the predetermined regions (for example, see PTL 1).

In general, the joining apparatus includes: an ultrasonic vibrating device applying ultrasonic vibration to the predetermined regions of continua of diaper components under conveyance; an anvil roller including protrusions for pressing the continua in the predetermined regions between the anvil

roller and the ultrasonic vibrating device; a motor rotating the anvil roller; and a belt (connector) connecting the anvil roller and the motor.

In the joining apparatus with the aforementioned
5 configuration, the driving of the motor in association with the conveyance of the continua rotates the anvil roller via the belt. Then, an ultrasonic horn provided in the ultrasonic vibrating device and one of the protrusions of the anvil roller work together to nip the continua in each predetermined region at
10 a certain interval (i.e., the interval corresponding to a distance between each adjacent predetermined regions). Thereby, the continua in the predetermined region are subjected to ultrasonic vibration and joined.

The inventors have discovered that, in the known joining
15 apparatus mentioned above, while the motor keeps driving the belt to rotate the anvil roller, the rotational speed of the anvil roller is reduced temporarily when the ultrasonic horn of the ultrasonic vibrating device comes in contact with each protrusion of the anvil roller. This induces a problem of
20 loosening the belt between the motor and the anvil roller, and thus causing the belt to run off the anvil roller or the motor.

Moreover, the rotational speed of the anvil roller is changed drastically when the ultrasonic horn comes in contact with the protrusion. This results in a non-uniform joining in
25 the predetermined regions, that is, a non-uniform joining in the joint portions of the front waistline portion and the back waistline portion.

It is desirable to provide a joining apparatus and a method of manufacturing absorbent articles which are capable of
30 achieving a more uniform joining in predetermined regions thereof, where joint portions of a front waistline portion and a back waistline portion are to be formed, and of reliably preventing a connector such as a belt from running off an anvil

roller or a motor, in a case where the anvil roller and the motor are connected to each other via the connector.

Citation List

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Patent Literature

PTL 1: Japanese Patent Application Publication No. Hei 5-15551 (pages 2 and 3, and Fig. 4)

10 **Summary**

To solve the above-described problem, the present invention has the following aspects. An aspect of the present invention provides a joining apparatus which is used for manufacturing an absorbent article and which joins a continuum of front waistline portions and a continuum of back waistline portions in a predetermined region, where a joint portion of each of the front waistline portions and each of the back waistline portions is to be formed, after the continuum of the front waistline portions and the continuum of the back waistline portions continuously fed are superimposed, the continua being prepared to form an absorbent article. The joining apparatus includes an ultrasonic vibrating device configured to apply ultrasonic vibration to the predetermined region, an anvil roller facing the ultrasonic vibrating device with the superimposed continua of the front waistline portions and the back waistline portions interposed therebetween, and including a protrusion configured to press the continua in the predetermined region between the anvil roller and the ultrasonic vibrating device, a motor configured to rotate the anvil roller, a connector configured to connect the anvil roller and the motor and to be driven by the motor, and a pressing mechanism configured to press the connector in a cross direction perpendicular to a driving direction of the connector.

The aspect of the present invention can provide a joining apparatus and a method of manufacturing an absorbent article which are capable of achieving a more uniform joining in predetermined regions thereof, where joint portions of a front waistline portion and a back waistline portion are to be formed, and of reliably preventing a connector such as a belt from running off an anvil roller or a motor, in a case where the anvil roller and the motor are connected to each other via the connector.

10 **Brief Description of Drawings**

[Fig. 1] Fig. 1 is a partially cutaway, perspective view of an absorbent article according to one or more embodiments.

[Fig. 2] Fig. 2 is a diagram for explaining a relevant part of a method of manufacturing absorbent articles according to one or more embodiments.

[Fig. 3] Fig. 3 is a perspective view of a joining apparatus according to one or more embodiments.

[Fig. 4] Fig. 4 is a side view of the joining apparatus of FIG. 3.

[Fig. 5] Fig. 5 is an enlarged perspective view of pressing mechanisms according to one or more embodiments.

[Fig. 6] Parts (a) and (b) of Fig. 6 are schematic views of an anvil-side pulley and the pressing mechanisms in different positions according to one or more embodiments.

[Fig. 7] Fig. 7 is a schematic view of an anvil roller and pressing mechanisms of a joining apparatus according to a modified example.

Detailed Description

30 Hereinafter, a joining apparatus and a method of manufacturing absorbent articles according to one or more embodiments of the present invention will be described with reference to the accompanying drawings. Note that, in the

following description of the drawings, same or similar reference signs denote same or similar 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 in consideration of the following description. Moreover, the drawings do not necessarily reflect the real-life dimensional relationships and ratios of components. Firstly, a configuration of an absorbent article 1 according to one or more embodiments will be explained with reference to Fig. 1 which is a partially cutaway perspective of the absorbent article 1. In this particularly illustrated embodiment, the absorbent article 1 is a disposable pants-type diaper for adults.

As shown in Fig. 1, the absorbent article 1 mainly includes a top sheet 2, a back sheet 3, an absorber 4 and a waterproof sheet 5.

The top sheet 2 is adapted to come into contact with the skin of a person to wear the absorbent article 1 (hereinafter, "wearer"). The top sheet 2 is made of a liquid permeable sheet such as a nonwoven fabric or perforated plastic film. The back sheet 3 is provided outside the top sheet 2 (on a side facing away from the wearer). The back sheet 3 is made of a nonwoven fabric or the like.

The absorber 4 is provided between the top sheet 2 and the back sheet 3, for absorbing excretion discharged from the wearer. The absorber 4 is made of a mixture of ground pulp and superabsorbent polymer particles, or the like. The waterproof sheet 5 is provided between the back sheet 3 and the absorber 4, for blocking the permeation of the excretion from the wearer to the outside of the absorbent article 1. The waterproof sheet 5 is made of a liquid impermeable sheet.

The absorbent article 1 thus configured includes, in combination, a front waistline portion 10 to be fitted to the

front waist of a wearer, a back waistline portion 20 to be fitted to the back waist of the wearer, and a crotch portion 30 to be fitted to the crotch of the wearer. Incidentally, leg-surrounding openings 40 into which the legs of the wearer are inserted are formed at both sides of the crotch portion 30.

The front waistline portion 10 and the back waistline portion 20 are joined together by joint portions 50, and thereby form a waist opening 60 to be fit around the body of the wearer. A waist gather 6A made of a stretchable rubber strand or the like is provided to an entire peripheral edge of the front waistline portion 10 and the back waistline portion 20.

For example, to make the front waistline portion 10 and the back waistline portion 20 stretchable in the cross direction perpendicular to the front-to-back direction from the front waistline portion 10 toward the back waistline portion 20, the front waistline portion 10 and the back waistline portion 20 may be provided with the waist gather 6A, or may themselves be made of a stretchable sheet.

The crotch portion 30 is provided between the front waistline portion 10 and the back waistline portion 20. Leg gathers 6B made of stretchable rubber strands or the like are provided on both sides of the crotch portion.

For example, to make the crotch portion 30 stretchable in the leg-encircling direction of the absorbent article 1, the crotch portion 30 may be provided with the leg gathers 6B, or may itself be made of a stretchable sheet.

Secondly, a method of manufacturing absorbent articles according to one or more embodiments will be explained with reference to Fig. 2 which is a diagram for explaining a relevant part of the absorbent article manufacturing method.

As shown in Fig. 2, the method of manufacturing absorbent articles includes at least a waistline forming step S1, an absorber transferring step S2, a leg-surrounding opening forming

step S3, a folding step S4, a joining step S5 and a cutting step S6.

In the waistline forming step S1, gathers (a waist gather 6A and/or a leg gather 6B) are placed between a web 7A and a web 7B, and thereby a web 7 prepared to form the front waistline portion 10 and the back waistline portion 20 is formed.

Note that the web 7 (webs 7A, 7B) during conveyance is stretchable in a cross direction CD (width direction) perpendicular to a conveyance direction MD (machine direction) of the web 7. In addition, the web 7 is asymmetrical with respect to a center line CL that bisects a width in the cross direction CD of the web 7 and extends in the conveyance direction MD of the web 7.

In the absorber transferring step S2, a crotch portion member 30A to form the crotch portion 30 is transferred onto the web 7, more specifically, between the front waistline portion 10 and the back waistline portion 20 after the waistline forming step S1. Here, the crotch portion member 30A includes the back sheet 3 and the absorber 4.

In the leg-surrounding opening forming step S3, the leg-surrounding openings 40 (so-called leg holes) are formed by cutting the web 7 (webs 7A, 7B) after the absorber transferring step S2. Here, the formation of the leg-surrounding opening 40 does not necessarily involve cutting only the web 7A and the web 7B, but may involve cutting, together with the web 7A and the web 7B, the back sheet 3 constituting the crotch portion member 30A.

Note that the absorber transferring step S2 and the leg-surrounding forming step S3 may be performed in the reverse order.

In the folding step S4, the web 7 is folded into two parts along a folding line extending in the conveyance direction MD of the web 7 by bringing a side edge 10A of the front waistline

portion 10 toward a side edge 20A of the back waistline portion 20, after the leg-surrounding opening forming step S3.

Note that, in this particularly illustrated embodiment, the folding line is the center line CL. However, the folding
5 line is not necessarily the center line CL, and may be shifted from the center line CL toward either of the first side edge 10A and the second side edge 20A.

In the joining step S5, a joining apparatus 100 to be described later applies ultrasonic treatment after the folding
10 step S4 to predetermined regions 50A of the folded web 7, that is, to the predetermined regions 50A where the joint portions 50 of the front waistline portion 10 and the back waistline portion 20 are to be formed. Thereby, the web 7 in the predetermined regions 50A is joined. The predetermined region
15 50A extends, in the conveyance direction MD, across an imaginary line SL that extends in the cross direction CD and represents a to-be-cut line of the web 7.

In the cutting step S6, the web 7 joined in the predetermined regions 50A is cut along the imaginary lines SL
20 after the joining step S5. Thereby, the absorbent article 1 is manufactured.

Next, a configuration of the joining apparatus 100 used in the joining step S5 described above will be explained with reference to Figs. 3-5. Fig. 3 is a perspective view of the
25 joining apparatus 100 according to one or more embodiments. Fig. 4 is a side view (as seen in the direction of an arrow A of Fig. 3) of the joining apparatus 100 of Fig. 3. Fig. 5 is an enlarged perspective view of pressing mechanisms 150 according to one or more embodiments.

30 As shown in Figs. 3 to 5, the joining apparatus 100 is used for manufacturing the absorbent article 1, and joins a continuum of the front waistline portions 10 and a continuum of the back waistline portions 20 in the predetermined regions 50A, where

the joint portions 50 of the front waistline portion 10 and the back waistline portion 20 are to be formed, after these continua continuously fed are superimposed. Hereinafter, the continuum of the front waistline portions 10 and the continuum of the back waistline portions 20 are collectively and simply called the "web 7."

To be more specific, the joining apparatus 100 includes an ultrasonic vibrating device 110, an anvil roller 120, a motor 130, a belt 140 (connector), the pressing mechanisms 150 and guide rollers 160.

The ultrasonic vibrating device 110 works with one of protrusions 122 of the anvil roller 120 to be described later to nip the web 7 in each predetermined region 50A, and thus applies ultrasonic vibration to the predetermined region 50A. The ultrasonic vibrating device 110 includes an ultrasonic vibrator 111, a booster 112 and an ultrasonic horn 113.

The ultrasonic vibrator 111 provides ultrasonic vibration to the ultrasonic horn 113 via the booster 112. Here, the ultrasonic vibrator 111 is connected to the booster 112.

The booster 112 amplifies the ultrasonic vibration provided by the ultrasonic vibrator 111. The booster 112 is fixed to a pressurizing arm 114 which adjusts the height of the ultrasonic horn 113. The booster 112 transmits the amplified ultrasonic vibration to the ultrasonic horn 113. The ultrasonic horn 113 presses the web 7 in each predetermined region 50A against the anvil roller 120, and applies the ultrasonic vibration to the predetermined region 50A. In other words, the ultrasonic horn 113 works with one of the protrusions 122 of the anvil roller 120 to nip the web 7 in each predetermined region 50A. The ultrasonic horn 113 is connected to the pressurizing arm 114 via the booster 112.

The anvil roller 120 conveys the web 7 in the conveyance direction MD while supporting the web 7. The anvil roller 120

faces the ultrasonic vibrating device 110 with the web 7 interposed therebetween. The anvil roller 120 includes an anvil main body 121 and the protrusions 122.

The anvil main body 121 is in the form of a cylinder, and
5 rotates about its central shaft 121A in the conveyance direction MD. On one end face of the anvil main body 121, an anvil-side pulley 123 is provided which is fixed to the central shaft 121A and around which the belt 140 is trained. Thus, the anvil-side pulley 123 rotates at the same speed as the anvil main body 121.

10 Each protrusion 122 protrudes from the anvil main body 121 outward in the radial direction of the anvil main body 121. The protrusion 122 presses the web 7 in each predetermined region 50A against the ultrasonic vibrating device 110 (ultrasonic horn 113). In other words, in each predetermined region 50A, the
15 protrusion 122 works with the ultrasonic vibrating device 110 to nip the web 7.

The motor 130 rotates the anvil roller 120. The motor 130 is arranged at the anvil roller 120 side of the web 7 (under the anvil roller 120 in the drawings), and is arranged farther
20 from the web 7 than the anvil roller 120. The motor 130 includes a motor main body 131 and a rotational shaft 132. The motor main body 131 includes: a rotor (not shown) rotating about its axis; a stator (not shown) working with the rotor to generate torque; and a bearing (not shown) supporting the rotational shaft
25 132.

The rotational shaft 132 transmits the rotation of the rotor to the outside, i.e., to the belt 140. On one end of the rotational shaft 132, a motor-side pulley 133 is provided which is fixed to the rotational shaft 132 and around which the belt
30 140 is trained. Thus, the motor-side pulley 133 rotates at the same speed as the rotational shaft 132 by the rotation of the rotational shaft 132.

The belt 140 is an endless belt. The belt 140 connects

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the anvil roller 120 (anvil-side pulley 123) and the motor 130 (motor-side pulley 133), and is driven by the motor 130. Thereby, the belt 140 can transmit the rotation of the motor 130 to the anvil roller 120.

5 The pressing mechanisms 150 constantly press the belt 140 in respective directions transverse to a driving direction D of the belt 140, e.g., in cross directions DI each perpendicular to the driving direction D of the belt 140. When seen in the axial direction of the anvil roller 120 (see Fig. 4), the pressing
10 mechanisms 150 each press the belt 140 toward an imaginary line L connecting the center of the central shaft 121A of the anvil roller 120 and the center of the rotational shaft 132 of the motor 130. In other words, the pressing mechanisms 150 press the belt 140 inward from the outer side of the belt 140.

15 The pressing mechanisms 150 include a first pressing mechanism 150A and a second pressing mechanism 150B. The first pressing mechanism 150A is arranged to abut on the belt 140 in a region where the belt 140 moves from the motor 130 to the anvil roller 120 in the driving direction D. The second pressing
20 mechanism 150B is arranged to abut on the belt 140 in a region where the belt 140 moves from the anvil roller 120 to the motor 130 in the driving direction D.

 The pressing mechanisms 150 (first and second pressing mechanisms 150A and 150B) each include a rotating portion 151,
25 a moving portion 152 and an arm 153. The rotating portion 151 abuts on the belt 140, and is rotated with the rotation of the belt 140 about a shaft (unnumbered) provided to the arm 153. The rotating portion 151 is connected to the moving portion 152 with the arm 153 interposed therebetween. The moving portion
30 152 is a general suspension unit which moves (for example, biases) the rotating portion 151 in the corresponding cross direction DI. The rotating portion 151 and the arm 153 rotate about the moving portion 152.

The pressing mechanism 150 (the first and second pressing mechanism 150A and 150B) presses such that the belt 140 is located closer to the imaginary line L than a tangent line common to the anvil-side pulley 123 and the motor-side pulley 133.

5 The guide rollers 160 support the web 7, and change the conveyance direction MD of the web 7. The guide rollers 160 include a first guide roller 160A and a second guide roller 160B. The first guide roller 160A guides the web 7 between the anvil roller 120 and the ultrasonic horn 113. The second guide roller
10 160B guides part of the web 7, the predetermined region 50A of which has been subjected to ultrasonic vibration, to the next process.

Hereinafter, an operation of the joining apparatus 100 according to one or more embodiments will be briefly described
15 with reference to Figs. 3 to 6. Parts (a) and (b) of Fig. 6 are schematic views of the anvil roller 120 and the pressing mechanisms 150 in different positions according to one or more embodiments.

As shown in Figs. 3 to 6, in the joining apparatus 100,
20 the anvil roller 120 rotates in association with the conveyance of the web 7. To put it differently, the driving of the motor 130 rotates the anvil roller 120 via the belt 140. In this event, the rotating portion 151 of each pressing mechanism 150 is moved (biased) by the corresponding moving portion 152 in
25 the corresponding cross direction DI, and thereby presses the belt 140 in the cross direction DI. Hereinafter, an operation of the first and second pressing mechanisms 150A and 150B will be briefly described.

Firstly, on the one hand, the contact between the
30 ultrasonic horn 113 and each protrusion 122 with the web 7 interposed therebetween loosens the belt 140 in a portion where the belt 140 moves from the motor 130 to the anvil roller 120 in the driving direction D (see part (b) of Fig. 6). In this

state, the rotating portion 151 of the first pressing mechanism 150A is moved closer to the imaginary line L than in a normal state where the ultrasonic horn 113 and the protrusion 122 are not in contact with each other (see part (a) of Fig. 6).

5 Accordingly, the first pressing mechanism 150A presses the belt 140 toward the imaginary line L, and is thus capable of keeping constant the tension of the belt 140.

Further, the release of the contact between the ultrasonic horn 113 and the protrusion 122 tightens the belt 140 in the
10 portion where the belt 140 moves from the motor 130 to the anvil roller 120 in the driving direction D (see part (a) of Fig. 6). In this state, the rotating portion 151 of the first pressing mechanism 150A is moved farther from the imaginary line L than in the state where the ultrasonic horn 113 and the protrusion
15 122 are in contact with each other (see part (b) of Fig. 6). Accordingly, the first pressing mechanism 150A returns to a state prior to the pressing of the belt 140. The first pressing mechanism 150A moves into a state that it is attached to the belt 140.

20 On the other hand, the contact between the ultrasonic horn 113 and the protrusion 122 tightens the belt 140 in a portion where the belt 140 moves from the anvil roller 120 to the motor 130 in the driving direction D (see part (b) of Fig. 6). In this state, the rotating portion 151 of the second pressing mechanism
25 150B is moved farther from the imaginary line L than in the normal state (see part (a) of Fig. 6). Accordingly, the second pressing mechanism 150B is in a state prior to the pressing of the belt 140. The second pressing mechanism 150B moves into a state that it is attached to the belt 140.

30 Further, the release of the contact between the ultrasonic horn 113 and the protrusion 122 loosens the belt 140 in the portion where the belt 140 moves from the anvil roller 120 to the motor 130 in the driving direction D (see part (a) of Fig.

6). In this state, the rotating portion 151 of the second pressing mechanism 150B is moved closer to the imaginary line L than the state where the ultrasonic horn 113 and the protrusion 122 are in contact with each other (see part (b) of Fig. 6).
5 Accordingly, the second pressing mechanism 150B presses the belt 140 toward the imaginary line L, and is thus capable of keeping constant the tension of the belt 140.

In the above configuration, the ultrasonic horn 113 and one of the protrusions 122 work together to nip the web 7 in
10 each predetermined region 50A at a certain interval (i.e., the interval corresponding to a distance between each adjacent predetermined regions 50A). Thereby, the ultrasonic horn 113 applies ultrasonic vibration generated by the ultrasonic vibrator 111 to the predetermined region 50A. In this manner,
15 the web 7 in the predetermined regions 50A, where the joint portions 50 of the front waistline portion 10 and the back waistline portion 20 are to be formed, is subjected to ultrasonic vibration and joined.

In the joining apparatus 100 and the method of
20 manufacturing absorbent articles according to the embodiment(s) having been described thus far, the pressing mechanisms 150 press the belt 140 in the respective cross directions DI each perpendicular to the driving direction D of the belt 140. This prevents the belt 140 from being loosened between the motor 130
25 and the anvil roller 120 when the ultrasonic horn 113 comes in contact with each protrusion 122 and, thereby, preventing the rotational speed of the anvil roller 120 from being temporarily reduced when the horn-protrusion contact occurs. Moreover, this prevents the rotational speed of the anvil roller 120 from
30 being changed drastically when the ultrasonic horn 113 comes in contact with the protrusion 122. These effects make it possible to keep the belt 140 tensioned.

Therefore, it is possible to keep the belt 140 being

tensioned, to join the predetermined regions 50A in the conveyance direction of the web 7 at a certain interval, and to surly prevent the belt 140 from running off the anvil roller 120 and the motor 130.

5 The inventors are aware of a known technique in which a shaft (similar to shaft 121A) coupled to the anvil-side pulley 123 is provided with a rubber material interposed between the shaft and the anvil-side pulley 123, in order to cushion the impact of the contact between the ultrasonic horn 113 and each
10 protrusion 122 and to prevent, if at all possible, the belt 140 from running off the anvil roller 120 or the motor 130. However, this technique is not suited to finely control the torque of the anvil roller 120. To cope with this, the anvil roller 120 is rotated via the belt 140 in this embodiment. Accordingly,
15 the torque of the anvil roller 120 can be finely controlled.

 In the joining apparatus 100 and the method of manufacturing absorbent articles according to the disclosed embodiment(s), the pressing mechanisms 150 constantly press the belt 140 from the first pressing mechanism 150A and/or the second
20 pressing mechanism 150B. In other words, each moving portion 152 constantly biases the corresponding rotating portion 151 in the corresponding cross direction DI. Accordingly, the pressing mechanisms 150 constantly press the belt 140 in the respective cross directions DI regardless of whether the
25 rotation of the anvil roller 120 is reduced. This arrangement makes it possible to keep the belt 140 tensioned and to more reliably prevent the belt 140 from running off the anvil roller 120 or the motor 130.

 In the joining apparatus 100 and the method of
30 manufacturing absorbent articles according to the disclosed embodiment(s), the pressing mechanisms 150 are arranged to abut on the belt 140 in the region where the belt 140 moves from the motor 130 to the anvil roller 120 in the driving direction D

and the region where the belt 140 moves from the anvil roller 120 to the motor 130 in the driving direction D, respectively. With this arrangement, the pressing mechanisms 150 press the belt 140 in the respective cross directions DI in these regions
5 where the belt 140 is likely to be loosened. As a result, the belt 140 can be kept tensioned reliably.

In the joining apparatus 100 and the method of manufacturing absorbent articles according to the disclosed embodiment(s), the pressing mechanisms 150 each press the belt
10 140 toward the imaginary line L, as seen in the axial direction of the anvil roller 120 (see Fig. 4). In other words, the pressing mechanisms 150 press the belt 140 inward from the outer side of the belt 140. Such a way of pressing the belt 140 makes the belt 140 more likely to be trained around the anvil-side
15 pulley 123 or the motor-side pulley 133 than a way in which the pressing mechanisms 150 press the belt 140 outward from the inner side of the belt 140. Thus, the belt 140 can be more reliably prevented from running off the anvil roller 120 or the motor 130.

20 In the joining apparatus 100 and the method of manufacturing absorbent articles according to the disclosed embodiment(s), the pressing mechanisms 150 include the first pressing mechanism 150A and the second pressing mechanism 150B. This enables the belt 140 to rotate while the looseness of the
25 belt 140 is more suppressed on each of the first pressing mechanism 150A side and the second pressing mechanism 150B side, than a case where only one of the first and second pressing mechanisms 150A and 150B is arranged. This arrangement reduces the looseness degree of the belt 140, i.e., how much the belt
30 140 is loosened. As a result, the belt 140 can be more reliably prevented from running off the anvil roller 120 or the motor 130.

Note that, both of the first and second pressing mechanisms

150A and 150B are not necessarily provided. For example, only one of the first and second pressing mechanisms 150A and 150B may be provided instead. In this case, it is particularly preferable to choose the second pressing mechanism 150B with
5 which the belt 140 is more likely to be kept tensioned. It is however within the scope of the invention to provide only the first pressing mechanism 150B.

Thus, one or more of the aspects disclosed above can provide a joining apparatus and a method of manufacturing
10 absorbent articles which are capable of achieving a more uniform joining in predetermined regions, where joint portions of a front waistline portion and a back waistline portion are to be formed, and reliably preventing a connector, such as a belt, from running off an anvil roller or a motor, where the anvil roller and the
15 motor are connected to each other via the connector.

Modified Examples

The joining apparatus 100 according to the foregoing description may be modified in the following manner. Fig. 7 is
20 a schematic view of an anvil roller 120 and pressing mechanisms 150 of a joining apparatus 100A according to a modified example. Here, description will be provided mainly for differences from the foregoing description, with the same or similar reference signs denoting the same or similar elements.

25 In the joining apparatus 100 according to the foregoing description, the pressing mechanisms 150 press the belt 140 inward from the outer side of the belt 140. By contrast, in the joining apparatus 100A according to the modified example, the pressing mechanisms 150 press the belt 140 outward from the inner
30 side of the belt 140, as shown in Fig. 7. To be more specific, as seen in the axial direction of the anvil roller 120, the pressing mechanisms 150 press the belt 140 in respective directions of moving away from the imaginary line L.

In Fig. 7, the first and second pressing mechanisms 150A and 150B are provided. Alternatively, for example, only one of the first and second pressing mechanisms 150A and 150B may be provided. In this case, it is particularly preferable to
5 provide the second pressing mechanism 150B with which the belt 140 is more likely to be kept tensioned. It is however within the scope of the invention to provide only the first pressing mechanism 150B.

10 **Further Embodiments**

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

For example, the following additional embodiments can be envisaged. Specifically, the absorbent article 1 has been
20 described as including, in combination, the front waistline portion 10, the back waistline portion 20 and the crotch portion 30. The absorbent article 1 is not limited to this configuration, but may be formed entirely as a single unit. In this case, needless to say, a different method of manufacturing an absorbent
25 article is employed.

The joining apparatus in the foregoing description has been described as for joining front and rear waistline portions. However, the joining apparatus is not limited to such use. For example, the joining apparatus can be used to join together any
30 two or more layers, e.g., two separate webs, or two parts of the same web (e.g., folded web 7 after steps S4 in Fig.2) etc. The webs and/or web parts are not necessarily front and rear waistline portions of wearing articles, but can be any two or more

components of such wearing articles. For example, a waistline portion and an ear portion (for carrying a tape fastener) can be joined together by the joining apparatus in some embodiments.

In addition, the description has been provided for the
5 joining apparatus 100 used in the manufacturing of pants-type disposable diapers. However, the joining apparatus 100 is not limited to such use. The joining apparatus 100 may be used to manufacture various products including open-type disposable
10 medical use and disposable wearing articles for sports, for example.

Further, the belt 140 has been described as the connector. However, the connector is not limited to the belt 140. The connector may be any tensionable connector, e.g., a general chain.
15 In this case, a sprocket or the like to engage with the chain is employed for each of the anvil-side pulley 123 and the motor-side pulley 133.

Furthermore, the pressing mechanisms 150 have been described as constantly pressing the belt 140 in the respective
20 cross directions DI. However, the pressing mechanisms 150 are not limited to such a configuration.

Also, the moving portions 152 have been described as constantly biasing the respective rotating portions 151 in the respective cross directions DI. However, the moving portions
25 152 are not limited to such a configuration.

The rotating portions 151 have been described as being moved (biased) in the respective cross directions DI. However, the movements of the rotating portions 151 are not limited to such a configuration. For example, the moving portions 152 may
30 be fixed, and the rotating portions 151 are biased, in a rotational movement around the moving portions 152, against the belt 140. Alternatively, the rotating portions 151 may be biased both in the respective cross directions DI (by the moving

portions 152) and in the rotational movement around the moving portions 152.

As described above, the present invention naturally includes various embodiments which are not described herein.

5 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 Applications
10 2009-048436 (filed on March 2, 2009) and 2010-042135 (filed on February 26, 2010) are incorporated herein by reference.

Industrial Applicability

Therefore, according to the present invention, since it
15 is possible to provide a joining apparatus and a method of manufacturing an absorbent article which are capable of achieving a more uniform joining in predetermined regions thereof, where joint portions of a front waistline portion and a back waistline portion are to be formed, and of reliably
20 preventing a connector such as a belt from running off an anvil roller or a motor, in a case where the anvil roller and the motor are connected to each other via the connector, it is useful in manufacturing technology for absorbent articles.

Reference Signs List

- 1 absorbent article
- 2 top sheet
- 3 back sheet
- 4 absorber
- 30 5 waterproof sheet
- 6 gather
- 6A waist gather
- 6B leg gather

- 7, 7A, 7B web
- 10 front waistline portion
- 10A side edge
- 20 back waistline portion
- 5 20A side edge
- 30 crotch portion
- 40 leg-surrounding openings
- 50 joint portion
- 50A predetermined region
- 10 60 waist openings
- 100, 100A joining apparatus
- 110 ultrasonic vibrating device
- 111 ultrasonic vibrator
- 112 booster
- 15 113 ultrasonic horn
- 114 pressurizing arm
- 120 anvil roller
- 121 anvil main body
- 122 protrusion
- 20 123 anvil-side pulley
- 130 motor
- 131 motor main body
- 132 rotational shaft
- 133 motor-side pulley
- 25 140 belt (connector)
- 150 pressing mechanism
- 150A first pressing mechanism
- 150B second pressing mechanism
- 151 rotating portion
- 30 152 moving portion
- 153 arm
- 160 guide roller
- 160A first guide roller

160B second guide roller

CLAIMS

[Claim 1]

A joining apparatus for joining two or more layers, the
5 joining apparatus comprising:

an ultrasonic vibrating device configured to apply
ultrasonic vibration to a predetermined region where the layers
are to be joined;

an anvil roller facing the ultrasonic vibrating device,
10 and including a protrusion configured to press the predetermined
region of the layers against the ultrasonic vibrating device;

a motor configured to rotate the anvil roller;

a connector configured to connect the anvil roller and the
motor and to be driven by the motor; and

15 a pressing mechanism configured to press the connector in
a direction transverse to a driving direction of the connector.

[Claim 2]

The joining apparatus according to claim 1, wherein
20 the pressing mechanism includes:

a rotating portion configured to abut on the
connector and to be rotated in conjunction with the connector;
and

a moving portion configured to move the rotating
25 portion in the transverse direction.

[Claim 3]

The joining apparatus according to any one of claims 1 and
30 2, wherein the pressing mechanism is arranged in a region where
the connector moves from the motor to the anvil roller in the
driving direction.

[Claim 4]

The joining apparatus according to any one of claims 1 to 3, wherein the pressing mechanism is arranged in a region where the connector moves from the anvil roller to the motor in the driving direction.

[Claim 5]

The joining apparatus according to any one of claims 1 to 4, wherein the pressing mechanism is configured to press, as seen in an axial direction of the anvil roller, the connector toward an imaginary line connecting a center of a rotational shaft of the anvil roller and a center of a rotational shaft of the motor.

[Claim 6]

The joining apparatus according to any one of claims 1 to 5, wherein the pressing mechanism constantly presses the connector.

[Claim 7]

A method of manufacturing an absorbent article having at least a front waistline portion and a back waistline portion, the method comprising the step of

causing a joining apparatus to join a continuum of the front waistline portions and a continuum of the back waistline portions in a predetermined region, where a joint portion of each of the front waistline portions and each of the back waistline portions is to be formed, after the continuum of the front waistline portions and the continuum of the back waistline portions continuously fed are superimposed, wherein

the joining apparatus includes:

an ultrasonic vibrating device configured to apply ultrasonic vibration to the predetermined region;

an anvil roller facing the ultrasonic vibrating device

with the superimposed continua of the front waistline portions and the back waistline portions interposed therebetween, and including a protrusion configured to press the continua in the predetermined region between the anvil roller and the ultrasonic

5 vibrating device;

a motor configured to rotate the anvil roller;

a connector configured to connect the anvil roller and the motor and to be driven by the motor; and

a pressing mechanism configured to press the connector in
10 a cross direction perpendicular to a driving direction of the connector.

INGLES
RESUMEN

ABSTRACT

The method 100 includes an ultrasonic vibrating device 110 configured to apply ultrasonic vibration to the predetermined region 50A, an anvil roller 120 facing the ultrasonic vibrating device 110 with the superimposed continua of the front waistline portions and the back waistline portions interposed therebetween, and including a protrusion 122 configured to press the continua in the predetermined region 50A between the anvil roller 120 and the ultrasonic vibrating device 110, a motor 130 configured to rotate the anvil roller 120, a belt 140 configured to connect the anvil roller 120 and the motor 130 and to be driven by the motor 130, and a pressing mechanism 150 configured to press the belt 140 in a cross direction perpendicular to a driving direction of the belt 140.

FIG. 2

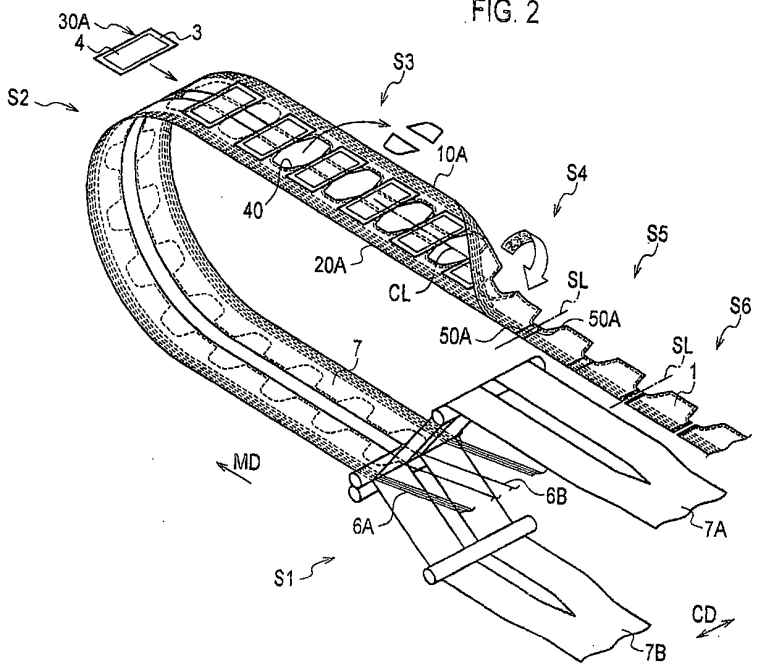


FIG. 5

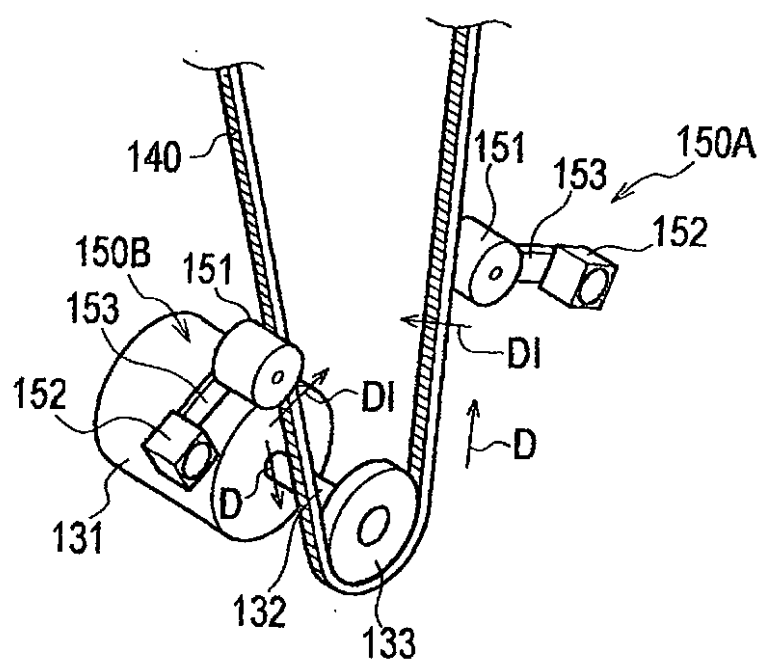


FIG. 6

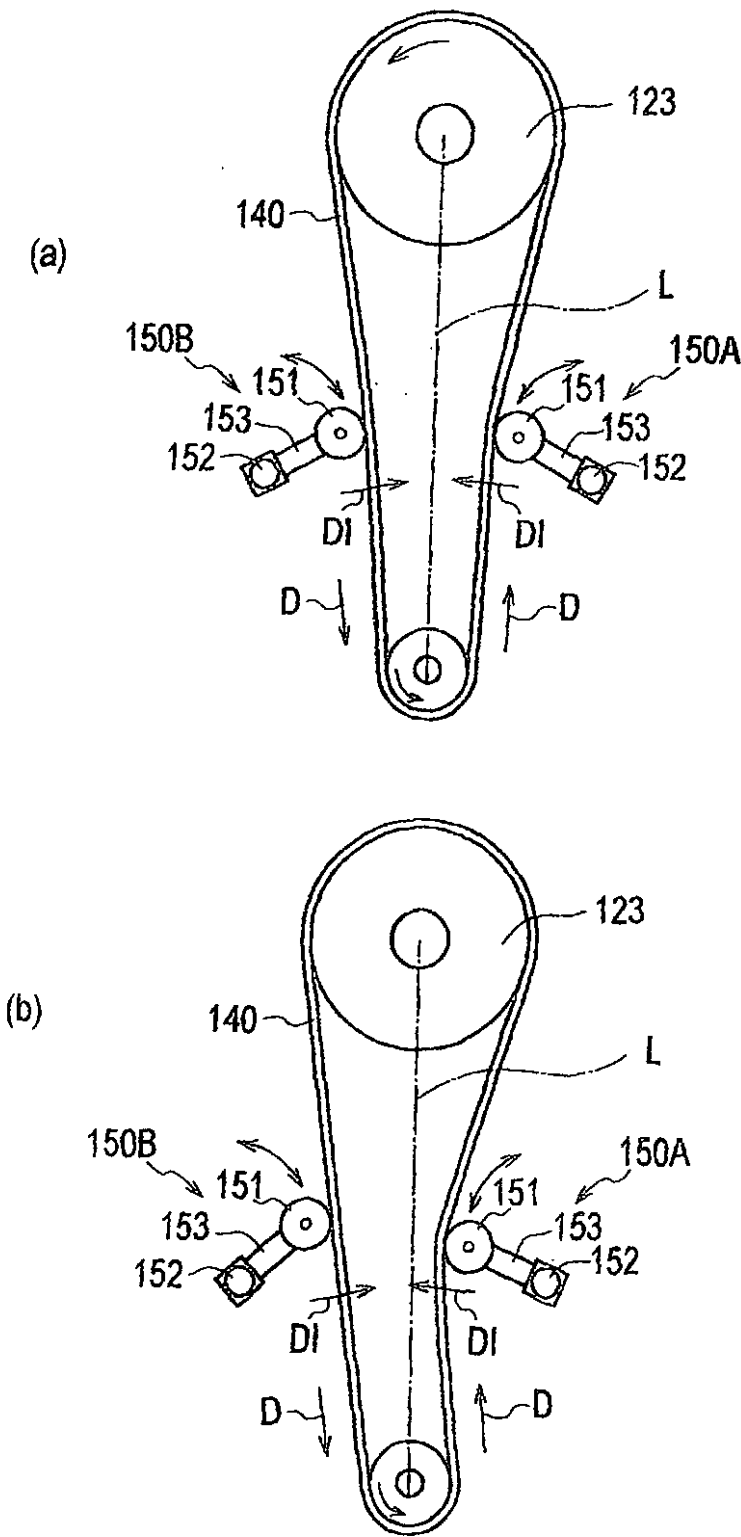
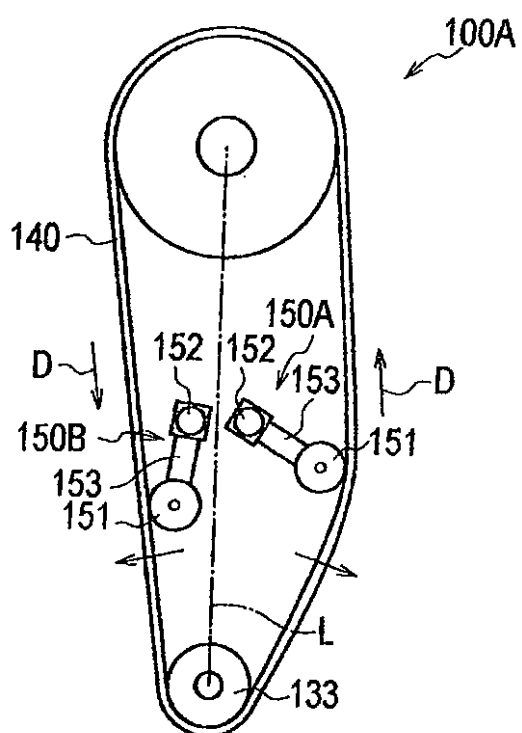


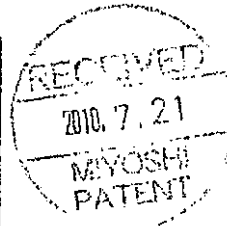
FIG. 7



PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To: MIYOSHI, Hidekazu Toranomon Tower, 2-8, Toranomon 1-chome, Minato-ku, Tokyo 1050001 Japan	Kotohira
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PCT

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

Date of mailing (day/month/year)	20.07.2010
-------------------------------------	------------

Applicant's or agent's file reference JUN-085-PCT	FOR FURTHER ACTION See paragraph 2 below
---	--

International application No. PCT/JP2010/053745	International filing date (day/month/year) 02.03.2010	Priority date (day/month/year) 02.03.2009
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International Patent Classification (IPC) or both national classification and IPC Int.Cl. A61F13/15 (2006.01) i, A61F13/49 (2006.01) i

Applicant UNICHARM CORPORATION
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1. This opinion contains indications relating to the following items: ☒ Box No. I Basis of the opinion ☐ Box No. II Priority ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability ☐ Box No. IV Lack of unity of invention ☒ 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 ☐ Box No. VI Certain documents cited ☐ Box No. VII Certain defects in the international application ☐ 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		05.07.2010	
Name and mailing address of the ISA/JP Japan Patent Office 3-4-3, Kasumigaseki, Chiyoda-ku, Tokyo 100-8915, Japan	Authorized officer Atsushi MORIFUJI Telephone No. +81-3-3581-1101 Ext. 3320	3B	9 2 4 8

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/JP2010/053745

Box No. I	Basis of this opinion
1.	With regard to the language, this opinion has been established 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)).
2.	☐ This opinion has been established taking into account the rectification of an obvious mistake authorized by or notified to this Authority under Rule 91 (Rule 43 <i>bis</i>.1(b)).
3.	With regard to any nucleotide and/or amino acid sequence disclosed in the international application, this opinion has been established on the basis of a sequence listing filed or furnished: a. (means) ☐ on paper ☐ in electronic form b. (time) ☐ in the international application as filed ☐ together with the international application in electronic form ☐ subsequently to this Authority for the purposes of search
4.	☐ 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/JP2010/053745

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 1-7	YES
	Claims	NO
Inventive step (IS)	Claims	YES
	Claims 1-7	NO
Industrial applicability (IA)	Claims 1-7	YES
	Claims	NO

2. Citations and explanations:

D1: WO 2008/126748 A1 (UNI-CHARM CORPORATION) 2008.10.23,
Paragraphs [0033], [0034], [0043]; Fig.3C
& JP 2008-253633 A & US 2010/0108268 A & EP 2135591 A1
& CN 101663007 A

D2: JP 2004-141636 A (UNI-CHARM CORPORATION) 2004.05.20,
Paragraphs [0034], [0039], [0040]; Fig.4
& US 2005/0148946 A1 & EP 1552798 A1 & WO 2004/019841 A1
& CA 2495256 A & BR 314415 A & TW 230599 B & CN 1678263 A
& AU 2003257552 B & KR 10-2005-0057055 A

D3: JP 8-14341 A (KUBOTA CORPORATION) 1996.01.16,
Paragraphs [0006], [0007], [0016] (No Family)

Claim 1, 6, 7:

The subject matters of claims 1, 6 and 7 do not involve an inventive step over D1 and D2 for the following reasons.

D1 discloses a joining apparatus for joining two or more layers, comprising: an ultrasonic vibrating device(50) configured to apply ultrasonic vibration to a predetermined region(14) where the layers are to be joined; an anvil roller(30) facing the ultrasonic vibrating device, and including a protrusion(32) configured to press the predetermined region of the layers against the ultrasonic vibrating device, a motor(44) configured to rotate the anvil roller; a connector(i.e. "an endless belt 45") configured to connect the anvil roller and the motor and to be driven by the motor.

D1, however, failed to explicitly disclose said joining apparatus comprising a pressing mechanism configured to the connector in a direction transverse to a driving direction of the connector.

On the other hand, D2 discloses apparatus comprising: a pressing mechanism(42) configured to the connector(40) in a direction transverse to a driving direction of the connector, and the pressing mechanism constantly presses the connector.

The person skilled in the art would easily conceive the idea of employing a pressing mechanism as described in D2 for said a joining apparatus disclosed in D1.

(Continued in the Supplemental Box)

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/JP2010/053745

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

Claim 2:

The subject matter of claim 2 does not involve an inventive step over D1, D2 and D3 for the following reasons.

D1 failed to disclose the technical feature described in claims 2 in the present application.

On the other hand, D3 discloses a pressing mechanism(7) including a moving portion(12) configured to move the rotating portion in the transverse direction.

The person skilled in the art would easily conceive the idea of employing a pressing mechanism as described in D3 for said a joining apparatus disclosed in D1.

Claim 3-5:

The subject matters of claims 3-5 do not involve an inventive step over D1, D2 and D3 for the following reasons.

The constituent features identified claims 3-5 are mere workshop modification.

PATENT COOPERATION TREATY PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)



Applicant's or agent's file reference JUN-085-PCT	FOR FURTHER ACTION see Form PCT/ISA/220 as well as, where applicable, item 5 below.	
International application No. PCT/JP2010/053745	International filing date(day/month/year) 02.03.2010	(Earliest) Priority Date (day/month/year) 02.03.2009
Applicant 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. 3

☒ 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/JP2010/053745

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 Published examined utility model applications of Japan 1921-1930 Published unexamined utility model applications of Japan 1971-2010 Registered utility model specifications of Japan 1996-2010 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	WO 2008/126748 A1 (UNI-CHARM CORPORATION) 2008.10.23, Paragraphs [0033], [0034], [0043]; Fig. 3C & JP 2008-253633 A & US 2010/0108268 A & EP 2135591 A1 & CN 101663007 A	1-7
Y	JP 2004-141636 A (UNI-CHARM COPRORATION) 2004.05.20, Paragraphs [0034], [0039], [0040]; Fig. 4 & US 2005/0148946 A1 & EP 1552798 A1 & WO 2004/019841 A1 & CA 2495256 A & BR 314415 A & TW 230599 B & CN 1678263 A & AU 2003257552 B & KR 10-2005-0057055 A	1-7
☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "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) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "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 "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 "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 "&" document member of the same patent family		
Date of the actual completion of the international search		Date of mailing of the international search report
05.07.2010		20.07.2010
Name and mailing address of the ISA/JP		Authorized officer
Japan Patent Office		Atsushi MORIFUJI
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/JP2010/053745

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 8-14341 A (KUBOTA CORPORATION) 1996.01.16, Paragraphs [0006] , [0007] , [0016] (No Family)	2-5

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-choime,
Minato-ku, Tokyo
1050001
JAPON

Date of mailing (day/month/year) 07 July 2011 (07.07.2011)		IMPORTANT NOTICE	
Applicant's or agent's file reference JUN-085-PCT			
International application No. PCT/JP2010/053745	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			

1. **ATTENTION:** For any designated Office(s), for which the time limit under Article 22(1), as in force from 1 April 2002 (30 months from the priority date), **does not apply**, please see Form PCT/IB/308(First Notice) issued previously.
2. Notice is hereby given that the following designated Office(s), for which the time limit under Article 22(1), as in force from 1 April 2002, **does apply**, has/have requested that the communication of the international application, as provided for in Article 20, be effected under Rule 93bis.1. The International Bureau has effected that communication on the date indicated below:
10 September 2010 (10.09.2010)

AU, AZ, BY, CN, CO, DZ, EP, HU, KG, KP, KR, MD, MK, MY, MZ, NA, NG, PG, RU, SY, TM, US

In accordance with Rule 47.1(c-bis)(i), those Offices will accept the present notice as conclusive evidence that the communication of the international application has duly taken place on the date of mailing indicated above and no copy of the international application is required to be furnished by the applicant to the designated Office(s).

3. The following designated Offices, for which the time limit under Article 22(1), as in force from 1 April 2002, **does apply**, have not requested, as at the time of mailing of the present notice, that the communication of the international application be effected under Rule 93bis.1 :

AE, AG, AL, AM, AO, AP, AT, BA, BB, BG, BH, BR, BW, BZ, CA, CH, CL, CR, CU, CZ, DE, DK, DM, DO, EA, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, ID, IL, IN, IS, KE, KM, KN, KZ, LA, LC, LK, LR, LS, LT, LY, MA, ME, MG, MN, MW, MX, NI, NO, NZ, OA, OM, PE, PH, PL, PT, RO, RS, SC, SD, SE, SG, SK, SL, SM, ST, SV, TH, TJ, TN, TR, TT, UA, UZ, VC, VN, ZA, ZM, ZW

In accordance with Rule 47.1(c-bis)(ii), those Offices accept the present notice as conclusive evidence that the Contracting State for which that Office acts as a designated Office does not require the furnishing, under Article 22, by the applicant of a copy of the international application.

4. **TIME LIMITS** for entry into the national phase

For the designated or elected Office(s) listed above, the applicable time limit for entering the national phase will, **subject to what is said in the following paragraph**, be **30 MONTHS** from the priority date.

In practice, time limits other than the 30-month time limit will continue to apply, for various periods of time, in respect of certain of the designated or elected Office(s) listed above. For regular updates on the applicable time limits (30 or 31 months, or other time limit), Office by Office, refer to the *PCT Gazette*, the *PCT Newsletter* and the *PCT Applicant's Guide*, Volume II, National Chapters, all available from WIPO's Internet site, at <http://www.wipo.int/pct/en/index.html>.

It is the applicant's sole responsibility to monitor all these time limits.

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer Gijsbertus Beijer
Facsimile No. +41 22 338 02 70	e-mail: pi07.pct@wipo.int

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION CONCERNING
SUBMISSION OR TRANSMITTAL
OF PRIORITY DOCUMENT

(PCT Administrative Instructions, Section 411)

To:

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

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Applicant UNICHARM CORPORATION et al	

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The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Authorized officer

Yoshiko Kuwahara

e-mail PT07.PCT@WIPO.INT

Telephone No. +41 22 338 74 07

Facsimile No. +41 22 338 82 70

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(71) Applicant (for all designated States except US):
UNICHARM CORPORATION [JP/JP]; 182, Shimobun, Kinsei-cho, Shikokuchuo-shi, Ehime, 7990111 (JP).

(72) Inventor; and

(75) Inventor/Applicant (for US only): YAMAMOTO, Hiroki [JP/JP]; c/o Technical Center of UNICHARM CORPORATION, 1531-7, Wadahama, Toyohama-cho, Kanonji-shi, Kagawa, 7691602 (JP).

(74) Agents: MIYOSHI, Hidekazu et al.; Toranomon Kotohira Tower, 2-8, Toranomon 1-chome, Minato-ku, Tokyo, 1050001 (JP).

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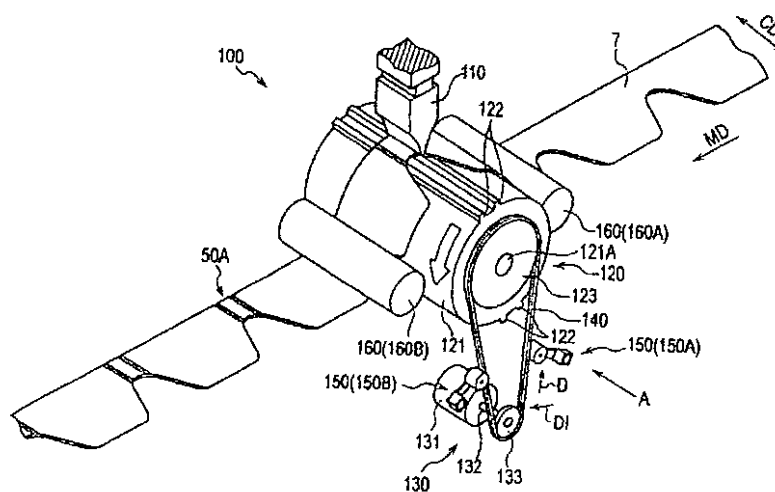
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(54) Title: JOINING APPARATUS AND METHOD OF MANUFACTURING ABSORBENT ARTICLE

FIG. 3



(57) Abstract: The method 100 includes an ultrasonic vibrating device 110 configured to apply ultrasonic vibration to the predetermined region 50A, an anvil roller 120 facing the ultrasonic vibrating device 110 with the superimposed continua of the front waistline portions and the back waistline portions interposed therebetween, and including a protrusion 122 configured to press the continua in the predetermined region 50A between the anvil roller 120 and the ultrasonic vibrating device 110, a motor 130 configured to rotate the anvil roller 120, a belt 140 configured to connect the anvil roller 120 and the motor 130 and to be driven by the motor 130, and a pressing mechanism 150 configured to press the belt 140 in a cross direction perpendicular to a driving direction of the belt 140.

DESCRIPTION**Title of Invention**

JOINING APPARATUS AND METHOD OF MANUFACTURING ABSORBENT

5 ARTICLE

Technical Field

The present disclosure relates to a joining apparatus
for joining two or more superimposed layers, and a method of
10 manufacturing an absorbent article.

Background Art

An absorbent article, such as a pants-type disposable
diaper, includes: a front waistline portion to be fitted to
15 the front waist of a wearer; a back waistline portion to be
fitted to the back waist of the wearer; and a crotch portion
to be fitted to the crotch of the wearer. Here,
leg-surrounding regions into which the legs of the wearer are
inserted are formed at both sides of the crotch portion.

20 The front waistline portion and the back waistline
portion are joined to each other in a region extending from
an edge portion of a waist opening to be fit around the body
of the wearer to each leg-surrounding region. Japanese Patent
Application Publication No. Hei 5-15551 discloses a technique
25 of joining a web in predetermined regions thereof, where joint
portions of the front waistline portion and the back waistline
portion are to be formed, by causing a joining apparatus to
apply ultrasonic vibration to the predetermined regions (for
example, see PTL 1).

In general, the joining apparatus includes: an ultrasonic vibrating device applying ultrasonic vibration to the predetermined regions of continua of diaper components under conveyance; an anvil roller including protrusions for pressing the continua in the predetermined regions between the anvil roller and the ultrasonic vibrating device; a motor rotating the anvil roller; and a belt (connector) connecting the anvil roller and the motor.

In the joining apparatus with the aforementioned configuration, the driving of the motor in association with the conveyance of the continua rotates the anvil roller via the belt. Then, an ultrasonic horn provided in the ultrasonic vibrating device and one of the protrusions of the anvil roller work together to nip the continua in each predetermined region at a certain interval (i.e., the interval corresponding to a distance between each adjacent predetermined regions). Thereby, the continua in the predetermined region are subjected to ultrasonic vibration and joined.

The inventors have discovered that, in the known joining apparatus mentioned above, while the motor keeps driving the belt to rotate the anvil roller, the rotational speed of the anvil roller is reduced temporarily when the ultrasonic horn of the ultrasonic vibrating device comes in contact with each protrusion of the anvil roller. This induces a problem of loosening the belt between the motor and the anvil roller, and thus causing the belt to run off the anvil roller or the motor.

Moreover, the rotational speed of the anvil roller is changed drastically when the ultrasonic horn comes in contact with the protrusion. This results in a non-uniform joining

in the predetermined regions, that is, a non-uniform joining in the joint portions of the front waistline portion and the back waistline portion.

It is desirable to provide a joining apparatus and a
5 method of manufacturing absorbent articles which are capable of achieving a more uniform joining in predetermined regions thereof, where joint portions of a front waistline portion and a back waistline portion are to be formed, and of reliably preventing a connector such as a belt from running off an anvil
10 roller or a motor, in a case where the anvil roller and the motor are connected to each other via the connector.

Citation List

15 Patent Literature

PTL 1: Japanese Patent Application Publication No. Hei 5-15551 (pages 2 and 3, and Fig. 4)

Summary

20 To solve the above-described problem, the present invention has the following aspects. An aspect of the present invention provides a joining apparatus which is used for manufacturing an absorbent article and which joins a continuum of front waistline portions and a continuum of back waistline
25 portions in a predetermined region, where a joint portion of each of the front waistline portions and each of the back waistline portions is to be formed, after the continuum of the front waistline portions and the continuum of the back waistline portions continuously fed are superimposed, the

continua being prepared to form an absorbent article. The joining apparatus includes an ultrasonic vibrating device configured to apply ultrasonic vibration to the predetermined region, an anvil roller facing the ultrasonic vibrating device
5 with the superimposed continua of the front waistline portions and the back waistline portions interposed therebetween, and including a protrusion configured to press the continua in the predetermined region between the anvil roller and the ultrasonic vibrating device, a motor configured to rotate the
10 anvil roller, a connector configured to connect the anvil roller and the motor and to be driven by the motor, and a pressing mechanism configured to press the connector in a cross direction perpendicular to a driving direction of the connector.

15 The aspect of the present invention can provide a joining apparatus and a method of manufacturing an absorbent article which are capable of achieving a more uniform joining in predetermined regions thereof, where joint portions of a front waistline portion and a back waistline portion are to be formed,
20 and of reliably preventing a connector such as a belt from running off an anvil roller or a motor, in a case where the anvil roller and the motor are connected to each other via the connector.

25 Brief Description of Drawings

[Fig. 1] Fig. 1 is a partially cutaway, perspective view of an absorbent article according to one or more embodiments.

[Fig. 2] Fig. 2 is a diagram for explaining a relevant part of a method of manufacturing absorbent articles according to

one or more embodiments.

[Fig. 3] Fig. 3 is a perspective view of a joining apparatus according to one or more embodiments.

[Fig. 4] Fig. 4 is a side view of the joining apparatus of FIG.

5 3.

[Fig. 5] Fig. 5 is an enlarged perspective view of pressing mechanisms according to one or more embodiments.

[Fig. 6] Parts (a) and (b) of Fig. 6 are schematic views of an anvil-side pulley and the pressing mechanisms in different
10 positions according to one or more embodiments.

[Fig. 7] Fig. 7 is a schematic view of an anvil roller and pressing mechanisms of a joining apparatus according to a modified example.

15 Detailed Description

Hereinafter, a joining apparatus and a method of manufacturing absorbent articles according to one or more embodiments of the present invention will be described with reference to the accompanying drawings. Note that, in the
20 following description of the drawings, same or similar reference signs denote same or similar 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
25 determined in consideration of the following description. Moreover, the drawings do not necessarily reflect the real-life dimensional relationships and ratios of components.

Firstly, a configuration of an absorbent article 1 according to one or more embodiments will be explained with

reference to Fig. 1 which is a partially cutaway perspective of the absorbent article 1. In this particularly illustrated embodiment, the absorbent article 1 is a disposable pants-type diaper for adults.

5 As shown in Fig. 1, the absorbent article 1 mainly includes a top sheet 2, a back sheet 3, an absorber 4 and a waterproof sheet 5.

The top sheet 2 is adapted to come into contact with the skin of a person to wear the absorbent article 1 (hereinafter,
10 "wearer"). The top sheet 2 is made of a liquid permeable sheet such as a nonwoven fabric or perforated plastic film. The back sheet 3 is provided outside the top sheet 2 (on a side facing away from the wearer). The back sheet 3 is made of a nonwoven fabric or the like.

15 The absorber 4 is provided between the top sheet 2 and the back sheet 3, for absorbing excretion discharged from the wearer. The absorber 4 is made of a mixture of ground pulp and superabsorbent polymer particles, or the like. The waterproof sheet 5 is provided between the back sheet 3 and
20 the absorber 4, for blocking the permeation of the excretion from the wearer to the outside of the absorbent article 1. The waterproof sheet 5 is made of a liquid impermeable sheet.

The absorbent article 1 thus configured includes, in combination, a front waistline portion 10 to be fitted to the
25 front waist of a wearer, a back waistline portion 20 to be fitted to the back waist of the wearer, and a crotch portion 30 to be fitted to the crotch of the wearer. Incidentally, leg-surrounding openings 40 into which the legs of the wearer are inserted are formed at both sides of the crotch portion

30.

The front waistline portion 10 and the back waistline portion 20 are joined together by joint portions 50, and thereby form a waist opening 60 to be fit around the body of the wearer.

5 A waist gather 6A made of a stretchable rubber strand or the like is provided to an entire peripheral edge of the front waistline portion 10 and the back waistline portion 20.

For example, to make the front waistline portion 10 and the back waistline portion 20 stretchable in the cross
10 direction perpendicular to the front-to-back direction from the front waistline portion 10 toward the back waistline portion 20, the front waistline portion 10 and the back waistline portion 20 may be provided with the waist gather 6A, or may themselves be made of a stretchable sheet.

15 The crotch portion 30 is provided between the front waistline portion 10 and the back waistline portion 20. Leg gathers 6B made of stretchable rubber strands or the like are provided on both sides of the crotch portion.

For example, to make the crotch portion 30 stretchable
20 in the leg-encircling direction of the absorbent article 1, the crotch portion 30 may be provided with the leg gathers 6B, or may itself be made of a stretchable sheet.

Secondly, a method of manufacturing absorbent articles according to one or more embodiments will be explained with
25 reference to Fig. 2 which is a diagram for explaining a relevant part of the absorbent article manufacturing method.

As shown in Fig. 2, the method of manufacturing absorbent articles includes at least a waistline forming step S1, an absorber transferring step S2, a leg-surrounding opening

forming step S3, a folding step S4, a joining step S5 and a cutting step S6.

In the waistline forming step S1, gathers (a waist gather 6A and/or a leg gather 6B) are placed between a web 7A and a web 7B, and thereby a web 7 prepared to form the front waistline portion 10 and the back waistline portion 20 is formed.

Note that the web 7 (webs 7A, 7B) during conveyance is stretchable in a cross direction CD (width direction) perpendicular to a conveyance direction MD (machine direction) of the web 7. In addition, the web 7 is asymmetrical with respect to a center line CL that bisects a width in the cross direction CD of the web 7 and extends in the conveyance direction MD of the web 7.

In the absorber transferring step S2, a crotch portion member 30A to form the crotch portion 30 is transferred onto the web 7, more specifically, between the front waistline portion 10 and the back waistline portion 20 after the waistline forming step S1. Here, the crotch portion member 30A includes the back sheet 3 and the absorber 4.

In the leg-surrounding opening forming step S3, the leg-surrounding openings 40 (so-called leg holes) are formed by cutting the web 7 (webs 7A, 7B) after the absorber transferring step S2. Here, the formation of the leg-surrounding opening 40 does not necessarily involve cutting only the web 7A and the web 7B, but may involve cutting, together with the web 7A and the web 7B, the back sheet 3 constituting the crotch portion member 30A.

Note that the absorber transferring step S2 and the leg-surrounding forming step S3 may be performed in the reverse

order.

In the folding step S4, the web 7 is folded into two parts along a folding line extending in the conveyance direction MD of the web 7 by bringing a side edge 10A of the front waistline portion 10 toward a side edge 20A of the back waistline portion 20, after the leg-surrounding opening forming step S3.

Note that, in this particularly illustrated embodiment, the folding line is the center line CL. However, the folding line is not necessarily the center line CL, and may be shifted from the center line CL toward either of the first side edge 10A and the second side edge 20A.

In the joining step S5, a joining apparatus 100 to be described later applies ultrasonic treatment after the folding step S4 to predetermined regions 50A of the folded web 7, that is, to the predetermined regions 50A where the joint portions 50 of the front waistline portion 10 and the back waistline portion 20 are to be formed. Thereby, the web 7 in the predetermined regions 50A is joined. The predetermined region 50A extends, in the conveyance direction MD, across an imaginary line SL that extends in the cross direction CD and represents a to-be-cut line of the web 7.

In the cutting step S6, the web 7 joined in the predetermined regions 50A is cut along the imaginary lines SL after the joining step S5. Thereby, the absorbent article 1 is manufactured.

Next, a configuration of the joining apparatus 100 used in the joining step S5 described above will be explained with reference to Figs. 3-5. Fig. 3 is a perspective view of the joining apparatus 100 according to one or more embodiments.

Fig. 4 is a side view (as seen in the direction of an arrow A of Fig. 3) of the joining apparatus 100 of Fig. 3. Fig. 5 is an enlarged perspective view of pressing mechanisms 150 according to one or more embodiments.

5 As shown in Figs. 3 to 5, the joining apparatus 100 is used for manufacturing the absorbent article 1, and joins a continuum of the front waistline portions 10 and a continuum of the back waistline portions 20 in the predetermined regions 50A, where the joint portions 50 of the front waistline portion
10 10 and the back waistline portion 20 are to be formed, after these continua continuously fed are superimposed. Hereinafter, the continuum of the front waistline portions 10 and the continuum of the back waistline portions 20 are collectively and simply called the "web 7."

15 To be more specific, the joining apparatus 100 includes an ultrasonic vibrating device 110, an anvil roller 120, a motor 130, a belt 140 (connector), the pressing mechanisms 150 and guide rollers 160.

The ultrasonic vibrating device 110 works with one of
20 protrusions 122 of the anvil roller 120 to be described later to nip the web 7 in each predetermined region 50A, and thus applies ultrasonic vibration to the predetermined region 50A. The ultrasonic vibrating device 110 includes an ultrasonic vibrator 111, a booster 112 and an ultrasonic horn 113.

25 The ultrasonic vibrator 111 provides ultrasonic vibration to the ultrasonic horn 113 via the booster 112. Here, the ultrasonic vibrator 111 is connected to the booster 112.

The booster 112 amplifies the ultrasonic vibration provided by the ultrasonic vibrator 111. The booster 112 is

fixed to a pressurizing arm 114 which adjusts the height of the ultrasonic horn 113. The booster 112 transmits the amplified ultrasonic vibration to the ultrasonic horn 113.

The ultrasonic horn 113 presses the web 7 in each predetermined region 50A against the anvil roller 120, and applies the ultrasonic vibration to the predetermined region 50A. In other words, the ultrasonic horn 113 works with one of the protrusions 122 of the anvil roller 120 to nip the web 7 in each predetermined region 50A. The ultrasonic horn 113 is connected to the pressurizing arm 114 via the booster 112.

The anvil roller 120 conveys the web 7 in the conveyance direction MD while supporting the web 7. The anvil roller 120 faces the ultrasonic vibrating device 110 with the web 7 interposed therebetween. The anvil roller 120 includes an anvil main body 121 and the protrusions 122.

The anvil main body 121 is in the form of a cylinder, and rotates about its central shaft 121A in the conveyance direction MD. On one end face of the anvil main body 121, an anvil-side pulley 123 is provided which is fixed to the central shaft 121A and around which the belt 140 is trained. Thus, the anvil-side pulley 123 rotates at the same speed as the anvil main body 121.

Each protrusion 122 protrudes from the anvil main body 121 outward in the radial direction of the anvil main body 121. The protrusion 122 presses the web 7 in each predetermined region 50A against the ultrasonic vibrating device 110 (ultrasonic horn 113). In other words, in each predetermined region 50A, the protrusion 122 works with the ultrasonic vibrating device 110 to nip the web 7.

The motor 130 rotates the anvil roller 120. The motor 130 is arranged at the anvil roller 120 side of the web 7 (under the anvil roller 120 in the drawings), and is arranged farther from the web 7 than the anvil roller 120. The motor 130 includes
5 a motor main body 131 and a rotational shaft 132. The motor main body 131 includes: a rotor (not shown) rotating about its axis; a stator (not shown) working with the rotor to generate torque; and a bearing (not shown) supporting the rotational shaft 132.

10 The rotational shaft 132 transmits the rotation of the rotor to the outside, i.e., to the belt 140. On one end of the rotational shaft 132, a motor-side pulley 133 is provided which is fixed to the rotational shaft 132 and around which the belt 140 is trained. Thus, the motor-side pulley 133
15 rotates at the same speed as the rotational shaft 132 by the rotation of the rotational shaft 132.

The belt 140 is an endless belt. The belt 140 connects the anvil roller 120 (anvil-side pulley 123) and the motor 130 (motor-side pulley 133), and is driven by the motor 130.
20 Thereby, the belt 140 can transmit the rotation of the motor 130 to the anvil roller 120.

The pressing mechanisms 150 constantly press the belt 140 in respective directions transverse to a driving direction D of the belt 140, e.g., in cross directions DI each
25 perpendicular to the driving direction D of the belt 140. When seen in the axial direction of the anvil roller 120 (see Fig. 4), the pressing mechanisms 150 each press the belt 140 toward an imaginary line L connecting the center of the central shaft 121A of the anvil roller 120 and the center of the rotational

shaft 132 of the motor 130. In other words, the pressing mechanisms 150 press the belt 140 inward from the outer side of the belt 140.

The pressing mechanisms 150 include a first pressing mechanism 150A and a second pressing mechanism 150B. The first pressing mechanism 150A is arranged to abut on the belt 140 in a region where the belt 140 moves from the motor 130 to the anvil roller 120 in the driving direction D. The second pressing mechanism 150B is arranged to abut on the belt 140 in a region where the belt 140 moves from the anvil roller 120 to the motor 130 in the driving direction D.

The pressing mechanisms 150 (first and second pressing mechanisms 150A and 150B) each include a rotating portion 151, a moving portion 152 and an arm 153. The rotating portion 151 abuts on the belt 140, and is rotated with the rotation of the belt 140 about a shaft (unnumbered) provided to the arm 153. The rotating portion 151 is connected to the moving portion 152 with the arm 153 interposed therebetween. The moving portion 152 is a general suspension unit which moves (for example, biases) the rotating portion 151 in the corresponding cross direction DI. The rotating portion 151 and the arm 153 rotate about the moving portion 152.

The pressing mechanism 150 (the first and second pressing mechanism 150A and 150B) presses such that the belt 140 is located closer to the imaginary line L than a tangent line common to the anvil-side pulley 123 and the motor-side pulley 133.

The guide rollers 160 support the web 7, and change the conveyance direction MD of the web 7. The guide rollers 160

include a first guide roller 160A and a second guide roller 160B. The first guide roller 160A guides the web 7 between the anvil roller 120 and the ultrasonic horn 113. The second guide roller 160B guides part of the web 7, the predetermined region 50A of which has been subjected to ultrasonic vibration, to the next process.

Hereinafter, an operation of the joining apparatus 100 according to one or more embodiments will be briefly described with reference to Figs. 3 to 6. Parts (a) and (b) of Fig. 6 are schematic views of the anvil roller 120 and the pressing mechanisms 150 in different positions according to one or more embodiments.

As shown in Figs. 3 to 6, in the joining apparatus 100, the anvil roller 120 rotates in association with the conveyance of the web 7. To put it differently, the driving of the motor 130 rotates the anvil roller 120 via the belt 140. In this event, the rotating portion 151 of each pressing mechanism 150 is moved (biased) by the corresponding moving portion 152 in the corresponding cross direction DI, and thereby presses the belt 140 in the cross direction DI. Hereinafter, an operation of the first and second pressing mechanisms 150A and 150B will be briefly described.

Firstly, on the one hand, the contact between the ultrasonic horn 113 and each protrusion 122 with the web 7 interposed therebetween loosens the belt 140 in a portion where the belt 140 moves from the motor 130 to the anvil roller 120 in the driving direction D (see part (b) of Fig. 6). In this state, the rotating portion 151 of the first pressing mechanism 150A is moved closer to the imaginary line L than in a normal

state where the ultrasonic horn 113 and the protrusion 122 are not in contact with each other (see part (a) of Fig. 6). Accordingly, the first pressing mechanism 150A presses the belt 140 toward the imaginary line L, and is thus capable of
5 keeping constant the tension of the belt 140.

Further, the release of the contact between the ultrasonic horn 113 and the protrusion 122 tightens the belt 140 in the portion where the belt 140 moves from the motor 130 to the anvil roller 120 in the driving direction D (see part
10 (a) of Fig. 6). In this state, the rotating portion 151 of the first pressing mechanism 150A is moved farther from the imaginary line L than in the state where the ultrasonic horn 113 and the protrusion 122 are in contact with each other (see part (b) of Fig. 6). Accordingly, the first pressing mechanism
15 150A returns to a state prior to the pressing of the belt 140. The first pressing mechanism 150A moves into a state that it is attached to the belt 140.

On the other hand, the contact between the ultrasonic horn 113 and the protrusion 122 tightens the belt 140 in a
20 portion where the belt 140 moves from the anvil roller 120 to the motor 130 in the driving direction D (see part (b) of Fig. 6). In this state, the rotating portion 151 of the second pressing mechanism 150B is moved farther from the imaginary line L than in the normal state (see part (a) of Fig. 6).
25 Accordingly, the second pressing mechanism 150B is in a state prior to the pressing of the belt 140. The second pressing mechanism 150B moves into a state that it is attached to the belt 140.

Further, the release of the contact between the

ultrasonic horn 113 and the protrusion 122 loosens the belt 140 in the portion where the belt 140 moves from the anvil roller 120 to the motor 130 in the driving direction D (see part (a) of Fig. 6). In this state, the rotating portion 151 of the second pressing mechanism 150B is moved closer to the imaginary line L than the state where the ultrasonic horn 113 and the protrusion 122 are in contact with each other (see part (b) of Fig. 6). Accordingly, the second pressing mechanism 150B presses the belt 140 toward the imaginary line L, and is thus capable of keeping constant the tension of the belt 140.

In the above configuration, the ultrasonic horn 113 and one of the protrusions 122 work together to nip the web 7 in each predetermined region 50A at a certain interval (i.e., the interval corresponding to a distance between each adjacent predetermined regions 50A). Thereby, the ultrasonic horn 113 applies ultrasonic vibration generated by the ultrasonic vibrator 111 to the predetermined region 50A. In this manner, the web 7 in the predetermined regions 50A, where the joint portions 50 of the front waistline portion 10 and the back waistline portion 20 are to be formed, is subjected to ultrasonic vibration and joined.

In the joining apparatus 100 and the method of manufacturing absorbent articles according to the embodiment(s) having been described thus far, the pressing mechanisms 150 press the belt 140 in the respective cross directions DI each perpendicular to the driving direction D of the belt 140. This prevents the belt 140 from being loosened between the motor 130 and the anvil roller 120 when the ultrasonic horn 113 comes in contact with each protrusion 122

and, thereby, preventing the rotational speed of the anvil roller 120 from being temporarily reduced when the horn-protrusion contact occurs. Moreover, this prevents the rotational speed of the anvil roller 120 from being changed drastically when the ultrasonic horn 113 comes in contact with the protrusion 122. These effects make it possible to keep the belt 140 tensioned.

Therefore, it is possible to keep the belt 140 being tensioned, to join the predetermined regions 50A in the conveyance direction of the web 7 at a certain interval, and to surly prevent the belt 140 from running off the anvil roller 120 and the motor 130.

The inventors are aware of a known technique in which a shaft (similar to shaft 121A) coupled to the anvil-side pulley 123 is provided with a rubber material interposed between the shaft and the anvil-side pulley 123, in order to cushion the impact of the contact between the ultrasonic horn 113 and each protrusion 122 and to prevent, if at all possible, the belt 140 from running off the anvil roller 120 or the motor 130. However, this technique is not suited to finely control the torque of the anvil roller 120. To cope with this, the anvil roller 120 is rotated via the belt 140 in this embodiment. Accordingly, the torque of the anvil roller 120 can be finely controlled.

In the joining apparatus 100 and the method of manufacturing absorbent articles according to the disclosed embodiment(s), the pressing mechanisms 150 constantly press the belt 140 from the first pressing mechanism 150A and/or the second pressing mechanism 150B. In other words, each moving

portion 152 constantly biases the corresponding rotating portion 151 in the corresponding cross direction DI.

Accordingly, the pressing mechanisms 150 constantly press the belt 140 in the respective cross directions DI regardless of whether the rotation of the anvil roller 120 is reduced. This arrangement makes it possible to keep the belt 140 tensioned and to more reliably prevent the belt 140 from running off the anvil roller 120 or the motor 130.

In the joining apparatus 100 and the method of manufacturing absorbent articles according to the disclosed embodiment(s), the pressing mechanisms 150 are arranged to abut on the belt 140 in the region where the belt 140 moves from the motor 130 to the anvil roller 120 in the driving direction D and the region where the belt 140 moves from the anvil roller 120 to the motor 130 in the driving direction D, respectively. With this arrangement, the pressing mechanisms 150 press the belt 140 in the respective cross directions DI in these regions where the belt 140 is likely to be loosened. As a result, the belt 140 can be kept tensioned reliably.

In the joining apparatus 100 and the method of manufacturing absorbent articles according to the disclosed embodiment(s), the pressing mechanisms 150 each press the belt 140 toward the imaginary line L, as seen in the axial direction of the anvil roller 120 (see Fig. 4). In other words, the pressing mechanisms 150 press the belt 140 inward from the outer side of the belt 140. Such a way of pressing the belt 140 makes the belt 140 more likely to be trained around the anvil-side pulley 123 or the motor-side pulley 133 than a way in which the pressing mechanisms 150 press the belt 140 outward from

the inner side of the belt 140. Thus, the belt 140 can be more reliably prevented from running off the anvil roller 120 or the motor 130.

In the joining apparatus 100 and the method of manufacturing absorbent articles according to the disclosed embodiment(s), the pressing mechanisms 150 include the first pressing mechanism 150A and the second pressing mechanism 150B. This enables the belt 140 to rotate while the looseness of the belt 140 is more suppressed on each of the first pressing mechanism 150A side and the second pressing mechanism 150B side, than a case where only one of the first and second pressing mechanisms 150A and 150B is arranged. This arrangement reduces the looseness degree of the belt 140, i.e., how much the belt 140 is loosened. As a result, the belt 140 can be more reliably prevented from running off the anvil roller 120 or the motor 130.

Note that, both of the first and second pressing mechanisms 150A and 150B are not necessarily provided. For example, only one of the first and second pressing mechanisms 150A and 150B may be provided instead. In this case, it is particularly preferable to choose the second pressing mechanism 150B with which the belt 140 is more likely to be kept tensioned. It is however within the scope of the invention to provide only the first pressing mechanism 150B.

Thus, one or more of the aspects disclosed above can provide a joining apparatus and a method of manufacturing absorbent articles which are capable of achieving a more uniform joining in predetermined regions, where joint portions of a front waistline portion and a back waistline portion are

to be formed, and reliably preventing a connector, such as a belt, from running off an anvil roller or a motor, where the anvil roller and the motor are connected to each other via the connector.

5

Modified Examples

The joining apparatus 100 according to the foregoing description may be modified in the following manner. Fig. 7 is a schematic view of an anvil roller 120 and pressing mechanisms 150 of a joining apparatus 100A according to a modified example. Here, description will be provided mainly for differences from the foregoing description, with the same or similar reference signs denoting the same or similar elements.

15 In the joining apparatus 100 according to the foregoing description, the pressing mechanisms 150 press the belt 140 inward from the outer side of the belt 140. By contrast, in the joining apparatus 100A according to the modified example, the pressing mechanisms 150 press the belt 140 outward from the inner side of the belt 140, as shown in Fig. 7. To be more specific, as seen in the axial direction of the anvil roller 120, the pressing mechanisms 150 press the belt 140 in respective directions of moving away from the imaginary line L.

25 In Fig. 7, the first and second pressing mechanisms 150A and 150B are provided. Alternatively, for example, only one of the first and second pressing mechanisms 150A and 150B may be provided. In this case, it is particularly preferable to provide the second pressing mechanism 150B with which the belt

140 is more likely to be kept tensioned. It is however within the scope of the invention to provide only the first pressing mechanism 150B.

5 Further Embodiments

As described above, the details of several embodiments of the present invention have been exemplarily disclosed. It should not be understood that the description and drawings which constitute part of this disclosure limit the present
10 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 following additional embodiments can be envisaged. Specifically, the absorbent article 1 has been
15 described as including, in combination, the front waistline portion 10, the back waistline portion 20 and the crotch portion 30. The absorbent article 1 is not limited to this configuration, but may be formed entirely as a single unit. In this case, needless to say, a different method of
20 manufacturing an absorbent article is employed.

The joining apparatus in the foregoing description has been described as for joining front and rear waistline portions. However, the joining apparatus is not limited to such use. For example, the joining apparatus can be used to join together
25 any two or more layers, e.g., two separate webs, or two parts of the same web (e.g., folded web 7 after steps S4 in Fig.2) etc. The webs and/or web parts are not necessarily front and rear waistline portions of wearing articles, but can be any two or more components of such wearing articles. For example,

104

a waistline portion and an ear portion (for carrying a tape fastener) can be joined together by the joining apparatus in some embodiments.

In addition, the description has been provided for the joining apparatus 100 used in the manufacturing of pants-type disposable diapers. However, the joining apparatus 100 is not limited to such use. The joining apparatus 100 may be used to manufacture various products including open-type disposable diapers, sanitary napkins, panty liners, disposable gowns for medical use and disposable wearing articles for sports, for example.

Further, the belt 140 has been described as the connector. However, the connector is not limited to the belt 140. The connector may be any tensionable connector, e.g., a general chain. In this case, a sprocket or the like to engage with the chain is employed for each of the anvil-side pulley 123 and the motor-side pulley 133.

Furthermore, the pressing mechanisms 150 have been described as constantly pressing the belt 140 in the respective cross directions DI. However, the pressing mechanisms 150 are not limited to such a configuration.

Also, the moving portions 152 have been described as constantly biasing the respective rotating portions 151 in the respective cross directions DI. However, the moving portions 152 are not limited to such a configuration.

The rotating portions 151 have been described as being moved (biased) in the respective cross directions DI. However, the movements of the rotating portions 151 are not limited to such a configuration. For example, the moving portions 152

may be fixed, and the rotating portions 151 are biased, in a rotational movement around the moving portions 152, against the belt 140. Alternatively, the rotating portions 151 may be biased both in the respective cross directions DI (by the moving portions 152) and in the rotational movement around the moving portions 152.

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 Applications 2009-048436 (filed on March 2, 2009) and 2010-042135 (filed on February 26, 2010) are incorporated herein by reference.

Industrial Applicability

Therefore, according to the present invention, since it is possible to provide a joining apparatus and a method of manufacturing an absorbent article which are capable of achieving a more uniform joining in predetermined regions thereof, where joint portions of a front waistline portion and a back waistline portion are to be formed, and of reliably preventing a connector such as a belt from running off an anvil roller or a motor, in a case where the anvil roller and the motor are connected to each other via the connector, it is useful in manufacturing technology for absorbent articles.

Reference Signs List

- 1 absorbent article
- 2 top sheet
- 3 back sheet
- 5 4 absorber
- 5 waterproof sheet
- 6 gather
- 6A waist gather
- 6B leg gather
- 10 7, 7A, 7B web
- 10 front waistline portion
- 10A side edge
- 20 back waistline portion
- 20A side edge
- 15 30 crotch portion
- 40 leg-surrounding openings
- 50 joint portion
- 50A predetermined region
- 60 waist openings
- 20 100, 100A joining apparatus
- 110 ultrasonic vibrating device
- 111 ultrasonic vibrator
- 112 booster
- 113 ultrasonic horn
- 25 114 pressurizing arm
- 120 anvil roller
- 121 anvil main body
- 122 protrusion
- 123 anvil-side pulley

25

- 130 motor
- 131 motor main body
- 132 rotational shaft
- 133 motor-side pulley
- 5 140 belt (connector)
- 150 pressing mechanism
- 150A first pressing mechanism
- 150B second pressing mechanism
- 151 rotating portion
- 10 152 moving portion
- 153 arm
- 160 guide roller
- 160A first guide roller
- 160B second guide roller

15

CLAIMS

[Claim 1]

A joining apparatus for joining two or more layers, the
5 joining apparatus comprising:

an ultrasonic vibrating device configured to apply
ultrasonic vibration to a predetermined region where the layers
are to be joined;

an anvil roller facing the ultrasonic vibrating device,
10 and including a protrusion configured to press the
predetermined region of the layers against the ultrasonic
vibrating device;

a motor configured to rotate the anvil roller;

a connector configured to connect the anvil roller and
15 the motor and to be driven by the motor; and

a pressing mechanism configured to press the connector
in a direction transverse to a driving direction of the
connector.

20 [Claim 2]

The joining apparatus according to claim 1, wherein
the pressing mechanism includes:

a rotating portion configured to abut on the
connector and to be rotated in conjunction with the connector;
25 and

a moving portion configured to move the rotating
portion in the transverse direction.

[Claim 3]

The joining apparatus according to any one of claims 1 and 2, wherein the pressing mechanism is arranged in a region where the connector moves from the motor to the anvil roller
5 in the driving direction.

[Claim 4]

The joining apparatus according to any one of claims 1 to 3, wherein the pressing mechanism is arranged in a region
10 where the connector moves from the anvil roller to the motor in the driving direction.

[Claim 5]

The joining apparatus according to any one of claims 1 to 4, wherein the pressing mechanism is configured to press,
15 as seen in an axial direction of the anvil roller, the connector toward an imaginary line connecting a center of a rotational shaft of the anvil roller and a center of a rotational shaft of the motor.

20

[Claim 6]

The joining apparatus according to any one of claims 1 to 5, wherein the pressing mechanism constantly presses the connector.

25

[Claim 7]

A method of manufacturing an absorbent article having at least a front waistline portion and a back waistline portion, the method comprising the step of

causing a joining apparatus to join a continuum of the front waistline portions and a continuum of the back waistline portions in a predetermined region, where a joint portion of each of the front waistline portions and each of the back waistline portions is to be formed, after the continuum of the front waistline portions and the continuum of the back waistline portions continuously fed are superimposed, wherein the joining apparatus includes:

an ultrasonic vibrating device configured to apply ultrasonic vibration to the predetermined region;

an anvil roller facing the ultrasonic vibrating device with the superimposed continua of the front waistline portions and the back waistline portions interposed therebetween, and including a protrusion configured to press the continua in the predetermined region between the anvil roller and the ultrasonic vibrating device;

a motor configured to rotate the anvil roller;

a connector configured to connect the anvil roller and the motor and to be driven by the motor; and

a pressing mechanism configured to press the connector in a cross direction perpendicular to a driving direction of the connector.

FIG. 1

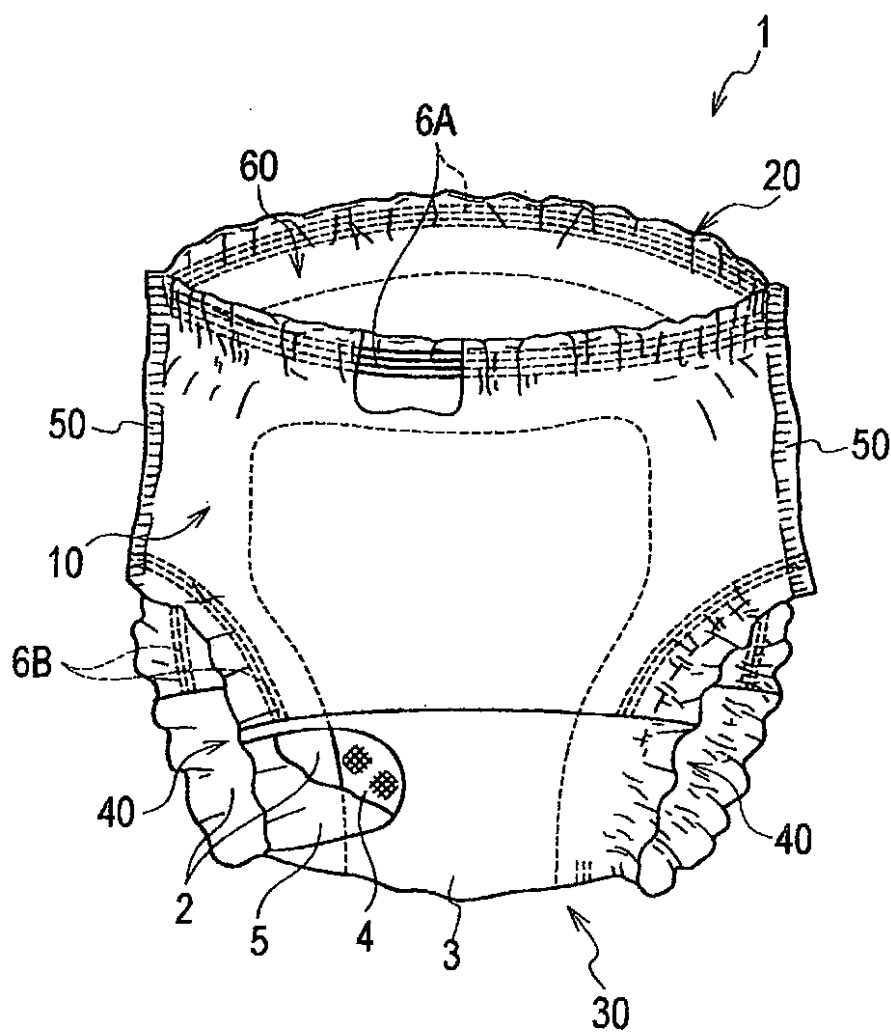


FIG. 2

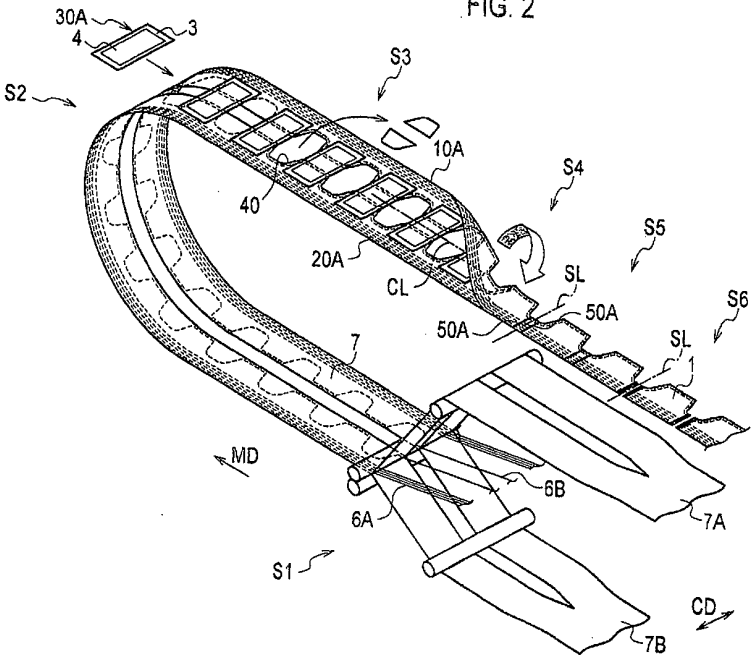


FIG. 3

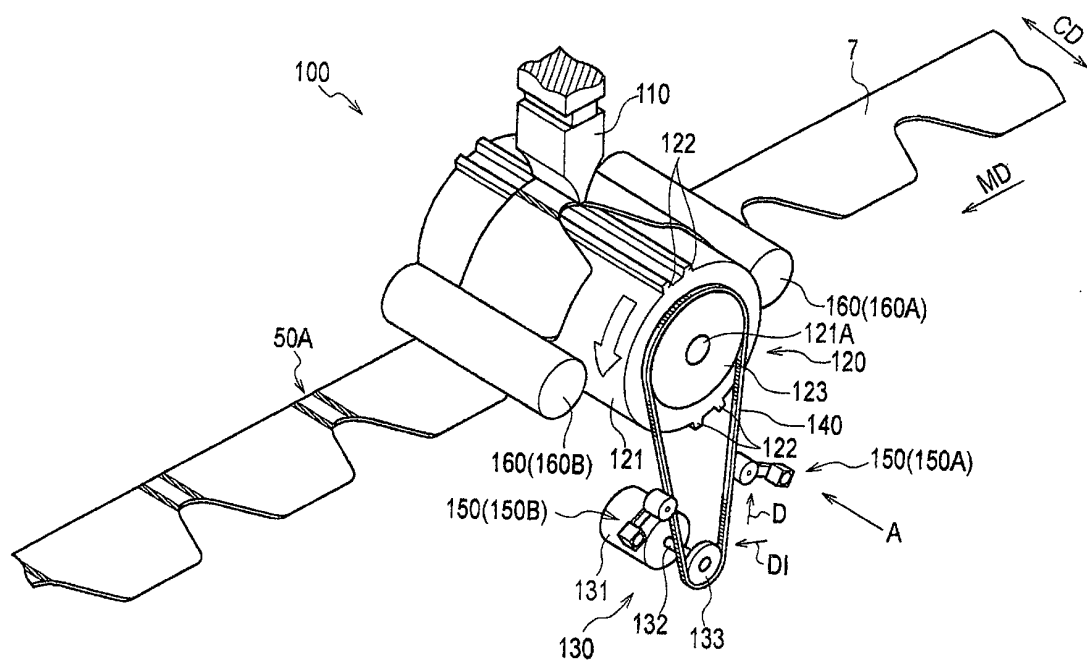


FIG. 4

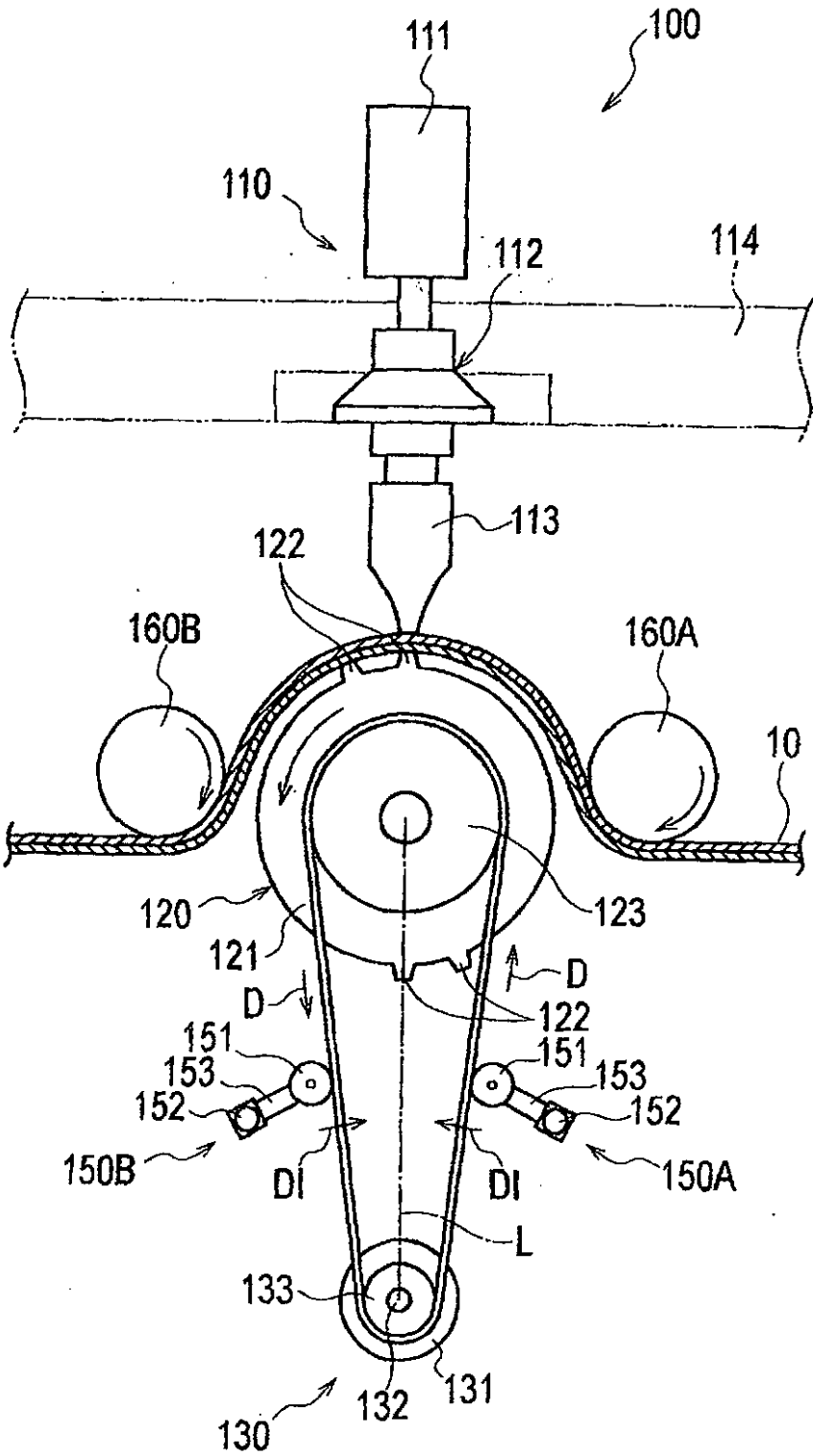


FIG. 5

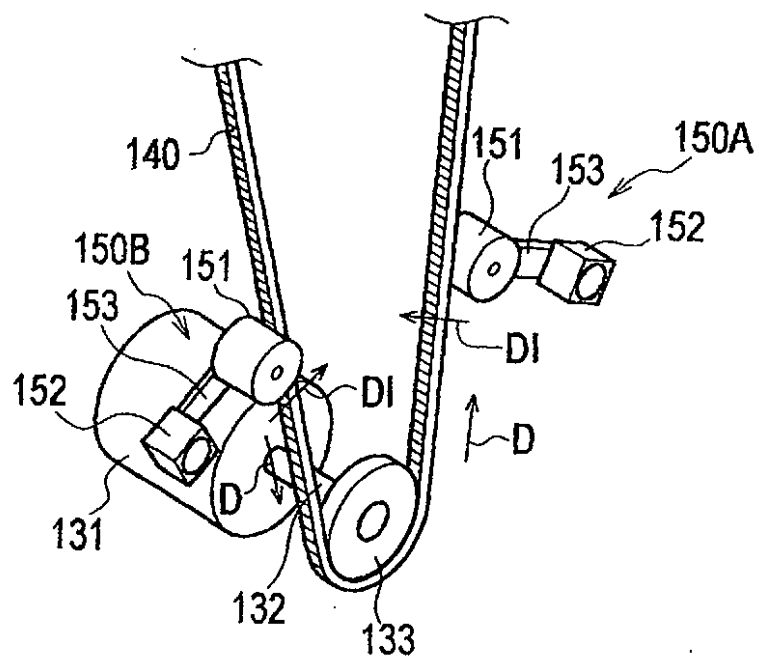


FIG. 6

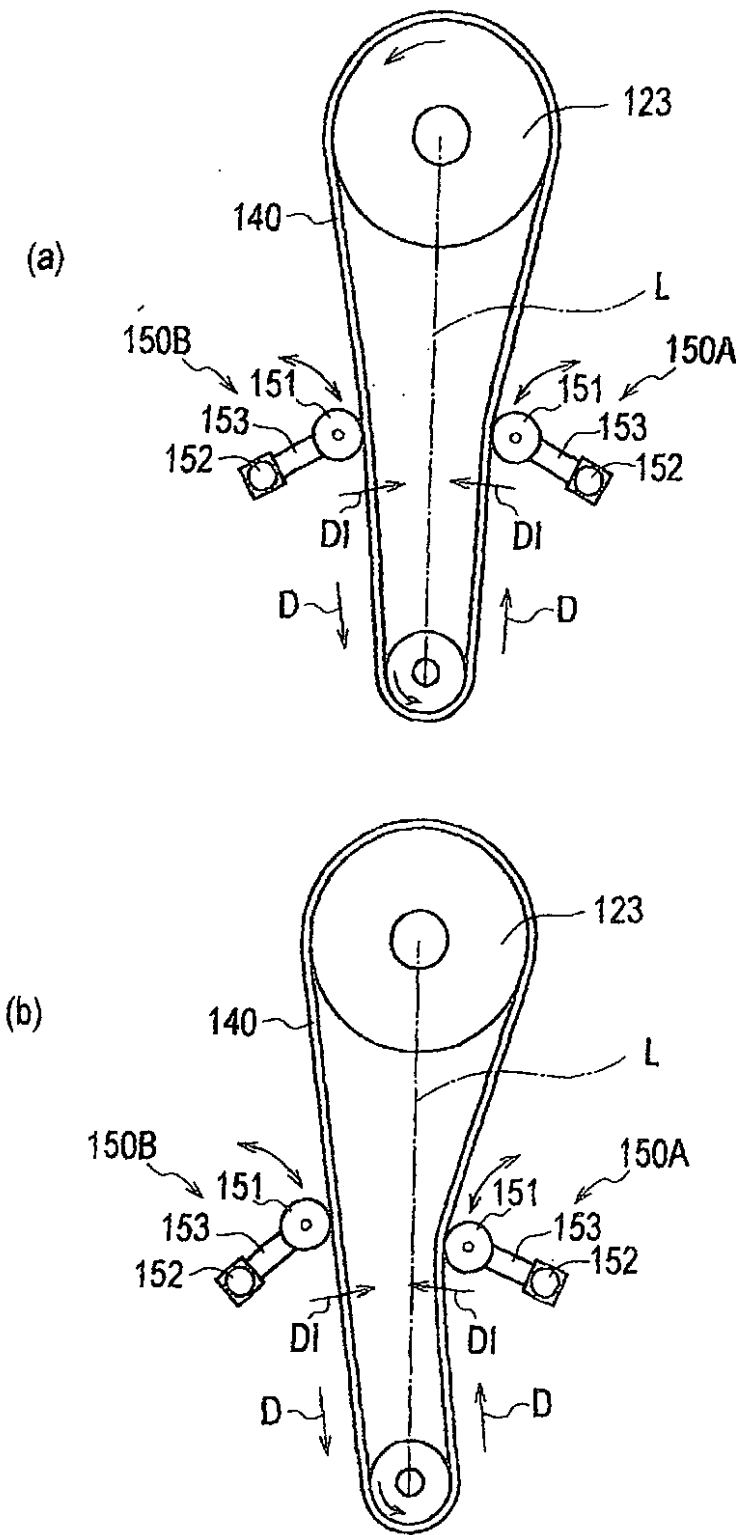
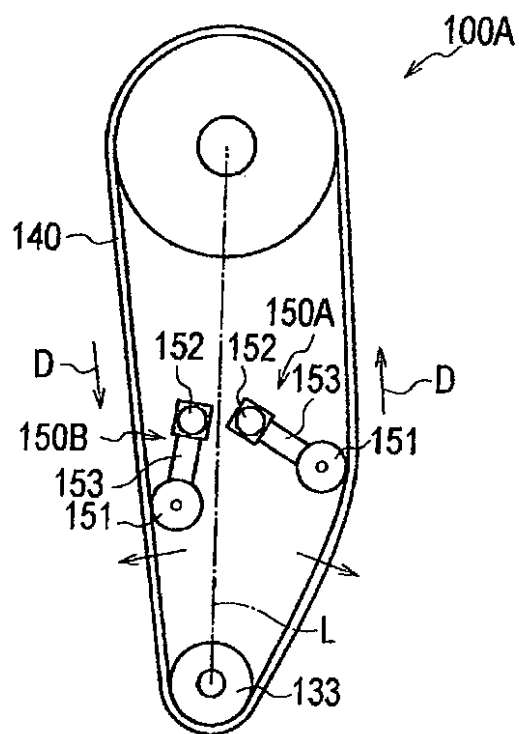


FIG. 7



Applicant(1)	English	Japanese
Name	UNICHARM CORPORATION	日本語表記：ユニ・チャーム株式会社 中国語表記：尤妮佳股份有限公司
Address	182, Shimobun, Kinsei-cho, Shikokuchuo-shi, Ehime 799-0111 Japan	〒799-0111 愛媛県四国中央市金生町下分 182 番地
Nationality	Japan	日本

Inventor(1)	English	Japanese
Name	Hiroki YAMAMOTO	山本 広喜
Address	c/o Technical Center of UNICHARM CORPORATION, 1531-7, Wadahama, Toyohama-cho, Kanonji-shi, Kagawa 769-1602 Japan	〒769-1602 香川県観音寺市豊浜町和田浜 1531-7 ユニ・チャーム株式会社テクニカルセンタ ー内
Nationality	Japan	日本

Title of Invention	Please use the title of invention, which is mentioned in the International Publication
日本語の発明の名称	接合装置及び吸収性物品の製造方法
International Application Number / International Publication Number / Priority Data	Please see enclosed the front page of International Publication

Corresponding applications (including this application) have been or will be filed in:	<u>US, EP, CN, KR, AU, TH, ID, MY, VN, IN, PH, EA, NZ, EG, BR, CO,</u> <u>MX, CL, CA, ZA, MA, DZ, AR, GC</u>
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Amendments:

- During the international phase, the applicant(s):
- ☒ **made no amendments.**
 - ☐ amended the claims under PCT Article 19.
 - ☐ made the amendments found in the Annexes to the International Preliminary Report on Patentability (Chapter II of the PCT) to:
 - ☐ the Description ☐ the Claims ☐ the Abstract ☐ the Drawings

To Be Filed By: October 2, 2011 (31 months from the earliest priority date)

Basis of National/Regional Phase Entry:

Entry into the National/Regional phase should be made based upon:

- ☒ (X) the application as originally filed.
- ☐ () the amendments found in the Annexes to the International Preliminary Report on Patentability (Chapter II of the PCT).
- ☐ () the new amendments that we have enclosed.

Request for Substantive Examination:

- ☐ () to be requested when entering the regional/national phase
- ☒ (X) to be deferred

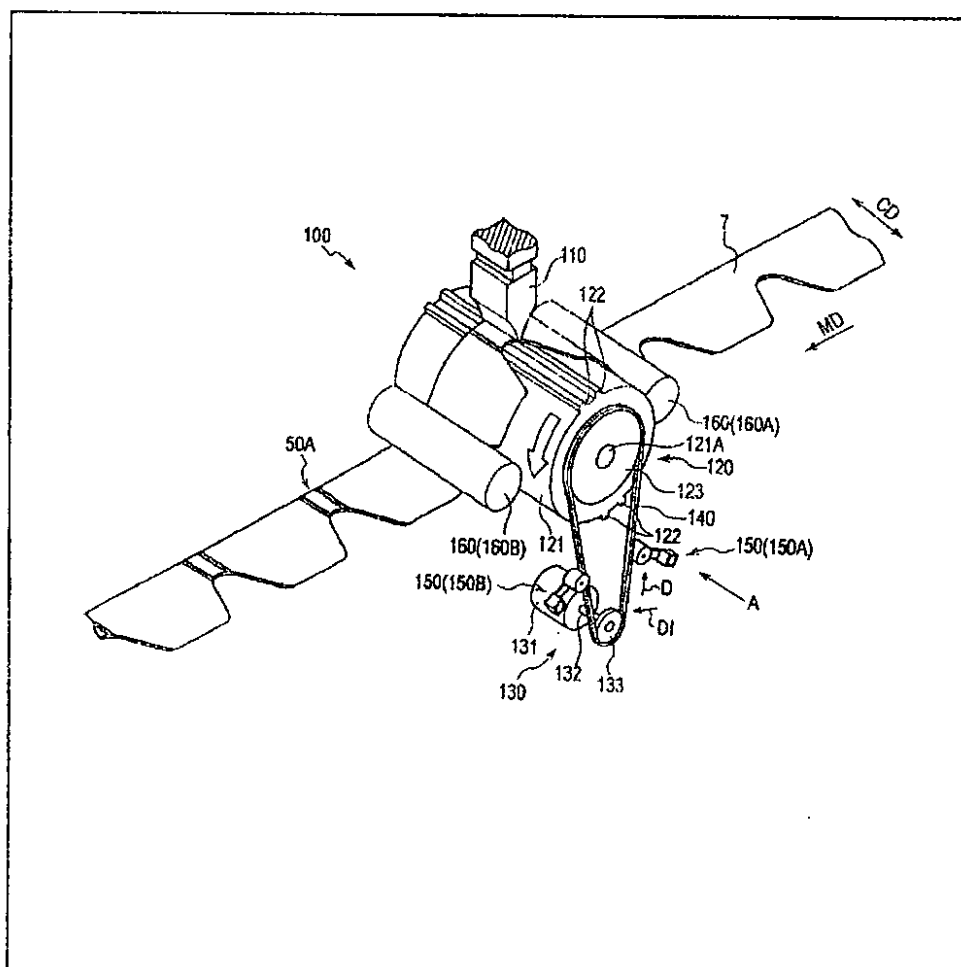
Documents:

Enclosed To Follow

- (1) ☐ () English text of the PCT International Application as originally filed
(in which differences between the English text of the corresponding Argentine application and this PCT application are underlined.)
- (1) ☐ () Spanish translation of the corresponding Argentine application
- (1) ☐ () Copy of International Publication
- (1) ☐ () Copy of PCT/IB/304
- (1) ☐ () Copy of PCT/IB/308 (Second & Supplementary Notice)
- (1) ☐ () Copy of International Search Report (PCT/ISA/210)
- (1) ☐ () Copy of Written Opinion of the ISA (PCT/ISA/237)

Special Remarks:

1. The Demand for International Preliminary Examination was not filed in this application.
2. If you require additional information or documentation for this filing, please do not hesitate to contact us.
3. Please be advised that the applicant has obtained the right of filing this application from the inventor(s), by virtue of contract of employment.
4. Please send us sign form for execution by the applicant and/or inventors in word format, if necessary.
5. Please refer to the enclosed English text of this PCT application, and reflect the differences between the English text of the corresponding Argentine application and this PCT application to the Spanish translation of this national phase application.



PATENTE DE INVENCION ☐ MODELO DE UTILI

☐
☐
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Indicación que se solicita una patente.

Datos de identificación del solicitante o de la persona que presenta la solicitud

Descripción de la invención

Dibujos de ser estos pertinentes

Comprobante de pago de las tasas establecidas (De ser el caso formato de descuento)

Completa ☐ Incompleta ☐

PATENTE DE INVENCION PCT ☒ MODELO DE UTILIDAD PCT ☐ Art.33 Decisión 486/00, Circular Única

☒
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Indicación que se solicita una PCT

Copia de la solicitud en español, tal como fue presentada inicialmente (capítulo descriptivo, reivindicatorio, resumen)

Dibujos de ser estos pertinentes

Comprobante de pago de las tasas establecidas (de ser el caso formato de descuento)

Completa ☒ Incompleta ☐

DISEÑO INDUSTRIAL ☐ (Art. 119 Decisión 486/00)

☐
☐
☐
☐

Indicación que se solicita Diseño industrial

Datos de identificación del solicitante o de la persona que presenta la solicitud

Representación gráfica y fotográfica del Diseño industrial o muestra del material que incorpora el diseño

Comprobante de pago de las tasas establecidas

Completa ☐ Incompleta ☐

ESQUEMA DE TRAZADO ☐ (Art. 92 Decisión 486/00)

☐
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Indicación que se solicita un esquema de trazado

Datos de identificación del solicitante o de la persona que presenta la solicitud

Representación gráfica de un esquema de trazado

Comprobante de pago de las tasas establecidas

Completa ☐ Incompleta ☐