

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO	
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DEP: 2020 DIRECCION DE NUEVAS CREACIONES	EVE: 379 FASE NACIONAL INCLUIDO CAPITULO II
TRA: 11 PCT-PATENTE DE INVENCION CAPITULOS I Y II	FOLIOS: 8
ACT: 430 REQUERSOLICITA	

DIRECCIÓN DE NUEVAS CREACIONES

2020
Bogotá, D.C.,

Abogado(a)/Señor(a)
LUZ CLEMENCIA DE PÁEZ

Asunto: Radicación: 14-64573- -3
 Trámite: 11
 Evento: 379
 Actuación: 430
 Oficio: 8945
 Folios: 8

Patente de Invención	X			Patente de Modelo de Utilidad	
Vía Nacional					
Vía PCT (Fase Nacional)	X	Capítulo I		Capítulo II	X
No. Solicitud Internacional	PCT/EP2011/065027				
Fecha de Presentación Internacional	31/08/2011				

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

1. Documentos estudiados

Descripción:	Rad. N° 14-064573-00000-0000	26/Marzo/2014
Reivindicaciones:	Rad. N° 14-064573-00000-0000	26/Marzo/2014
Dibujos:	Rad. N° 14-064573-00000-0000	26/Marzo/2014

2. Objeto de la invención

De acuerdo con lo establecido en el numeral 1.2.2.2 del Capítulo Primero del Título X de la Circular Única para efectos del examen de patentabilidad, se tendrá en cuenta la tasa pagada por el solicitante al momento de comenzar el examen para las reivindicaciones adicionales; esto es que cuando la solicitud contenga más de diez (10) reivindicaciones y no se haya pagado la tasa complementaria, sólo se estudiarán las cubiertas por la tasa pagada. Por lo tanto, se estudiaran las reivindicaciones 1 a 26.

Título de la solicitud: “Pila de productos para la higiene plegados y método y aparato para su producción” (Fl. 1).

El problema planteado en esta solicitud, consiste en producir pilas de secciones de red individuales, que pueda usarse en un dispensador de papel y que pueda separarse fácilmente en sus secciones individuales para que pueda ser utilizada por el usuario.

Para resolver este problema técnico, la solicitud en estudio propone un método, un aparato y una pila de hojas plegadas de producto, donde dicha pila consiste en una sección tipo red que se divide en una pluralidad de hojas individuales, dichas hojas individuales están plegadas a lo largo de por lo menos una línea de plegado.

El objeto de la presente solicitud se relaciona con la Clasificación Internacional de Patentes (CIP): B 65 H 45/20, 45/24.

3. De la solicitud de patente

Reivindicaciones (Art 30 D 486, Art 22 PCT)

El capítulo reivindicatorio no es claro porque:

- Las expresiones: “...la red es sostenida de manera que hace fricción” (reivindicación 1) “...para formar una pila de hojas plegadas entre sí.” (reivindicación 8), “...en donde el elemento de perforación está adaptado para generar una línea de perforación.”, “...que actúa como yunque; en donde el elemento de corte está adaptado para generar un corte limpio o una unión tipo etiqueta.”, “...para formar una pila de hojas...” (reivindicación 9), “...que funciona por medio de un mecanismo de leva...” (reivindicación 11), “...en donde por lo menos uno de los rodillos de perforación esta adaptado para activarse en forma selectiva o colocarse en estado de espera.” (reivindicación 13), “...ésta diseñado para sostener con fricción y transportar la reda una velocidad controlada...” (reivindicación 15), “...está adaptado para generar una unión tipo etiqueta...”, “...para separar el material de la red en las uniones tipo etiqueta.” (reivindicación 16), “...adaptado para determinar la longitud de una sección tipo red.” (reivindicación 18), “...en donde las líneas de perforación están en un debilitamiento continuo o intermitente, en donde la fuerza restante de la red está en un intervalo entre 4% y 50% y preferentemente entre 4% y 15%.” (reivindicación 20), “...como para formar una configuración de nido...” (reivindicación 22), “...para adherir un comienzo de la pila a un extremo de una pila anterior...”, “...de manera tal que el panel superior y el segundo panel superior en el comienzo de la pila sean susceptibles de adherirse al extremo de una pila precedente idéntica adyacente a la pila.” (reivindicación 23), “...el panel superior de la sección de la red y el segundo panel superior de la segunda sección de la red tienen forma y están dispuestos de manera tal que están expuestos...” (reivindicación 26); describen funciones, efectos, ventajas o resultados a alcanzar, los cuales no son aspectos susceptibles de patente. Para mayor claridad, el producto reclamado se debe definir técnicamente mediante sus características estructurales. Se sugiere al solicitante eliminar la reivindicación y las expresiones citadas.
- Las expresiones: “por lo menos” (reivindicaciones 1, 9, 13, 14, 20, 22), “con preferencia”, “con mayor preferencia” (reivindicaciones 6, 15, 18, 20), es impreciso, por

lo cual no permite distinguir la invención del estado de la técnica. Se sugiere sustituirlo por un término preciso o un rango concreto.

- La expresión: *“hacia abajo y hacia arriba”* (reivindicaciones 1 y 9) es de carácter relativo, porque hace opcional a la característica y no limita el alcance de la reivindicación. Se sugiere al solicitante eliminar la expresión citada o en su defecto reemplazarlas por características que limiten de forma clara la invención.
- Existe un error de transcripción al utilizar la expresión: *“el elemento de separación en un dedo separador.”* (reivindicación 17). Se sugiere al solicitante realizar las correcciones correspondientes.

4. Unidad de invención (Art 25 D 486)

La solicitud no cumple con el requisito de unidad de invención porque se refiere a 2 grupos inventivos. Los grupos inventivos están definidos así:

- Grupo I: Reivindicaciones 1 y 9. Método para producir pilas de secciones de red individuales y aparato para realizar dicho método.
- Grupo II: Reivindicación 20. Pila de hojas plegadas de productos para la higiene.

Se sugiere presentar las solicitudes divisionales que considere necesarias, o limitar la solicitud inicial a una sola invención, eliminando de ella las otras invenciones. De acuerdo con lo anterior, el examen de patentabilidad se realizó con base en el Grupo II.

5. Determinación del Estado de la Técnica

El estado de la técnica se determinó con base en la fecha de presentación internacional: agosto 31 de 2011, y se encontraron los siguientes documentos que anticipan el objeto de esta solicitud:

Ítem	Documento	Título	Fecha de Publicación*
D1	CO 14-30017	'Pila de primera y segunda hojas interplegadas'	13/Julio/2011
D2	EP 291.211	'Method and apparatus for interfolding webs'	17/Noviembre/1988
D3	EP 2'204.345	'Improved single-fold interfolding machine and method terefor'	07/Julio/2010
D4	US 2001/0020616	'Interfolded dispenser napkins'	13/Septiembre/2001

*El artículo 16 de la Decisión 486 señala lo siguiente:

“Una invención se considerará nueva cuando no está comprendida en el estado de la técnica.

El estado de la técnica comprenderá todo lo que haya sido accesible al público por una descripción escrita u oral, utilización, comercialización o cualquier otro medio antes de la fecha de presentación de la solicitud de

patente o, en su caso, de la prioridad reconocida.

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

En aplicación de la norma anterior, se ha tomado, como anterioridad que afecta la patentabilidad de la invención en estudio, el documento [CO 14-30017](#) (en adelante llamado D1), pues corresponde a una solicitud nacional cuya fecha de presentación es el 13 de julio de 2011, es decir, anterior a la fecha de presentación de la solicitud en estudio, 31 de agosto de 2011.

Ahora bien, el Tribunal Andino de Justicia, respecto al requisito de novedad, ha señalado lo siguiente:

“El requisito de novedad exige que la invención no esté comprendida en el estado de la técnica, el cual comprende el conjunto de conocimientos tecnológicos accesibles al público antes de la fecha de presentación de la solicitud de patente o, en su caso, de la prioridad reconocida.

Para la aplicación de este concepto, es importante que el estudio del estado de la técnica esté basado en las características o condiciones innovadoras del invento.

En este sentido, el ´estado de la técnica está constituido por todo lo que antes de la fecha de presentación de la solicitud se ha hecho accesible al público por una descripción escrita u oral, por una utilización o por cualquier otro medio, en cualquier lugar del mundo`. Todo ello, desde luego, considerando las excepciones previstas en el artículo 3 de la Decisión 344.

En otras palabras, para que una invención sea novedosa se requiere que no esté comprendida en el estado de la técnica, es decir, que antes de la fecha de presentación de la solicitud de patente o de la prioridad reconocida, ni la innovación ni los conocimientos técnicos que de ella se desprenden hayan sido accesibles al público, entendiendo que la difusión de la información que se menciona debe ser detallada y suficiente para que una persona versada en la materia pueda utilizar esa información a fin de explotar la invención”^[1].

Cabe señalar que la Superintendencia de Industria y Comercio acepta la prioridad reivindicada en la presente solicitud en virtud del artículo 9 de la Decisión 486, sin desconocer el artículo 16, que establece o delimita lo que comprende el estado de la técnica.

Este artículo señala que “[s]ólo para el efecto de la determinación de la novedad, también se considerará dentro del estado de la técnica, el contenido de una solicitud de patente en trámite ante la oficina nacional competente, cuya fecha de presentación o de prioridad fuese anterior a la fecha de presentación o de prioridad de la solicitud de patente que se

[1] Proceso 156 IP 2006

estuviese examinando, siempre que dicho contenido esté incluido en la solicitud de fecha anterior cuando ella se publique o hubiese transcurrido el plazo previsto en el artículo 40”.

Así las cosas, el documento [CO 14-30017](#), al ser una solicitud que fue presentada en fecha anterior a la presentación de la actual solicitud, en virtud del artículo 16 señalado, hace parte del estado de la técnica y, por ende, se constituye en una anterioridad que destruye la novedad de la invención.

Es necesario recordar, que dicho artículo da la posibilidad de que pertenezca al estado de la técnica una solicitud en trámite cuya fecha de presentación fuese anterior a la fecha de presentación de la patente que se está examinando, razón por la cual el documento [CO 14-30017](#) sí corresponde a una anterioridad que afecta la presente solicitud. Lo anterior, en atención a que la norma pretende evitar la doble patentabilidad.

El documento D1¹ divulga la solicitud en estudio propone una pila que comprende una capa de adherencia para adherir un inicio de la una un final de una pila precedente (reivindicación 1).

El documento D2² divulga un aparato y un método para doblado en zig-zag de un par de hojas (W1, W2) continuas o segmentos para proveer pilas (11, 12) cada uno teniendo un número específico de segmentos (resumen).

El documento D3³ divulga un aparato y un método para el interplegado de láminas para la conformación de pilas de papel (Párrs. [0001] y [0002]).

El documento D4⁴ divulga un ensamble de servilletas que incluye una primera lámina de servilletas que incluye una pluralidad de servilletas y una segunda lamina de servilletas con una pluralidad de servilletas (resumen).

6. Examen de Patentabilidad (Art 14 D486)

Novedad (Art 16 D486)

La reivindicación 20 consiste en: *“Pila de hojas plegadas de productos para la higiene tales como papel de productos tejidos, caracterizada porque comprende una sección tipo red de una longitud predeterminada...”* (Ver página 80 del radicado N° 14-064573-00000-0000).

Comparación de las características técnicas esenciales, con las del estado de la técnica:

1 http://worldwide.espacenet.com/publicationDetails/biblio?DB=EPODOC&II=0&ND=3&adjacent=true&locale=en_EP&FT=D&date=20130117&CC=WO&NR=2013007301A1&KC=A1

2 http://worldwide.espacenet.com/publicationDetails/biblio?DB=EPODOC&II=0&ND=3&adjacent=true&locale=en_EP&FT=D&date=19881117&CC=EP&NR=0291211A2&KC=A2

3 http://worldwide.espacenet.com/publicationDetails/biblio?CC=EP&NR=2204345A1&KC=A1&FT=D&ND=&date=20100707&DB=&locale=en_EP

4 <https://www.google.ca/patents/US20010020626?hl=es&dq=wo0000072&ei=8QM1VefuPK3nsATTkYEI&cl=en>

Características esenciales	D1	D2	D3	D4
Pila de hojas plegadas de productos que comprende:	Pila de primera y segunda hojas interplegadas caracterizada por:	Hojas interplegadas caracterizadas por:	Hojas interplegadas caracterizadas por:	Servilletas interplegadas caracterizadas por:
Una sección tipo red de una longitud predeterminada que se divide en una pluralidad de hojas individuales de producto por medio de líneas de perforación entre dos hojas consecutivas.	Las líneas debilitadas (4) definen hojas separables de una pila. Se presenta una línea de plegado (6) para formar el primer y el segundo panel (7) y (8) (Párr. [0034]).	Líneas de perforación (15a) para la hoja (W1) y (15b) para la hoja (W2). Las líneas de perforación de una hoja están desplazadas respecto a las líneas de perforación de la otra hoja (Col. 3; líneas 20 a 36).	Una sección tipo red de una longitud predeterminada que se divide en una pluralidad de hojas individuales de producto por medio de líneas de perforación (51) y (52) entre dos hojas consecutivas (Fig. 2).	Una sección tipo red de una longitud predeterminada que se divide en una pluralidad de hojas individuales de producto por medio de líneas de perforación (N) dos hojas consecutivas (Figs. 7 a 9).
Las hojas individuales están plegadas a lo largo de una línea de plegado que se ubica entre líneas adyacentes de perforación.		Las pilas están dobladas en zig-zag (Figs. 3, 4 y 5; Col. 2; líneas 41 a 46).	Las hojas individuales están plegadas a lo largo de una línea de plegado que se ubica entre líneas adyacentes de perforación (Fig. 2).	Las hojas individuales están plegadas a lo largo de una línea de plegado que se ubica entre líneas adyacentes de perforación (N) (Figs. 7 a 9).
Una de las hojas forma un panel superior de la pila en un extremo de la longitud dada de la sección de la red, el panel superior tiene un borde de extremo en una posición diferente a las de las líneas de perforación y líneas de plegado de las otras hojas de la pila.	Una de las hojas forma un panel superior de la pila en un extremo de la longitud dada de la sección de la red, el panel superior tiene un borde de extremo en una posición diferente a las de las líneas de perforación y líneas de plegado de las otras hojas de la pila (Figs. 1 y 4).	Una de las hojas forma un panel superior de la pila en un extremo de la longitud dada de la sección de la red, el panel superior tiene un borde de extremo en una posición diferente a las de las líneas de perforación y líneas de plegado de las otras hojas de la pila (Figs. 3, 4 y 5).	Una de las hojas forma un panel superior de la pila en un extremo de la longitud dada de la sección de la red, el panel superior tiene un borde de extremo en una posición diferente a las de las líneas de perforación y líneas de plegado de las otras hojas de la pila (Fig. 2).	Una de las hojas forma un panel superior de la pila en un extremo de la longitud dada de la sección de la red, el panel superior tiene un borde de extremo en una posición diferente a las de las líneas de perforación y líneas de plegado de las otras hojas de la pila (Fig. 9).

De acuerdo con la tabla anterior, las características esenciales de la pila de la reivindicación 1 habían sido divulgadas previamente en los documentos D1 a D4, por lo tanto, la materia reivindicada no es nueva.

Asimismo, el documento D1 divulga las características de las reivindicaciones dependientes así:

- Reivindicación 21: El borde del extremo se encuentra en ángulo con relación a las líneas de perforación (D1: Fig. 2).
- Reivindicación 22: Una segunda sección de la red dividida en una pluralidad de hojas del producto para la higiene por medio de segundas líneas de perforación, las segundas hojas también están dobladas a lo largo de por lo menos una segunda línea de plegado que se ubica entre líneas adyacentes de perforación; la sección de la red y la segunda sección de la red están dobladas entre si tales como para

formar una configuración de nido, en donde las perforaciones están compensadas respecto de la otra a lo largo de las secciones de red; la segunda sección de la red forma un segundo panel superior (D1: Fig. 1; D3: Fig. 1).

- Reivindicación 23: Una capa de adherencia (14) que se ubica sobre la hoja y la segunda hoja (D1: Figs. 1 y 2 a 5).
- Reivindicación 24: La capa de adherencia es una capa de pegamento, una capa de cinta adhesiva, o un ajuste mecánico de gancho y bucle (D1: reivindicación 2).
- Reivindicación 25: La capa de adherencia se proporciona en la forma de tira de material de adherencia (D1: reivindicación 3).
- Reivindicación 26: El panel superior y el segundo panel superior están expuestos y la capa de adherencia se aplica a ambos (D1: reivindicación 4).

Las reivindicaciones 1 a 19 fueron afectadas en el numeral 5 de la presente comunicación.

7. Conclusión

Los requisitos de Patentabilidad de la presente solicitud están afectados así:

Ítem	Documento	Reivindicaciones afectadas	Requisito que afecta
D1	CO 14-30017	20 a 26	Novedad/Nivel Inventivo
D2	EP 291.211	20	Novedad/Nivel Inventivo
D3	EP 2'204.345	20 y 22	Novedad/Nivel Inventivo
D4	US 2001/0020616	20	Novedad/Nivel Inventivo
D5	CO 14-30017	20	Novedad/Nivel Inventivo

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

Se invita al solicitante se sirva indicar, si así lo considera, su renuncia al término faltante de sesenta (60) días para dar respuesta a este requerimiento y presentarla por escrito.

Finalmente, se le recuerda al solicitante que si como respuesta a este requerimiento llegara a modificar el capítulo reivindicatorio y éste contenga más de diez (10) reivindicaciones, no pagará la tasa de modificación voluntaria pero sí la correspondiente al pago por reivindicación adicional.

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



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Director de Nuevas Creaciones (c)

El anterior requerimiento fue notificado por fijación en lista, de fecha 2015-08-04

Elaboró: Monica Andrea Gutierrez Almonacid
Revisó: Sonia Andrea Diaz Pirazan



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- (22) International Filing Date:
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- (71) Applicant (for all designated States except US): **SCA HYGIENE PRODUCTS AB** [SE/SE]; S-405 03 Göteborg (SE).
- (72) Inventors; and
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- (74) Agents: **SACH, Greg** et al.; **HOFFMANN · EITLE**, Arabellastrasse 4, 81925 Munich (DE).
- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM,

AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

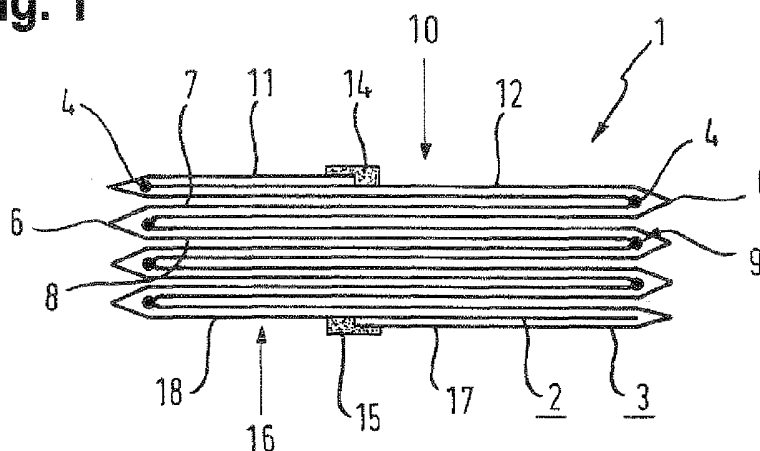
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Published:

— with international search report (Art. 21(3))

(54) Title: STACK OF INTERFOLDED FIRST AND SECOND SHEETS

Fig. 1



(57) Abstract: A stack (1) of hygiene sheet products comprising first and second webs (2, 3) that are interfolded with each other. The stack includes a top panel (11) of the first web (2) and a top panel (12) of the second web (3), wherein the top panel of the first web overlays the top panel of the second web but has been cut away so that the top panel of the second web is revealed by the top panel of the first web. An adherence layer (14) is placed on the top panel of the first web and the top panel of the second web and is exposed at the top of the stack so that it can adhere to an adjacent stack so that when the last sheets of the adjacent stack are pulled through a dispenser opening of a dispenser, the first and second sheets are pulled securely through with it as a result of the direct adherence.

Stack of interfolded first and second sheetsField of the invention

5 [0001] The present invention is directed to a stack of interfolded first and second sheets and particularly the manner by which the stack is connected to a second stack.

Background to the invention

10

[0002] WO 00/00072 discloses interfolded napkins comprising first and second napkin sheets. The first napkin sheet is divided into many napkins connected to one another by tab parts of a line of perforation. The second napkin sheet is
15 similarly formed. The first and second napkin sheets are interfolded with each other to form a stack of interfolded napkins. The lines of perforation of the first sheet may be aligned with folds of the second sheet so that the first sheet is folded at the lines of perforation in the
20 interfolded stack. In an alternative stack disclosed in WO 00/00072, the interfolding is such that the lines of perforation are positioned between adjacent folds so that folds are not formed at lines of perforation. In both versions, the first and second sheets can be described as
25 being interfolded with each other in an offset way since the lines of perforation of the first and second sheets are offset with respect to one another along the longitudinal direction of the first and second sheets.

30 [0003] In WO 00/00072, napkins of the stack are dispensed from a dispenser through a dispenser opening and torn away from the corresponding napkin sheet at the lines of perforation. The longitudinal offset of the lines of perforations of the first sheet relative to the lines of
35 perforations of the second sheet result in the dispenser revealing just one more forwardly protruding sheet at the dispensing opening to reduce the chance of both sheets being

grasped as would occur if the offset was marginal or non-existent. The interfolding of the sheets means that when a napkin of the first sheet is pulled through the opening of the dispenser, part of a napkin of the second sheet comes
5 through the opening with it. The protruding part of the napkin of the second sheet can be grasped by a user for dispensing convenience. As compared to interfolded napkins where each napkin is pre-separated from one another in the stack (in contrast to interfolded offset sheets where each
10 napkin is connected to an adjacent napkin by a line of perforation), there is a reduced risk for a dispensing failure to occur whereby the next napkin in the stack is not pulled through with the napkin being dispensed.

15 [0004] US 1,381,307 and EP 0287766 also disclose stacks of interfolded offset sheets.

[0005] The prior art interfolded sheet stacks enable a first sheet hygiene product (e.g. napkin, towel, tissue or the
20 like) of one sheet to be pulled partly through a dispensing opening of a dispenser when a second sheet hygiene product of the second sheet is dispensed through the dispensing opening for convenience in revealing to a user the next product to be dispensed. While the prior art interfolded stacks are
25 generally successful in pulling a product of the other sheet with the product of the other sheet being dispensed for most of the stack, the present inventors have found that a dispensing failure can still occur at the transition from one stack to a next stack in the dispenser.

30 Summary of the invention

[0006] The present invention is thus directed at the
35 technical objective of improving the reliability of sheets of a new stack of interfolded sheets being pulled through a dispensing opening as a preceding stack is finished.

[0007] In one aspect of the invention, there is provided a stack of interfolded first and second sheets, wherein the stack comprises an adherence layer for adhering a start of the stack to an end of a preceding stack, and wherein the adherence layer is applied on the first and the second sheets so that the first and second sheets at the start of the stack are adhered to the end of the preceding stack.

[0008] According to the invention both the first and the second sheets will be adhered to a preceding stack in a dispenser. This ensures that both the first and second sheets are pulled through the dispensing opening at the start of the next stack, thereby meeting the technical objective given above. If only one of the sheets has the adherence layer, then there is a possibility that the other of the sheets would fall away when the new stack is started for dispensing, which would cause a dispensing failure. Important is to get both of the first and second sheets through the dispensing opening at the start of dispensing the stack. The present invention achieves this by having the adhesive layer on both of the first and second sheets in such a way that they can both adhere to the end of the preceding stack.

[0009] The adherence layer may be a layer of glue, a layer of adhesive tape, the hook or the loop component of hook and loop fastening material (wherein the other component is provided at the end of the preceding stack) or other known adherence means. The adherence layer may, in one embodiment, be provided in the shape of a strip of adherence material, such as a tape. The adherence layer may include a release liner stuck to the adherence layer for shielding the underlying adherence layer to sticking to unintended objects during processing. The adherence layer could be provided by a layer of hooks of the form (but perhaps not the size) of the hook component of traditional hook and loop material.

The adherence layer of hooks is able to adhere to the material of the sheets. Such a hook type material that does not require a mating loop component is known in the art.

5 [0010] In an embodiment, one of the first and second sheets forms a top panel of the stack at the start of the stack and is arranged to reveal an underlying panel of the other of the first and second sheets, wherein the adherence layer is applied on both the top panel and the revealed underlying
10 panel. Put another way, one of the first and second sheets has a top panel exposed at the top of the stack and the other of the first and second sheets has a top panel exposed at the top of the stack, wherein one of the top panel overlays the other top panel, yet is arranged to reveal the underlying top
15 panel. The adherence layer is applied on both of the top panels. Put yet another way, the stack has a top planar surface extending perpendicular to a stacking direction of the stack that is partly defined by a panel of the first sheet and a panel of the second sheet, wherein the adherence
20 layer is applied on both the panel of the first sheet and the panel of the second sheet.

[0011] In a particular embodiment, the adherence layer is provided by a substrate having a jungle of hook members
25 dispersed thereon, wherein the adherence layer adheres to a corresponding adherence layer by hook to hook interaction. There may be at least 10, 15, 20, 25, 30, 35, 40, 45 or 50 hooks per square centimetre on the substrate. The other side of the layer may be adhesive that adhesively bonds to the
30 first and second sheets of the stack. In this way, two such stacks placed together are able to adhere the first and second sheets thereof to one another by hook to hook interaction. An advantage of the hook to hook possibility as compared to a hook and loop version is that the stacks do not
35 have to be placed in a "right way up" configuration in a dispenser. Dispensing failure could occur if the two hook components or two loop components are placed together in a

dispenser as they will not adhere to one another, but this can not happen in the hook to hook adherence layers.

[0012] The one of the first and second sheets may be cut in
5 such a way that the top panel reveals the underlying panel of the other of the first and second sheets.

[0013] In this way, the top panel only extends partly over the underlying panel to make it possible to conveniently
10 (manufacturing wise) apply the adherence layer to both the first and second sheets.

[0014] In the top panel embodiment, the adherence layer may be applied so as to extend in one direction, and the cut
15 includes a component extending in a direction perpendicular to the one direction so that the cut and the adherence layer cross one another in being applied on both the top panel and the revealed panel. In one embodiment, the adherence layer extends along a longitudinal direction of the stack in a
20 plane of the stack extending perpendicular to a stacking direction, wherein the stacking direction is an axis passing through each of the sheet products in the stack. In another embodiment, the cut includes at least a portion extending diagonally with respect to a plane of the stack extending
25 perpendicular to a stacking direction, wherein the stacking direction is an axis passing through each of the sheet products in the stack. By these features of the invention, the adherence layer is conveniently applied to both the first and second sheets because the crossing of the cut line and
30 the extension direction of the adherence layer does not require stringent manufacturing tolerances to be met.

[0015] In an embodiment, the part of the top panel cut away and the part remaining are complementary in shape and of the
35 same size. In this way, during manufacturing, the cutting of the top panel of one stack will provide the adjacent stack with a complementarily cut end panel of an adjacent stack in

the manufacturing direction which can thus also receive the adherence layer which can thus also receive the adherence layer according the concept of the present invention.

5 [0016] In another embodiment, a top panel of the stack, which is a panel of one of the first or the second sheets, at the start of the stack is relatively short in a direction perpendicular to a fold line of the interfolded sheet along the sheet so as to reveal an underlying panel of the other of
10 the first or the second sheets, wherein the adherence layer is applied on the top panel and the revealed underlying panel. In this embodiment, the terminal edge of the top panel extends parallel to the fold line and the adherence layer may have a longitudinal direction aligned with the
15 terminal edge and is applied on the top panel for part of the width of the adherence layer and is applied on the revealed underlying panel for the remainder of the width of the adhesive layer. This may provide an easier to grasp starting panel than in a shaped cut implementation as
20 described above. To form the shortened top panel, it can be cut to be shorter in a conventional manner.

[0017] Alternatively, a short top panel can be formed by appropriately positioning lines of weakness of the first and
25 second sheets relative to one another to make the short top panel relatively easy to implement in existing manufacturing machines. Accordingly, in an embodiment, the first sheet is a first elongate web, the second sheet is a second elongate web, the first and second webs are divided into separable
30 disposable sheet products by lines of weakness extending laterally across the web, the lines of weakness of the first web and the second web are arranged offset relative to one another in a longitudinal direction of the webs, and fold lines of at least one of the first and second webs are
35 arranged offset relative to the lines of weakness for that web, so that a top panel of the stack, which is a panel of one of the first and second webs, is relatively short in the

longitudinal direction of the web to reveal an underlying panel of the other of the first and second webs, wherein the adherence layer is applied on the top panel and the revealed underlying panel. The lines of weakness may be formed by
5 lines of at least one perforation.

[0018] In embodiments, the stack has an adherence layer at the start and the end of the stack for adhering the first and second sheets to adjacently placed stacks in a dispensing
10 machine so that the stack is adhered to both a preceding stack and a succeeding stack. The adherence layer at the end of the stack may be as described above for the adherence layer at the start of the stack.

15 [0019] In embodiments, the first sheet is a first elongate web, the second sheet is a second elongate web, the first and second webs are divided into separable hygiene sheet products by lines of weakness extending laterally across the webs and the webs are interfolded with each other to form the stack.

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[0020] In another aspect of the invention, there is provided a combination of a preceding stack of interfolded first and second sheets respectively defining at least one sheet hygiene product and a succeeding stack of interfolded first
25 and second sheets respectively defining at least one sheet hygiene product, wherein the start of the succeeding stack and the end of the preceding stack are adhered together in such a way that an adherence layer is adhered to both the first and the second sheets of the succeeding stack so that
30 as the end of the preceding stack is pulled through a dispenser opening of a dispenser, both the first and the second sheets at the start of the succeeding stack are securely pulled through the dispensing opening with it.

35 [0021] In this aspect of the invention, the same inventive concept is defined, namely that of having both the first and the second sheets of the succeeding stack secured to a last

panel of the preceding stack so as to ensure it gets through the dispensing opening without falling away and causing a dispensing failure. According to this definition, however, the adherence layer is not necessarily only applied to the start of the succeeding stack. It is merely required that between the end of the preceding stack and the start of the succeeding stack, such a layer is present. The stacks of this aspect of the invention can include any of the features defined above for the preceding stacks.

[0022] In another aspect of the invention, there is provided a dispenser containing a combination of stacks as defined above as a preceding stack and a succeeding stack with respect to the dispensing order in the dispenser and comprising a dispensing opening through which the sheet hygiene products are dispensed from the stacks, the dispensing opening and the stacks arranged so that the first and second sheets are pulled through a dispensing path to the dispensing opening against the force of gravity, whereby the force of gravity has a tendency to cause one or both of the first and second sheets to fall from the dispensing path. It is in such a dispenser that dispensing failure at the transition between a succeeding and a preceding stack is particularly liable to happen. The secure connection between the stacks according to present invention avoids such a dispensing failure. Further, in such a dispenser, because the weight of the stacks does not have to bare against the product being dispensed, the number of products in the dispenser is not limited by a maximum weight that can bare on a product being dispensed. It should be appreciated, however, that the problem of losing one or both of the sheets of the stack along a dispensing path to a dispensing opening of a dispenser is a general one, and the stacks of the present invention are useful in combination with other types of dispenser.

[0023] In an embodiment, the dispenser comprises a clamp for clamping the first and second sheets adjacent the dispensing opening to prevent sheet fall back, wherein the first and second sheets are fed along the dispensing path to the clamp
5 against the force of gravity. The adherence layer of the present invention mitigates any potential dispensing failure in getting the sheets to the clamp at the transition between a preceding stack and a succeeding stack.

10 [0024] In the above dispenser, the term "against the force of gravity" is to be understood in the context of the dispenser being properly mounted. It is unambiguous for the skilled person as to the proper mounting of a dispenser, from regarding the dispenser itself. For example, a known
15 dispenser with a stack reservoir and a dispensing opening at the bottom of the reservoir is intended to be mounted with the opening facing downwards because if you were to tip it up so that the opening faced forwards, then the stack would fall back from the opening making it increasingly difficult or
20 impossible to access the products through the opening as the stack becomes depleted.

[0025] In the present application, the words "top" and "start" are used to represent an end of the stack. It is
25 important to appreciate that this does not require the stack to be placed only one way up. That is, a stack facing one way up can be described as having a start or top end. If one was to turn the stack up, the end can still be considered a top or start end. The purpose of the terminology is to
30 differentiate from panels, or portions of the stack that are buried in the depth of the stack and thus can no be used for sticking adjacent stacks together since they are not exposed at either end of the stack, where end is to be understood with respect to the dispensing order of the stack. A skilled
35 person is able to recognise opposing ends of a stack and either one of these ends can be considered a top or start of the stack, unless the stack configuration necessitates that

one of the ends must be considered the top or start end for the stack to dispense properly or for some other reason.

5 [0026] The sheets or webs described herein may be fibrous sheet materials or paper based sheet materials. The hygiene sheet products may be paper towels, facial tissues, toilet tissues, or wet wipes.

Brief description of the figures

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[0027] Figure 1 shows a stack of hygiene sheet products comprising first and second webs that are interfolded with each other. The stack includes a top panel of the first web and a top panel of the second web, wherein the top panel of the first web overlays the top panel of the second web but
15 the first web overlays the top panel of the second web but has been cut away so that the top panel of the second web is revealed by the top panel of the first web. An adherence layer is placed on the top panel of the first web and the top panel of the second web and is exposed at the top of the
20 stack so that it can adhere to an adjacent stack so that when the last sheets of the adjacent stack are pulled through a dispenser opening of a dispenser, the first and second sheets are pulled securely through with it as a result of the direct adherence.

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[0028] Figure 2 shows the stack of figure 1 when the top of the stack is viewed in plan to show the tape like shape of the adherence layer and its positioning on the start panel of the first web and the start panel of the second web of the
30 stack.

[0029] Figure 3 illustrates first and second webs as they proceed along a machine direction in a manufacturing process and shows the relative positions of lines of weakness and
35 fold lines for providing a convenient to manufacture way of revealing both a top panel of the first web and a top panel of a second web at the top of a stack so that an adherence

layer can be applied on both of these webs so that both of the webs are reliably secured to a preceding stack in a dispenser.

5 [0030] Figure 4 shows the webs of figure 3 as formed into a stack to show the folding pattern and to show the positions of the lines of weakness for the first and second webs in the stack in greater detail.

10 [0031] Figure 5 shows the stack of figure 4 when the top of the stack is viewed in plan to show that the top panel of the first web is short relative to the top panel of the second web and also shows an adherence layer provided in a tape like form so that part of the width of the tape is applied on the
15 top panel of the first web and the remaining part is provided on a top panel of the second web.

Detailed description of embodiments

20 [0032] A first embodiment is shown in figures 1 and 2 of the drawings. Figure 1 shows a stack 1 of interfolded first and second webs 2, 3. The first and second webs 2, 3 are divided into separable hygiene sheet products (e.g. paper hygiene sheet products, paper towel products, tissue products, or the
25 like) by lines of weakness 4 extending laterally across the elongate webs 2, 3. The lines of weakness 4 are illustrated in figure 1 with filled-in circles for clarity. The lines of weakness 4 may be lines of perforations.

30 [0033] The lines of weakness 4 for the first web 2 are positioned offset from the lines of weakness 4 for the second web 3 along the longitudinal direction of the webs 2, 3 so that when the first web 2 is pulled through a dispensing opening, the second web 3 will be pulled through the
35 dispensing opening with it. The first web will thus break at the first line of weakness 4 in the dispensing order to leave a pull tab portion of the second web 3 protruding beyond the

end of the first web 2 for convenience of grasping at the dispensing opening. This process will alternate during dispensing of the stack 1 so that a separable sheet product of the second web 3 is presented more forwardly than a product of the first web 2 relative to the dispensing opening, which will then be the product that is dispensed by a user and then a product of the first web will be more forwardly presented at the dispensing opening for dispensing by a user, as a result of the offset lines of weakness of the first web 2 and the second web 3. Such a stack 1 ensures one at a time dispensing of hygiene sheet products, while also ensuring that the first and second webs 2, 3 move together along a dispensing path as a result of face-to-face interaction of the continuous webs 2, 3.

[0034] As explained above, the lines of weakness 4 of the first and second 2, 3 define separable sheet hygiene products of the stack 1. The interfolding pattern for the stack 1 shown in figure 1 is such that each separable sheet product is folded at a fold line 6 to form first and second panels 7, 8 for each separable sheet hygiene product. The interfolding pattern is also such that a fold line 6 of one of the webs 2,3 is provided at each line of weakness 4 of the other of the webs 2, 3. In this way, the interfolding pattern provides a fold line 6 for the first web 2 at a line of weakness 4 for the second web 3 and correspondingly a line of weakness 4 for the first web 2 at a fold line 6 of the second web 3.

[0035] The example given in figure 1 is just one manner of interfolding first and second webs 2, 3 providing separable sheet hygiene products in an offset manner relative to a dispensing opening containing the stack. Other implementations can be provided. For example, the lines of weakness of one web may be positioned offset from the fold lines of the other web, rather than being aligned with a fold line as shown in figure 1. Further, the first and second

webs 2, 3 may be folded so that each separable hygiene sheet product includes more than two panels as shown, such as 3, 4, 5 or more panels. In fact, the first and second webs may be interfolded in such a way that each separable hygiene sheet product defines just one panel, which is to say it does not have a fold line at any location other than the lines of weakness. Thus, while one particular interfolding pattern is shown in figure 1 for first and second webs respectively defining separable hygiene sheet products between lines of weakness in an offset feed manner, the principles of the present invention (the adherence layer to be described below) are applicable to any known or any other such interfolding pattern for first and second webs.

[0036] Further shown in figures 1 and 2 is a top surface 10 of the stack 1, which is a planar surface that can be seen when the stack 1 is viewed from above looking down at the top of the stack 1. This surface 10 is defined partly by a top panel 11 of the first sheet 2 and partly by a top panel 12 of the second sheet 3. The top panel 11 of the first sheet 2 overlays the top panel 12 of the second web 3 but is cut away along a diagonal cut line 13 (figure 2) so as to reveal the underlying panel 12 of the second web 3.

[0037] In the embodiment of figure 2, the cut line 13 is shown as extending diagonally relative to the fold line 6. Numerous other configurations for the cut line can be imagined, provided they serve to reveal the underlying panel of the second web 3. For example, a cut line extending perpendicularly to the fold lines 6 would also provide a top surface 10 of the stack 1 defined in part by a top panel 11 of the first web and an underlying panel 12 of the second web 3. Likewise, a cut line extending parallel with the fold line 6 could also be configured to expose both the first web 2 and the second web 3 at a top surface of the stack 1. While straight cut lines are shown, curved cut lines could also be used.

[0038] An adherence layer 14 in strip form is applied on the top surface 10 of the stack 1 so as to be partly applied on the top panel of the first web 2 and to be partly applied on the top panel of the second web 12. In the shown embodiment, the adherence layer is embodied by double sided adhesive tape. One side of the adhesive tape 14 is adhered to the top panels 11, 12. The double sided adhesive tape 14 may include a release liner to shield the underlying sticky tape during processing and which is to be removed when the stack is positioned against an adjacent stack in a dispenser so that the two stacks are secured together.

[0039] In the embodiments shown in figures 1 and 2, the adherence layer 14 is elongate and extends parallel to the fold lines 6. The adherence layer could also be applied perpendicular to the configuration shown and still be able to serve the purpose of being applied on both the first and second webs 2, 3 so as to stick both the first and second webs 2, 3 to the last hygiene products or product of a preceding stack in a dispenser. Other adherence layers may be used than double sided adhesive tape with a release liner. For example, a strip of glue may be rolled or sprayed or otherwise applied on the first and second sheets 2, 3.

Another example would be the use of one component of a hook and loop fastener, which may require the other component of the hook and loop fastener to be provided at the bottom of the preceding stack in a dispenser. Alternatively, a hook component could be provided that is adhereable directly to the material, e.g. paper based material, at the bottom of a preceding stack by nature of the fineness of the hooks. In this alternative a mating loop component would not be necessary. The hook and loop or just hook materials could also be provided in the form of a tape that extends parallel to the fold lines 6 of the stack 1.

[0040] Referring back to figure 1, it can be seen that a corresponding adherence layer 15 is provided at a bottom surface 16 of the stack 1. Also, the bottom surface 16 of the stack 1 is defined partly by a bottom panel 17 of the second web 3 and a bottom panel 18 of the first web 2. The bottom panel 17 of the second web 3 overlays the bottom panel of the first web 2 and has been cut away in a complementary manner to that described above for the top panels 11, 12 of the first and second webs 2, 3. This complementary cut line at opposing ends of the stack 1 is a convenient result of the manufacturing process in that cutting away a top panel of the stack 1 so as to reveal an underlying panel will provide a complementary cut in the next stack in the manufacturing process, thereby resulting in each stack produced having complementary cut lines at the top and the bottom surfaces thereof.

[0041] As with the adherence layer 14 exposed at the top of the stack 1, the adherence layer 15 exposed at the bottom of the stack 1 is partly applied on the bottom panel 17 of the second web 3 and is partly applied on the bottom panel 18 of the first web 2. By providing a stack 1 having adherence layers 14, 15 on the top and the bottom of the stack 1, the combination of first and second such stacks will provide mating adherence layers, which can provide particularly strong adherence in combination.

[0042] The mating adherence layer of first and second stack also opens up the possibility to use two part components for the adherence layers so that the adherence properties are only felt when the two parts come into contact with one another. Such two parts adherence layers are conventional hook and loop fasteners, where one of the hook and loop components could be provided on the top of the stack and one of the hook and loop components could be provided on the bottom of the stack. Another two part adherence layer could be known two part adhesives whose adhesive properties only

activate once the respective parts are brought into contact. Such a configuration may be advantageous since it does away with the requirement for a release liner such as when double sided adhesive tape is used as the adherence layer 14, as
5 described above.

[0043] Alternatively, the adherence layer 14 on the top surface 10 of the stack 1 and the adherence layer 15 on the bottom surface of the stack 1 could be offset from one
10 another so that when two such stacks are stacked on top of one another in an aligned manner, the adherence layers 14 and 15 only partly contact with one another or do not contact with one another, so as to provide overall increased adherence coverage between the top and bottom surfaces of the
15 adjacent stacks.

[0044] In use, a stack 1 as shown in figure 1 will be mounted in a dispenser so that the top surface 10 of the stack 1 is brought into engagement and complete overlapping
20 alignment with a bottom surface of a stack being dispensed through the dispenser. As the existing or preceding stack is depleted and the last sheet is drawn through a dispensing opening of the dispenser, the bottom of the preceding stack is stuck to the adherence layer 14 on the top of the
25 succeeding stack so that both the top panel 11 of the first sheet 2 and the top panel 12 of the second sheet 3 is stuck to the bottom of the preceding stack to ensure that both of the webs 2, 3 of the succeeding stack are securely drawn through the dispensing path of the dispenser to the
30 dispensing opening of the dispenser. As both of the first and second webs 2, 3 are stuck to the bottom of the preceding stack, it can be assured that one or both of the start of the first and second webs 2, 3 do not fall away along the dispensing path and thus dispensing failure as a result of a
35 transition between respective stacks is avoided.

[0045] Another embodiment of the present invention will be shown and described with respect to figures 3 to 5 in the following. It should be noted that the discussion given above regarding various alternatives for the implementation of the adherence layer or layers is applicable to the present embodiment, but will not be repeated for brevity. The second embodiment is described to show another way of exposing respective webs of a stack at a top surface of the stack, and thus is described with the purpose of explaining the modifications from the above described embodiments given with respect to figures 1 and 2. The remaining common subject matter between the embodiments is not described again in the following.

[0046] Referring to figure 3, there is shown first and second webs 21, 22 divided into separable sheet hygiene products by lines of weakness 23 extending laterally across the elongate first and second webs 21, 22. Also shown in figure 3 are arrows to indicate where a fold line will be positioned when the first and second webs 21, 22 are interfolded into a stack 24 as shown in figure 4. As can be seen, the fold lines 25 for the first web 21 are positioned at each of the lines of weakness 23, while the fold lines 26 for the second web are offset by 1/3 of the length of a separable sheet hygiene product along the length of the second web 22 from the lines of weakness 23.

[0047] The offset of the lines of weakness 23 along the longitudinal direction of the first and second webs 21, 22 ensures that pull tab portions more forwardly protruding relative to a dispensing opening for one web as compared to the other are alternately provided for a user to grasp at the dispensing opening to ensure that one sheet hygiene product is dispensed at a time. Further, the offset of the fold lines 26 for the second web 22 relative to the lines of weakness 23 for the second web 22 allow the first and second webs 21, 22 to be interfolded into a stack 24 in such a way

that a top panel of the first web 21 and a top panel of the second web 22 are both exposed at a top surface 29 of the web 24, so that an adherence layer 30 can be partly stuck on the respective top panels 28, 27, as is described further below
5 with respect to figures 4 and 5.

[0048] Referring to figure 4, the interfolding pattern for the stack 24 can be seen as a cross-section through the stacking direction of the stack 24. As shown, the lines of
10 weakness 23 for the second web 22 are positioned intermediate fold lines 26 of the second web 22, while the fold lines 25 for the first web 25 are positioned at the lines of weakness 23 of the first web 21. These results in the first and second webs 21, 22 being interfolded so that the longitudinal
15 extent of the second web 22 is shifted along the longitudinal direction of the webs 21, 22 relative to the first web 21 by a non-integral fraction of the distance along the webs 21, 22 between the lines of weakness 23. When interfolded and stacked with such a longitudinal shift, the top surface 29
20 can be defined by a short top panel 28 of the second web 22 along the length of the second web 22 relative to an underlying top panel 27 of the first web 21. In this way, the top surface 29 of the stack 24 is defined in part by the short top panel 28 of the second web 22 and the protruding
25 longer top panel of the top panel 27 of the first web 21. This length differential enables both the first web 21 and the second web 22 to be disposed at the top surface 29 of the stack 24 so that an adherence layer 30 can be applied to both of them and so that both the first web and the second web 22
30 can be adhered to the bottom of an adjacent stack in a dispenser. This is achieved with only a very minor adjustment to the manufacturing process by appropriately configuring the relative locations of the lines of weakness 23 and the fold lines 25, 26 of the first and second webs 21,
35 22.

[0049] In the embodiments shown in figures 3 to 5, the fold lines 25 of the first web 21 are positioned at the lines of weakness 23 and the fold lines 26 of the second web are shifted relative to the lines of weakness 23 of the first web 22. This is just one way of a countless number of variations for providing a shortened top panel of one web that partly overlies a longer panel of another web in an interfolded stack. Important is that the fold lines of one of the webs is positioned closer to or at the line of weakness for that web than the fold lines for the other web so that a longer panel for the one web can be provided than for the other web, whereby the one web is positioned under the other web in the interfolding process. Thus, one can imagine configurations where the fold lines for the first web and the fold lines for the second web are both offset from the lines of weakness and offset from one another relative to the lines of weakness so as to provide the short and long top panels for the resulting stack as required by this embodiment of the invention.

[0050] In the arrangement shown in figures 3 to 5, there is one panel per sheet hygiene product. As explained previously with respect to figures 1 and 2, more than one panel per hygiene sheet product can be provided, in a manner known to the skilled person.

[0051] An adherence layer 30 is applied on the top surface 29 of the stack 24 so as to be partly applied on the top panel 28 of the second web 22 and to be partly applied on the top panel 27 of the first web 21. In the shown configuration, the adherence layer 30 is elongate and extends parallel to the fold lines 25, 26 so that part of the width of the adherence layer 30 is applied on the top panel 28 of the second web 22 and part of the width of the adherence layer 30 is applied on the top panel 27 of the first web 21. In the shown embodiment, the adherence layer 30 is provided as double sided adhesive tape having a release liner on one side of the adhesive tape. The release liner shields the

double sided adhesive tape 30 during processing and is to be removed in order to allow it to be stuck onto the underside of a preceding stack when the stack 24 is stacked in a dispenser.

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[0052] Numerous other possibilities exist for the adherence layer 30, as described above with respect to figures 1 and 2. For example, while the adherence layer 30 is shown as extending in parallel to the fold lines 25, 26 of the stack 24, it could extend perpendicularly thereto and still be applied on the top panels 27, 28 of the first and second webs 21, 22, respectively.

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[0053] Referring to figure 4, it can be seen that the bottom surface 31 is also defined by a short bottom panel 33 of the second web 22 overlying a longer bottom panel 34 of the first web 21 so that both panels are exposed at the bottom surface 31 of the stack 24. In the same way as the adherence layer 30 is applied on the top panels 27, 28, a second adherence layer 32 is applied on both of the bottom panels 33, 34 so that a stack positioned against the bottom of the stack 24 will be stuck to it and, more particularly, both the first and second webs 21, 22 of the stack 24 will be secured to the succeeding stack. If the succeeding stack is a stack according to that shown in figures 3 to 5, then the top adherence layer 30 of the succeeding stack will be secured to the bottom of the stack 24 and the bottom adherence layer 32 of the stack 24 will be secured to the top of the succeeding stack. Since the first and second adherence layers 30, 32 are offset from one another, they will not come into contact when the two stacks are stacked together in an aligned manner. It is, however, possible to arrange the adherence layers 30, 32 so that they are centrally positioned or so that they come into contact in some other way, thereby enabling the use of two component adherence layers that only act once the two components are in contact with one another, as described above.

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[0054] Other alternatives to the embodiments shown in figures 1 to 5 are also possible. For example, there is known from WO 2010/007260 the use of adhesive tape to connect one stack to an adjacent stack in a dispenser. The adhesive tape has a release liner positioned over the adhesive tape. What characterises the disclosure of WO 2010/007260 is that the release liner has an extension portion extending beyond the underlying adhesive that is bent so as to protrude out from one of the sides defining a stacking direction of the stack. The protruding extension portion can be pulled with the stacks in position in a dispenser to remove the release liner from the adhesive tape to stick the neighbouring stacks together. This idea enables a maintenance person to position and stack stacks of interfolded hygiene sheet products in a dispenser and only after the proper positioning of the stacks has been confirmed is it necessary to remove the release liner from the adhesive tape. This is made possible by the protruding extension portion of the release liner. We envisage the use of a release liner that covers the adherence layer described herein and which protrudes out from a side defining a stacking direction of the stack to be a useful modification of the embodiments of the present invention disclosed herein.

[0055] It is deemed to be particularly advantageous for the manner by which neighbouring stacks are connected to one another for interfolded first and second web-type stacks as disclosed herein to be applied to a dispenser in which the products are drawn along a dispensing path against the force of gravity. It is when sheet hygiene products are being moved against gravity that a risk is especially prevalent of one or both of the first and second sheets of the interfolded stack falling away. One example of a suitable dispenser with which the interfolded stack of first and second sheets of the present invention can be used is disclosed in figure 1 of WO 2006/071148.

[0056] In the dispenser of figure 1 of WO 2006/071148, neighbouring stacks of interfolded sheets will be placed against one another in the stacking direction and the hygiene sheet products will be withdrawn along a dispensing path that runs against gravity for at least a portion thereof. Because the weight of the stacks of interfolded sheets is not pressed against the dispensed products in such a bottom loading dispenser, the number of stacks can be greatly increased as compared to dispenser arrangements where the weight of the stacks bares against the hygiene sheet products being dispensed. Since both the first and second sheets are exposed at the top of the stack to be secured to the bottom of a stack currently being dispensed and since the adherence layer is applied on both of the exposed portions of the first and second webs at the top of the stack, it can be reliably assured that both the first and second webs will be successfully pulled through the dispensing path to the dispensing opening because they are both adhered to the bottom of the preceding stack.

[0057] In the dispenser of figure 1 of WO 2006/071148, there is provided a nip adjacent a dispensing opening that will serve to clamp sheet material products adjacent the dispensing opening to hold them there so that the forward most sheet hygiene products of the first and second webs is available for grasping by a user through the dispensing opening. As the user pulls the protruding sheet hygiene product of one of the first and second webs, the other of the first and second webs is pulled through the dispensing opening with it. The sheet material product being grasped by the user is torn at the line of weakness, leaving the protruding portion of the sheet hygiene product of the other web in position at the dispensing opening for subsequent product dispensing. The nip or clamp adjacent the dispensing opening will, according to the present invention, ensure that the first and second webs are held clamped adjacent the

dispensing opening. The adherence layer of the present invention ensures that both the first and second webs reach the nip or clamp adjacent the dispensing opening of the dispenser at a transition from the webs of one stack to the
5 webs of the next stack, to avoid dispensing failure.

Claims

1. A stack of interfolded first and second sheets, wherein the stack comprises an adherence layer for adhering a start
5 of the stack to an end of a preceding stack in a dispenser, and wherein the adherence layer is applied on the first and the second sheets so that the first and second sheets at the start of the stack are adherable to the end of the preceding stack.

10 2. The stack of claim 1, wherein the adherence layer is a layer of glue, a layer of adhesive tape, or a mechanical fastener such as a layer of a hook or a loop component of hook and loop fastening material or a layer of hook component
15 of hook and hook fastening material or other known adherence means.

20 3. The stack of claim 1, wherein the adherence layer is provided in the shape of a strip of adherence material, such as a tape.

25 4. The stack of claim 1, 2 or 4, wherein one of the first and second sheets forms a top panel of the stack at the start of the stack, the top panel is arranged to reveal a panel of the other of the first and second sheets so that the top panel and the revealed panel are exposed to the preceding stack at the top of the stack, wherein the adherence layer is applied on both the top panel and the revealed panel.

30 5. The stack of claim 4, wherein the top panel overlays part of the revealed panel.

35 6. The stack of claim 4 or 5, wherein the one of the first and second sheets is cut along a cut line in such a way that the top panel reveals the panel of the other of the first and second sheets.

7. The stack of claim 6, wherein the cut line and the adherence layer cross one another so that the adherence layer is applied on both the top panel and the revealed panel.

5 8. The stack of claim 6 or 7, wherein the cut line includes at least a portion extending diagonally with respect to a plane of the stack extending perpendicular to a stacking direction, wherein the stacking direction is an axis passing through each of the sheet products in the stack.

10

9. The stack of claim 6, 7 or 8, wherein the part cut away and the part remaining of the top panel are complementary in shape and of the same size.

15 10. The stack of any one of claims 1 to 5, wherein a top panel of the stack, which is a panel of one of the first or the second sheets, at the start of the stack is relatively short in a direction perpendicular to a fold line of the interfolded sheet along the sheet so as to reveal a panel of
20 the other of the first or the second sheets, wherein the adherence layer is applied on the top panel and the revealed panel.

11. The stack of claim 10, wherein the first sheet is a
25 first elongate web, the second sheet is a second elongate web, the first and second webs are divided into separable hygiene sheet products by lines of weakness extending laterally across the web, the lines of weakness of the first web and the second web are arranged offset relative to one
30 another in a longitudinal direction of the webs, and the positioning of fold lines of the first web relative to the lines of weakness of the first web in the longitudinal direction is different from the positioning of the fold lines of the second web relative to the lines of weakness of the
35 second web so that a top panel of the stack, which is a panel of one of the first and second webs, is relatively short in the longitudinal direction of the web to reveal an underlying

panel of the other of the first and second webs, wherein the adherence layer is applied on the top panel and the revealed underlying panel.

5 12. The stack of claim 11 or 12, wherein the terminal edge of the top panel extends parallel to the fold line

13. The stack of claim 12, wherein the adherence layer has a longitudinal direction aligned with the terminal edge and is
10 applied on the top panel for part of the width of the adherence layer and is applied on the revealed underlying panel for the remainder of the width of the adherence layer.

14. The stack of any one of the preceding claims, wherein
15 the adherence layer extends along a longitudinal direction of the stack in a plane of the stack extending perpendicular to a stacking direction, wherein the stacking direction is an axis passing through each of the sheet products in the stack.

20 15. The stack of any one of the preceding claims, wherein the adherence layer extends along an axis in a plane of the stack extending perpendicular to a stacking direction of the stack, wherein the stacking direction is an axis passing
25 through each of the sheet products in the stack, wherein the adherence layer extends at least 25%, 50%, 70%, 80%, 90% of the full dimension of the stack along the axis or extends the full dimension of the stack along the axis.

16. The stack of any one of the preceding claims, wherein
30 the first sheet is a first elongate web, the second sheet is a second elongate web, the first and second webs are divided into separable hygiene sheet products by lines of weakness extending laterally across the webs, the webs are interfolded with each other to form the stack, and the lines of weakness
35 of the first elongate web are offset in the longitudinal direction of the webs from the lines of weakness of the second elongate web so that as the products are dispensed, a

terminal product from the first web and a terminal product from the second web, which are the products next to be dispensed for the respective webs, are alternately further forward in the longitudinal direction.

5

17. The stack of any one of the preceding claims, wherein there is a boundary line between a top panel of the first sheet and a top panel of the second sheet as seen in plan view of a top surface of the stack, and wherein the adhesive
10 layer is applied on the top panels so as to cross the boundary line.

18. The stack of any one of the preceding claims, wherein the stack has an adherence layer at the start and the end of
15 the stack for adhering the first and second sheets to adjacently placed stacks in a dispensing machine so that the stack is adhered to both a preceding stack and a succeeding stack.

20 19. The stack of claim 18, wherein the adherence layers are respectively formed of a first part of a two part adherence material and a second part of a two part adherence material, wherein the adherence effect of the adherence layers only properly activates when the first and second parts come into
25 contact, and wherein the adherence layers are positioned on the stack so that if a corresponding such stack was placed start to end and so that the end surfaces of the stacks completely overlap, then the start and end adherence layers of the respective stacks would come into contact and activate
30 the adherence effect.

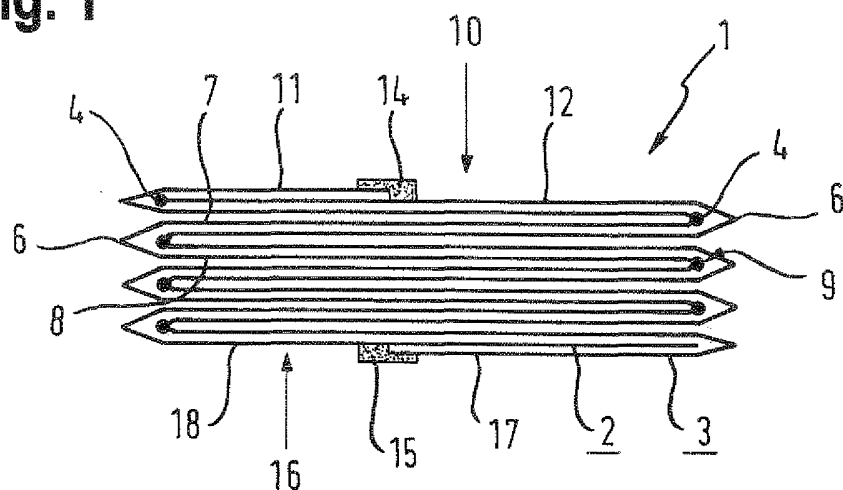
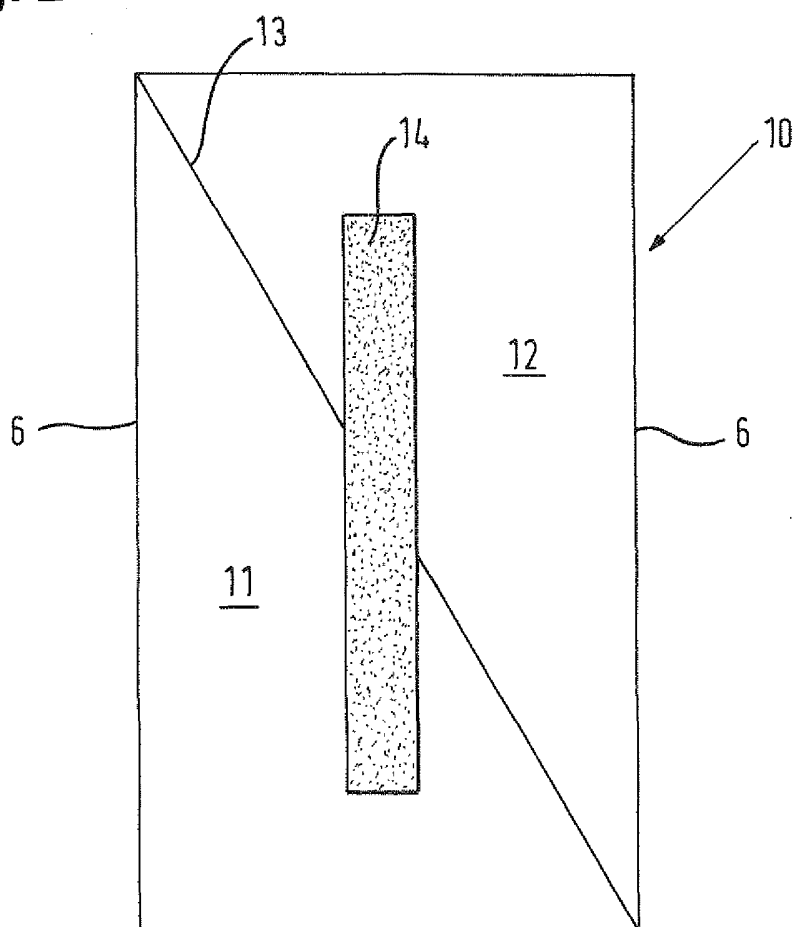
20. The stack of any one of the preceding claims, wherein a top surface at the start of the stack, which defines a top plane of the stack perpendicular to an axis passing through
35 each of the products in the stack, is defined in part by a top panel of the first sheet and in part by a top panel of the second sheet, wherein a bottom surface at the end of the

stack, which defines a bottom plane of the stack perpendicular to an axis passing through each of the products in the stack, is defined in part by a bottom panel of the first sheet and a bottom panel of the second sheet, wherein
5 one of the top panels overlays the other to reveal the other top panel, which defines a full panel, and one of the bottom panels overlays the other to reveal the other bottom panel, which also defines a full panel, wherein the one top panel and the one bottom panel are complementarily sized and shaped
10 with one another so that they can be pieced together to define a full panel.

21. A combination of a preceding stack of interfolded first and second sheets respectively defining at least one sheet
15 hygiene product and a succeeding stack of interfolded first and second sheets respectively defining at least one sheet hygiene product, wherein the start of the succeeding stack and the end of the preceding stack are adhered together in such a way that an adherence layer is adhered to both the
20 first and the second sheets of the succeeding stack so that as the end of the preceding stack is pulled through a dispenser opening of a dispenser, both the first and the second sheets at the start of the succeeding stack are securely pulled through the dispensing opening with it.

22. A dispenser containing a combination of first and second
25 stacks according to any one of claims 1 to 20 or the combination of stacks of claim 21, the stack providing a preceding stack and a succeeding stack with respect to the dispensing order in the dispenser, the dispenser comprising a dispensing opening through which the sheet hygiene products are dispensed from the stacks, the dispensing opening and the
30 stacks arranged so that the first and second sheets are pulled through a dispensing path to the dispensing opening against the force of gravity, whereby the force of gravity
35 has a tendency to cause one or both of the first and second sheets to fall from the dispensing path.

23. The dispenser of claim 22, wherein the dispenser
comprises a clamp for clamping the first and second sheets
adjacent the dispensing opening to prevent sheet fall back,
5 wherein the first and second sheets are fed along the
dispensing path to the clamp against the force of gravity

Fig. 1**Fig. 2**

2 / 2

Fig. 3

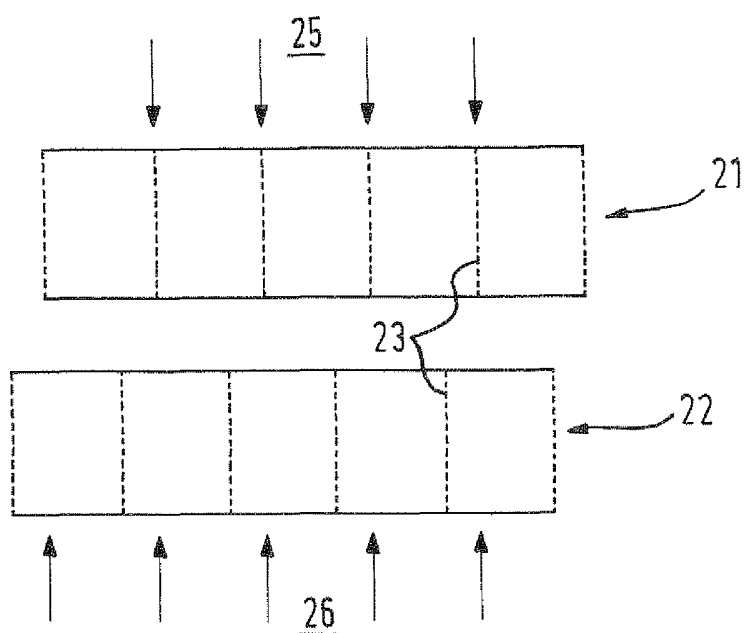


Fig. 4

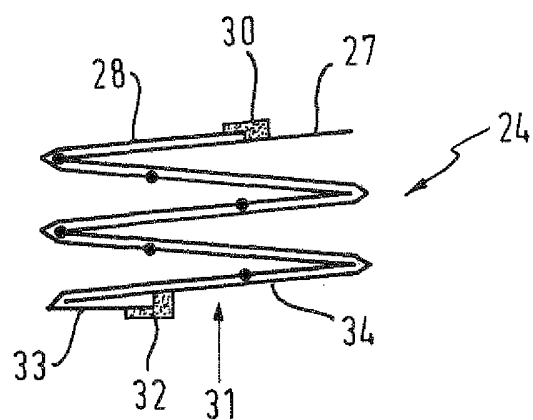
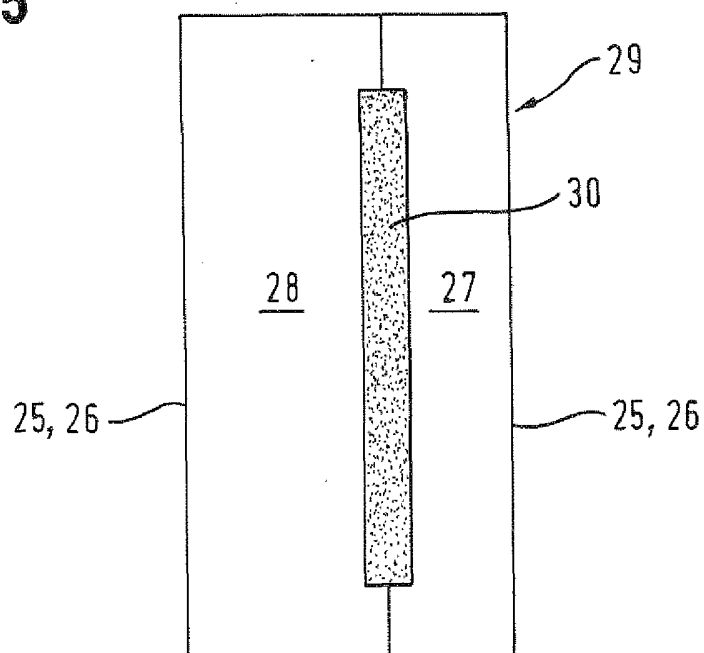


Fig. 5



INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2011/061937

A. CLASSIFICATION OF SUBJECT MATTER

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ADD.

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)

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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EP0-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 1 462 389 A1 (GEORGIA PACIFIC FRANCE [FR]) 29 September 2004 (2004-09-29) the whole document -----	1,21,22
A	EP 1 118 568 A2 (PAPER CONVERTING MACHINE CO [US]) 25 July 2001 (2001-07-25) the whole document -----	1,21,22
A	WO 2010/007260 A1 (GRANGER MAURICE [FR]) 21 January 2010 (2010-01-21) cited in the application the whole document -----	1,21,22



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

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"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

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"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.

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Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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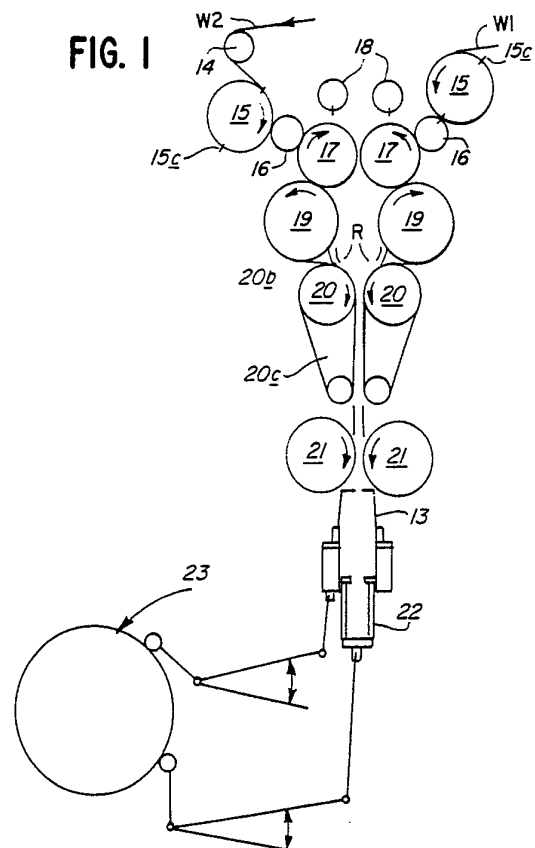
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(54) Method and apparatus for interfolding webs.

(57) There is disclosed an apparatus and method for zig-zag folding a pair of continuous webs (W1,W2) or web segments (sheets) to provide stacks (11,12) each having a specified number of segments wherein the segments are preferably offset one-half segment length in one web from the other, the invention including reversely folding the leading edge portion of each web to provide a spacing for the insertion of stack separator means (13).

FIG. 1



EP 0 291 211 A2

METHOD AND APPARATUS FOR INTERFOLDING WEBS

This invention relates to a method and apparatus for interfolding webs and more particularly for providing discrete stacks each having the same number of web segments --each segment being "V" folded to provide a pair of panels, the segments being offset one panel length.

Interfolding has been practiced for a long time --whereby the removal of one web segment automatically places the succeeding web segment in a position for manual grasping. As such, it has been widely used for both paper towels and facial tissue. Interfolded tissues, for example, have been made in two ways. One way was to fold longitudinally 200 webs, then severing the stack. This had the drawback of dispensing the tissues in the weaker cross machine direction. The other way was to transversely interfold (normally by tuckers and grippers) two webs so that the dispensing was in the stronger machine direction. It is to the latter way that the instant invention is directed.

In transverse zig-zag folding, there has been a problem of separating one stack from another. This is true irrespective of whether the webs are transversely perforated --as in tissues or whether the webs are transversely severed --as in towels.

In the case of the tissues, the perforations result in small bonds connecting contiguous segments. Therefore, such webs are essentially continuous. When a predetermined "count" was reached, some means had to be provided for isolating the already achieved count from the web material continuing to issue from the interfolder. This normally was done manually --with markers of some type being inserted to indicate the place of separation. This was both back-breaking and costly. Further, the breaking of the bonds could disarrange the bottom segment.

In the case of towels, separator plates were inserted from opposite sides of the stack to flank the ending and beginning panels of succeeding stacks. When these plates were separated as by lowering the lower plate faster than the upper plate, the sheets became de-lapped. But, in doing this there was also the possibility of disarrangement because the segments were not under full control.

According to the instant invention, the stack separation is achieved by developing a spacing in the two continuous streams of contiguous web segments prior to the zig-zag folding. This spacing is achieved by reverse folding once each count the leading free edge of the leading segment of each stream.

Separation of segments or sheets prior to zig-zag folding has been performed previously, but not for use with a single folder. In both Patent No.

4,494,741 and co-pending, co-owned application Serial No. 816,441 filed January 6, 1986, the separation was achieved for directing the web streams alternately to a pair of folders. More importantly, there was no suggestion of achieving the spacing by reverse folding.

The invention brings about additional advantages. Not only is the spacing between stacks achieved but further the reversely folded portion of the protruding web provides a starter tab for manual grasping to remove the web segments from a container and further, the reverse folding also provides a multiple thickness, longitudinally extending web portion to facilitate the zig-zag folding of the initial panel of a stack.

The invention is further explained, by way of example with an illustrative embodiment in the accompanying drawings, in which --

FIG. 1 is a side elevational view, essentially - schematic, of apparatus illustrating the practice of the invention;

FIG. 2 is a side elevational view of the webs being processed --after reverse folding, but before zig-zag folding;

FIG. 3 is another side elevational view, again generally schematic, showing the webs after zig-zag folding and at the time of stack separation;

FIG. 4 is a side elevational view of a portion of a stack developed according to the preferred practice of the invention and where the reverse fold is 1/3 the length of a panel (a web segment or sheet consisting of two panels in length);

FIG. 5 is a view similar to FIG. 4 but wherein the reverse fold is 1/2 the panel length; and

FIG. 6 is a fragmentary end elevational view of the apparatus of FIG. 1.

Referring to the drawing and particularly FIG. 2, the numeral 10 designates a spacing between the beginning of one stack 11 and the ending of the previous stack 12.

Now referring to FIG. 3, the stacks are seen to have been zig-zag folded and the beginning of the stack 11 is designated 11', while the ending of the stack 12 is designated 12'. From FIG. 3 it will be seen that stack separator means 13 are interposed in the spacing 10.

As indicated previously, the spacing 10 is achieved through reverse folding the leading edges of the webs intended for zig-zag folding. Apparatus for achieving this is now described with reference to FIG. 1.

Apparatus

At the the top of FIG. 1 a pair of webs derived from parent rolls (not shown) are designated W_1 and W_2 . Because the parent rolls are usually located side-by-side, a guide roll 14 is provided in the path of travel of web W_2 from its parent roll to its perforator roll 15. The web W_1 is shown to be entering in contact with its perforator roll 15 without the interposition of a guide roll.

It will be appreciated, however, that, in accordance with conventional practice, a frame consisting of two side frames (one such being designated F in FIG. 6) is provided in which bearings are mounted for supporting the various rolls in rotatable fashion. The major portion of the frame normally will also include tensioning rolls or other means to insure that the webs coming from the parent rolls are properly tensioned. The frame and these various entering components have been omitted from the drawing for clarity of presentation and ease of understanding. However, they are provided as seen in the previously mentioned application and for details of the frame and other elements, express reference is made thereto.

The perforator rolls 15 transversely perforate the two webs W_1 , W_2 along equally longitudinally spaced transverse lines. The perforations are designated schematically in FIG. 2 by the numeral 15a relative to the web W_1 and by the numeral 15b relative to the web W_2 . From FIG. 2 it will be seen that the lines of perforation in one web are offset longitudinally from the lines of perforation in the other web, i.e., the lines 15b lie halfway between the lines 15a. For this purpose, the perforator rolls are suitably coordinated in their perforating action --as by phasing the perforating blades 15c in one roll intermediate the perforator blades in the other roll (compare FIGS. 1 and 6). A typical construction of perforator is shown in co-owned Patent No. 2,870,840.

After being perforated, the webs W_1 , W_2 encounter transfer rolls 16 which direct the webs to rolls 17 which are also transfer rolls and further can serve the purpose of perforation breaking or cutoff rolls. The rolls 17 are equipped with vacuum ports so as to maintain the severed webs in contact with the surface of each of these rolls. Each of the perforator breaker rolls 18 has a blade protruding from its surface. When the roll is periodically (once each stack length) lowered toward its associated roll 17, the blade enters (co-acts with) a slot in the transfer roll 17 which action breaks or severs the bonds 15a or 15b.

When facial tissue is being interfolded, it is normally the practice not to rupture the bonds between adjacent sheets --except, in the practice

of the invention to break the bonds at the beginning of the lead sheets or segments --so as to develop the spacing 10. On the other hand, with paper toweling, each segments is discrete and separate from the sheets in the web preceding and following the same. Therefore, where a machine is going to produce only interfolded toweling, the perforating function can be eliminated and a transverse severing function substituted --as seen in co-owned Patent 2,478,240. Thus, the invention comprehends both types of transverse cutting: perforation and severance.

When leaving the transfer rolls 17, the webs (or contiguous segments) are transferred to vacuum transfer-folding rolls 19 which transfer the webs (or segments) to vacuum-belt rolls 20. Incident to this the reverse folds R are developed periodically --creating the space 10 at the start of each new stack of interfolded segments. Rolls 19 and 20 have dual vacuum systems which are controlled by solenoid valves 19a and 20a or other controller in the lines from the vacuum pump (not shown). Such intermittent application of vacuum to perform selective folding is well known. Illustrative of vacuum folding rolls is my earlier Patent 4,521,209.

The webs now having their leading edges reversely folded are brought together in the nip 20b between rolls 20 and belts of transfer belt system 20c. Thereafter, the contacting webs are introduced between folding rolls 21 and the webs at this stage are in the configuration depicted in FIG. 2.

The folding rolls 21 are equipped with conventional tuckers and grippers (see co-owned Patent 4,279,411). As seen in FIG. 6, the right hand folding roll has an intermittently activated vacuum system controlled by a solenoid valve 21a or other controller. This serves to carry the end 12' (see FIG. 3) of stack 12 to its proper position on top of stack 12 and assure that the end 12' is below stack separator means 13 as it enters the space 10.

Referring again to FIG. 1, the numeral 13 again designates the stack separator means which advantageously can be pivotally mounted fingers and below the fingers is provided an elevator 22. An elevator can be seen in co-owned, co-pending application Serial No. 855,132 filed April 22, 1986.

Thus, when the stack separator means 13 enter the spacing between stacks, the elevator 22 supports the now-completed stack and descends to carry it to a conveyor (not shown) which transports the finished stacks out of the machine to the next operation. The separator fingers 13 support the developing stack until the elevator has been returned to stack supporting position after which the stack separator fingers are retracted and elevated to a position for separating the next stacks. The numeral 23 designates generally cams and levers

or equivalent operators which control the movement up-and-down, and in-and-out of the separator fingers 13 and the up-and-down movement of the elevator 22.

Starter Tab

To appreciate how the reverse folding develops a starter tab, reference is first made to FIG. 4 where the starter tab is designated 24. There the web W_1 is shown in solid line and the web W_2 in dashed line.

The starter tab 24 is developed in the web W_1 and provides a convenient finger graspable portion --as through a slot in the container (not shown) --for starting the extraction of tissues, towels, etc.

The leading segment in the web W_1 for a newly developing stack is designated by the numeral 25 in FIG. 2. This segment 25 extends from the former leading edge --now reversely folded and designated 26 --through the next transverse line of perforation which is designated 27.

As indicated previously, a single segment includes two panels and this can be readily appreciated from a consideration of FIG. 4. In FIG. 4, the starter tab has two thicknesses each being one-third of a panel length. These two tab-forming portions are designated 28 and 29, and can also be seen in FIG. 2.

Also indicated in FIG. 2 is a tucker 30 of the right-hand folding roll 21. As the tucker 30 cooperates with its mating gripper (not shown) on the left hand folding roll, the web W_1 is folded --as seen in the central portion of FIG. 3 --about the point 31, also so designated in FIG. 4.

This results in confining the leading portion of the next adjacent segment in the web W_1 as at 32 which also can be appreciated from a consideration of FIG. 3. The folding of the remainder of the leading segment in W_1 is achieved by the tucker 33 provided in the left hand folding roll 21 --and with its cooperating gripper (not shown) in the right hand folding roll. This develops the fold designated 34 in FIGS. 3 and 4. More particularly, this develops the trailing portion 35 of the leading segment in web W_1 which lies between the fold line 34 and the end 26.

The next tucker 36 to operate against the combined webs generates the fold line 37. Tuckers 33 and 36 configure the leading segment of the web W_2 in a fashion identical (but mirror image) to that of the leading segment of the web W_1 . As indicated previously, this is not needed for a starter tab but the web W_2 is transversely severed and reversely folded so as to provide the spacing 10.

Another advantage accrues through the prac-

tice of the invention and that resides in the fact that the reverse fold provides a multiple thickness of web material extending on both sides of the tucker 30 to facilitate tucking. It will be appreciated that tucking can be difficult if the tucker has only the leading edge to insert into the jaws of the gripper. This advantage also applies to zig-zag folders making use of other folding means such as vacuum rolls as contrasted to the tuckers shown.

Once the lead segment of the web W_2 has been transversely folded --as at 34 --the remainder of the operation is conventional wherein alternate tuckers and grippers operate on each web successively to provide the usual configuration of interfolded webs.

In some instances it may be advantageous to provide a starter tab that projects further across the stack. Such a modification is seen in FIG. 5 where the starter tab is designated by the numeral 124. Here the starter tab is made up of two portions 128 and 129 each having a length of one-half panel, viz., one-quarter of the initial sheet length. The remainder, i.e., the full panel portion of the leading segment of web W_1 is designated 138 and extends between the fold lines 131 and 134. It has been found advantageous to provide a starter tab having a dimension across the stack of from about one-third to about one-half of the panel length. However, the starter tab may be less than one-third the panel length, but greater than zero length, viz., about 1/5 panel length and still be within the scope of this invention.

In the illustration given, it will be noted that the webs are reversely folded so that the lead portion confronts the other web, i.e., the reverse fold is sandwiched between the webs W_1 and W_2 proper. If the contrary were true of the lead sheet in web W_1 , there is the possibility that grasping and pulling on the starter tab 24 might not cause the next sheet to become partially pulled out. As illustrated in FIG. 5, the portion 138 lies within the portion 132 and this facilitates the removal of the second sheet from the carton.

While in the foregoing specification a detailed description of the invention has been set down for the purpose of illustration, many variations in the details hereingiven may be made by those skilled in the art without departing from the spirit and scope of the invention.

Claims

1. A method for making stacks of interfolded web material, characterised by the steps of continuously advancing two streams (W_1, W_2) of web segments into a transverse folder (21), and periodically reverse folding a web segment in each

stream prior to introduction into said transverse folder (21) to provide a spacing (10) between stacks (11,12).

2. A method as claimed in claim 1, characterised in that the web segments in each stream (W1,W2) are connected by perforation bonds, the bonds in one stream being offset one-half segment length from the bonds in the other stream, and severing the bonds periodically just prior to said reverse folding.

3. A method as claimed in claim 1, characterised in that the web segments in each stream are separate from the other segments thereof to provide free edges, the free edges in one stream being offset one-half segment length from the free edges in the other stream.

4. A method as claimed in any one of the preceding claims, characterised in that said streams prior to introduction into said transverse folder (21) are brought together in confronting relation with the reverse folds (R) confined between confronting segments.

5. A method of interfolding webs to provide discrete stacks each having the same number of panels, characterised by comprising advancing a pair of webs (W1,W2) along first predetermined paths, each of said webs having equally longitudinally spaced lines of potential folding with the lines in one web being offset one panel length from the lines in the other whereby said webs (W1,W2) provide adjacent lines when disposed side-by-side in a second path, severing said webs along a pair of adjacent lines to provide a leading edge (26) in each web, reversely folding once per stack each web a spaced distance from its leading edge to provide a spacing from the trailing edge of the preceding panel of the same web, zig-zag folding said webs (W1,W2) together along said fold lines whereby said spacing provides entry areas for stack separator (13) means to develop said discrete stacks and the reverse folding (R) provides a starter tab for manual grasping to remove panels from a dispenser, said reverse folding (R) also providing multiple thickness, longitudinally extending web portions to facilitate said zig-zag folding of the initial panel of a stack.

6. A method as claimed in claim 5, characterised in that said webs (W1,W2) are perforated along said lines before said severing.

7. A method as claimed in claim 5 or 6, characterised in that said webs (W1,W2) are severed along all of said lines prior to zig-zag folding.

8. A method as claimed in any one of claims 5 to 7, characterised in that said reverse folding provides a flap (25) positioned between its associated web and the other of said webs (W1,W2).

9. A method as claimed in any one of claims 5 to 8, characterised in that said reverse folding provides a tab (124) having a dimension in the direction of web movement up to about 1:2 the length of a panel.

10. A method of zig-zag folding a pair of continuous webs (W1,W2) to provide stacks (11,12) each having a specified number of segments wherein the segments are offset one-half segment length in one web from the other, characterised by the steps of severing said webs (W1,W2) between stacks (11,12) and reversely folding on itself a portion of the leading stack segment of each web to provide a spacing from the trailing segments of the stack preceding, and zig-zag folding said webs (W1,W2) together along equally spaced transverse lines.

11. A method as claimed in claim 10, characterised in that each web (W1,W2) is transversely cut between each segment.

12. A method as claimed in claim 10 or 11, characterised in that stack separator means (13) are interposed in said spacing following zig-zag folding.

13. A method as claimed in any one of claims 10 to 12, characterised in that the folding is achieved by tuckers (30,33,36) and grippers, a first set of said tuckers and grippers operating against multiple web thickness spaced rearward of the reverse fold line in the forwardly projecting web to provide a starter tab for each stack.

14. Apparatus for interfolding webs (W1,W2) to provide discrete stacks (11,12) each having the same number of segments of two panels each characterised by comprising a frame (F), roll means (14,15,16,17,19) on said frame for advancing a pair of webs along first predetermined paths, said roll means including means (18) in each of said paths for transversely cutting web associated therewith along a severance line, said cutting means (18) being co-ordinated to provide a free leading edge in one web (W2) a panel length behind the leading edge in the other web (W1), said roll means further including means (19) for reversely folding each web along a line which is a spaced distance from its leading edge to provide a spacing between the portions of the webs on opposite sides of said severance lines, belt means (20) on said frame (F) for advancing said webs (W1,W2) in side-by-side relation along a second path, means in said second path for zig-zag folding said webs, and means of said frame for inserting stack separation means into said spacing.

15. An apparatus as claimed in claim 14, characterised in that said cutting means includes a pair of perforator rolls (15), each perforator roll having a perforator breaker roll (18) operatively associated therewith to provide interfolded tissue.

16. An apparatus as claimed in claim 14 or 15, characterised in that said cutting means includes means for completely transversely severing each web along a line between each pair of panels in each web to provide interfolded toweling.

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17. Apparatus for interfolding two webs (W1,W2) to provide discrete stacks (11,12) each having the same number of panels, characterised by comprising a frame (F), a pair of perforator rolls (15) rotatably mounted on said frame (F) one for each web (W1,W2), said perforator rolls (15) being co-ordinated with each other to provide a transverse line of perforation in one web a panel length from the transverse lines of perforation in the other web adjacent thereto, means (14) for feeding a web to each of said perforator rolls (15), a pair of perforator breaker rolls (18) mounted on said frame (F) one for each perforator roll (15) adapted to provide a free leading edge in each web for the panel commencing the start of a stack, a pair of vacuum-equipped folding rolls (19) rotatably mounted on said frame and adapted to reversely fold each web a spaced distance rearward of the associated free leading edge whereby a spacing is developed from the panel equipped with the reverse fold and the trailing edge of the panel immediately preceding, means (20,21) on said frame for bringing said webs together and zig-zag folding the same along lines of perforation, and stack separator means (13) on said frame adapted to enter said spacing to separate one stack from another.

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18. Apparatus for interfolding two webs (W1,W2) to provide discrete stacks (11,12) each having the same number of panels, characterised by comprising a frame (F), a severance means rotatably mounted on said frame one for each web, said severance means being co-ordinated with each other to provide a transverse line of severance in one web a panel length from the transverse lines of severance in the other web adjacent thereto, means (14) for feeding a web to each of said severance means, said severance means being adapted to provide a free leading edge in each web for the panel commencing the start of a stack, a pair of vacuum-equipped folding rolls (19) rotatably mounted on said frame (F) and adapted to reversely fold each web a spaced distance rearward of the associated free leading edge whereby a spacing is developed from the panel equipped with the reverse fold and the trailing edge of the panel immediately preceding, means (20,21) on said frame for bringing said webs together and zig-zag folding the same along lines between said lines of severance, and stack separator means (13) on said frame (F) adapted to enter said spacing to separate one stack from another.

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FIG. 1

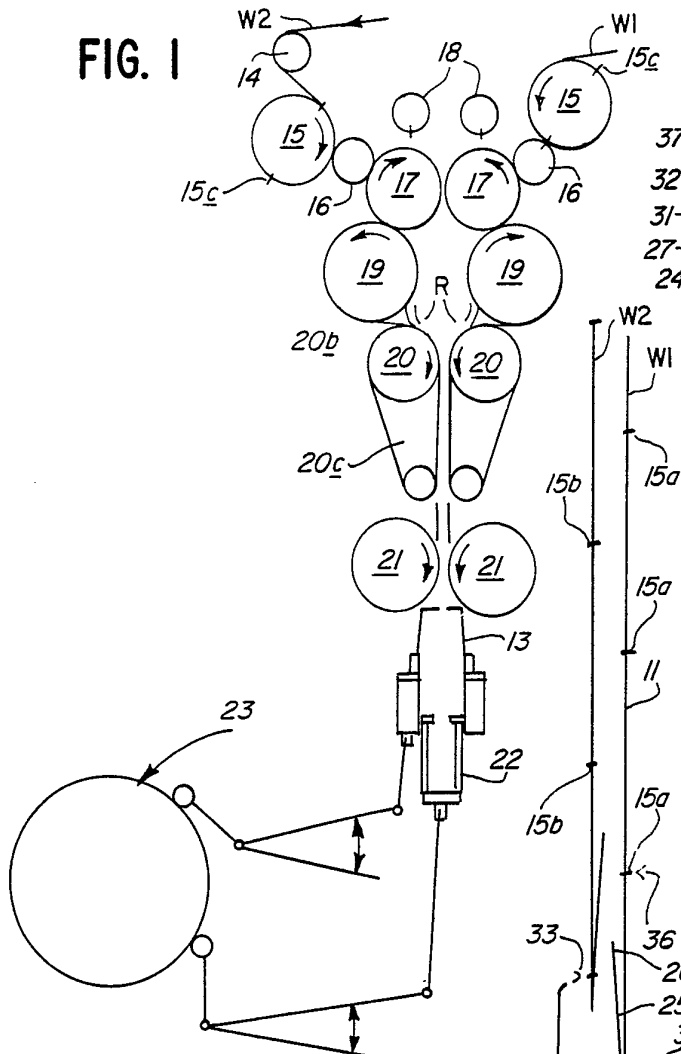


FIG. 2

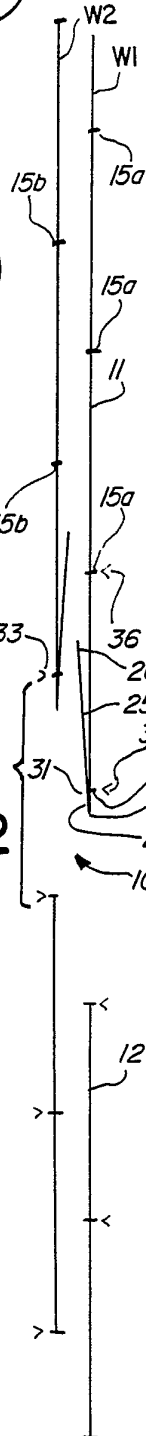


FIG. 3

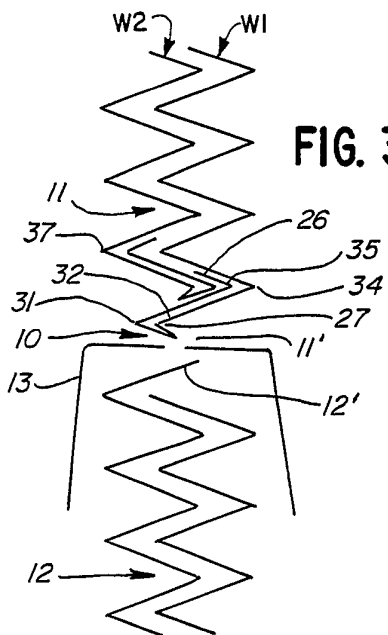


FIG. 4

FIG. 5

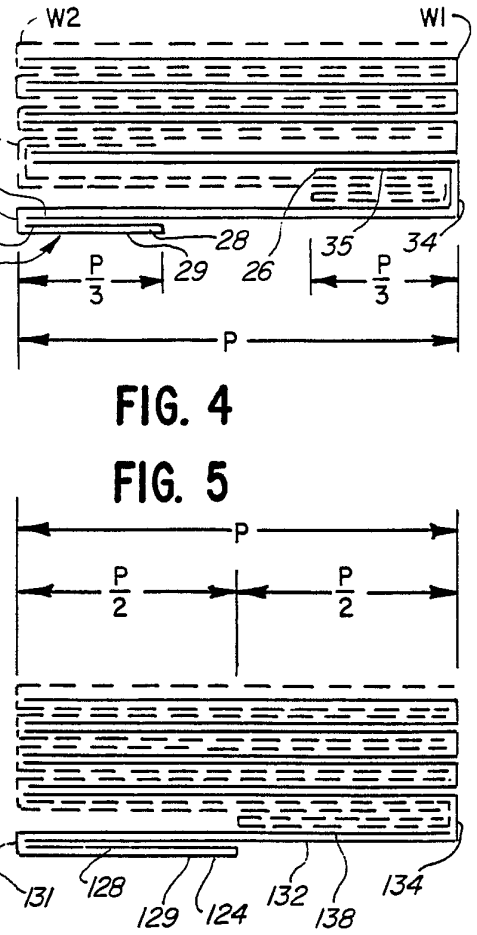
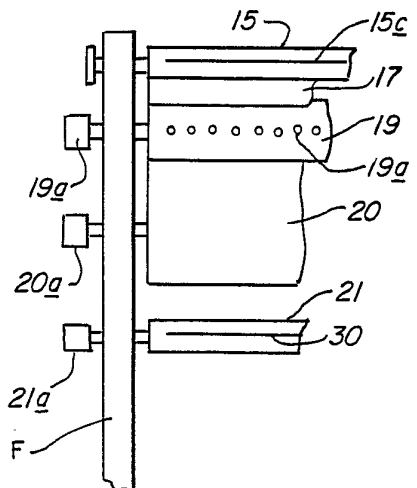


FIG. 6





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(54) **Improved single-fold interfolding machine and method therefor**

(57) An interfolding machine for making a stack of interfolded sheets is adapted to move a first web (10a) of a material to be interfolded, for example paper, non woven fabric, or similar material, along a first direction (101a) and a second web (10b) along a second direction (101b). The two webs of paper (10a, 10b) are dragged by means of respective series of rollers (31-36, 37-45) up to respective cutting sections (20a and 20b) where cutting rollers (2a, 2b) are arranged that in combination with respective counter-cutting rollers (3a, 3b) cut the webs of paper (10a, 10b) in order to form respective sequences of sheets (11a, 11b). The sequences of sheets

(11a, 11b) reach then an interfolding section (30) where the sheets (11a) obtained by the first web (10a) and the sheets (11b) obtained by the second web (10b) are folded and then interfolded according to a determined interfolded configuration. Each series of sheets (11a, 11b) has a complete cut (51), or "clean cut", alternated to a tear-off line (52), or "tab-bond". The above described configuration avoids the drawbacks of the prior art deriving from the separation of two successive sheets of two different stacks that are joined through a line of "tab-bond" type.

Description

Field of the invention

[0001] The present invention relates to an improved interfolding machine of single-fold type, for making paper material, and the like, as packages of interfolded sheets with a predetermined number of sheets.

[0002] The invention relates, furthermore, to an interfolding method therefor.

Background of the invention

[0003] As well known, in the paper converting industry a variety of types is used of machines and of processes for making paper tissues, paper towels and similar articles as stacks of a certain height of interfolded sheets.

[0004] They are obtained by folding the sheets in an "interfolded" way, i.e. enclosing within each fold a wing of the previous sheet and a wing the next sheet. This way, when drawing a sheet from the pack, also a wing the next sheet pops up from the pack, with subsequent practicality of use for certain types of applications. Among possible interfolding ways the L-type, with 2 panels, or the Z or W types, respectively with 3 and 4 panels, are known.

[0005] The interfolding machines of known type provide a couple of folding rollers that supply the interfolded sheets on a stacking table and, in some cases, a plurality of "hands" is provided that alternately conceal within and protrude from special grooves, which are made on the folding rollers for the production of a stack of interfolded sheets on the stacking table.

[0006] When the growing stack reaches a predetermined height, a first and a second plurality of separating elements, which are arranged for all the length of the stack and at opposite sides with respect to it, enter within the stack same. The introduction of the separating elements starts the separation of a formed stack from a growing stack.

[0007] Between the separators and the table the introduction is provided also of a sheet stretching board. The completed stack is then located between the table and the sheet stretching board. While the sheet stretching board remains to support the growing stack, the table drops vertically moving the stack already formed away from the growing stack up to cause the separation of the two stacks.

[0008] However, the above described interfolding machines, of so-called single-fold type, which perform the interfolding process starting from webs of paper that converge towards the folding rollers, have various drawbacks when they are used to make stacks of interfolded sheets that have three panels, so-called "Z" folding. In particular, in a pack of "Z" interfolded products, it is necessary that two successive sheets are joined by portions that are separated by cut lines, or "tab-bonds", owing to the odd number of panels.

[0009] The presence of "tab-bonds", which is always necessary in the known single-fold machines for making "Z" type interfolded products, however, complicates remarkably the separation step of a formed stack of sheets from the growing stack, once achieved a desired height of the pack, owing to the need of tearing the tab-bonds during the separation step.

[0010] In particular, when tearing the paper of the tab-bonds an unpredictable movement of the sheet occurs, and irregular folds in the starting and final zone of the pack are formed. Furthermore, for the separation of packs it is necessary to use a sheet stretching board, with relevant structural and operative complications in the machine.

[0011] A further drawback of the prior art is that the first and the last sheet of each stack is torn. Therefore, to avoid that the resulting product has a low quality, it is necessary to provide a very thin tab-bond, which with the other drawbacks above described does not achieve a high production rate, comparable with single-fold machines with two or four panel sheets.

[0012] For these reasons, this type of machines has never been used for products of very light paper, like "facial tissue", but only for heavier products, such as paper towels.

Summary of the invention

[0013] It is therefore a feature of the present invention to provide an interfolding machine that provides an interfolded product of "Z" type that is improved with respect to the similar products of the prior art.

[0014] It is also a feature of the present invention to provide an interfolding machine that allows achieving a higher production rate with respect to the interfolding machines of the prior art.

[0015] It is another feature of the present invention to provide an interfolding machine that is cheap with respect to the interfolding machines of the prior art.

[0016] It is a further feature of the present invention to provide an interfolding machine that is adapted to process a wide variety of different paper material types.

[0017] It is also a feature of the present invention to provide an interfolding machine that is highly flexible, since it is capable of making interfolded products of different types.

[0018] It is also a feature of the present invention to provide an interfolding machine that assists remarkably the separation of two packages of interfolded sheets of "Z" type.

[0019] It is still a feature of the present invention to provide an interfolding machine that is structurally much easier than similar machines of the prior art.

[0020] These and other objects are achieved by an interfolding machine comprising:

- a feeding section equipped with a first plurality of rollers for moving a first web of paper and with a

second plurality of rollers for moving a second web of paper;

- a cutting section comprising:
 - first cutting means that is adapted to divide the first web of paper into a first plurality of sheets of measured length;
 - second cutting means that is adapted to divide the second web of paper into a second plurality of sheets of measured length;
- an interfolding section comprising:
 - an interfolding means that is adapted to fold said first and said second plurality of sheets in a determined interfolded configuration to obtain a stack of interfolded sheets;
- a separating section for separating a stack of interfolded sheets from the growing stack;

whose main feature is that the first and the second cutting means comprises means to provide a cut line, or "clean cut", and means to provide a tear-off line, or "tab-bond", on said first and said second web.

[0021] This way, the machine allows to separate the sheets only at the clean-cut lines, without tearing.

[0022] Advantageously, the first and the second cutting means cut the first and the second web of paper, respectively, in combination with respective counter-cut means that act opposite to the web of paper in order to provide the above described division into the first plurality of sheets and into the second plurality of sheets.

[0023] Advantageously, the first and the second cutting means provide, each, a cutting roller that is peripherally equipped with:

- at least one cutting blade having a profile that is adapted to cut a complete cut, or "clean cut", on a web of paper;
- at least one perforating blade having a profile that is adapted to cut a tear-off line, or "tab-bond" on the web of paper.

[0024] In particular, the first and the second cutting means can provide, each, a cutting roller comprising:

- a plurality of cutting blades having a profile that is adapted to make a cut, or "clean cut", on a web of paper, said cutting blades of said plurality arranged peripherally on the cutting roller at a first angle from each other;
- a plurality of perforating blades having a profile that is adapted to cut a tear-off line, or "tab-bond", on said web of paper, said perforating blades arranged peripherally on the cutting roller at a second angle from each other.

[0025] Advantageously, the interfolding means are selected from the group comprised of:

- suction holes;
- mechanical clamps;
- a combination thereof.

[0026] In particular, the plurality of cutting blades and the plurality of perforating blades are mounted on the boundary of a cutting roller at respective housings in a way movable selectively between an operating position, in which said blades protrude from said cutting roller and cut the web of paper, and a rest position, in which said blades are withdrawn within said cutting roller and cannot cut the web of paper, said cutting blades and/or perforating blades in said operating positions obtaining a desired cutting configuration.

[0027] Advantageously, a means is provided for actuating selectively each blade of said plurality of cutting blades and of said perforating blades between said operating position and said rest position in order to provide a desired cutting configuration.

[0028] In particular, the means for actuating selectively each of said cutting blades and each of said perforating blades between said operating position and said rest position can provide an actuator, for example a pneumatic actuator, having a stem with an end that is connected to the blade and the other end that is arranged in an actuating chamber, said blade being pivotally constrained to said roller at a pivoting point, said end of said actuator sliding in said actuating chamber for causing the rotation of said blade about said pivot point and then the movement of said blade from said operating position to said rest position, or vice-versa.

[0029] Alternatively, the means for actuating the blades between the operating position and the rest position provide a carriage that is integral to each blade and slides on a guide, said carriage withdrawing/forwarding with respect to the boundary of the roller along the guide for bringing the blade from the operating position to the rest position, or vice-versa.

[0030] In a further exemplary embodiment, the means for actuating the blades between the operating position and the rest position comprises a first plurality of blade holders that are arranged peripherally on the roller at the first angle from each other and a second plurality of blade holders that are arranged peripherally on the roller at the second angle from each other, whereby the blades can be mounted on the roller at the first, or the second, plurality of blade holders to provide the complete cuts, or the perforations, respectively.

[0031] In particular, at the separating section first and second separation means are provided that act at opposite sides of the stack and are adapted to be moved between a position that is external to the stack and a position within the stack, said first and second separation means arranged in said position within the stack in points such that the separation of two successive sheets is obtained

at a complete cut, or "clean cut".

[0032] More precisely, the first separation means enters the stack at a cut line, or "clean cut" and the second separation means enters the stack opposite to the first separation means in a position immediately upstream of it. This way, after the separation of two consecutive sheets, between the first and the second separation means only one sheet remains hanging that can be easily bent for finishing the pack.

[0033] Advantageously, furthermore, a program means is provided that is adapted to operate electronically said first and second separation means. This way, the separation means is operated with high precision. This way, furthermore, the separation means is prevented from entering the stack in wrong points i.e. in points that bridge two "tab-bonds", or between a "tab-bond" and a "clean cut", and the separation means is caused to enter only at two "clean cut", as above described.

[0034] According to another aspect of the invention, a method for making a stack of interfolded sheets comprises the steps of:

- feeding a first and a second web of paper;
- cutting the first and the second web of paper in order to provide a first and a second plurality of sheets of measured length, respectively;
- interfolding the first and the second plurality of sheets in a determined interfolded configuration to obtain a stack of interfolded sheets;
- separating said stack of interfolded sheets from the growing stack and moving away the stack;

said cutting step providing the cut of a combination of complete cuts, or "clean cut", and of perforations, or "tab-bond" on said first and second web.

[0035] This way, the separation of the stacks is carried out only at the clean-cut lines, without tearing, and with simplification of the steps of separation, such that the separation between the formed stack and the growing stack does not require using separating tables for tearing the tab-bonds, since at the clean-cut the separation between the two stacks is obtained freely.

[0036] In particular, the above described combination of complete cuts, or "clean cut", and of perforations, or "tab-bond" comprises a step of making a cutting line on each of said first and second web of paper alternated to a step of making a tear-off line.

[0037] Advantageously, the step of separating said stack of interfolded sheets from the growing stack is effected by first and second separation means that are adapted to enter the stack, at opposite sides with respect to it, at points of the stack such that the separation of two successive sheets is obtained at a complete cut, or "clean cut".

[0038] According to a further aspect of the invention, an interfolded product comprises a plurality of sheets that are arranged according to a determined interfolded configuration such that two successive sheets of said plural-

ity of sheets are alternately separated by a cut line, or "clean cut", and a tear-off line, or "tab-bond".

[0039] In particular, the plurality of interfolded sheets comprises a cut line, or "clean cut", at the first and the last sheet, and perforations, or "tab bond", at the sheets that are adjacent to said first and said last sheet. This way, the separation between two stacks is carried out always at the complete cut, or "clean cut".

Brief description of the drawings

[0040] Further characteristic and the advantages of the interfolding machine, according to the invention, will be made clearer with the following description of an exemplary embodiment thereof, exemplifying but not limitative, with reference to the attached drawings, in which like reference characters designate the same or similar parts, throughout the figures of which:

- figure 1 diagrammatically shows an elevational side view of an interfolding machine, according to the invention, for making packages of interfolded sheets;
- figure 2 shows in detail an elevational front view of a stack of interfolded sheets of "Z" type obtained with the machine of Fig. 1;
- figures from 3 to 5 show elevational side views of three possible exemplary embodiments of a cutting roller according to the invention;
- figure 6 shows an elevational side view of the cutting roller of Fig. 5 in a first cutting configuration;
- figure 7 diagrammatically shows an elevational side view of a stack of interfolded sheets as it is obtained with the cutting configuration of Fig. 6;
- figure 8 shows an elevational side view of the cutting roller of Fig. 5 in a second cutting configuration;
- figure 9 diagrammatically shows an elevational side view of a stack of interfolded sheets as it is obtained with the cutting configuration of Fig. 8;
- figure 10 shows an elevational side view of the cutting roller of Fig. 5 in a third cutting configuration;
- figure 11 diagrammatically shows an elevational side view of a stack of interfolded sheets as it is obtained with the cutting configuration of Fig. 10;
- figures 12 and 13 show in detail a possible device of handling the blades of the cutting roller of Fig. 5 between a cutting position and a neutral position.

Description of a preferred exemplary embodiment

[0041] With reference to Fig. 1, an interfolding machine for making a stack of interfolded sheets is adapted to move a first web 10a of a material to interfold, for example paper, non woven fabric, or similar material, along a first direction 101a and a second web of paper 10b along a direction 101b.

[0042] The two webs of paper 10a and 10b are dragged by respective series of rollers 31-36 and 37-45 up to respective cutting sections 20a and 20b, where cutting roll-

ers 2a and 2b are arranged that in combination with respective counter cutting rollers 3a and 3b cut the webs of paper 10a and 10b, in order to form respective sequences of sheets 11a and 11b.

[0043] The sequences of sheets 11a and 11b reach then an interfolding section 30, where the sheets 11a that have been obtained by the first web 10a and the sheets 11b that have been obtained by the second web 10b are folded and then interfolded according to a determined interfolded configuration.

[0044] In particular, at the interfolding section 30, the cut sheets 11a and 11b, which have all the same length, are folded into a determined interfolded configuration by counter-rotating folding rollers 4a, 4b.

[0045] With reference to Fig. 2, in a stack of interfolded sheets of "Z" type each sheet 11a of a first series of sheets, as they are obtained by cutting web 10a, comprises 3 panels I-III, where panels II and III are overlapped to the panels I and II of a sheet 11b of the second series of sheets, as they are obtained by cutting web 10b.

[0046] According to the invention, each series of sheets 11a and 11b has a complete cut 51, or "clean cut", alternated to a tear-off line 52, or "tab-bond".

[0047] The above described configuration avoids the above described drawbacks of the prior art machines deriving from the separation of two successive sheets of two different stacks that are joined by a line of "tab-bond" type.

[0048] In fact, the separation means of two stacks of successive sheets are operated only at two lines of complete cut, or "clean cut".

[0049] With reference to Fig. 3, a possible exemplary embodiment of a cutting roller 2a, or 2b, which is capable of providing alternately, a complete cut line, or "clean cut" and a tear-off line, or "tab-bond", on the web of paper 10a, or 10b, in order to provide a stack of interfolded sheets as shown in Fig. 2, provides a cutting blade 21a and a perforating blade 22a that are arranged at an angle 180° from each other.

[0050] Alternatively, each cutting roller 2a, or 2b, comprises a first blade 21a and a second blade 21b, which have a profile that is adapted to cut a complete cutting line of "clean cut" type and are arranged at an angle from each other equal to 180°, and also two blades 22a and 22b, which have a profile that is adapted to cut a tear-off line "tab-bond" type and are arranged at an angle 90° from each other.

[0051] In a further exemplary embodiment shown in Fig. 5, each cutting roller 2a, or 2b has peripherally a first series of blades 21a-21f that are arranged at first angular positions and has a second plurality of blades 22a-22b that are arranged at second angular positions.

[0052] More precisely, blades 21a-21f of the first series of blades are arranged at a first angle from each other equal to 60° starting from a reference position P0. Blade 22a of the second series of blades is arranged at a position P1 at an angle 90° from the actual reference position P0, whereas blade 22b of the second series of blades

is arranged at a position P2 at an angle 270° from the actual reference position P0.

[0053] More in detail, blades 21a-21f of the first series comprise a cutting edge that is adapted to provide a complete cut, or "clean cut", on web 10a, or 10b, whereas blades 22a and 22b of the second series has a cutting profile that is adapted to provide a tear-off line, or "tab bond", on web 10a, or 10b.

[0054] Blades 21a-21f of the first series and blades 22a and 22b of the second series are, therefore, operated responsive to the desired interfolded configuration.

[0055] In this case, by operating selectively the blades of the first series 21a-21f and/or the blades of the second series 22a and 22b it is possible to obtain different interfolded configurations. More in detail, according to the type of desired interfolded configuration a desired cutting configuration is obtained by arranging selectively blades 21a-21f and 22a and 22b in a cutting position, in which they protrude from the roller surface 2a, or 2b, and lay in a circumference C1, or in a "neutral" position in which they do not cut the web of paper 10a, or 10b, and lay in a circumference C2.

[0056] For example, as shown in Fig. 6, in order to make an interfolded configuration of "Z" type, blades 21a and 21d of the first series of blades are operated to provide a complete cut line, or "clean cut", on the respective web of paper 10a, or 10b, and blades 22a and 22b of the second series of blades provide a tear-off line 52, or "tab-bond", between two cuts 51 (Fig. 7).

[0057] In particular, a separation means is provided that is adapted to pass from a position that is external to the stack to a position within the stack, in which it causes the separation of two consecutive sheets. More precisely, the separation means comprises a first separator 81 and a second separator 82 that act at opposite sides of the stack. When making the separation of two consecutive sheets, separators 81 and 82 enter the stack at points of the stack such that the separation of two successive sheets is obtained at two lines of complete cut, or "clean cut" 51.

[0058] In particular, first separator 81 enters stack at a complete cut 51, whereas separator 82 enters stack in a next upstream position with respect to separator 81, with respect to the conveying direction of the stack (Fig. 7). This way, the separation is carried out at the lines of clean cut 51 and after the separation only one sheet of a sheet remains free between the two separator 81 and 82. To ensure that the separation step is made with high precision, a program means is provided that is adapted to operate the handling the separator 81 and 82 between the external position to the stack and the position within the stack.

[0059] In case of an "L" type interfolded configuration, instead, where two sheets 11a and 11b comprise, each, two panels I and II that are interfolded by one panel, all the sheets 11 of the stack are separated by a complete cut, or "clean cut" 51 (Fig. 9).

[0060] Therefore, in this case all the 6 blades of "clean

cut" type of each roller 2a and 2b are arranged in the cutting position, whereas blades 22a and 22b of the second series are arranged in the withdrawn position (Fig. 8).

[0061] If, instead, an interfolded "W" configuration has to be obtained, where two successive sheets 11a and 11b of the stack have 4 panels each interfolded for 2 panels (Fig. 11), only blades 21a, 21c and 21e of the first series of blades of each cutting roller 4a and 4b (Fig. 10) are operated. Blades 21a, 21c and 21e are, in particular, arranged 120° from each other on respective cutting roller 4a and 4b and can be arranged in a cutting position in which they protrude from the boundary thereof. The other blades 21b, 21d and 21f of the first series of blades as well as blades 22a and 22b of the second series of blades are arranged in a withdrawn position in which they cannot cut web 10a and 10b. Even in this case, therefore, two successive sheets of each succession of sheets 11a and 11b are separated by a cutting line 51 of "clean cut" type (Fig. 11).

[0062] Therefore, the interfolding machine, as above described, is highly flexible and capable of providing all the different interfolded configurations of the machines of "single-fold" type.

[0063] In Figs. 12 and 13 a possible device is diagrammatically shown that can be used for bringing each blade of first series 21a-21f and each blade of second series 22a and 22b from the cutting position to a "neutral" position. In particular, each blade of first series 21a-21f and of second series 22a and 22b, is associated with a flexible duct 200 that is in communication with a inflation/deflation device. The latter comprises a reversible pump means 205 that is adapted pump a fluid towards/away from flexible duct 200.

[0064] More in detail, when flexible duct 200 is not run by the fluid, it moves to a deflated configuration such that blade 21, or 22, which is associated with it, is brought to "neutral" position A on circumference C2, in which it does not act on the web of paper (Fig. 12).

[0065] When, instead, the duct 200 is run by the inflation fluid, it turns into an inflated configuration and forces the corresponding blade-holder 202 to rotate about a pivot point 201 in order to bring the respective blade 21, or 22, to the cutting position B on circumference C1 in which it acts on the web of paper (Fig. 13).

[0066] The foregoing description of a specific embodiment will so fully reveal the invention according to the conceptual point of view, so that others, by applying current knowledge, will be able to modify and/or adapt for various applications such an embodiment without further research and without parting from the invention, and it is therefore to be understood that such adaptations and modifications will have to be considered as equivalent to the specific embodiment. The means and the materials to realise the different functions described herein could have a different nature without, for this reason, departing from the field of the invention. It is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation.

Claims

1. Interfolding machine comprising:

- a feeding section equipped with a first plurality of rollers for moving a first web of paper and with a second plurality of rollers for moving a second web of paper;
- a cutting section comprising:

- first cutting means that is adapted to divide the first web of paper into a first plurality of sheets of measured length;
- second cutting means that is adapted to divide the second web of paper into a second plurality of sheets of measured length;

- an interfolding section comprising:

- an interfolding means that is adapted to fold said first and said second plurality of sheets in a determined interfolded configuration to obtain a stack of interfolded sheets;
- a separating section for separating a stack of interfolded sheets from the growing stack;

characterised in that said first and said second cutting means comprises means to provide a cut line, or "clean-cut", and means to provide a tear-off line, or "tab-bond", on said first and said second web.

2. Interfolding machine, according to claim 1, wherein said first and said second cutting means cut said first and said second web of paper, respectively, in combination with respective counter-cut means that act opposite to said web of paper with respect to said cutting means to make said cut in said first plurality of sheets and in said second plurality of sheets.

3. Interfolding machine according to claim 1, wherein the first and the second cutting means provide, each, a cutting roller that is peripherally equipped with:

- at least one cutting blade having a profile that is adapted to cut a complete cut, or "clean cut", on a web of paper;
- at least one perforating blade having a profile that is adapted to cut a tear-off line, or "tab-bond" on the web of paper.

4. Interfolding machine according to claim 1, wherein said first and the second cutting means provide each a cutting roller comprising:

- a plurality of cutting blades having a profile that is adapted to make a cut, or "clean cut", on a web of paper, said cutting blades of said plurality

arranged peripherally on the cutting roller at a first angle from each other;

- a plurality of perforating blades having a profile that is adapted to cut a tear-off line, or "tab-bond", on said web of paper, said perforating blades arranged peripherally on the cutting roller at a second angle from each other.

5. Interfolding machine according to claim 4, wherein said plurality of cutting blades and said plurality of perforating blades are mounted on the boundary of a cutting roller at respective housings in a way movable selectively between an operating position, in which said blades protrude from said cutting roller, and a rest position, in which said blades are withdrawn within said cutting roller, said cutting blades and/or perforating blades adapted to be arranged at said operating positions obtaining a desired cutting configuration.

6. Interfolding machine according to claim 5, wherein a means is provided for actuating selectively each blade of said plurality of cutting blades and of said perforating blades between said operating position and said rest position in order to provide a desired cutting configuration.

7. Interfolding machine according to claim 6, wherein said means for actuating selectively each of said cutting blades and each of said perforating blades between said operating position and said rest position, are selected from the group comprised of:

- an actuator, for example a pneumatic actuator, having a stem with an end that is connected to the blade and the other end that is arranged in an actuating chamber, said blade being pivotally constrained to said roller at a pivoting point, said end of said actuator sliding in said actuating chamber for causing the rotation of said blade about said pivot point and then the movement of said blade from said operating position to said rest position, or vice-versa.

- a carriage that is integral to each blade and slides on a guide, said carriage withdrawing/forwarding with respect to the boundary of said roller along said guide for bringing said blade from said operating position to said rest position, or vice-versa.

- a first plurality of blade holders that are arranged peripherally on said roller at said first angle from each other and a second plurality of blade holders that are arranged peripherally on said roller at said second angle from each other, whereby said blades can be mounted on said roller at said first, or said second plurality of blade holders in order to make either said complete cuts, or said perforations, respectively.

8. Interfolding machine according to claim 1, wherein, furthermore, a first and second separation means are provided arranged at said separating section, said first and second separation means acting at opposite sides with respect to the stack and are adapted to be moved between a position that is external to the stack and a position within the stack, said first and second separation means arranged in said position within the stack in points such that the separation of two successive sheets is obtained at a complete cut, or "clean cut".

9. Interfolding machine according to claim 8, wherein, furthermore, a program means is provided that is adapted to operate electronically said first and second separation means.

10. Method for making a stack of interfolded sheets comprising the steps of:

- feeding a first and a second web of paper;
- cutting said first and said second web of paper in order to provide a first and a second plurality of sheets of measured length, respectively;
- interfolding said first and said second plurality of sheets in a determined interfolded configuration to obtain a stack of interfolded sheets;
- separating said stack of interfolded sheets from a growing stack and moving away the stack;

characterised in that said cutting step provides a combination of steps of making complete cuts, or "clean cut", and perforations, or "tab bond" on said first and second web.

11. Method, according to claim 9, wherein said combination of steps comprises a step of making a complete cut line, or "clean cut", on each of said first and second web of paper alternated to a step of making a tear-off line, or "tab-bond".

12. Method, according to claim 9, wherein said step of separating said stack of interfolded sheets from the growing stack is effected by means of first and second separation means that act at opposite sides of the stack and are adapted to enter the stack in corresponding points of the stack such that cause the separation of two successive sheets at two lines of complete cut, or "clean cut".

13. Interfolded product comprising a plurality of sheets that are arranged according to a determined interfolded configuration **characterised in that** two successive sheets of said plurality of sheets are alternately separated by a cut line, or "clean cut", or tear-off line, or "tab bond".

14. Interfolded product comprising a plurality of sheets

that are arranged according to a determined interfolded configuration **characterised in that** it comprises a plurality of complete cuts, or clean cut, alternate to a plurality of perforations, or "tab bond".

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15. Interfolded product comprising a plurality of sheets that are arranged according to a determined interfolded configuration **characterised in that** it comprises a cut line, or clean cut, at the first and the last sheet of said plurality of sheets, and perforations, or "tab bond", at the sheets that are adjacent to said first and said last sheet.

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Fig. 1

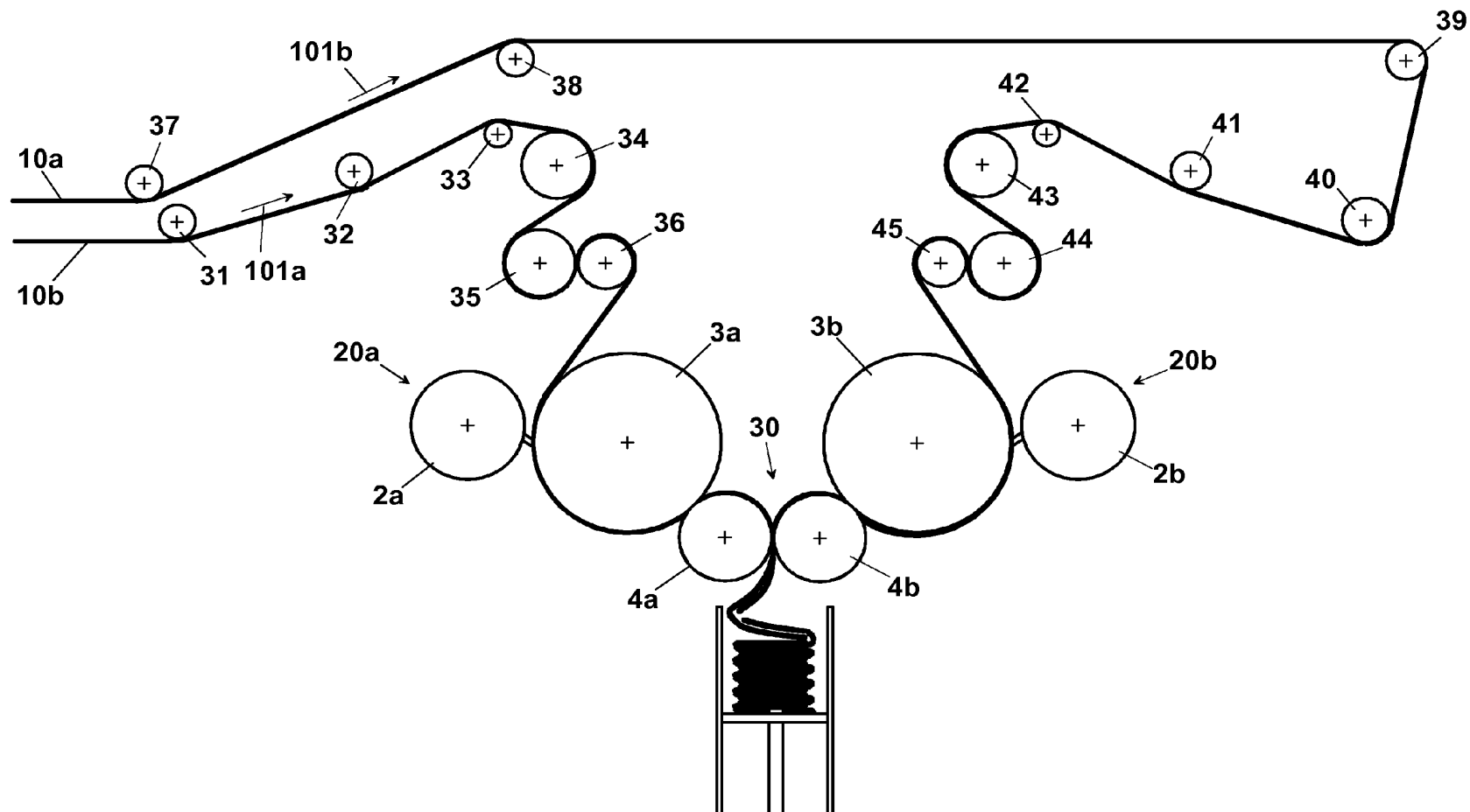


Fig. 2

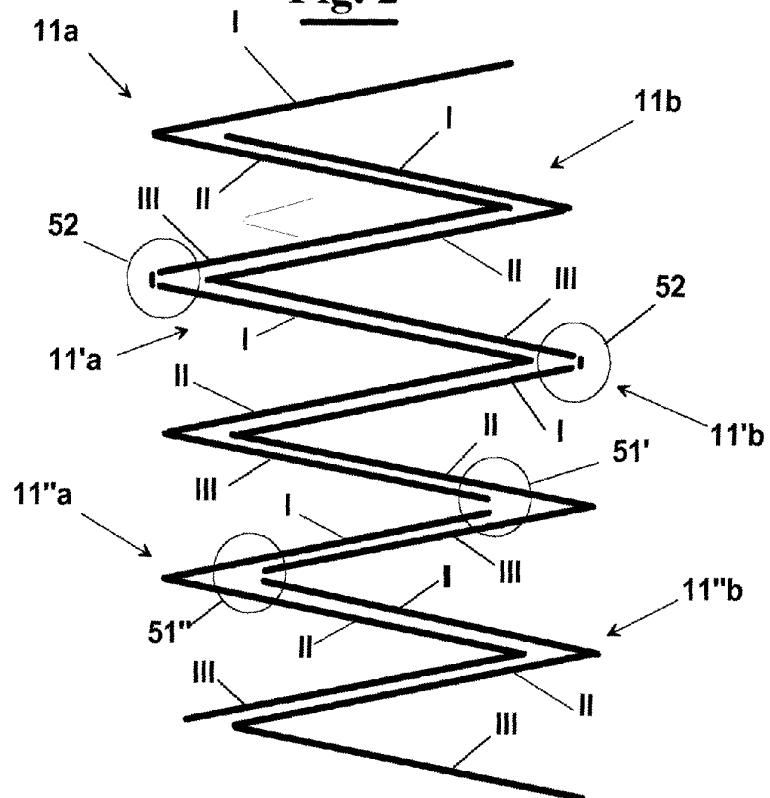


Fig. 3

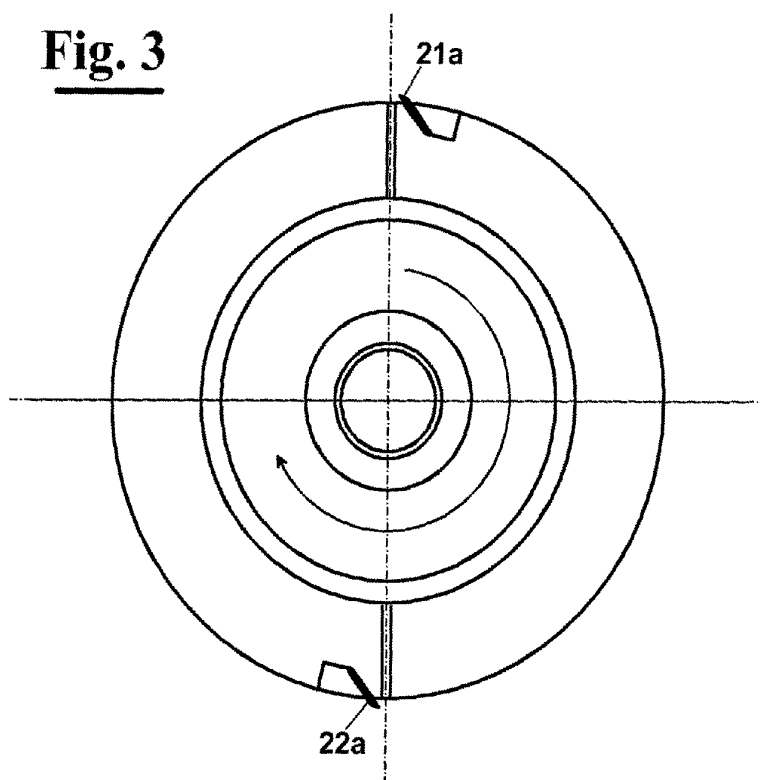


Fig. 4

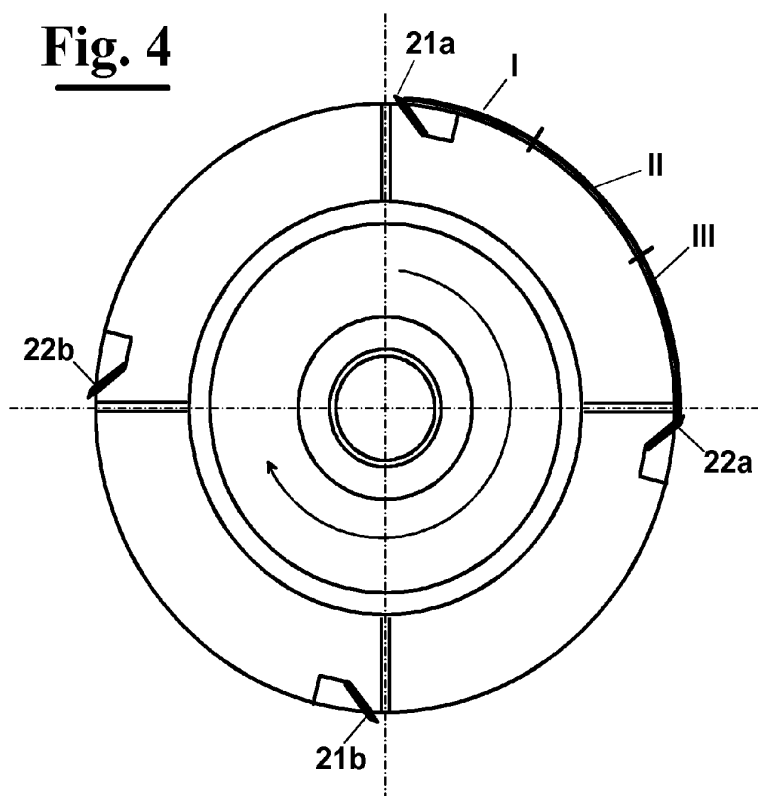


Fig. 5

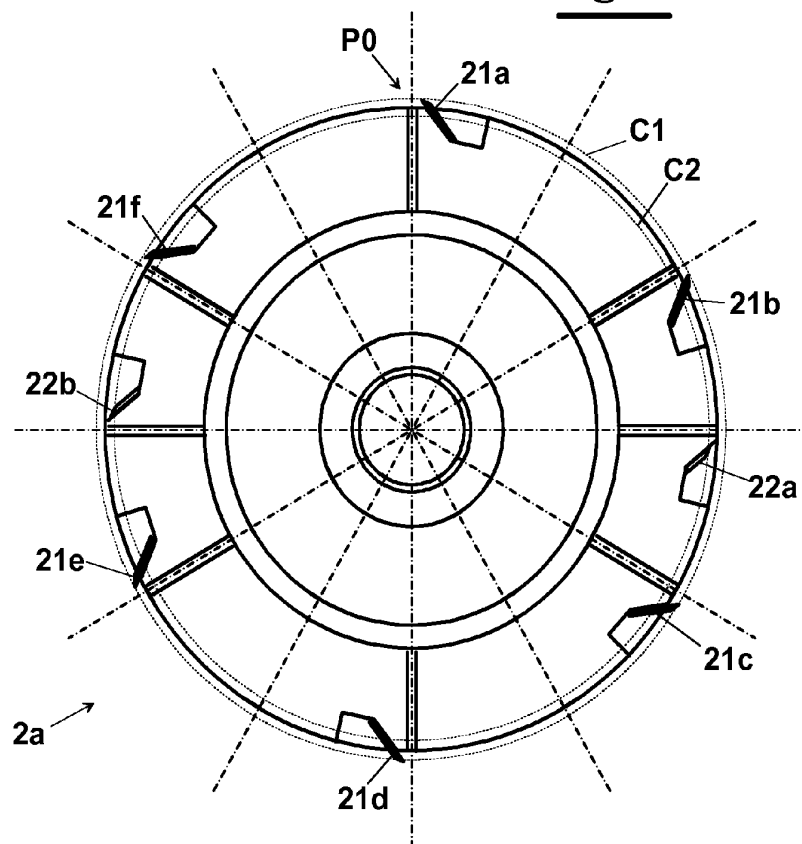


Fig. 6

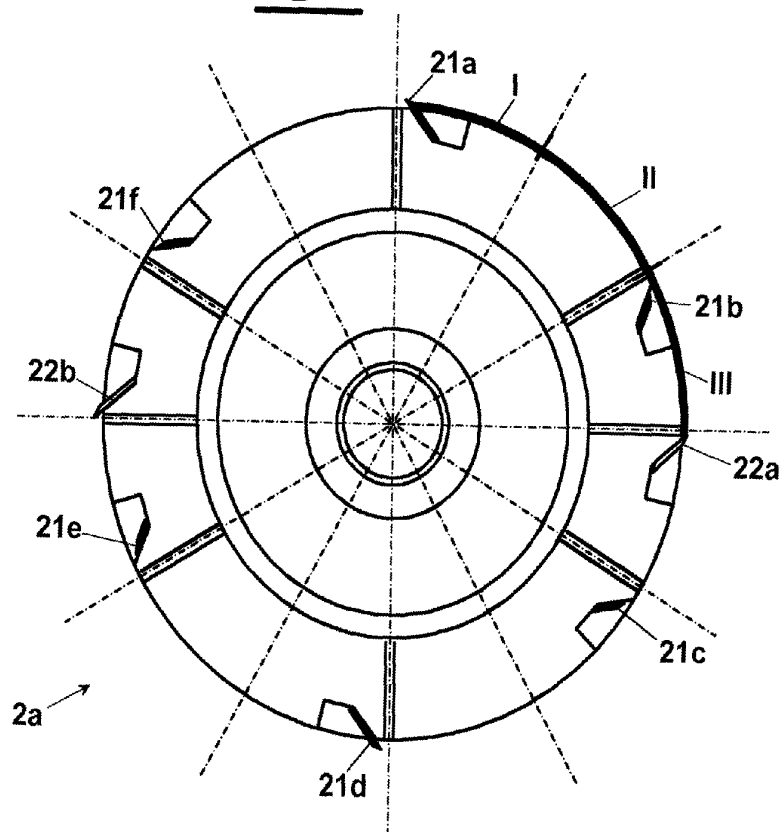


Fig. 7

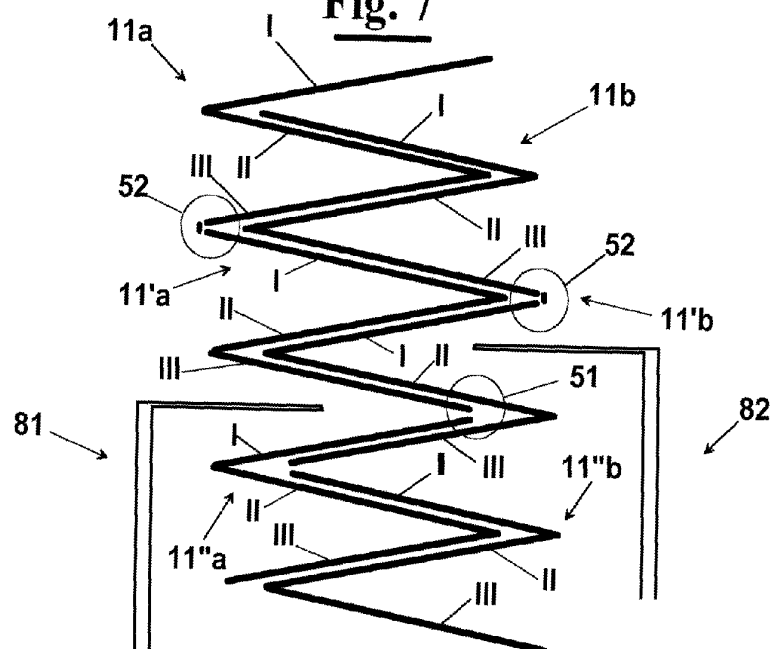


Fig. 8

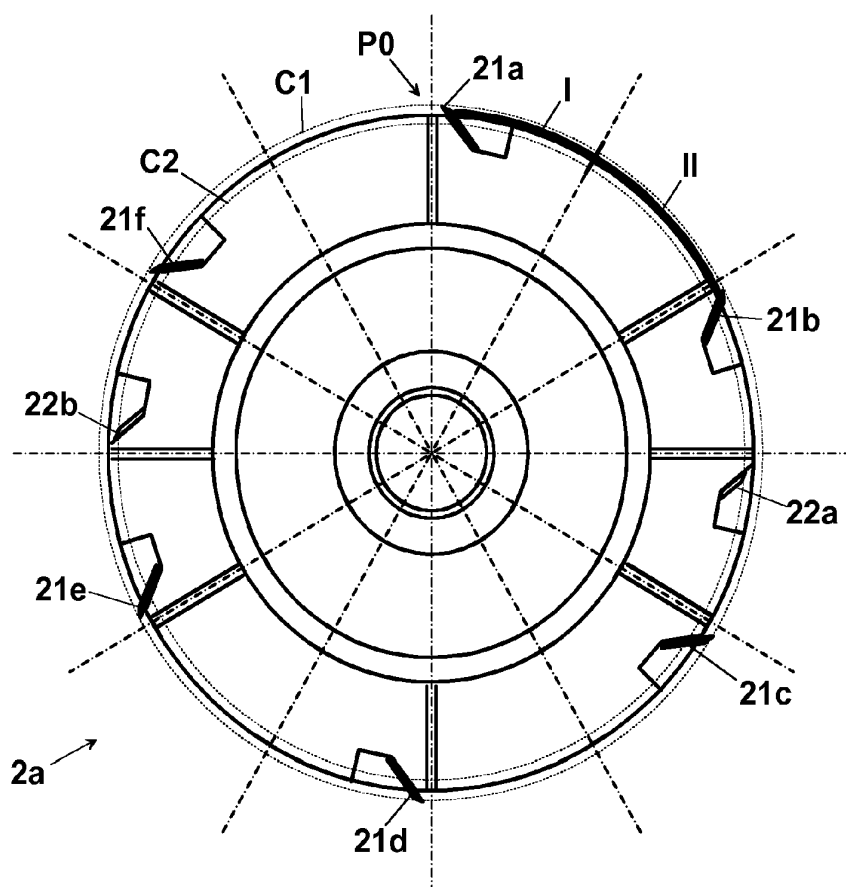


Fig. 9

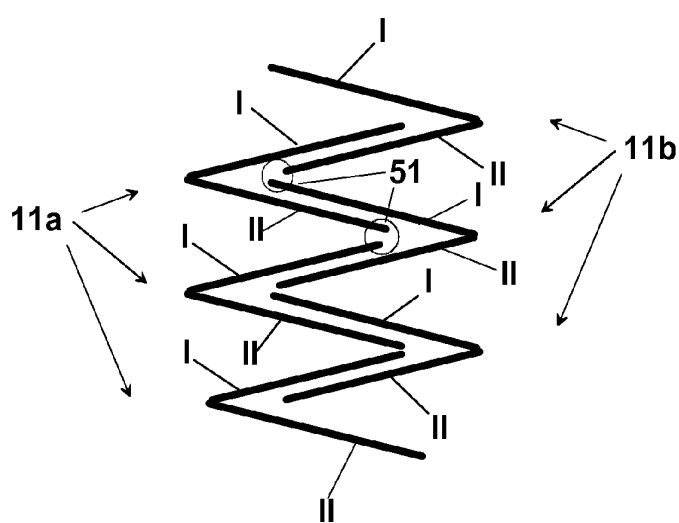


Fig. 10

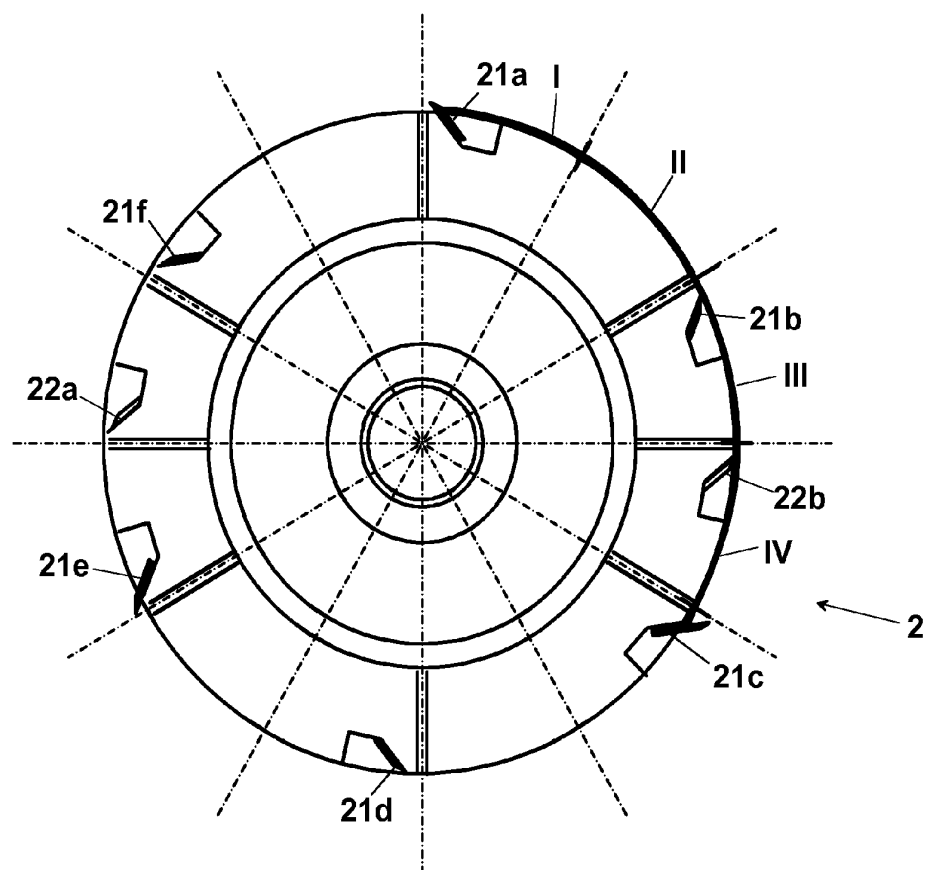


Fig. 11

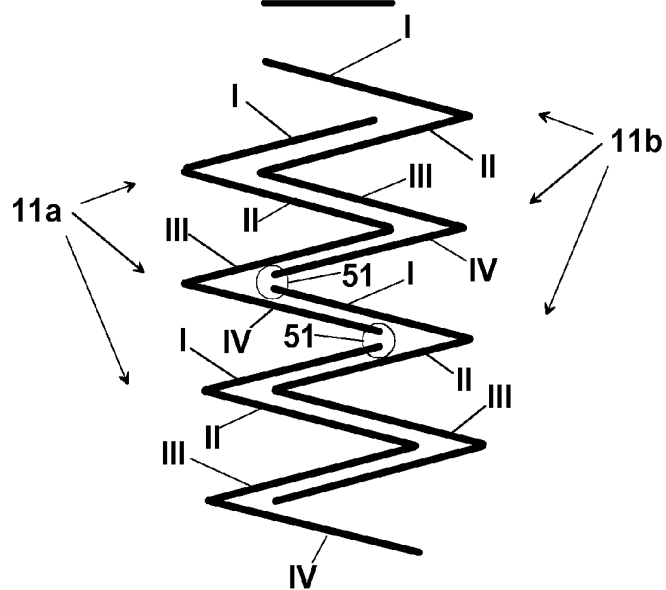


Fig. 12

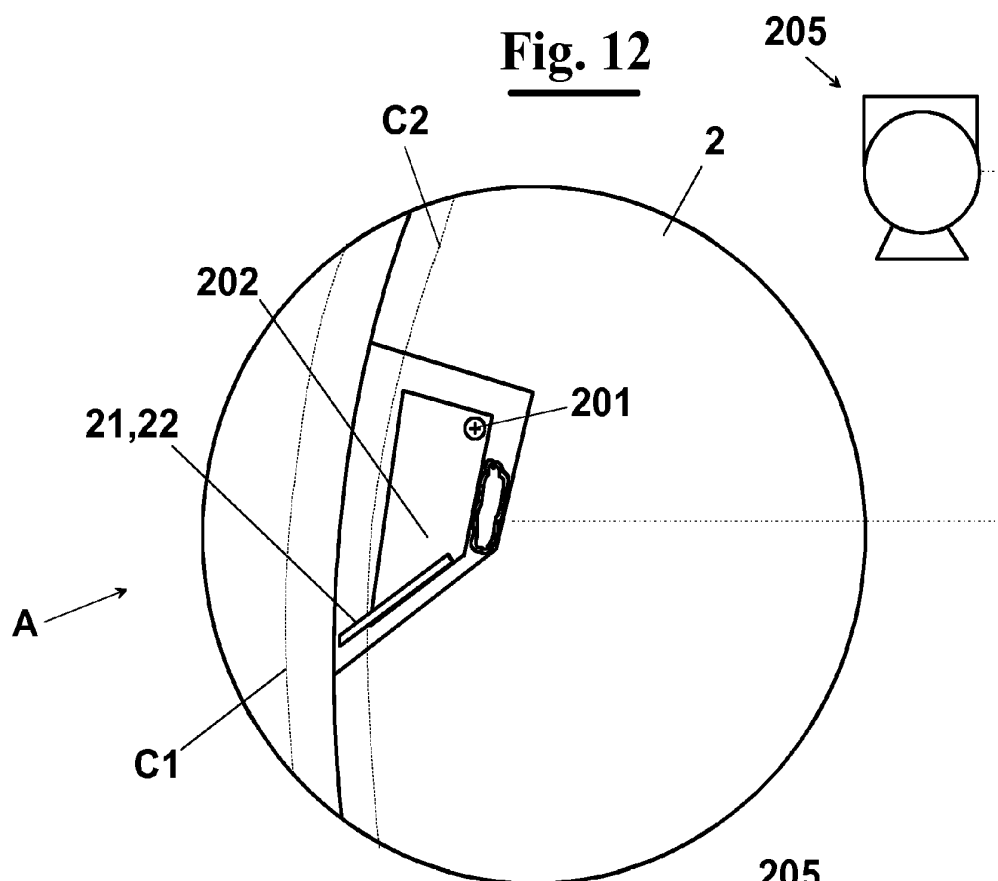
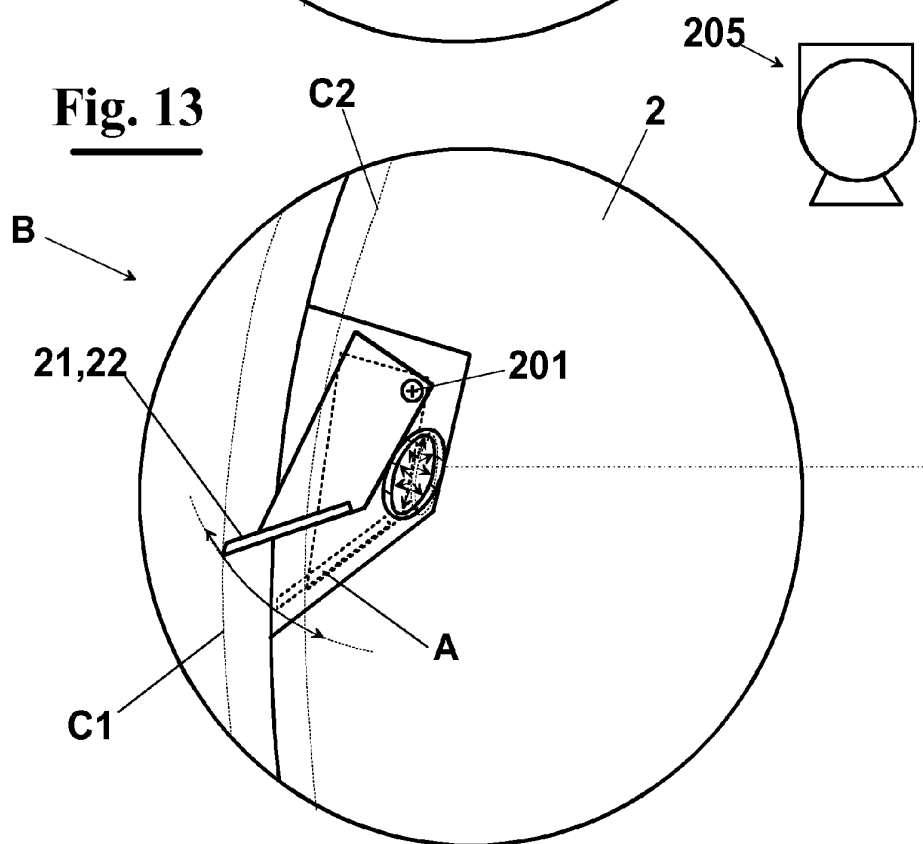


Fig. 13





EUROPEAN SEARCH REPORT

 Application Number
 EP 08 17 3144

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 0 982 256 A (M T C MACCHINE TRASFORMAZIONE [IT]) 1 March 2000 (2000-03-01) * paragraphs [0008], [0018] - [0026]; claims 1,2; figures 1,2 *	1-15	INV. B65H45/24
A	EP 0 228 687 A (PAPER CONVERTING MACHINE CO [US]) 15 July 1987 (1987-07-15) * column 8, line 1 - column 8, line 52; figure 15 *	1-15	
A	US 4 494 741 A (FISCHER DAVID L [US] ET AL) 22 January 1985 (1985-01-22) * column 1, line 51 - column 2, line 23 * * column 3, line 53 - column 4, line 17 * * column 7, line 21 - column 8, line 4 * * column 9, line 4 - column 9, line 13; claim 1 *	1-15	
			TECHNICAL FIELDS SEARCHED (IPC)
			B65H
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		4 June 2009	Jezierski, Krzysztof
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 08 17 3144

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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04-06-2009

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(19) **United States**

(12) **Patent Application Publication**

(10) **Pub. No.: US 2001/0020626 A1**

(43) **Pub. Date: Sep. 13, 2001**

Skerrett et al.

(54) **INTERFOLDED DISPENSER NAPKINS**

Publication Classification

(76) Inventors: **John Richard Skerrett**, Alpharetta, GA (US); **Michael Yuwah Chan**, Alpharetta, GA (US)

(51) **Int. Cl.⁷** **A47K 10/24**; B65H 1/00
(52) **U.S. Cl.** **221/48**; 428/126; 428/130

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(57) **ABSTRACT**

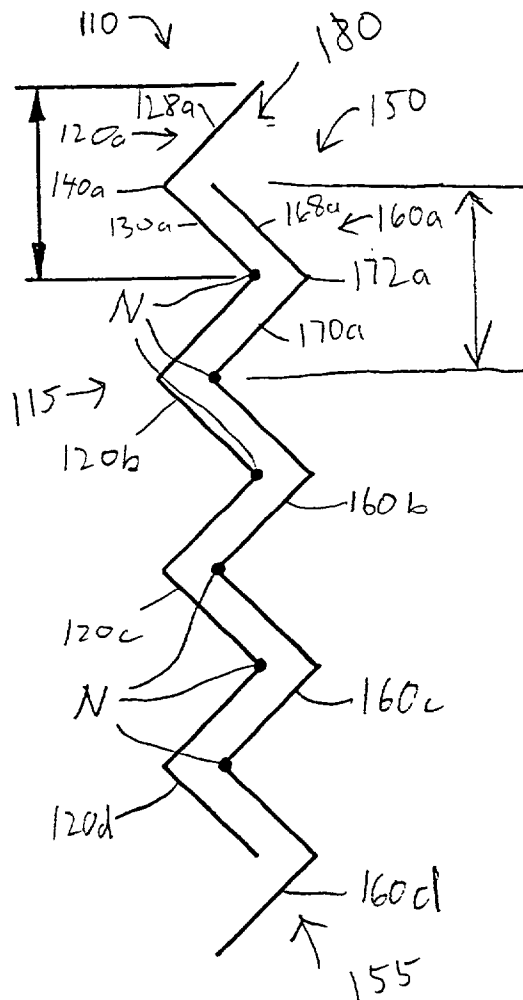
The present invention provides a napkin assembly for a dispenser. The napkin assembly may include a first napkin sheet further including a plurality of napkins and a second napkin sheet further including a plurality of napkins. Each napkin of both sheets having a basis weight from about 20 gsm to about 40 gsm may be connected to an adjacent napkin in series by a plurality of tabs. The second napkin sheet may be positioned proximate to the first napkin sheet in an offset relation and the first and second napkin sheets may be formed into a nested configuration for dispensing.

(21) Appl. No.: **09/776,395**

(22) Filed: **Feb. 2, 2001**

Related U.S. Application Data

(62) Division of application No. 09/106,978, filed on Jun. 29, 1998, now Pat. No. 6,213,346.



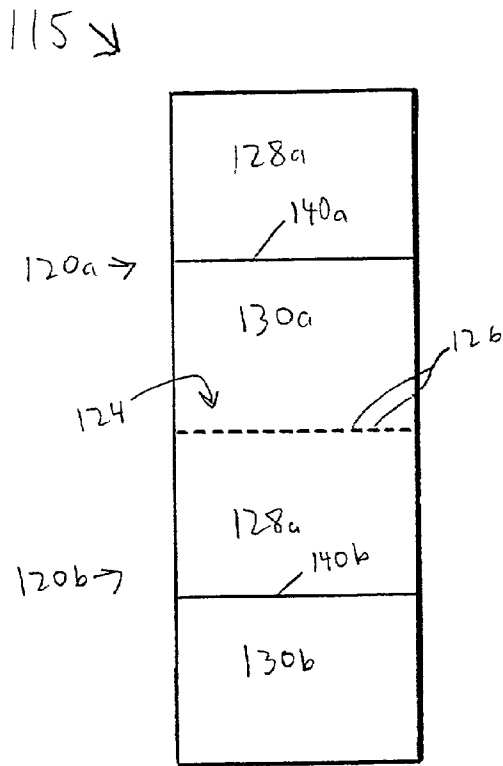


FIG. 1

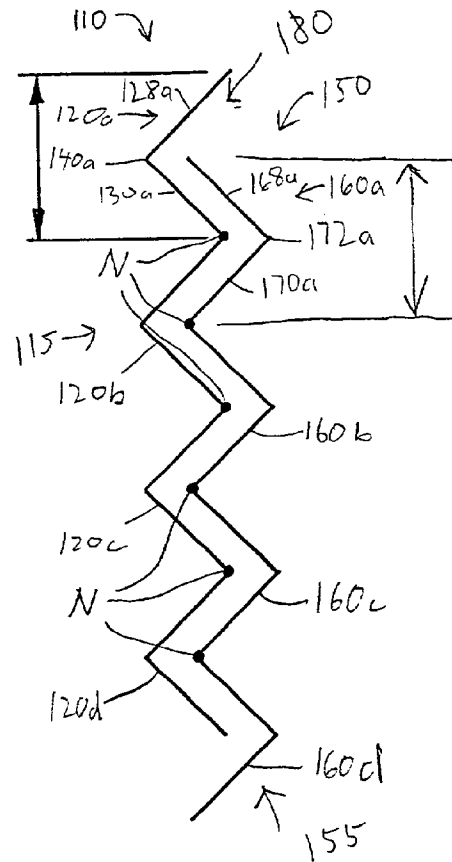


FIG. 2

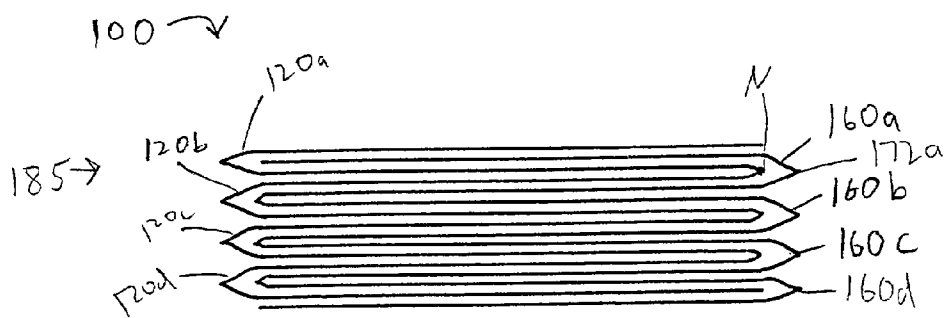


FIG. 3

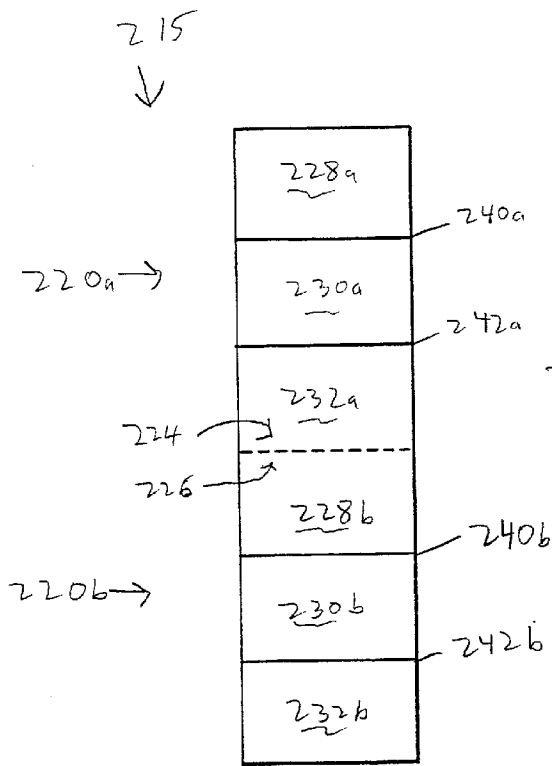


FIG. 4

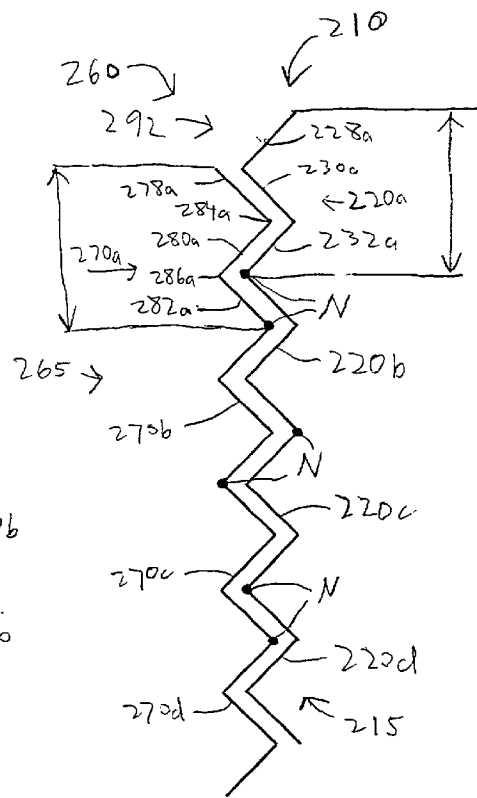


FIG. 5

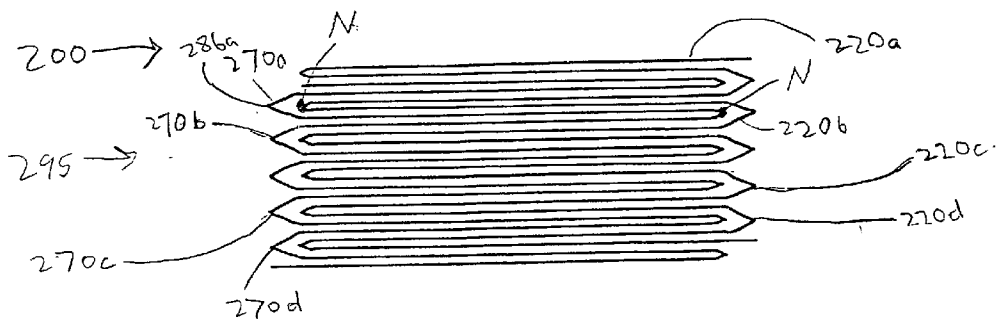


FIG. 6

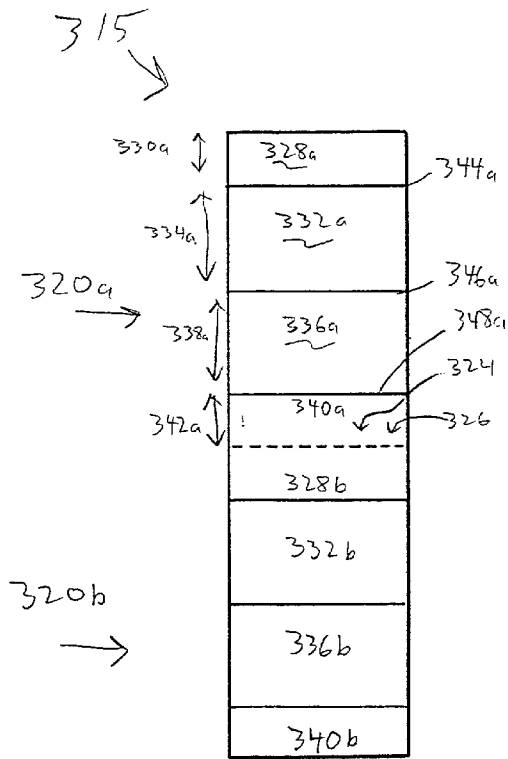


FIG. 7

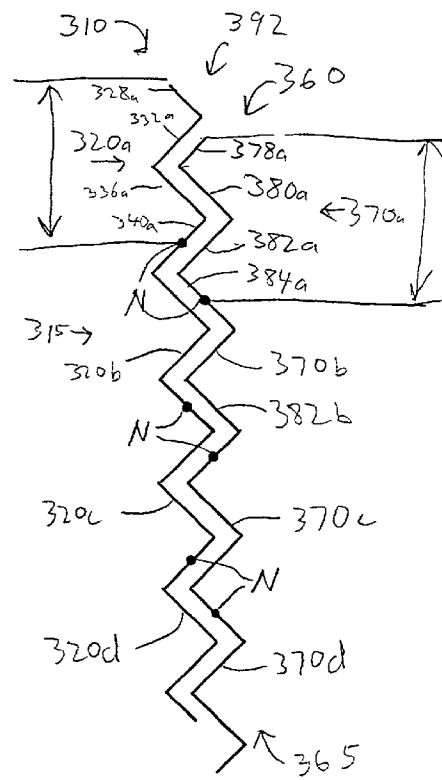


FIG. 8

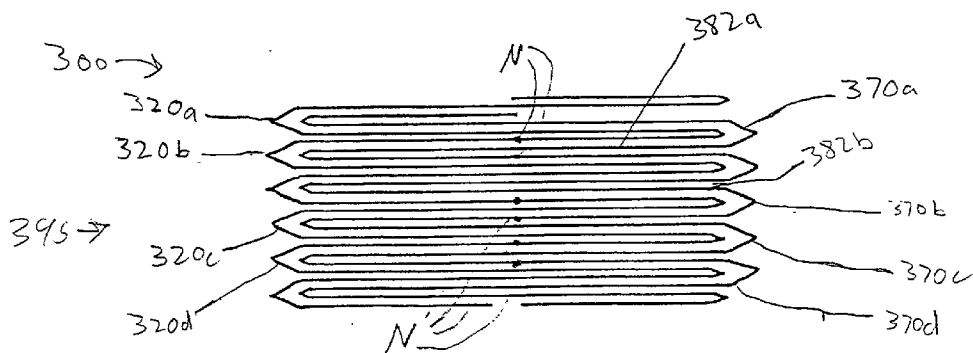


FIG. 9

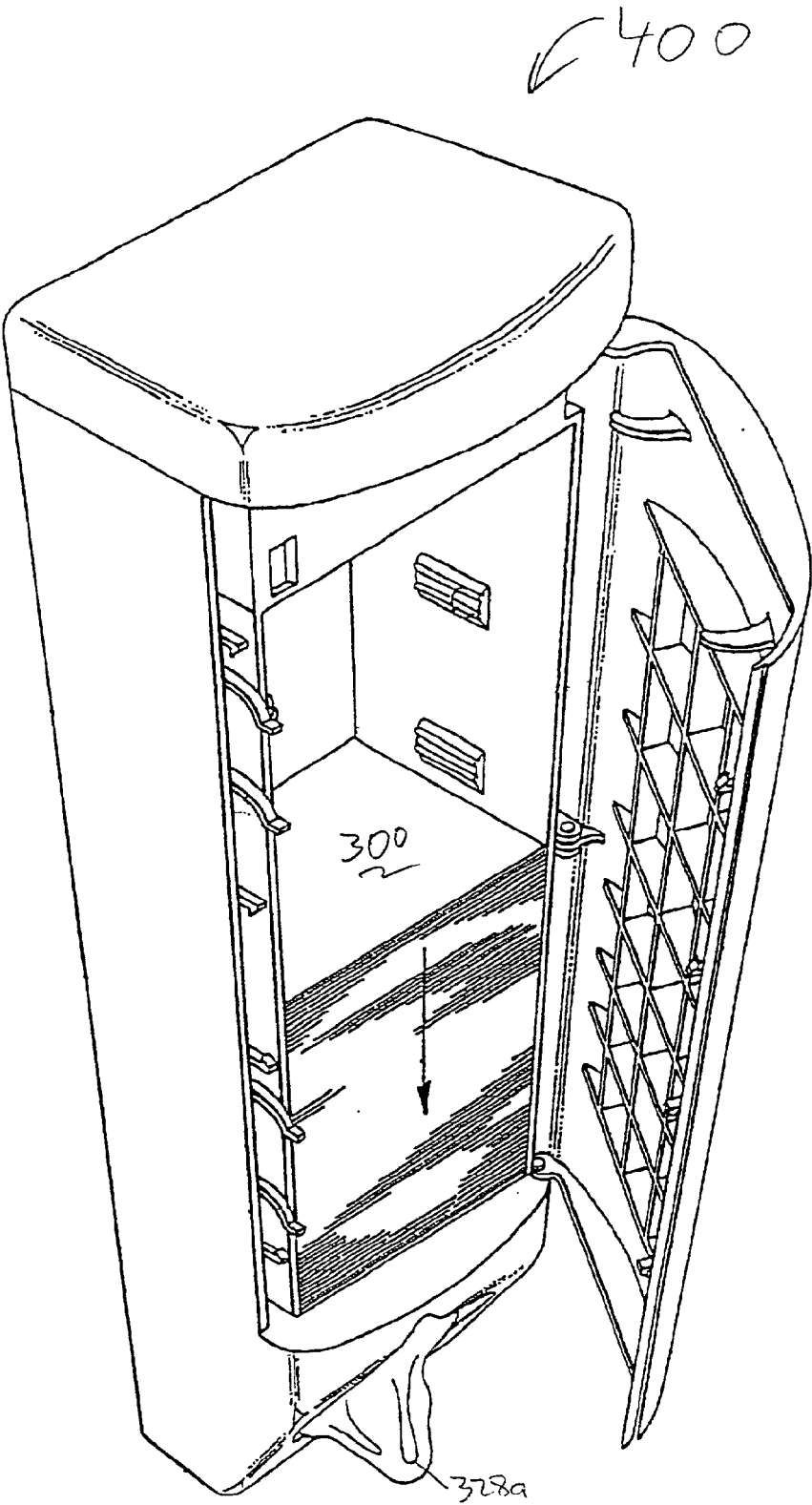


FIG. 10

INTERFOLDED DISPENSER NAPKINS

FIELD OF THE INVENTION

[0001] This invention generally relates to the field of paper products, and more specifically, to dispenser napkins.

BACKGROUND

[0002] Dispensers may be used to provide napkins in settings such as restaurants and stadiums. Typically, the napkins are folded and stacked together, and then loaded into a dispenser. The user grasps the edge of the leading napkin in the dispenser opening for obtaining a napkin.

[0003] However, these stacked arrangements of napkins suffer several disadvantages. Often, the user cannot find an edge or flap of the leading napkin. As a result, the user pinches several napkins and removes them from the dispenser instead of dispensing the napkins one-at-a-time. Often, this is more napkins than the user needs. Consequently, napkins are wasted, which in turn, increases costs to the establishment owner. Furthermore, some napkins if improperly loaded may not properly dispense. As an example, loading a stack of napkins backward may not present an edge or a flap for a user to grasp. Consequently, the napkins must be removed from the dispenser and reloaded.

[0004] Accordingly, a stacked napkin arrangement that provides consistent one-at-a-time napkin dispensing to reduce waste and costs and variable loading arrangements will improve over conventional stacked napkins.

DEFINITIONS

[0005] As used herein, the term "cellulosic material" refers to material that may be prepared from cellulose fibers from synthetic source or natural sources, such as woody and non-woody plants. Woody plants include, for example, deciduous and coniferous trees. Non-woody plants include, for example, cotton, flax, esparto grass, milkweed, straw, jute, hemp, and bagasse. The cellulose fibers may be modified by various treatments such as, for example, thermal, chemical and/or mechanical treatments. It is contemplated that reconstituted and/or synthetic cellulose fibers may be used and/or blended with other cellulose fibers of the fibrous cellulosic material. Desirably, no synthetic fibers are woven into the cellulosic material fibers.

[0006] As used herein, the term "pulp" refers to cellulosic fibrous material from sources such as woody and non-woody plants. Woody plants include, for example, deciduous and coniferous trees. Non-woody plants include, for example, cotton, flax, esparto grass, milkweed, straw, jute, hemp, and bagasse. Pulp may be modified by various treatments such as, for example, thermal, chemical and/or mechanical treatments. Desirably, no synthetic fibers are woven into the pulp fibers.

[0007] As used herein, the term "nonwoven web" refers to a web that has a structure of individual fibers or filaments which are interlaid forming a matrix, but not in an identifiable repeating manner. Nonwoven webs have been, in the past, formed by a variety of processes known to those skilled in the art such as, for example, meltblowing, spunbonding, wet-forming and various bonded carded web processes.

[0008] As used herein, the term "spunbonded web" refers to a web of small diameter fibers and/or filaments which are formed by extruding a molten thermoplastic material as filaments from a plurality of fine, usually circular, capillaries in a spinneret with the diameter of the extruded filaments then being rapidly reduced, for example, by non-eductive or eductive fluid-drawing or other well known spunbonding mechanisms. The production of spunbonded nonwoven webs is illustrated in patents such as Appel, et al., U.S. Pat. No. 4,340,563.

[0009] As used herein, the term "meltblown fibers" means fibers formed by extruding a molten thermoplastic material through a plurality of fine, usually circular, die capillaries as molten threads or filaments into a high-velocity gas (e.g. air) stream which attenuates the filaments of molten thermoplastic material to reduce their diameters, which may be to microfiber diameter. Thereafter, the meltblown fibers are carried by the high-velocity gas stream and are deposited on a collecting surface to form a web of randomly disbursed meltblown fibers. The meltblown process is well-known and is described in various patents and publications, including NRL Report 4364, "Manufacture of Super-Fine Organic Fibers" by V. A. Wendt, E. L. Boone, and C. D. Fluharty; NRL Report 5265, "An Improved Device for the Formation of Super-Fine Thermoplastic Fibers" by K. D. Lawrence, R. T. Lukas, and J. A. Young; and U.S. Pat. No. 3,849,241, issued Nov. 19, 1974, to Buntin, et al.

[0010] As used herein, the term "basis weight" (hereinafter may be referred to as "BW") is the weight per unit area of a sample and may be reported as gram-force per meter squared and may be hereinafter abbreviated as "g_ms". The basis weight may be calculated using test procedure ASTM D 3776-96.

[0011] As used herein, the term "napkin assembly" refers to a stacked, interfolded arrangement of napkins, which may be in the form of napkin sheets.

[0012] As used herein, the term "napkin sheet" refers to a plurality of napkins connected together in series by a plurality of tabs separated by slits perforating the sheet. Individual napkins may be separated at the perforations during dispensing. The napkin sheet may include one or more plies.

[0013] As used herein, the term "machine direction" (hereinafter may be referred to as "MD") is the direction of a material parallel to its forward direction during processing.

[0014] As used herein, the term "machine direction tensile" (hereinafter may be referred to as "MDT") is the breaking force in the machine direction required to rupture a three inch width specimen. The results may be reported as gram-force and abbreviated as "gf". The MDT may be determined using test method number ASTM D5035-95.

[0015] As used herein, the term "tab strength" is the breaking force in the machine direction required to rupture a sheet product along its perforations. The results may be reported as gram-force and abbreviated as "gf". The MDT may be determined using test method number ASTM D5035-95.

[0016] As used herein, the term "tab width to slit width ratio" (hereinafter may be referred to as "T/S") refers to the ratio of the average width of a tab divided by the average width of a slit for a paper product.

[0017] As used herein, the term “caliper” refers to the thickness measurement of a sheet taken under constant force. The caliper may be determined using test method number TAPPI 411-OM-89.

SUMMARY OF THE INVENTION

[0018] The problems and needs described above are addressed by the present invention, which provides a napkin assembly for a dispenser. The napkin assembly may include a first napkin sheet further including a plurality of napkins and a second napkin sheet further including a plurality of napkins. Each napkin of both sheets has a basis weight from about 20 gsm to about 40 gsm and may be connected to an adjacent napkin in series by a plurality of tabs. The second napkin sheet may be positioned proximate to the first napkin sheet in an offset relation and the first and second napkin sheets may be formed into a nested configuration for dispensing.

[0019] Furthermore, each napkin of the first and second napkin sheets may include a first member integrally formed with a second member. These members may form a fold therebetween. At least one napkin from the first napkin sheet may terminate at about the fold of a respective napkin from the second napkin sheet.

[0020] Moreover, at least 500 napkins from the first napkin sheet may terminate at about the fold of a respective napkin from the second napkin sheet.

[0021] In addition, the napkin basis weight may be about 30 gsm, the machine direction tensile may be greater than about 2000 g_f, the T/S ratio may be greater than about 0.03, and the tab strength may be greater than about 30 g_f. What is more, the napkins may include pulp fibers.

[0022] Another embodiment of a napkin assembly for a dispenser may include a first napkin sheet further including a plurality of napkins and a second napkin sheet further including a plurality of napkins. Each napkin of both sheets may be connected to an adjacent napkin in series by a plurality of tabs. What is more, each napkin of the first and second napkin sheets may include a first member, a second member, and a third member wherein the first member may be formed integrally with the second member forming a first fold between the first and second members and the second member may be formed integrally with the third member forming a second fold between the second and third members. At least one napkin from the first napkin sheet may terminate at about the second fold of a respective napkin from the second napkin sheet when nestably configured for dispensing.

[0023] Furthermore, at least 500 napkins from the first napkin sheet may terminate at about the second fold of a respective napkin from the second napkin sheet. Also, the napkin basis weight may be from about 20 gsm to about 40 gsm. Moreover, the napkin basis weight may be about 30 gsm, the machine direction tensile may be greater than about 2000 g_f, the T/S ratio may be greater than about 0.03, and the tab strength may be greater than about 30 g_f. Additionally, the napkins may include pulp fibers.

[0024] A further embodiment of the present invention is a napkin assembly for a dispenser. The napkin assembly may include a first napkin sheet further including a plurality of napkins and a second napkin sheet further including a

plurality of napkins. Each napkin may be connected to an adjacent napkin in series by a plurality of tabs. What is more, each napkin of the first and second napkin sheets may include a first member, a second member, a third member, and a fourth member. The first member may be formed integrally with the second member forming a first fold between the first and second members, the second member may be formed integrally with the third member forming a second fold between the second and third members, and the third member may be formed integrally with the fourth member forming a third fold between the third and fourth members. The second and third members may have a length about twice that of the first and fourth members. At least one napkin from the first napkin sheet may terminate at about the middle of a third member of a respective napkin from the second napkin sheet when nestably configured for dispensing.

[0025] Furthermore, at least 500 napkins from the first napkin sheet may terminate at about the middle of a third member of a respective napkin from the second napkin sheet. Additionally, the napkin basis weight may be from about 20 gsm to about 40 gsm. Likewise, the napkin basis weight may be about 30 gsm, the machine direction tensile may be greater than about 2000 g_f, the T/S ratio may be greater than about 0.03, and the tab strength may be greater than about 30 g_f. In addition, the napkins may include pulp fibers.

BRIEF DESCRIPTION OF THE DRAWINGS

[0026] FIG. 1 is a front, plan view, but not necessarily to scale, of one embodiment of a plurality of napkins.

[0027] FIG. 2 is a side, exploded view, but not necessarily to scale, of one embodiment of a napkin assembly having two interfolded napkin sheets.

[0028] FIG. 3 is a side, elevational view, but not necessarily to scale, of one embodiment of a napkin assembly in a nested configuration.

[0029] FIG. 4 is a front, plan view, but not necessarily to scale, of a second embodiment of a plurality of napkins.

[0030] FIG. 5 is a side, exploded view, but not necessarily to scale, of a second embodiment of a napkin assembly having two interfolded napkin sheets.

[0031] FIG. 6 is a side, elevational view, but not necessarily to scale, of a third embodiment of a napkin assembly in a nested configuration.

[0032] FIG. 7 is a front, plan view, but not necessarily to scale, of a third embodiment of a plurality of napkins.

[0033] FIG. 8 is a side, exploded view, but not necessarily to scale, of a third embodiment of a napkin assembly having two interfolded napkin sheets.

[0034] FIG. 9 is a side, elevational view but not necessarily to scale, of a third embodiment of a napkin assembly in a nested configuration.

[0035] FIG. 10 is a perspective view of an open napkin dispenser housing a napkin assembly.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT(S)

[0036] Referring now to the drawings, like reference numerals designate corresponding structure throughout the

views and like reference numerals used in conjunction with sequentially ordered lower case letters refer to a series of substantially identical items or components. Referring in particular to FIGS. 1-3, there is depicted a napkin assembly 100 having a first napkin sheet 110 and a second napkin sheet 150. The first and second napkin sheets 110 and 150 may be substantially identical. As a result, only the first napkin sheet 110 is discussed in detail hereinafter.

[0037] The first napkin sheet 110 may include a plurality of napkins 115. Referring to FIGS. 2 and 3, nodes (identified by the letter "N") may be placed on the drawings to merely indicate perforations or slits 126 separating individual napkins. These nodes are not actually present on the desired embodiments.

[0038] Referring to FIG. 1, there is shown a portion of a napkin sheet 110 depicting a plurality of napkins 115 that may include napkins 120a and 120b. The napkins may be attached together with a plurality of tabs 124. These tabs may be separated by a plurality of slits 126 perforating the sheet 110. The tabs 124 may range from about 1 millimeter to about 10 millimeter and may be manufactured by any method readily recognizable to one of ordinary skill in the art. Furthermore, although the tabs 124 are depicted as having the same length and as evenly spaced across the sheet 110, it should be understood that the tabs 124 may be of various sizes or unevenly spaced in alternative embodiments. As an example, the tabs 124 may be positioned on only one half of the sheet 110. In addition, the tabs 124 may be varied in size in relation to the slits 126 depending upon the properties of the sheet 110. As an example, some or all of the tabs 124 may have a length twice that of an adjacent slit 126. This tabbed structure may permit separating the napkins 120a and 120b during dispensing and may be used to connect subsequent napkins, such as the napkins 120c and 120d, as well. Napkins 120a and 120b may be substantially identical, consequently, only napkin 120a is discussed in detail hereinafter.

[0039] The napkin 120a may include a first member 128a and a second member 130a. The members 128a and 130a having approximately the same dimensions may be formed integrally together creating a fold 140a therebetween. The fold 140a may permit the napkin 120a from the first sheet 110 to be interfolded with a napkin 160a from the second sheet 150.

[0040] The first and second napkin sheets 110 and 150 may be interfolded to form a nested configuration 185 as shown in FIG. 3. Although the depicted napkin assembly 100 consists of eight napkins, desirably the napkin assembly 100 may include from about 200 to about 1000 napkins. Furthermore, it is contemplated that even larger numbers of napkins may be used.

[0041] Referring to FIGS. 2 and 3, the sheets 110 and 150 may be positioned in an offset relation 180. The second sheet 150 may include a plurality of napkins 155 where each napkin 160a-d may include, respectively, a first member 168a-d, a second member 170a-d, and a fold 172a-d, similar to the previously described napkins 120a-d of the first napkin sheet 110. When the assembly 100 is formed into the nested configuration 185, the napkin 120a may terminate at tabs 124 at about the corresponding location of the fold 172a of the napkin 160a. This position may align the perforated section of the napkin 120a with the fold 172a of the napkin

160a. Napkins 120b-d of the first sheet 110 may terminate in the same manner to correspond with respective napkins 160b-d of the second sheet 150.

[0042] Referring to FIGS. 4-6, there is depicted another napkin assembly 200 having a first napkin sheet 210 and a second napkin sheet 260. The first and second napkin sheets 210 and 260 may be substantially identical. As a result, only the first napkin sheet 210 is discussed in detail hereinafter.

[0043] The first napkin sheet 210 may include a plurality of napkins 215. Referring to FIGS. 5 and 6, nodes "N" are placed on the drawings to merely indicate the perforations or slits 226 separating individual napkins. These nodes are not actually present on the desired embodiments.

[0044] Referring to FIG. 4, there is shown a portion of a napkin sheet 210 depicting a plurality of napkins 215 that may include napkins 220a and 220b. The napkins 220a and 220b may be attached together with a plurality of tabs 224. These tabs 224 may be separated by a plurality of slits 226 perforating the sheet 210. The tabs 224 may range from about 1 millimeter to about 10 millimeter and may be manufactured by any method readily recognizable to one of ordinary skill in the art. Furthermore, although the tabs 224 are depicted as having the same width and as evenly spaced across the sheet 210, it should be understood that the tabs 224 may be of various sizes or unevenly spaced in alternative embodiments. As an example, the tabs 224 may be positioned on only one half of the sheet 210. In addition, the tabs 224 may be varied in size in relation to the slits 226 depending upon the properties of the sheet 210. As an example, some or all of the tabs 224 may have a length twice that of an adjacent slit 226. This tabbed structure may permit separating the napkins 220a and 220b during dispensing and may be used to connect subsequent napkins, such as napkins 220c and 220d, as well. Napkins 220a and 220b may be substantially identical, consequently, only napkin 220a is discussed in detail hereinafter.

[0045] The napkin 220a may include a first member 228a, a second member 230a, and a third member 232a. The members 228a, 230a, and 232a having approximately the same dimensions may be formed integrally together. Members 228a and 230a may form a fold 240a and members 230a and 232a may form a fold 242a. The folds 240a and 242a may permit the napkin 220a from the first sheet 210 to be interfolded with a napkin 270a from the second sheet 260.

[0046] The first and second napkin sheets 210 and 260 may be interfolded to form a nested configuration 295 as shown in FIG. 6. Although the depicted napkin assembly 200 consists of eight napkins, desirably the napkin assembly 200 may include from about 200 to about 1000 napkins. Furthermore, it is contemplated that even larger numbers of napkins may be used.

[0047] Referring to FIGS. 5 and 6, the sheets 210 and 260 may be positioned in an offset relation 292. The second napkin sheet 260 may include a plurality of napkins 265 where each napkin 270a-d may include a first member 278a-d, a second member 280a-d, a third member 282a-d, a first fold 284a-d, and a second fold 286a-d, similar to the previously described napkins 220a-d of the first napkin sheet 210. When the assembly 200 is formed into the nested configuration 295, the napkin 220a may terminate at tabs

224 at about the corresponding location of the second fold **286a** of the second sheet napkin **270a**. This position may align the perforated section of the napkin **220a** with the fold **286a** of the napkin **270a**. Napkins **220b-d** of the first sheet **210** may terminate in the same manner to correspond with respective napkins **270b-d** of the second sheet **260**.

[0048] Referring to FIGS. 7-9, there is depicted a further napkin assembly **300** having a first napkin sheet **310** and a second napkin sheet **360**. The first and second napkin sheets **310** and **360** may be substantially identical. As a result, only the first napkin sheet **310** is discussed in detail hereinafter.

[0049] The first napkin sheet **310** may include a plurality of napkins **315**. Referring to FIGS. 8 and 9, nodes "N" are placed on the drawings to merely indicate perforations separating individual napkins. These nodes are not actually present on the desired embodiments.

[0050] Referring to FIG. 7, there is shown a portion of a napkin sheet **310** depicting a plurality of napkins **215** that may include napkins **320a** and **320b**. The napkins **320a** and **320b** may be attached together with a plurality of tabs **324**. These tabs **324** may be separated by a plurality of slits **326** perforating the sheet **310**. The tabs **324** may range from about 1 millimeter to about 10 millimeter and may be manufactured by any method readily recognizable to one of ordinary skill in the art. Furthermore, although the tabs **324** are depicted as having the same width and as evenly spaced across the sheet **310**, it should be understood that the tabs **324** may be of various sizes or unevenly spaced in alternative embodiments. As an example, the tabs **324** may be positioned on only one half of the sheet **310**. In addition, the tabs **324** may be varied in size in relation to the slits **326** depending upon the properties of the sheet **310**. As an example, some or all of the tabs **324** may have a length twice that of an adjacent slit **326**. This tabbed structure may permit separating the napkins **320a** and **320b** during dispensing and may be used to connect subsequent napkins, such as napkins **320c** and **320d**, as well. Napkins **320a** and **320b** may be substantially identical, consequently, only napkin **320a** is discussed in detail hereinafter.

[0051] The napkin **320a** may include a first member **328a**, a second member **332a**, a third member **336a**, and a fourth member **340a**. The members **328a**, **332a**, **336a**, and **340a** may be formed integrally together. Members **328a** and **332a** may form a fold **344a**, members **332a** and **336a** may form a fold **346a**, and members **336a** and **340a** may form a fold **348a**. The lengths **330a** and **342a** of respective members **328a** and **340a** may be about half the length **334a** and **338a** of respective members **332a** and **336a**. The folds **344a**, **346a**, and **348a** may permit the napkin **320a** from the first sheet **310** to be interfolded with a napkin **370a** from the second sheet **360**.

[0052] The first and second napkin sheets **310** and **360** may be interfolded to form a nested configuration **395** as shown in FIG. 9. Although the napkin assembly **300** consists eight napkins, desirably the napkin assembly **300** may include from about 200 to about 1000 napkins. Furthermore, it is contemplated that even larger numbers of napkins may be used.

[0053] Referring to FIGS. 8 and 9, the sheets **310** and **360** may be positioned in an offset relation **392**. The second napkin sheet **360** may include a plurality of napkins **365**

where each napkin **370a-d** may include a first member **378a-d**, a second member **380a-d**, a third member **382a-d**, and a fourth member **384a-d**, similar to the previously described napkins **320a-d** of the first napkin sheet **310**. When the assembly **300** is formed into the nested configuration **395**, the napkin **320a** may terminate at tabs **324** at about the corresponding location of the middle of the third member **382a** of the napkin **370a**. This positions may align the perforated section of the napkin **320a** with about the midpoint of the member **382a**. Napkins **320b-d** of the first sheet **310** may terminate in the same manner to correspond with respective napkins **370b-d** of the second sheet **360**.

[0054] The napkins may be constructed from cellulosic fibers, nonwoven materials, or combinations of both materials. The basis weight of the napkins may vary from about 10 gram-force per square meter (hereinafter may be abbreviated as "gsm") to about 50 gsm, desirably from about 20 gsm to about 40 gsm, and more desirably about 30 gsm.

[0055] These napkins may be interfolded using any method or machine known by one of ordinary skill in the art, such as those disclosed by U.S. Pat. Nos. 1,253,644, 1,302,241, and 1,457,978, which are hereby incorporated by reference.

[0056] An exemplary napkin dispenser **400**, which is disclosed in application Ser. No. 08/991,669, entitled, "Container And Cartridge For Dispensing Paper Product," hereby incorporated by reference, may hold a napkin assembly **300**, although napkin assemblies **100** and **200** may be used as well. The dispenser **400** may be vertical with the napkins fed by gravity or horizontal with a spring to force napkins from the dispenser. A first member **328** of the napkin sheet **310** may protrude from the dispenser to be grasped by a user. Grasping and pulling the member **328a** may pull a portion of the napkin **370a** of the second sheet **360** from the dispenser **400**. The user may pull the napkin **320a** to tear along the tabs **324** for obtaining one napkin. Thus, the user may obtain a napkin **320a** for use while still leaving a portion of the next napkin outside the dispenser for the next user to grasp. As a result, this invention may permit one-at-a-time napkin dispensing and minimize waste. It should be understood that the other napkin assemblies **100** and **200** operate in the same manner. In particular, removing one napkin from a sheet results in the positioning a napkin from the other sheet outside the dispenser **400** for grasping by a user. Furthermore, the napkin assemblies **200**, **300**, and **400** may be inverted so that either end may dispense individual napkins.

COMPARISON DATA

[0057] Generally, the ratio of tab width to slit width (hereinafter may be referred to as "T/S") is greater in napkin assemblies of the present invention than toilet tissue products. The T/S value of napkins is generally 0.04 while the T/S value of toilet tissue products is generally 0.02. This higher ratio creates a stronger connection between napkins, which in turn, prevents inadvertent separation of the napkins within the dispenser during dispensing.

[0058] Table 1 depicts data from a napkin sheet of the present invention and an interfolded toilet tissue.

TABLE 1

	Napkin	Toilet Tissue Product
Basis weight (g _r)	29	14
Caliper (millimeter)	0.20	0.064
Machine Direction Tensile (g _r)	5700	1200

[0059] As depicted, the napkin tends to have a higher basis weight, caliper measurement, and machine direction tensile than the toilet tissue product. Thus, the napkin has different physical properties created for its intended use, which may present different dispensing properties than toilet tissue.

[0060] Table 2 depicts data regarding perforated structure for the paper products of Table 1.

TABLE 2

	Napkin	Toilet Tissue Product
Tab Width (millimeter)	0.48	0.48
Slit Width (millimeter)	12	28
Tab strength (g _r)	92	20

[0061] Although the tab widths for the napkin of the present invention and the toilet tissue product are the same, the slit width of the toilet tissue product is over twice that of the napkin, and likewise, the tab strength is less than a quarter of the napkin. Generally, greater slit widths in toilet tissue result in less tabs present in the sheet. Toilet tissue may be constructed with less tabs because of its smaller sheet size, which may require less pulling force during dispensing. Napkins tend to be bigger sheet products, and as a result, more force may be required to pull napkins from the dispenser. Thus, smaller slit widths, and thereby more tabs, may prevent unintentional napkin sheet separation during dispensing.

[0062] While the present invention has been described in connection with certain preferred embodiments, it is to be understood that the subject matter encompassed by way of the present invention is not to be limited to those specific embodiments. On the contrary, it is intended for the subject matter of the invention to include all alternatives, modifications and equivalents as can be included within the spirit and scope of the following claims.

What is claimed is:

1. A napkin assembly for a dispenser, the napkin assembly comprising:
 - a first napkin sheet further comprising a plurality of napkins wherein each napkin has a basis weight from about 20 gsm to about 40 gsm and is connected to an adjacent napkin in series by a plurality of tabs;
 - a second napkin sheet further comprising a plurality of napkins wherein each napkin has a basis weight from about 20 gsm to about 40 gsm and is connected to an adjacent napkin in series by a plurality of tabs, the second napkin sheet being positioned proximate to the first napkin sheet in an offset relation so that the first and second napkin sheets are formed into a nested configuration for dispensing.

2. The napkin assembly of claim 1 wherein each napkin of the first and second napkin sheets further comprises a first member integrally formed with a second member forming a fold between the first and second members; and

at least one napkin from the first napkin sheet terminates at about the fold of a respective napkin from the second napkin sheet.

3. The napkin assembly of claim 2 wherein at least 500 napkins from the first napkin sheet terminate at about the fold of a respective napkin from the second napkin sheet.

4. The napkin assembly of claim 1 wherein the napkin basis weight is about 30 gsm.

5. The napkin assembly of claim 1 wherein the napkins comprise pulp fibers.

6. The napkin assembly of claim 1 wherein the machine direction tensile is greater than about 2000 g_r.

7. The napkin assembly of claim 1 wherein the T/S ratio is greater than about 0.03.

8. The napkin assembly of claim 1 wherein the tab strength is greater than about 30 g_r.

9. A napkin assembly for a dispenser, the napkin assembly comprising:

a first napkin sheet further comprising a plurality of napkins wherein each napkin is connected to an adjacent napkin in series by a plurality of tabs;

a second napkin sheet further comprising a plurality of napkins wherein each napkin is connected to an adjacent napkin in series by a plurality of tabs;

each napkin of the first and second napkin sheets further includes a first member, a second member, and a third member wherein the first member is formed integrally with the second member forming a first fold between the first and second members and the second member is formed integrally with the third member forming a second fold between the second and third members; and

at least one napkin from the first napkin sheet terminates at about the second fold of a respective napkin from the second napkin sheet when nestably configured for dispensing.

10. The napkin assembly of claim 9 wherein at least 500 napkins from the first napkin sheet terminate at about the second fold of a respective napkin from the second napkin sheet.

11. The napkin assembly of claim 9 wherein the napkin basis weight is from about 20 gsm to about 40 gsm.

12. The napkin assembly of claim 11 wherein the napkin basis weight is about 30 gsm.

13. The napkin assembly of claim 9 wherein the napkins comprise pulp fibers.

14. The napkin assembly of claim 9 wherein the machine direction tensile is greater than about 2000 g_r.

15. The napkin assembly of claim 9 wherein the T/S ratio is greater than about 0.03.

16. The napkin assembly of claim 9 wherein the tab strength is greater than about 30 g_r.

17. A napkin assembly for a dispenser, the napkin assembly comprising:

a first napkin sheet further comprising a plurality of napkins wherein each napkin is connected to an adjacent napkin in series by a plurality of tabs;

a second napkin sheet further comprising a plurality of napkins wherein each napkin is connected to an adjacent napkin in series by a plurality of tabs;

each napkin of the first and second napkin sheets further includes a first member, a second member, a third member, and a fourth member wherein the first member is formed integrally with the second member forming a first fold between the first and second members, the second member is formed integrally with the third member forming a second fold between the second and third members, and the third member is formed integrally with the fourth member forming a third fold between the third and fourth members;

the second and third members have a length about twice that of the first and fourth members; and

at least one napkin from the first napkin sheet terminates at about the middle of a third member of a respective napkin from the second napkin sheet when nestably configured for dispensing.

18. The napkin assembly of claim 17 wherein at least 500 napkins from the first napkin sheet terminate at about the middle of a third member of a respective napkin from the second napkin sheet.

19. The napkin assembly of claim 17 wherein the napkin basis weight is from about 20 gsm to about 40 gsm.

20. The napkin assembly of claim 19 wherein the napkin basis weight is about 30 gsm.

21. The napkin assembly of claim 17 wherein the napkins comprise pulp fibers.

22. The napkin assembly of claim 17 wherein the machine direction tensile is greater than about **2000 g_f**.

23. The napkin assembly of claim 17 wherein the T/S ratio is greater than about 0.03.

24. The napkin assembly of claim 17 wherein the tab strength is greater than about 30 g_f.

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