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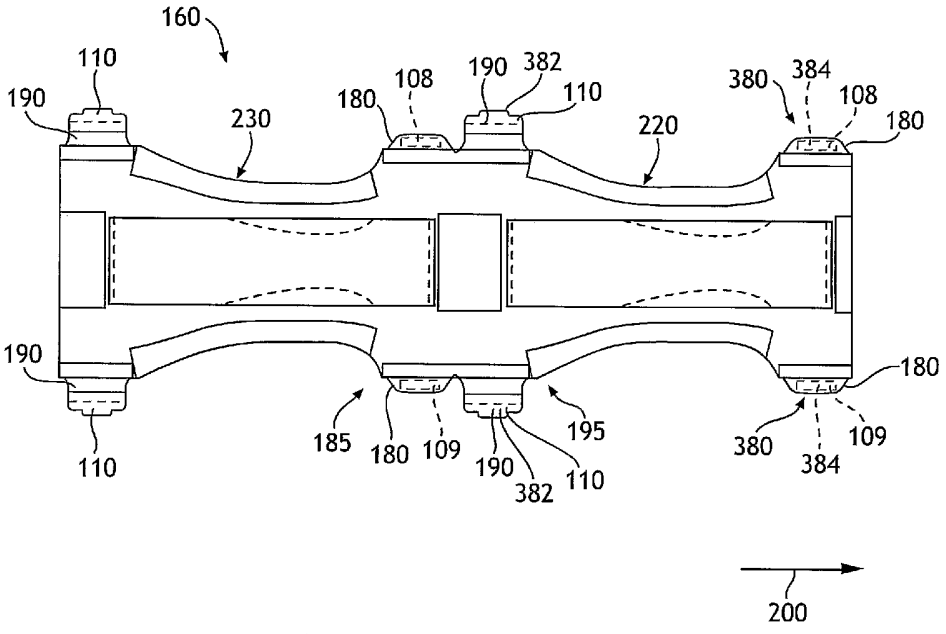
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(54) Title: COMPOSITE WEB AND USE IN AN ABSORBENT ARTICLE



(57) Abstract: A composite web has a first fastening material in a first longitudinally extending zone on a first outer surface, a second fastening material in a second longitudinally extending zone on the first outer surface, and at least a portion of a third fastening material on a longitudinal centerline on a second outer surface. A disposable absorbent article has a dual fastening system comprising a pair of front ear portions and a pair of back ear portions formed from a composite web. The composite web has first, second, and third fastening materials. Each back ear portion has a fastening material configured to engage the outer cover and each front ear portion has a fastening material configured to engage the body facing surface of the liner.

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COMPOSITE WEB AND USE IN AN ABSORBENT ARTICLE

Background of the Invention

Disposable diapers, and other absorbent articles, are typically manufactured from a high-speed moving web of nonwoven or other materials. Layers and components are introduced and brought together at various points to the moving web and, when all of the desired components are present, the web is cut into individual articles. As three-dimensional articles, absorbent articles are generally thin for comfort and fit purposes. Therefore, the primary dimensions of such articles are their length (longitudinal direction) and width (lateral direction). The thickness of an absorbent article is composed of piles of several of the article components that are generally coterminous with each other and form the "chassis" of the absorbent article. These components may include the outer cover (also known as the backsheet), the absorbent core, and the bodyside liner (also known as the topsheet). Other components are often attached to the chassis to form the complete article. These separate components include containment flaps, leg elastics, waist elastics and fastening system elements. As can be generally appreciated, the complexity and difficulty of the absorbent article manufacturing process increases as the number of separate components that must be introduced to the moving web increases. An associated challenge is the placement of each of those components in the correct location on the high-speed moving web.

The chassis of an absorbent article is generally understood to include a front waist portion, a crotch portion and a back waist portion. Fastening systems have been developed for joining the waist portions together around the waist of the wearer of the article. In order to provide coverage of the article over the hips of the wearer and to improve placement of the fasteners, absorbent articles have evolved to include "ear" portions. The ear portions of a diaper can serve many functions; for example, the ear portions can aid placement of the waist portions prior to fastening and the ear portions can provide coverage of the article around the hips of the wearer of the article. With some absorbent articles, the ear portions can form at least a part of the waist opening and the leg openings.

The ear portions may be attached to the front waist portion, the back waist portion or there may be two sets; one in the front and one in the back. The ear portions generally

extend laterally (perpendicularly) away from the chassis of the absorbent article. The ear portions can be made of a variety of materials and with disposable absorbent articles, they are typically made, at least partially, from a nonwoven material. At present, commercially available premium diapers tend to have back ear portions that are constructed from an elastic nonwoven material, such as a neck-bonded laminate. However, ear portions can be constructed of non-elastic or simply extensible nonwoven materials too and sometimes it is even desirable to have the ear portion constructed of a non-elastic nonwoven or for the ear portion to have a non-elastic/non-extensible portion attached to an elastic material. Therefore, in some cases, the ear portion can be constructed of more than one type of material. The addition of a non-elastic portion at the distal (furthest away from the chassis) end of the ear portion can simplify the application of the absorbent article because it gives the caregiver or wearer something sturdy to grab onto as they bring the waist portions of the article together for fastening.

While ear portions increase the ease with which absorbent articles can be applied and while they improve the fit of the articles, there are limitations associated with their attachment to the chassis during manufacture. The limitations generally relate to the ear portions not being integral with the chassis and therefore, requiring separate placement onto the high speed moving web of materials. Typically, it is desirable to place the ear portions near the edges of the front and back waist portions. Consequently, it is necessary to "register" the ear portions to a desired location in relation to the front and back waist edges of individual absorbent articles. In general, the closer the ear portions are to the waist edges, the better they perform their function. For example, if a diaper article includes a stretchable back waistband, registration of a stretchable back ear portion with the back waist edge results in better tensioning/performance of the stretchable waistband when the diaper is applied to a wearer. However, current manufacturing techniques limit precise and consistent registration of the ear portions relative to the waist edges of the article. The process of applying ear portions to the web is further complicated when the finished article is intended to include ears in both the front and the back waist regions. Commercially-available diapers having both front and back ear portions have typically had front and back ears that are made from different types of nonwoven materials. Therefore, there are two separate streams of ear portion materials that have to be introduced to the main web, further complicating manufacturing.

The manufacturing and registration of the ear portions are yet further complicated with the addition of dual (or secondary) fasteners. Dual fasteners may include primary fastening means and secondary fastening means. The primary fastening means maintain

the waist portion of the diaper in an overlapping configuration while the secondary fastening means typically are positioned to reduce shifting of the overlapping portions. Typically, the addition of the secondary fastening means involves the addition of yet another separate stream of ear portion material to the main web and the addition of a cut and place module or similar equipment to sever the secondary fastener and place it onto the absorbent article. Therefore, there exists a need to simplify the addition and registration of secondary fasteners to absorbent article manufacturing processes.

Summary of the Invention

In response to the difficulties and problems discussed above, new composite webs have been invented. Additionally, new disposable absorbent articles, that include secondary fasteners made from the new composite webs, have been invented.

One aspect relates to a composite web. The composite web has a base web and the base web has opposed first and second outer surfaces, a longitudinal centerline, and opposed first and second longitudinal side edges. The base web also has a first longitudinally extending zone lying between the longitudinal centerline and the first longitudinal side edge and a second longitudinally extending zone lying between the longitudinal centerline and the second longitudinal side edge. The composite web has first, second, and third fastening materials. The first fastening material is situated in the first longitudinally extending zone on the first outer surface of the base web. The second fastening material is situated in the second longitudinally extending zone on the first outer surface of the base web. The third fastening material is situated at least partially on the longitudinal centerline on the second outer surface of the base web.

In various embodiments of the composite web, the first and/ or second and/or third fastening material may be a discontinuous strip of material (i.e., discrete pieces). In embodiments wherein the first and second fastening materials are discontinuous strips of material, the first fastening material and the second fastening material may be configured in offset relation with one another.

In various embodiments of the composite web, at least a portion of the first and/or second fastening material may be situated adjacent a longitudinal side edge of the base web.

In various embodiments of the composite web, the first fastening material may be the same as the second fastening material.

Another aspect relates to a disposable absorbent article. The disposable absorbent article has opposed side edges, a front waist region, a back waist region, a crotch region extending between and connecting the waist regions, a longitudinal direction and a lateral direction. The disposable absorbent article also has an outer cover having a body facing surface and a garment facing surface; a liner superposed over the body facing surface of the outer cover, the liner having a body facing surface and a garment facing surface; an absorbent core disposed between the garment facing surface of the liner and the body facing surface of the outer cover; and a dual fastening system. The dual fastening system has a pair of front ear portions and a pair of back ear portions.

The pair of front ear portions and the pair of back ear portions are formed from a composite web. The composite web has a base web having opposed first and second outer surfaces, a longitudinal centerline, opposed first and second longitudinal side edges, a first longitudinally extending zone lying between the longitudinal centerline and the first longitudinal side edge, and a second longitudinally extending zone lying between the longitudinal centerline and the second longitudinal side edge. The composite web also has first, second and third fastening materials. The first fastening material is situated in the first longitudinally extending zone on the first outer surface of the base web. The second fastening material is situated in the second longitudinally extending zone on the first outer surface of the base web. At least a portion of the third fastening material is situated on the longitudinal centerline on the second outer surface of the base web.

Each back ear portion extends laterally outward from a side edge in the back waist region. Each back ear portion has a garment facing first outer surface, a body facing second outer surface and the third fastening material. The third fastening material is situated on at least a portion of the second outer surface of each back ear portion. The third fastening material is configured to engage at least a portion of the garment facing surface of the outer cover.

Each front ear portion extends laterally outward from a side edge in the front waist region and has a garment facing first outer surface, a body facing second outer surface and one of the first fastening material or the second fastening material. The first or second fastening material is situated on at least a portion of the first outer surface of each front ear portion. The first and second fastening materials are configured to engage at least a portion of the body facing surface of the liner.

In various embodiments of the disposable absorbent article, the first and/or second fastening material may be a discontinuous strip of material (i.e., discrete pieces).

In some embodiments, wherein both the first fastening material and the second fastening material are discontinuous strips of material, the first fastening material and the second fastening material may be configured in offset relation with one another when part of the composite web. In some embodiments, the third fastening material may be a discontinuous strip of material (i.e., discrete pieces). In some embodiments, wherein the first fastening material comprises discrete pieces, the discrete pieces of the first fastening material may be entirely located within the first longitudinally extending zone of the composite web. In some embodiments, wherein the second fastening material comprises discrete pieces, the discrete pieces of the second fastening material may be entirely located within the second longitudinally extending zone of the composite web.

In various embodiments of the disposable absorbent article, the first fastening material may be similar or identical to the second fastening material.

In various embodiment of the disposable absorbent article, the first fastening material, the second fastening material, and the third fastening material may be hook type fastening materials and the outer cover may be configured to function as a complementary loop type fastener and the liner may be configured to function as a secondary loop type fastener. In various embodiments, the disposable absorbent article may further have at least one attachment panel located on the garment facing surface of the outer cover to which the third fastening material may be releasably engaged.

Another aspect relates to a method of making a disposable absorbent article that defines a front waist region, a back waist region, a crotch region that extends between and connects the waist regions, a longitudinal direction and a lateral direction. The method includes providing a first continuous web. The first continuous web has a base web. The base web has opposed first and second outer surfaces, opposed first and second longitudinal side edges, a longitudinal centerline, a first longitudinally extending zone lying between the longitudinal centerline and the first longitudinal side edge, and a second longitudinally extending zone lying between the longitudinal centerline and the second longitudinal side edge. The first continuous web also has first, second, and third fastening materials. The first fastening material is situated in the first longitudinally extending zone on the first outer surface of the base web. The second fastening material is situated in the second longitudinally extending zone on the first outer surface of the base web. At least a portion of the third fastening material is situated on the longitudinal centerline on the second outer surface of the base web.

The method further includes selectively cutting the first continuous web to form two ear portion webs wherein each ear portion web includes a repeating pattern of a back ear portion and front ear portion. The back ear portion includes the third fastening material and the front ear portion includes one of the first fastening material or the second fastening material. The method further includes cutting and orienting the two ear portion webs to form pairs where each pair includes one of the back ear portions and one of the front ear portions. In various embodiments, the cutting and orienting step may be accomplished by crossing the two ear portion webs and selectively cutting the two ear portion webs to form pairs where each pair includes a back ear portion and a front ear portion. In other embodiments, the cutting and orienting step may be accomplished by cutting the two ear portion webs to form pairs where each pair includes a back ear portion and a front ear portion and rotating each pair 180 degrees.

The method further includes providing a second continuous web of interconnected absorbent chassis wherein each of the absorbent chassis has an exterior surface, an interior surface opposite the exterior surface, a pair of laterally opposed side edges and a pair of longitudinally opposed waist edges.

The method further includes attaching the pairs of ear portions on both of the laterally opposed side edges of the interconnected absorbent chassis wherein the pairs of ear portions are attached in alignment with the waist edges of adjacent absorbent chassis and selectively cutting the second continuous web of interconnected absorbent chassis into discrete absorbent articles wherein each discrete absorbent article includes two laterally opposed front ear portions and two laterally opposed back ear portions. The two laterally opposed front ear portions have one of the first or second fastener material and the two laterally opposed back ear portions have the third fastener material.

Brief Description of the Drawings

The present invention will be more fully understood and further advantages will become apparent when reference is made to the following detailed description of the invention and the accompanying drawings wherein like numerals represent like elements. The drawings are merely representative and are not intended to limit the scope of the appended claims.

Fig. 1A representatively shows one embodiment of an exemplary composite web;

Fig. 1B representatively shows a method by which the articles of the invention may be made;

Fig. 1C representatively shows an alternative method by which the articles of the invention may be made;

Fig. 2 representatively shows a pattern into which a composite material web may be cut in such a way that the back ear portions and front ear portions are nested together;

Fig. 3 representatively shows two individual absorbent articles adjacent each other as part of a continuous or unitary nonwoven web;

Fig. 4 representatively shows a composite material web from which nested front and back ear portions can be formed;

Fig. 5 representatively shows an alternative composite material web from which nested front and back ear portions can be formed;

Fig. 6 representatively shows another alternative composite material web from which nested front and back ear portions can be formed;

Fig. 7 representatively shows a plan view of the body facing surface of a disposable absorbent article of the invention;

Fig. 8 representatively shows a further alternative composite material web from which nested front and back ear portions can be formed; and

Fig. 9 representatively shows a web of material from which front and back side ear portions can be formed for use on a prefastened absorbent article, such as a diaper pant.

Detailed Description of the Invention

The present disclosure of the invention will be expressed in terms of its various components, elements, constructions, configurations, arrangements and other features that may also be individually or collectively referenced by the term, "aspect(s)" of the invention, or other similar terms. It is contemplated that the various forms of the disclosed invention may incorporate one or more of its various features and aspects, and that such features and aspects may be employed in any desired, operative combination thereof.

It should also be noted that, when employed in the present disclosure, the terms "comprises", "comprising" and other derivatives from the root term "comprise" are intended to be open-ended terms that specify the presence of any stated features,

elements, integers, steps, or components, and are not intended to preclude the presence or addition of one or more other features, elements, integers, steps, components, or groups thereof.

In a first aspect, the present invention relates to a composite web, a portion of which is representatively illustrated at **120** in **Fig. 1A**. The composite web **120** has a base web **100** having a first outer surface **122** and second outer surface **124**, opposed first longitudinal side edge **126** and second longitudinal side edge **128**, and a longitudinal centerline **129** (representatively illustrated with a dashed line in **Fig. 1A**). The base web **100** has a first longitudinally extending zone **132** lying between the longitudinal centerline **129** and the first longitudinal side edge **126**. The base web **100** has a second longitudinally extending zone **134** lying between the longitudinal centerline **129** and the second longitudinal side edge **128**. The base web **100** has at least one first fastening material **108** situated in the first longitudinally extending zone **132** on the first outer surface **122**. In some embodiments, the first fastening material **108** is located entirely within the first longitudinally extending zone **132**. The base web **100** has at least one second fastening material **109** situated in the second longitudinally extending zone **134** on the first outer surface **122**. In some embodiments, the second fastening material **108** is located entirely within the second longitudinally extending zone **134**. The base web **100** has a third fastening material **110** situated on the second outer surface **124**. At least a portion of the third fastening material **110** is situated on the longitudinal centerline **129**. In various embodiments, the base web **100** may comprise an integral web, as illustrated in **Fig. 1A**, or a plurality of connected sections.

In various embodiments, the first fastening material **108** may be a continuous strip of material or the first fastening material **108** may be more than one discontinuous strip of material (i.e., discrete pieces), as illustrated in **Fig. 1A**. Similarly, the second fastening material **109** may be a continuous strip of material or the second fastening material **109** may be more than one discontinuous strip of material (i.e., discrete pieces), as illustrated in **Fig. 1A**. In embodiments wherein the first and second fastening materials **108** and **109** are discontinuous strips of material, the strips may be configured in offset relation with one another as illustrated in **Fig. 1A**. Alternatively, the strips of the first fastening material **108** and the second fastening material **109** may be configured to at least partially align with one another. As used herein, the term "offset" means to situate two or more discontinuous strips of material such that an imaginary line drawn perpendicularly to the longitudinal centerline **129** and through any portion of one discontinuous first fastening

material **108** does not pass through any portion of one discontinuous second fastening material **109**. As used herein, the term "align" means to situate two or more discontinuous strips of material such that an imaginary line drawn perpendicularly to the longitudinal centerline **129** and through any portion of one discontinuous first fastening material **108** would also pass through a portion of one discontinuous second fastening material **109**.

In some embodiments the third fastening material **110** may be a continuous strip of material as illustrated in **Fig. 1A**. Alternatively, the third fastening material **110** may be a discontinuous strip of material comprising two or more discrete third fastening material pieces **110**.

The first fastening material **108** and/or the second fastening material **109** may be situated away from the respective longitudinal side edges **126** and/or **128** as illustrated in **Fig. 1A**. Alternatively, at least a portion of the first fastening material **108** and/or the second fastening material **109** may be situated adjacent the respective longitudinal side edges **126** and/or **128**. In various embodiments, the first fastening material **108** may be similar to the second fastening material **109**. For example, both the first fastening material **108** and the second fastening material **109** may be hook type fasteners. The first and second fastening material **108** and **109** need not be identical, but may, in some embodiments, be made of the same material.

In a second aspect, the present invention relates to disposable absorbent articles that have attached front ear portions, back ear portions, primary fasteners, and secondary fasteners that are formed from composite webs similar to the composite webs described above, for example, composite web **120** of **Fig. 1A,** and the composite webs described hereafter. The composite web can include one or more nonwoven or fastening materials. Typically, disposable absorbent articles include a front waist region, a back waist region and a crotch region that extends between and connects the waist regions. Absorbent articles also typically define a longitudinal direction and a lateral direction. Absorbent articles include an absorbent chassis that defines an exterior surface (or garment facing surface), an interior surface (or body facing surface) opposite the exterior surface, a pair of laterally opposed side edges and a pair of longitudinally opposed waist edges. As used herein, the term "disposable" refers to articles which are intended to be discarded after a limited use and that are not intended to be laundered or otherwise restored for reuse.

The present invention can also be used to address problems associated with the complexity of attaching front ear portions and back ear portions to the absorbent chassis of a disposable absorbent article, particularly when the front ear portions and the back ear

portions are made of different materials. The articles of the invention can have front ear portions and back ear portions that are in improved registration with the absorbent chassis. Further, the process of the invention can reduce waste of materials because the front ear portions and the back ear portions are formed from a single web of material as opposed to two or more material webs. Further yet, articles of the invention can also be used to address problems associated with the complexity of attaching secondary fasteners to disposable absorbent articles.

The disposable absorbent articles of the present invention will be described in terms of a disposable diaper article that is adapted to be worn by infants about the lower torso. In particular, the disposable absorbent articles will be described in terms of a disposable diaper having a pair of opposed back ear portions and a pair of opposed front ear portions and a dual fastening system. It is understood that the articles of the present invention are equally adaptable for other types of absorbent articles such as adult incontinent products, training pants, feminine hygiene products and other personal care or health care garments.

Fig. 1B representatively illustrates a method by which the disposable diapers can be made. **Step 1** of the method includes providing a base web **100** of material to be used for forming the back ear portions and the front ear portions. The base web **100** having a first outer surface **122** and second outer surface **124**, opposed first longitudinal side edge **126** and second longitudinal side edge **128**, and a longitudinal centerline **129** (representatively illustrated with a dashed line in **Fig. 1B**). The base web **100** has a first longitudinally extending zone **132** lying between the longitudinal centerline **129** and the first longitudinal side edge **126**. The base web **100** has a second longitudinally extending zone **134** lying between the longitudinal centerline **129** and the second longitudinal side edge **128**. The base web **100** may be formed of an extensible or an elastic material, such as a necked bonded laminate (hereinafter "NBL"). Alternatively, the base web **100** may be formed of a combination of a generally non-extensible material and an extensible material such as a combination of an SMS and an NBL. An example of a suitable material for base web **100** is a 1.5 ounce per square yard (hereinafter "osy") spunbond/meltblown/spunbond (hereinafter "SMS") nonwoven material. Additional suitable materials for the base web **100** include "bonded carded webs" ("BCW"); heavy-weight spunbond; and film-based materials such as film-based or film-like based laminates.

Typically, it is desirable to provide back ear portions, front ear portions, or both with a fastening material so that one or the other or both of the ear portions is able to secure the back waist and front waist regions together. For such product configurations, a web of a first fastening material **108**, a web of a second fastening material **109**, and a web of a third fastening material **110** may be fed in association with and laminated to the base web **100** to form a composite material web **120**. In various embodiments, the first fastening material **108**, the second fastening material **109**, and/or the third fastening material **110** may be continuous or discontinuous (i.e., discrete pieces). The embodiment illustrated in **Fig. 1B** shows a discontinuous first fastening material **108**, a discontinuous second fastening material **109**, and a continuous third fastening material **110**. The first fastening material **108** is in the first longitudinally extending zone **132** on the first outer surface **122**. In various embodiments, the first fastening material **108** may be situated entirely within the first longitudinally extending zone **132**. The second fastening material **109** is situated in the second longitudinally extending zone **134** on the first outer surface **122**. In various embodiments, the second fastening material **109** may be situated entirely within the second longitudinally extending zone **134**. The third fastening material **110** is situated on the second outer surface **124**. At least a portion of the third fastening material **110** is situated on the longitudinal centerline **129**. Lamination of first, second, and third fastening materials **108**, **109**, and **110** to the base web **100** is illustrated as **Steps 2** and **3** in **Fig. 1B**.

A next step for forming articles according to one embodiment of the invention is to die cut the composite material web **120** into a right continuous composite web **130** and a left continuous composite web **140** in such a way that the back ear portions and the front ear portions being formed are nested with each other. Die cutting of the composite web **120** is illustrated in **Fig. 1B** as **Step 3**. The web material located between and not part of the back and front ear portions is referred to as trim waste **145**. While not shown in **Fig. 1B**, the trim waste is removed from the system as **Step 4**. Next, shown as **Step 5** in **Fig. 1B**, right continuous composite web **130** and left continuous composite web **140** are transposed, that is the webs **130** and **140** are crossed so that they end up oriented 180 degrees opposite of their initial orientation. The right continuous composite web **130** and left continuous composite web **140** each have a sequence of back ear portions **190** and front ear portions **180**. The sequence depicted in **Fig. 1B** of alternating back and front ear portions may be used with absorbent articles that are formed "back to front" (meaning the back or rear portion of one article is adjacent to the front portion of the next article). If

the absorbent articles are being formed "front to front"/"back to back", then the sequence of ear portions on the right and left continuous composite webs **130**, **140** would be front, front, back, back etc. **Step 6** of **Fig. 1B** depicts the right continuous composite web **130** and the left continuous composite web **140** being cut into discrete front and back ear segments (or pairs) **150**. In **Step 7**, the front and back ear segments/pairs **150** are attached to a continuous absorbent article web **160**. The absorbent article web **160** has a machine direction **200** and a cross-direction **210**. Finally, **Step 8** of **Fig. 1B** depicts the continuous absorbent article web **160** being cut into individual absorbent articles **170**. Each absorbent article **170** includes its own pair of opposed front ear portions **180** with first and second fastening material **108** and **109** and pair of opposed back ear portions **190** with third fastening material **110**. A benefit of the front and back ear portions **180**, **190** being made from the same composite web **120** is that the ear portions can be applied to the article web **160** at the same time. Further, the front and back ear portions **180**, **190** can be in improved registration with the waist edges of the resulting absorbent articles **170**. Additionally, first fastening material **108**, second fastening material **109**, and third fastening material **110** can be in improved registration with the absorbent article **170**. The first fastening material **108**, the second fastening material **109**, and the third fastening material **110** can function together as a dual fastening system **380**. The dual fastening system **380** includes primary fasteners **382** and secondary fasteners **384**. The third fastening material **110** may be utilized as a primary fastener **382** and the first and second fastening materials **108** and **109** together may be utilized as a secondary fastener **384**. In various configurations, the first and second fastening materials **108** and **109** may comprise the same fastening material or different fastening materials.

An alternative to the method illustrated in **Fig. 1B** is illustrated in **Fig. 1C**. In **Fig. 1C**, the **Steps 1**, **2**, **3**, and **4** are the same as discussed above. In **Step 5**, the right continuous composite web **130** and left continuous composite web **140** are cut into discrete front and back ear segments (or pairs) **150** and rotated. That is, pairs **150** are rotated 180 degrees so that they end up oriented as illustrated in **Step 6** of **Fig. 1C**. In **Step 7**, the front and back ear segments/pairs **150** are attached to a continuous absorbent article web **160**. The absorbent article web **160** has a machine direction **200** and a cross-direction **210**. Finally, **Step 8** of **Fig. 1B** depicts the continuous absorbent article web **160** being cut into individual absorbent articles **170**. Each absorbent article **170** includes its own pair of opposed front ear portions **180** with first and second fastening

material **108** and **109** and pair of opposed back ear portions **190** with third fastening material **110**.

Fig. 2 representatively depicts a pattern into which a composite web **120** may be cut such that the front and back ear portions **180**, **190** are nested together. The ear portions have a length that is measured in direction **215** and a width that is measured in direction **205**. When the ear portions are attached to the absorbent article web **160**, the length of the ear portions is aligned with (parallel to) the cross-direction **210** of the absorbent article web **160** and the width of the ear portions is aligned with (parallel to) the machine direction **200** of the absorbent article web **160**. Two of the back ear portions **190** depicted in **Fig. 2** have lengths "F" and "G" and widths "B" and "C". Two of the front ear portions **180** depicted in **Fig. 2** have lengths "E" and "H" and widths "A" and "D". As depicted in **Fig. 2**, the lengths "F" and "G" of the back ear portions **190** are greater than the lengths "E" and "H" of the front ear portions **180** that the back ear portions **190** are nested with. More specifically, the sum of lengths "F" and "G" is greater than the sum of lengths "E" and "H". Additionally, the width "A" of one front ear portion **180** is approximately equal to the width "D" of the diagonally opposite front ear portion **180**. Likewise, the width "B" of one back ear portion **190** is approximately equal to the width "C" of the diagonally opposite back ear portion **190**. In another aspect, the relative dimensions of the front and back ear portions **180**, **190**, the sum of the widths "A" and "B" of adjacent back and front ear portions **180**, **190** is approximately equal to the sum of the widths "C" and "D" of the opposing, adjacent back and front ear portions **180**, **190**.

As previously described in relation to **Step 8** of **Fig. 1B**, the continuous absorbent article web **160** is cut into individual absorbent articles **170** at the "final cut off" point in the process. **Fig. 3** depicts two adjacent articles from a representative continuous absorbent article web **160** immediately before the final cut off. At the final cut off, the front ear portions **180** will be separated from the back ear portions **190** that they were originally continuous with (based on formation from the composite web **120**). The articles depicted in **Fig. 3** are being formed in a "back to front" configuration; that is, the back waist region **195** of one article is adjacent the front waist region **185** of the next article. The machine direction **200** of the absorbent article web **160** is depicted in **Fig. 3** in order to distinguish between the first article **220** formed and the second article **230** formed. Therefore, the back ear portions **190** attached to the first article **220** are adjacent the front ear portions **180** attached to the second article **230** and the adjacent ear portions are separated from each other when the first article **220** and the second article **230** are separated. When the

first article **220** and the second article **230** are separated from each other at the final cut off, the cut off forms the waist or longitudinal edges of the adjacent articles. Use of this technique of the invention for applying ear portions can result in the ear portions being in near perfect registration with the waist edges of the articles. That is, the attachment edge of the ear portion comes right to the waist edge instead of being somewhat over or below the waist edge. Additionally, the placement of the first, second and third fastening materials **108**, **109**, and **110** are in near perfect registration with the absorbent articles and one another. In a further processing step not depicted in **Fig. 3**, it is possible for front ear portions **180** of the articles to be attached to the back ear portions **190** of the articles to form prefastened disposable absorbent articles. The ear portions may be attached using techniques known to those of skill in the art including ultrasonic bonding, adhesives and mechanical fastening materials.

Fig. 4 representatively illustrates a composite web **120** from which nested front and back ear portions can be formed. The composite web **120** depicted in **Fig. 4** representatively illustrates a nesting pattern for the front ear portions **180** and the back ear portions **190** of front ear portion **180**; front ear portion **180**; back ear portion **190**; and back ear portion **190**. When the composite web **120** is split into complementary right continuous composite web **130** and left continuous composite web **140**, this nesting pattern may be suitable to form the ear portions of articles that are being formed in a front:front/back:back configuration. As shown, there are two front ear portions **180** on one side of the composite web **120** and there are two back ear portions **190** opposite the front ear portions **180**. Once the composite web **120** is split for application to the absorbent article web **160**, the right continuous composite web **130** may be sped up or slowed down in relation to the left continuous composite web **140** in order for sets of front ear portions **180** to be applied to adjacent front waist regions **185**. Likewise, the relative speed of the right continuous composite web **130** and the left continuous composite web **140** should be timed so that sets of back ear portions **190** are applied to adjacent back waist regions **195**.

In addition to depicting an alternative nesting pattern for the ear portions, **Fig. 4** also depicts a composite web **120** that may include multiple materials for forming the ear portions. The composite web **120** includes a base web **100**. The base web **100** material may be selected from a variety of materials but in one particular embodiment comprises a spunbond-meltblown-spunbond nonwoven material ("SMS" material). The base web **100** has a first outer surface **122** and second outer surface **124**, opposed first longitudinal side

edge **126** and second longitudinal side edge **128**, and a longitudinal centerline **129** (representatively illustrated with a dashed line in **Fig. 4**). The base web **100** has a first longitudinally extending zone **132** lying between the longitudinal centerline **129** and the first longitudinal side edge **126**. The base web **100** has a second longitudinally extending zone **134** lying between the longitudinal centerline **129** and the second longitudinal side edge **128**. The first fastening material **108** is situated in the first longitudinally extending zone **132** on the first outer surface **122**. The second fastening material **109** is situated in the second longitudinally extending zone **134** on the first outer surface **122**. The first fastening material **108** and/or the second fastening material **109** may include a mechanical fastening hook material or other material suitable for mechanical fastening. By selectively situating the first fastening material **108** as a discrete piece in the first longitudinally extending zone **132** only the front ear portions **180** will include the first fastening material **108**. By selectively situating the second fastening material **109** as a discrete piece in the second longitudinally extending zone **134** only the front ear portions **180** will include the second fastening material **109**. The length or height of the front ear portions **180** is selected so that it is short enough to not include the third fastening material **110**.

The composite web **120** may also include a third fastening material **110** that is applied in such a way that it runs down the center of the composite web **120** on the second outer surface **124**. The third fastening material **110** may include a mechanical fastening hook material or other material suitable for mechanical fastening. By running the third fastening material **110** down the center of the composite web **120**, only the ends of the back ear portions **190** will include the third fastening material **110**. The composite web **120** may further include a fourth material **125** that forms part of the back ear portions **190** and part of the front ear portions **180**. The fourth material **125** may be situated on the first outer surface **122** or the second outer surface **124**. Exemplary fourth materials may include a stretchable or extensible material or a super-soft material.

Fig. 5 representatively illustrates a composite web **120** that can be die-cut into front ear portions **180** and back ear portions **190**. The shapes of the front ear portions **180** and the back ear portions **190** are selected so that the shapes can be "nested" with each other on the composite web **120**. The nesting pattern depicted in **Fig. 5** is similar to the pattern described in relation to **Fig. 2**. One difference is that the front ear portion **180** shape depicted in **Fig. 5** includes a curved profile whereas the front ear portion **180** shape depicted in **Fig. 2** includes a straight profile. The profiles of both the front ear portions

180 and the back ear portions **190** can be designed to have both curved and straight portions so long as the profiles can co-exist opposite each other when formed from the composite web **120**. The nesting pattern of **Fig. 5** is an example of how using the composite webs **120** of the invention can significantly reduce wasted materials; the front ear portions **180** and back ear portions **190** are closely nested together in such a way that there is minimal material remaining between them.

The composite web **120** depicted in **Fig. 5** has a base web **100**. The base web **100** has a first outer surface **122** and a second outer surface **124**, an opposed first longitudinal side edge **126** and a second longitudinal side edge **128**, and a longitudinal centerline **129** (representatively illustrated with a dashed line). The base web **100** has a first longitudinally extending zone **132** lying between the longitudinal centerline **129** and the first longitudinal side edge **126**. The base web **100** has a second longitudinally extending zone **134** lying between the longitudinal centerline **129** and the second longitudinal side edge **128**. The composite web **120** depicted in **Fig. 5** includes a base web **100** material, a first fastening material **108**, a second fastening material **109**, and a third fastening material **110**. The first fastening material **108** is situated in the first longitudinally extending zone **132** on the first outer surface **122**. The second fastening material **109** is situated in the second longitudinally extending zone **134** on the first outer surface **122**. The third fastening material **110** is situated on the second outer surface **124** and at least a portion of the third fastening material **110** is situated on the longitudinal centerline **129**. The first, second, or third fastening materials **108**, **109**, and **110** may be a fastening material that can be attached to, or formed integrally with, the base web **100**. The fastening materials can be formed of a soft, flexible polymer such as KRATON polymer, polyethylene, ethylene vinyl acetate, and metallocene film (adhesive-based) that can be printed or otherwise directly applied onto the base web **100**.

Another embodiment of front ear portions **180** and back ear portions **190** formed from the same material web is depicted in **Fig. 6**. **Fig. 6** illustrates alternative shapes for both the front ear portions **180** and the back ear portions **190**. These shapes illustrate that a variety of shapes may be selected and are still capable of being nested with each other on a common composite web **120**. The use of multiple materials within one composite web **120** is also illustrated. For example, the composite web **120** may include a base web **100**, a first fastening material **108**, a second fastening material **109**, a third fastening material **110**, and a fourth material **125**. The base web **100** has a first outer surface **122** and second outer surface **124**, opposed first longitudinal side edge **126** and

second longitudinal side edge **128**, and a longitudinal centerline **129** (representatively illustrated with a dashed line in **Fig. 6**). The base web **100** has a first longitudinally extending zone **132** lying between the longitudinal centerline **129** and the first longitudinal side edge **126**. The base web **100** has a second longitudinally extending zone **134** lying between the longitudinal centerline **129** and the second longitudinal side edge **128**. The first fastening material **108** is situated in the first longitudinally extending zone **132** on the first outer surface **122**. The second fastening material **109** is situated in the second longitudinally extending zone **134** on the first outer surface **122**. The base web **100** may form the parts of the front ear portions **180** and the back ear portions **190** that will become the attachment areas of an absorbent article web **160**, as illustrated in **Fig. 1B**. A first, second, and third fastening materials **108**, **109**, and **110** may be attached to or formed integrally with the base web **100**. The third fastening material **110** may form the parts of the back ear portions **190** that will become a primary fastening surface for engagement with another fastening surface when used on an absorbent article. The first and second fastening materials **108** and **109** may form the parts of the front ear portions **180** that will become a secondary fastening surface for engagement with another fastening surface when used on an absorbent article. The first and second fastening materials **108** and **109** may be located on a first outer surface **122** of the base web **100**. The third fastening material **110** may be located on a first outer surface **122** of the base web **100**, a second outer surface **124** of the base web **100**, or on both sides/surfaces of the base web **100**. A fourth material **125** may likewise be attached to or integrally formed with the base web **100**. The fourth material **125** may be the same type of material as the third fastening material **110** or it may be different. The fourth material **125** may form a portion of the back ear portions **190** and may form a portion of the front ear portions **180**. The fourth material **125** may be an extensible or elastic material such as a NBL or SBL. Both the third fastening material **110** and the fourth material **125** may be located on one or more areas of the base web **100**. In another aspect, the third fastening material **110** may be attached to or formed integrally with the fourth material **125**.

Fig. 7 representatively illustrates an example of a disposable absorbent article to which the front ear portions **180** and the back ear portions **190** formed from the same composite web **120**, as previously discussed, may be attached. The absorbent article, which may be in the form of a disposable diaper, is generally indicated at **240**. The absorbent article **240** is generally illustrated with the body facing surface towards the viewer. As illustrated in **Fig. 7**, the diaper **240** defines an absorbent **250**, a front waist

region **185**, a back waist region **195**, a crotch region **260** that extends between and connects the front and back waist regions **185** and **195**, a longitudinal direction **200** and a lateral direction **210**. The front waist region **185** includes the portion of the diaper **240** that, when worn, is positioned on the front of the wearer while the back waist region **195** includes the portion of the diaper **240** that, when worn, is positioned on the back of the wearer. The crotch region **260** of the diaper **240** includes the portion of the diaper **240** that, when worn, is positioned between the legs of the wearer and covers the lower torso of the wearer.

The diaper **240** defines a pair of laterally opposed side edges **270**, a pair of longitudinally opposed waist edges **280**, an interior surface **290** (or body facing surface) that is configured to contact the wearer, and an exterior surface (not shown) opposite the interior surface **290** that is configured to contact the wearer's clothing in use (or garment facing surface). The illustrated diaper **240** also includes an outer cover (not visible in **Fig. 7**) and a bodyside liner **300** that is connected to the outer cover in a superposed relation. An absorbent **250** is located between the outer cover and the bodyside liner **300**. The laterally opposed side edges **270** of the diaper **240** are generally defined by the side edges of the outer cover that further define leg openings that may be curvilinear. The waist edges **280** of the diaper **240** are generally defined by the waist edges of the outer cover and define a waist opening that is configured to encircle the waist of the wearer when worn. The absorbent **250** is configured to contain and/or absorb any body exudates discharged from the wearer. The diaper **240** may further include leg elastics **310**, containment flaps (not shown) and waist elastics **320** as are known to those skilled in the art. The diaper **240** may include a dual fastening system **380** that includes primary fasteners **382** that are part of the back ear portions **190** and secondary fasteners **384** that are part of the front ear portions **180**. Each back ear portion **190** extends laterally outward from a side edge **270** in the back waist region **195**, each back ear portion **190** has a garment facing first outer surface **386**, a body facing second outer surface **388** and a third fastening material **110**. The third fastening material **110** is situated on at least a portion of the second outer surface **388** of each back ear portion **190**, the third fastening material **110** being configured to engage at least a portion of the garment facing surface of the outer cover and function as a primary fastener **382** for securing the diaper **240** about the waist of the wearer. Each front ear portion **180** extends laterally outward from a side edge **270** in the front waist region **185**. Each front ear portion **180** has a garment facing first outer surface **390** and a body facing second outer surface **392**. Each front ear

portion **180** has at least one of a first fastening material **108** or a second fastening material **109**, the first or second fastening material **108** or **109** being situated on at least a portion of the first outer surface **390** of each front ear portion **180**, the first or second fastening material **108** or **109** being configured to engage at least a portion of the body facing surface of the liner **300** and function as a secondary fastener **384** for securing the diaper **240** about the waist of the wearer. It should be recognized that individual components of the diaper **240** may be optional depending upon the intended use of the diaper **240**.

As illustrated in **Fig. 7**, the front and back ear portions **180** and **190** include curved edges and are in precise registration with the waist edges **280** of the diaper **240**. More specifically, the front ear portions **180** are aligned with the waist edge **280** in the front waist region **185** of the diaper **240** and the back ear portions **190** are aligned with the waist edge **280** in the back waist region **195** of the diaper **240**. This alignment or registration can assist with improved fit and performance of the diaper **240**. For example, when a diaper **240** such as the one illustrated in **Fig. 7** is applied to a baby, the caregiver may pull (apply tension) the back ear portions **190** around to the front waist region **185** and secure the third fastening material **110**, functioning as a primary fasteners **382** to an exterior surface of the front waist region **185**. Simultaneously, if the waist elastic **320** in the back waist region **195** is stretchable, the waist elastic **320** will be better tensioned and the diaper **240** will fit the baby better around the waist. Additionally, the first and/or second fastening material **108** or **109**, functioning as secondary fasteners **384**, will engage with an interior surface of the back waist region **195** to provide additional stability in the region wherein the front waist region **185** and back waist region **195** overlap. The secondary fasteners **384** work to reduce twisting which helps maintain proper fit.

The diaper **240** may be of various suitable shapes. For example, in the unfastened configuration as illustrated in **Fig. 7**, the diaper may have an overall rectangular shape, T-shape or an approximately hourglass shape. In the shown embodiment, the diaper **240** has a generally I-shape in an unfastened configuration. Examples of diaper configurations suitable for use in connection with the instant application and other diaper components suitable for use on diapers are described in U.S. Patent 4,798,603 issued January 17, 1989, to Meyer et al.; U.S. Patent 5,176,668 issued January 5, 1993, to Bernardin; U.S. Patent 5,192,606 issued March 9, 1993, to

Proxmire et al., and U.S. Patent 5,509,915 issued April 23, 1996, to Hanson et al., the disclosures of which are herein incorporated by reference where not contradictory.

The various components of the diaper **240** are integrally assembled together employing various types of suitable attachment means, such as adhesive, sonic bonds, thermal bonds or the like, as well as combinations thereof. In the shown embodiment, for example, the outer cover and bodyside liner **300** are assembled to each other and to the absorbent **250** with adhesive, such as a hot melt, pressure-sensitive adhesive. The adhesive may be applied as a uniform continuous layer of adhesive, a patterned layer of adhesive, a sprayed pattern of adhesive, or an array of separate lines, swirls or dots of adhesive. Alternatively, the absorbent **250** may be connected to the outer cover using conventional fasteners such as buttons, hook and loop type fasteners, adhesive tape fasteners, and the like. The other components of the diaper **240** may be suitably connected together using similar means. Similarly, other diaper components, such as the elastic members **320**, may be assembled into the diaper **240** article by employing the above-identified attachment mechanisms. Desirably, the majority of the diaper components are assembled together using ultrasonic bonding techniques for reduced manufacturing cost.

The outer cover generally presents a garment facing surface of the diaper **240**. More specifically, the outer cover has a body facing surface and a garment facing surface. The body facing surface of the outer cover is superposed with the liner **300**. The outer cover may suitably be composed of a material which is either liquid permeable or liquid impermeable. It is generally preferred that the outer cover be formed from a material that is substantially impermeable to liquids. A typical outer cover can be manufactured from a thin plastic film or other flexible liquid-impermeable material. For example, the outer cover may be formed from a polyethylene film having a thickness of from about 0.013 millimeter (0.5 mil) to about 0.051 millimeter (2.0 mils). If it is desired to present the outer cover with a more clothlike feeling, the outer cover may be formed from a polyolefin film having a nonwoven web laminated to the exterior surface thereof, such as a spunbond web of polyolefin fibers. For example, a stretch-thinned polypropylene film having a thickness of about 0.015 millimeter (0.6 mil) may have thermally laminated thereto a spunbond web of polypropylene fibers. The polypropylene fibers have a thickness of about 1.5 to 2.5 denier per filament, which nonwoven web has a basis weight of about 17 grams per square meter (0.5 ounce per square yard). The outer cover may otherwise include bicomponent fibers such as polyethylene/polypropylene bicomponent fibers. Methods of forming such

clothlike outer covers are known to those skilled in the art. The outer cover may also be an extensible outer cover such as the outer covers described in U.S. Patent 6,552,245 issued April 22, 2003 to Roessler et al., the entirety of which is incorporated herein where not contradictory.

Further, the outer cover may be formed of a woven or nonwoven fibrous web layer which has been totally or partially constructed or treated to impart a desired level of liquid impermeability to selected regions that are adjacent or proximate the absorbent **250**. Still further, the outer cover may optionally be composed of a micro-porous "breathable" material which permits vapors to escape from the absorbent **250** while still preventing liquid exudates from passing through the outer cover. For example, the outer cover may include a vapor permeable non-woven facing layer laminated to a micro-porous film. Suitable "breathable" outer cover materials are described in U.S. Patent No. 5,695,868 issued to McCormack et al. and U.S. Patent No. 5,843,056 issued December 1, 1998 to Good et al., the descriptions of which are hereby incorporated by reference where not contradictory. Still further, the outer cover may also be an elastomeric material such as a stretch-thermal laminate (STL), neck-bonded laminate (NBL), or stretch-bonded laminate (SBL) material. Methods of making such materials are well known to those skilled in the art and are described in U.S. Patent No. 4,663,220 issued May 5, 1987 to Wisneski et al., U.S. Patent No. 5,226,992 issued July 13, 1993 to Morman, and European Patent Application No. EP 0 217 032 published on April 8, 1987 in the names of Taylor et al., the disclosures of which are hereby incorporated by reference where not contradictory. The outer cover can also be embossed or otherwise provided with a matte finish to provide a more aesthetically pleasing appearance.

The bodyside liner **300**, as representatively illustrated in **Fig. 7**, suitably presents a bodyfacing surface of the diaper **240** that is compliant, soft feeling, and nonirritating to the wearer's skin. Further, the bodyside liner **300** may be less hydrophilic than the absorbent **250**, to present a relatively dry surface to the wearer, and may be sufficiently porous to be liquid permeable, permitting liquid to readily penetrate through its thickness. The liner **300** has a body facing surface and a garment facing surface. The garment facing surface of the liner is superposed with the body facing surface of the outercover. A suitable bodyside liner **300** may be manufactured from a wide selection of web materials, such as porous foams, reticulated foams, apertured plastic films, natural fibers (for example, wood or cotton fibers), synthetic fibers (for example, polyester or polypropylene fibers), or a combination of natural and synthetic fibers. The bodyside liner **300** is suitably employed

to help isolate the wearer's skin from liquids held in the absorbent **250**. The bodyside liner **300** can also be made from extensible materials as are described in U.S. Patent 6,552,245 that issued to Roessler et al. on April 22, 2003, the entirety of which is incorporated herein by reference where not contradictory.

Various woven and nonwoven fabrics can be used for the bodyside liner **300**. For example, the bodyside liner may be composed of a meltblown or spunbond web of polyolefin fibers. The bodyside liner **300** may also be a bonded-carded web composed of natural and/or synthetic fibers. The bodyside liner **300** may be composed of a substantially hydrophobic material, and the hydrophobic material may optionally be treated with a surfactant or otherwise processed to impart a desired level of wettability and hydrophilicity. In a particular embodiment of the present invention, the bodyside liner **300** is made from a nonwoven, spunbond, polypropylene fabric composed of about 1.5-2.5 denier fibers formed into a web having a basis weight of about 20 grams per square meter and a density of about 0.13 grams per cubic centimeter. The fabric may be surface treated with about 0.3 weight percent of a surfactant commercially available from Hodgson Textile Chemicals, Inc. under the trade designation AHCOVEL Base N-62. The surfactant may be applied by any conventional means, such as spraying, printing, brush coating or similar techniques. The surfactant may be applied to the entire bodyside liner **300** or may be selectively applied to particular sections of the bodyside liner **300**, such as the medial section along the longitudinal centerline of the diaper, to provide greater wettability of such sections. The bodyside liner **300** may further include a lotion or treatment applied thereto that is configured to be transferred to the wearer's skin. Suitable compositions for application to the bodyside liner **300** are described in U.S. Patent No. 6,149,934 that issued to Krzysik et al. on November 21, 2000, the entirety of which is incorporate herein by reference where not contradictory.

The absorbent **250** of the diaper **240**, as representatively illustrated in **Fig. 7**, may suitably be composed of a matrix of hydrophilic fibers, such as a web of cellulosic fluff, mixed with particles of a high-absorbency material commonly known as superabsorbent material. In a particular embodiment, the absorbent **250** includes a matrix of cellulosic fluff such as wood pulp fluff and superabsorbent hydrogel-forming particles. The wood pulp fluff may be exchanged with synthetic, polymeric, meltblown fibers or with a combination of meltblown fibers and natural fibers. The superabsorbent particles may be substantially homogeneously mixed with the hydrophilic fibers or may be nonuniformly mixed. The fluff and superabsorbent particles may also be selectively placed into desired

zones of the absorbent **250** to better contain and absorb body exudates. The concentration of the superabsorbent particles may also vary through the thickness of the absorbent **250**. Alternatively, the absorbent **250** may include a laminate of fibrous webs and superabsorbent material or other suitable means of maintaining a superabsorbent material in a localized area.

The absorbent **250** may have any of a number of shapes. For example, the absorbent may be rectangular, I-shaped, or T-shaped. It is generally preferred that the absorbent **250** be narrow in the crotch region **260** of the diaper **240**. It has been found that the absorbent **250** of the present invention is particularly useful when the width dimension in the crotch region **260** is from about 2.5 to about 12.7 centimeters (1.0 to about 5.0 inches), desirably no more than about 7.6 centimeters (3.0 inches) and more desirably no more than about 5.1 centimeters (2.0 inches). The narrow crotch width dimension of the absorbent **250** allows the absorbent **250** to better fit between the legs of the wearer. The size and the absorbent capacity of the absorbent **250** should be compatible with the size of the intended wearer and the liquid loading imparted by the intended use of the absorbent article.

The high-absorbency material can be selected from natural, synthetic, and modified natural polymers and materials. The high-absorbency materials can be inorganic materials, such as silica gels, or organic compounds, such as crosslinked polymers. Such high-absorbency materials are well known to those skilled in the art and are widely commercially available. Examples of superabsorbent polymers suitable for use in the present invention are SANWET IM 3900 polymer available from Hoechst Celanese located in Portsmouth, Virginia and DOW DRYTECH 2035LD polymer available from Dow Chemical Co. located in Midland, Michigan. As a general rule, the high absorbency material is present in the absorbent body in an amount of from about 5 to about 90 weight percent based on total weight of the absorbent **250**.

Optionally, a substantially hydrophilic tissue wrapsheet may be employed to help maintain the integrity of the airlaid fibrous structure of the absorbent **250**. The tissue wrapsheet is typically placed about the absorbent body over at least the two major facing surfaces thereof and composed of an absorbent cellulosic material, such as creped wadding or a high wet-strength tissue. In one aspect of the invention, the tissue wrapsheet can be configured to provide a wicking layer that helps to rapidly distribute liquid over the mass of absorbent fibers comprising the absorbent body. The wrapsheet material on one side of the absorbent fibrous mass may be bonded to the wrapsheet

located on the opposite side of the fibrous mass to effectively entrap the absorbent **250**. There may also be a surge layer **340** located between the absorbent body **250** and the liner **300** to facilitate the distribution of fluid during intake.

The disposable diaper **240** may include a pair of containment flaps (not shown in **Fig. 7**) that are configured to provide a barrier to the lateral flow of body exudates. The containment flaps may be located along the laterally opposed side edges **270** of the diaper adjacent the side edges of the absorbent **250**. Such containment flaps are generally well known to those skilled in the art. For example, suitable constructions and arrangements for containment flaps are described in U.S. Patent 4,704,116 issued November 3, 1987, to K. Enloe, the disclosure of which is hereby incorporated by reference where not contradictory.

The diaper **240** of the different aspects of the present invention may further include elastics at the waist edges **280** and side edges **270** of the diaper **240** to further prevent leakage of body exudates and support the absorbent **250**. For example, the diaper **240** of the present invention may include a pair of leg elastic members **310** that are connected to the laterally opposed side edges **270** of the diaper **240** in the crotch region **260**. The diaper **240** may also include a pair of waist elastic members **320** that is connected to the longitudinally opposed waist edges **280** of the diaper **240**. The leg elastics **310** and waist elastics **320** are generally adapted to fit about the legs and waist of a wearer in use to maintain a positive, contacting relationship with the wearer to effectively reduce or eliminate the leakage of body exudates from the diaper **240**.

Materials suitable for use as the leg elastics **310** and waist elastics **320** are well known to those skilled in the art. Exemplary of such materials are sheets or strands or ribbons of a polymeric, elastomeric material that are adhered to the outer cover in a stretched position, or that are attached to the outer cover while the outer cover is pleated, such that elastic constrictive forces are imparted to the outer cover. The leg elastics **310** may also include such materials as polyurethane, synthetic and natural rubber.

The diaper **240** of the different aspects of the present invention may further include a fit panel (not illustrated in **Fig. 7**) superimposed adjacent to the waist edge **280** in at least one of the waist sections **185** and **195**, to provide a more comfortable, contouring fit about the wearer. For example, the diaper **240** may include a fit panel superimposed adjacent the waist edge **280** on either the interior or exterior surface of the diaper **240**. Or there may be a fit panel located on both surfaces of the diaper **240**

simultaneously. The diaper may include a fit panel disposed in both waist sections **185** and **195** and desirably the diaper includes a fit panel in at least the rear waist section **195**. Desirably, the fit panel is extensible or elastomeric. Absorbent articles including such a fit panel and methods of making the same are further described in U.S. Patent 6,336,922 issued January 8, 2002 to VanGompel et al., the entirety of which is hereby incorporated by reference where not contradictory.

As previously described, in various aspects, the diaper **240** can further include a dual fastening system **380** for securing the diaper **240** about the waist of the wearer. In some embodiments, the dual fastening system **380** can include a pair of primary fasteners **382** and a pair of secondary fasteners **384** that may be used for joining the front and back waist sections **185** and **195** to each other during application of the diaper **240** to a wearer. An attachment panel (not illustrated in **Fig. 7**) may be located on the outer cover to which the primary fasteners **382** may be releasably engaged. The disposable diaper **240** of the present invention may include an attachment panel located on the outer cover in one of the waist regions **185** and **195** on the exterior surface of the diaper **240**. In such a configuration, the primary fastener **382** may be refastenably engaged with the attachment panel to maintain the diaper **240** about the waist of the wearer. The attachment panel may include two separate panels located along the opposed side edges of the diaper **240** in one of the waist regions **185** and **195** of the diaper **240**. Alternatively, the attachment panel may include a single piece of material that extends substantially across the respective waist region of the diaper **240**. Alternatively, the primary fasteners **382** may be releasably engageable directly with the garment facing surface of the outer cover.

The dual fastening system **380** of the present invention further includes a pair of secondary fasteners **384** to provide improved securement of the diaper **240** about the waist of the wearer. For example, as representatively illustrated in **Fig. 7**, the diaper **240** may include a pair of secondary fasteners **384** situated on the front ear portions **180** in the front waist region **185**. The secondary fasteners **384** are configured to encircle the hips of the wearer and engage the body facing surface of the liner **300** in the back waist region **195** of the diaper **240**. Suitably, the secondary fasteners **384** are hook type fasteners which are releasably engageable directly with the body facing surface of the liner **300**. Alternatively, the diaper **240** may include one or more fastening panels (not illustrated) on the body facing surface of the back waist region **195** to which the secondary fasteners **384** are releasably engageable.

Suitable fastening materials to provide the engageable portions of the primary fasteners **382** and/or the secondary fasteners **384** are well known to those skilled in the art and can include adhesive tape tab fasteners, hook and loop fasteners, mushroom fasteners, snaps, pins, belts and the like, and combinations thereof. The primary fasteners **382** may include hook type fastening materials and the outer cover may be configured to function as a complementary loop type fastener. The secondary fasteners **384** may include hook type fastening materials and the liner may be configured to function as a secondary loop type fastener. Alternatively, an attachment panel may be provided on the diaper **240** on either the outer cover, liner, or both to function as a complementary loop type fastener. Desirably, the primary fasteners **382** may include hook type fasteners that are releasably engageable directly with the outer cover of the diaper **240**. Desirably, the secondary fasteners **384** include hook type fasteners that are releasably engageable directly with the liner **300** of the diaper **240**. Such an arrangement provides the ability to vary the size of the waist opening in very small increments over a wide range to fit the waist of the wearer. Particular examples of hook fastening materials can include VELCRO HTH 858 or VELCRO HTH 823, or a similar hook material available from Velcro Industries B.V., Amsterdam, Netherlands or affiliates thereof. The primary fasteners **382** and/or the secondary fasteners **384** may also include adhesive-type materials known in the art and having the desired strength for joining the waist regions **185** and **195** together when the diaper **240** is applied. Further, the primary fasteners **382** and/or the secondary fasteners **384** may include materials that are capable of cohesively attaching to or engaging an opposite portion of the diaper **240** for fastening about the wearer.

As previously described herein, the primary fastener **382** portion of the diaper **240** may be incorporated into the back ear portion **190** formed from a composite web **120** together with the secondary fastener **384** incorporated into the front ear portion **180**. **Fig. 8** representatively illustrates an example of dimensions of front and back ear portions **180** and **190** that may be nested together and therefore formed from the same material web **120**. The composite material web **120** depicted in **Fig. 8** includes a base web **100**, a first fastening material **108**, a second fastening material **109**, a third fastening material **110** and a fourth material **125**. The material web **120** has a machine direction **205** and a cross direction **215**. The length of the front and back ear portions **180** and **190** is aligned with the cross direction **215** of the material web **120** and the width of the front and back ear portions **180** and **190** is aligned with the machine direction **205** of the material web **120**. As representatively illustrated in **Fig. 8**, the fourth material **125** is underneath the base

web **100** and the third fastening material **110**. The front ear portions **180** include the base web **100**, one of the first fastening material **108** or the second fastening material **109**, and a portion of the fourth material **125**. The front ear portions **180** do not, in this example, include the third fastening material **110**. The back ear portions **190** include the base web **100**, the third fastening material **110** and the fourth material **125**. The base web **100** material is provided in two sections in this example; both sections are overlying the fourth material **125**. In this example, both sections of the base web **100** have a length in the cross direction **215** of the material web **120** of 55 mm. The third fastening material **110** has a length in the cross direction **215** of the material web **120** of 23 mm. The fourth material **125** has a length in the cross direction **215** of the material web **120** of 56 mm.

Two diagonally opposed front ear portions **180** shown in **Fig. 8** have widths represented by letters "A" and "D". In one particular embodiment, the widths of the front ear portions **180** are approximately 78 mm and "A" and "D" are approximately equal to each other. Two diagonally opposed back ear portions **190** shown in **Fig. 8** have widths represented by letters "B" and "C". In this embodiment, the widths of the back ear portions **190** are approximately 86 mm and "B" and "C" are approximately equal to each other. The combined width of a pair of adjacent front and back ear portions **180** and **190** is represented by "A + B" and "C + D" is approximately equal to 164 mm. Further, the sum "A + B" is approximately equal to the sum "C + D". The two diagonally opposed front ear portions **180** have lengths represented by letters "E" and "H". The lengths of the front ear portions **180** are approximately 55 mm, approximately the same as the lengths of the base web **100** material in the cross direction **215**. The two diagonally opposed back ear portions **190** have lengths represented by letters "F" and "G". The lengths of the back ear portions **190** are approximately 78 mm, approximately the same as the sum of the lengths of one of the base webs **100** and the length of third fastening material **110** plus the approximate gap between webs **100** and **110** in the cross direction **215**. The lengths of the back ear portions **190** depicted in **Fig. 8** also include a section of the fourth material **125**. The lengths of the back ear portions **190** are generally greater than the lengths of the front ear portions **180**; that is, 78 mm is greater than 55 mm. Additionally, the sum of the lengths of the back ear portions ("F + G") is generally greater than the sum of the lengths of the front ear portions ("E + H"); that is, approximately 156 mm is greater than 110 mm. With the example of a nested ear pattern of the invention shown in **Fig. 8**, it may be desirable for the fourth material **125** to be a mechanical hook material that is capable of serving as a fastening material capable of engagement with another portion of

an absorbent article to which the front and back ear portions **180** and **190** are eventually attached.

The present invention may also be utilized for the formation of prefastened absorbent articles. Prefastened articles may be pant-like in configuration so that the wearer puts their legs through leg openings and pulls the article up and over their hips. **Fig. 9** representatively shows a material web **120** from which back ear portions **190** and front ear portions **180** may be formed for use on a prefastened absorbent article. The back ear portions **190** and front ear portions **180** may be more rectangular in shape and their nesting pattern may be such as to result in minimal trim waste **145**. After the back ear portions **190** and front ear portions **180** are applied to an absorbent chassis, the back ear portions **190** may be attached to the front ear portions **180** in order to provide the "prefastened" configuration of the article. The back ear portions **190** and the front ear portions **180** may be attached by techniques know to those of skill in the art such as adhesive, thermal and ultrasonic bonding. Additionally, a first fastening material **108**, a second fastening material **109**, and a third fastening material **110** may be included in the composite material web **120**. The first, second and third fastening materials **108**, **109**, and **110** are fastening materials capable of engaging and attaching to the base web material **100** used to form the other portions of the front and back ear portions **180** and **190**. For example, the first, second, or third fastening materials **108**, **109**, **110** may be a mechanical hook material. As depicted in **Fig. 9**, the shapes of the front and back ear portions **180** and **190** may be selected such that only the back ear portions **190** include the third fastening material **110** and only the front ear portions **180** include one of the first fastening material **108** or the second fastening material **109**.

While the invention has been described in detail with respect to specific aspects thereof, it will be appreciated that those skilled in the art, upon attaining an understanding of the foregoing, may readily conceive of alterations to, variations of and equivalents to these aspects. Accordingly, the scope of the present invention should be assessed as that of the appended claims and any equivalents thereto.

CLAIMS:

What is claimed is:

1. A composite web (120) comprising a base web (100) having opposed first and second outer surfaces (122, 124), a longitudinal centerline (129), opposed first and second longitudinal side edges (126, 128), a first longitudinally extending zone (132) lying between the longitudinal centerline (129) and the first longitudinal side edge (126), a second longitudinally extending zone (134) lying between the longitudinal centerline (129) and the second longitudinal side edge (128), and first, second and third fastening materials (108, 109, 110), the first fastening material (108) being situated in the first longitudinally extending zone (132) on the first outer surface (122), the second fastening material (109) being situated in the second longitudinally extending zone (134) on the first outer surface (122), and at least a portion of the third fastening material (110) being situated on the longitudinal centerline (129) on the second outer surface (124).

2. The composite web (120) of claim **1** used in a disposable absorbent article (240) having opposed side edges (270), a front waist region (185), a back waist region (195), a crotch region (260) extending between and connecting the waist regions, a longitudinal direction (200) and a lateral direction (210), the disposable absorbent article (240) comprising:

an outer cover having a body facing surface and a garment facing surface;

a liner (300) superposed over the body facing surface of the outer cover, the liner (300) having a body facing surface and a garment facing surface;

an absorbent core (250) disposed between the garment facing surface of the liner (300) and the body facing surface of the outer cover; and

a dual fastening system (380), the dual fastening system (380) comprising a pair of front ear portions (180) and a pair of back ear portions (190);

the pair of front ear portions (180) and the pair of back ear portions (190) are formed from the composite web (120) of claim **1**;

each back ear portion (190) extending laterally outward from a side edge (270) in the back waist region (195), each back ear portion (190) having a garment facing first outer surface (386), a body facing second outer surface (388) and the third fastening material (110), the third fastening material (110) being situated on at least a portion of the second outer surface (388) of each back ear portion (190), the third fastening material

(110) being configured to engage at least a portion of the garment facing surface of the outer cover; and

each front ear portion (180) extending laterally outward from a side edge (270) in the front waist region (185) and having a garment facing first outer surface (390), a body facing second outer surface (392) and one of the first fastening material (108) or the second fastening material (109), the first or second fastening material (108, 109) being situated on at least a portion of the first outer surface (390) of each front ear portion (180), the first and second fastening materials (108, 109) being configured to engage at least a portion of the body facing surface of the liner (300).

3. The composite web (120) used in the disposable absorbent article (240) of claim **2**, wherein the first fastening material (108), the second fastening material (109), and the third fastening material (110) are hook type fastening materials and the outer cover is configured to function as a complementary loop type fastener and the liner (300) is configured to function as a complementary loop type fastener.

4. The composite web (120) used in the disposable absorbent article (240) of claim **3**, further comprising at least one attachment panel located on the garment facing surface of the outer cover to which the third fastening material (110) may be releasably engaged.

5. The composite web (120) of claim **1** used in a method of making a disposable absorbent article (240) that defines a front waist region (185), a back waist region (195), a crotch region (260) that extends between and connects the waist regions, a longitudinal direction (200) and a lateral direction (210), the method comprising:

providing the composite web (120) of claim **1**;

selectively cutting the composite web (120) web to form two ear portion webs (130, 140) wherein each ear portion web includes a repeating pattern of a back ear portion (190) and a front ear portion (180), the back ear portion (190) comprising the third fastening material (110), the front ear portion (180) comprising one of the first fastening material (108) or the second fastening material (109);

cutting and orienting the two ear portion webs (130, 140) to form pairs (150) where each pair (150) includes one of the back ear portions (190) and one of the front ear portions (180);

providing a second continuous web of interconnected absorbent chassis (160) wherein each of said absorbent chassis (170) defines an exterior surface, an interior

surface opposite the exterior surface, a pair of laterally opposed side edges (270) and a pair of longitudinally opposed waist edges (280);

attaching the pairs of ear portions (150) on both of the laterally opposed side edges (270) of the interconnected absorbent chassis (160) wherein the pairs of ear portions (150) are attached in alignment with the waist edges (280) of adjacent absorbent chassis (170); and

selectively cutting the second continuous web of interconnected absorbent chassis (160) into discrete absorbent articles (170) wherein each discrete absorbent article (170) includes two laterally opposed front ear portions (180) and two laterally opposed back ear portions (190), wherein the two laterally opposed front ear portions (180) comprise one of the first or second fastener material (108, 109) and the two laterally opposed back ear portions (190) comprise the third fastener material (110).

6. The composite web (120) used in the method of claim **5** wherein the cutting and orienting step includes crossing the two ear portion webs (130, 140) and selectively cutting the two ear portion webs (130, 140).

7. The composite web (120) used in the method of claim **5** wherein the cutting and orienting step includes cutting the two ear portion webs (130, 140) to form pairs (150) and rotating each pair (150) 180 degrees.

8. The composite web (120) of any one of the preceding claims, wherein the first fastening material (108) is a discontinuous strip of material and the second fastening material (109) is a discontinuous strip of material.

9. The composite web (120) of claim **8**, wherein the first fastening material (108) and the second fastening material (109) are configured in offset relation with one another.

10. The composite web (120) of any one of the preceding claims, wherein at least one of the first fastening material (108) or the second fastening material (109) is situated adjacent a longitudinal side edge (126, 128).

11. The composite web (120) of any one of the preceding claims, wherein the first fastening material (108) is the same as the second fastening material (109).

12. The composite web (120) of any one of the preceding claims, wherein the third fastening material (110) is a discontinuous strip of material.

13. The composite web (120) of any one of the preceding claims, wherein the first fastening material (108) comprises discrete pieces being entirely located in the first longitudinally extending zone (132) and the second fastening material (109) comprises discrete pieces being entirely located in the second longitudinally extending zone (134).

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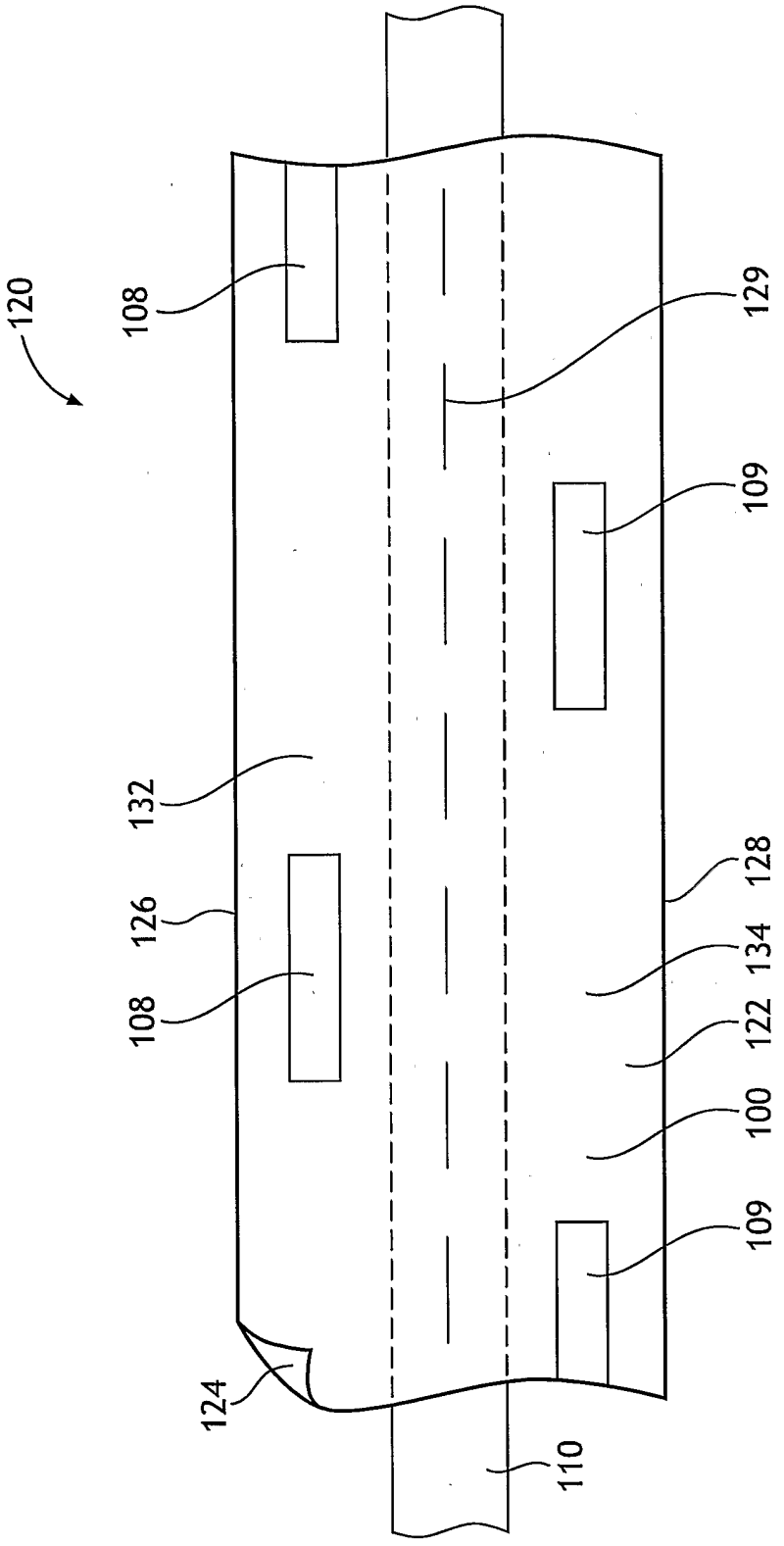


FIG. 1A

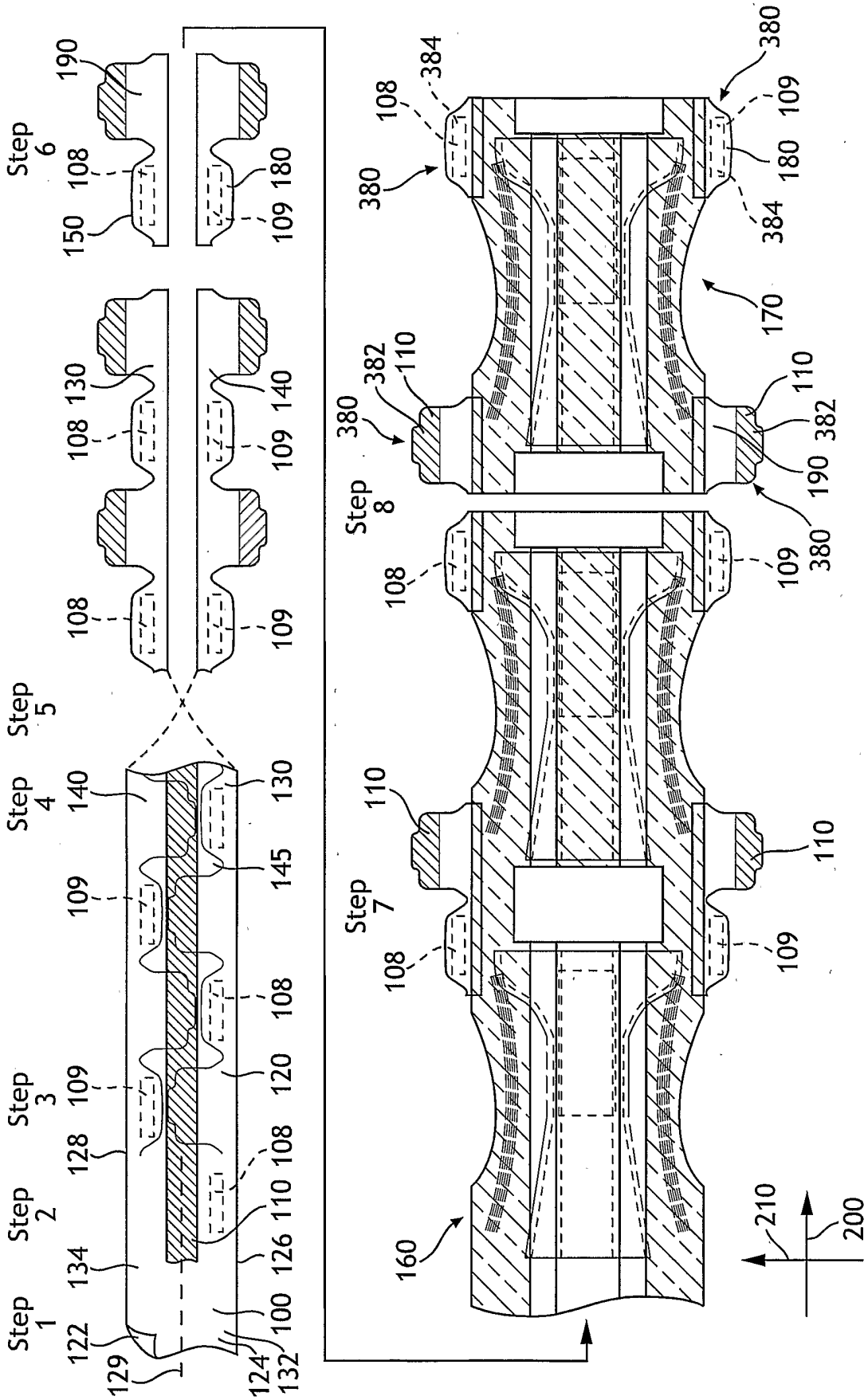

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FIG. 1B

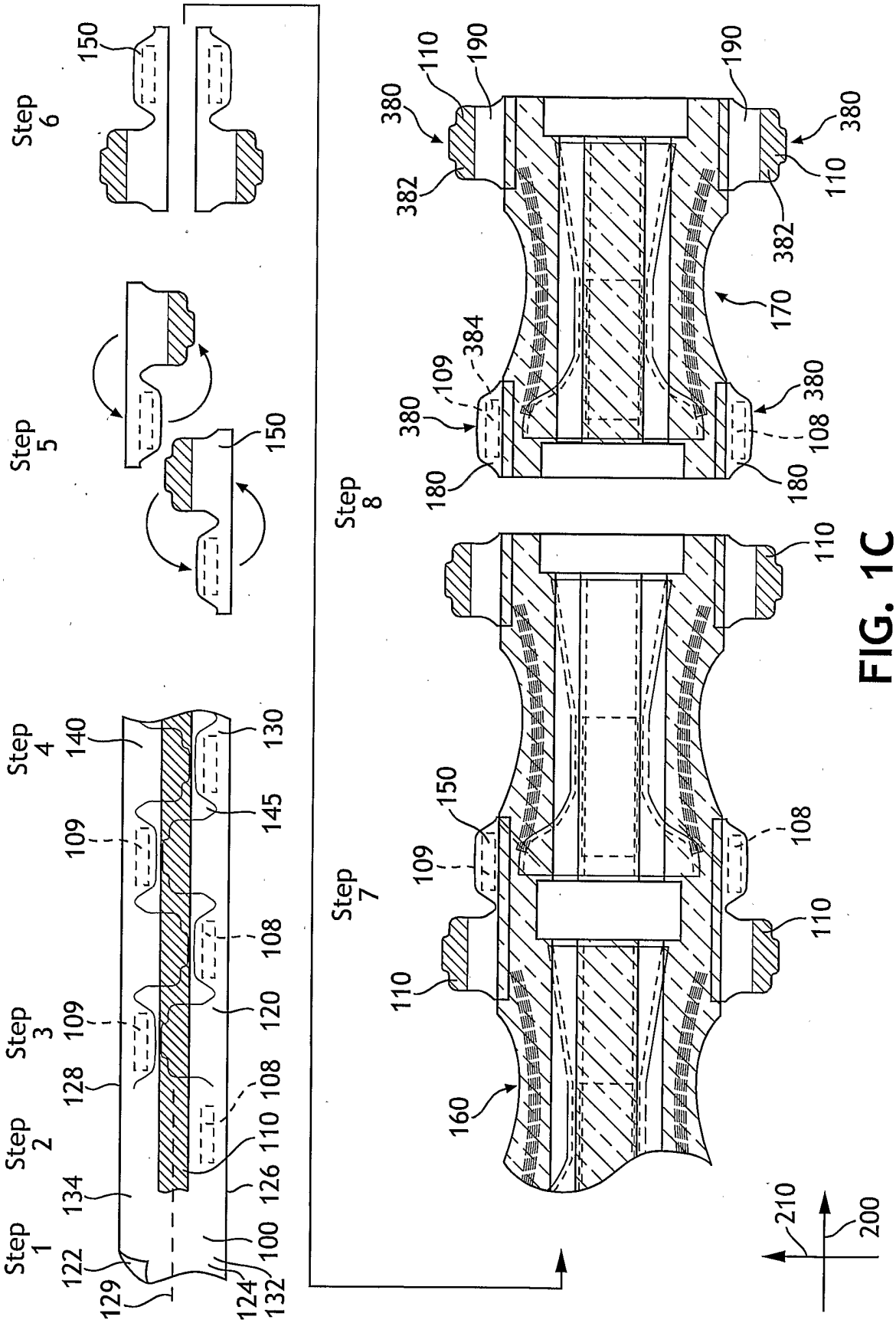

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FIG. 1C

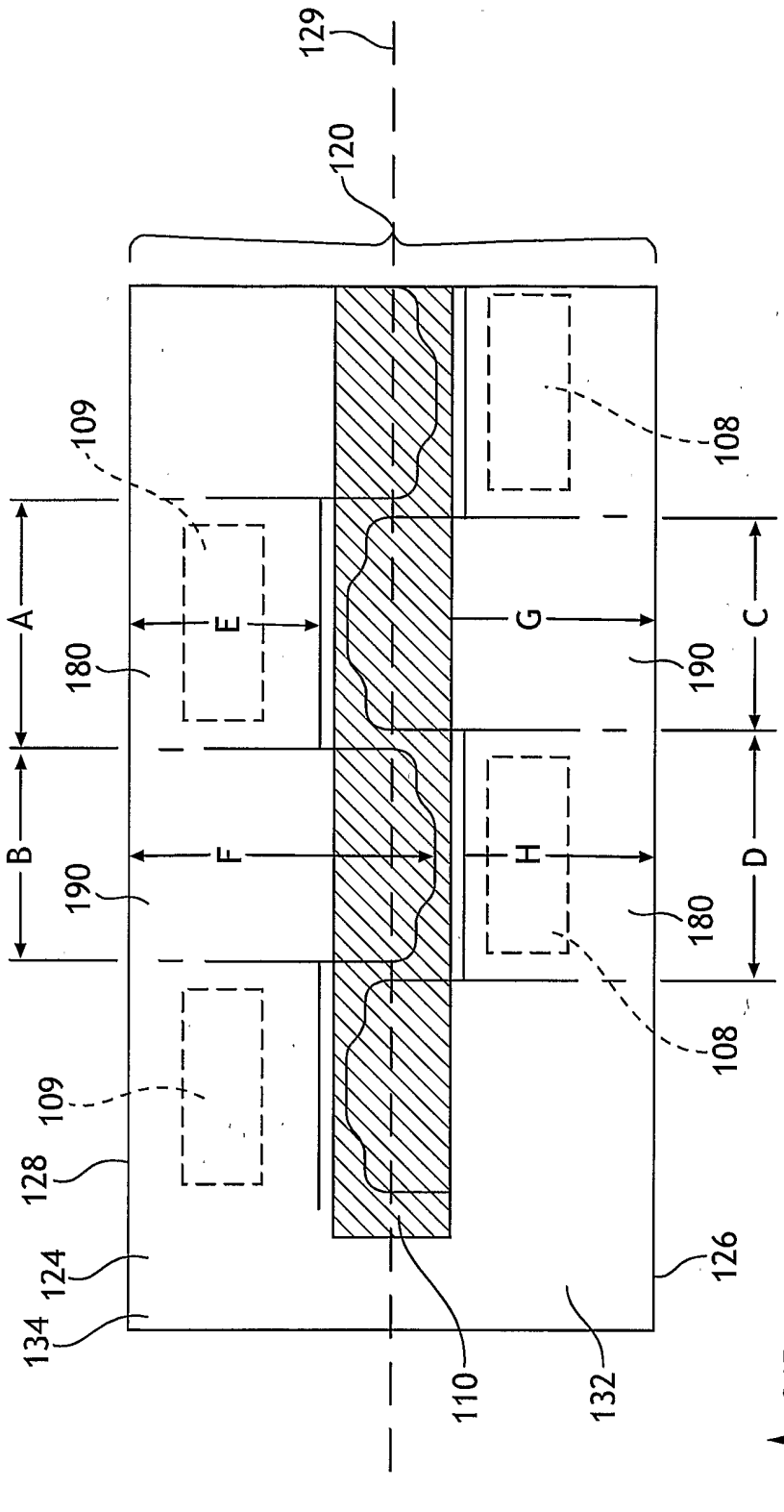

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FIG. 2

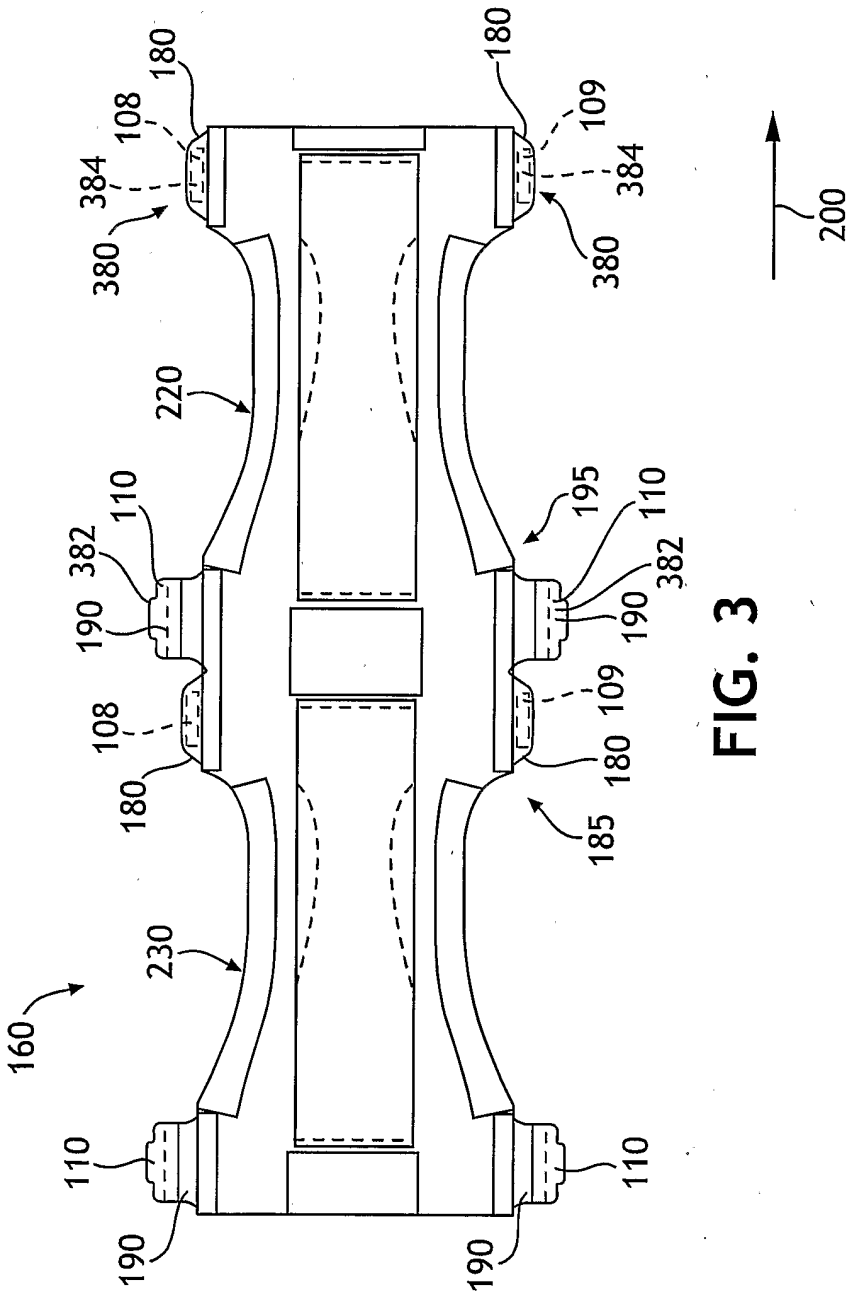

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FIG. 3

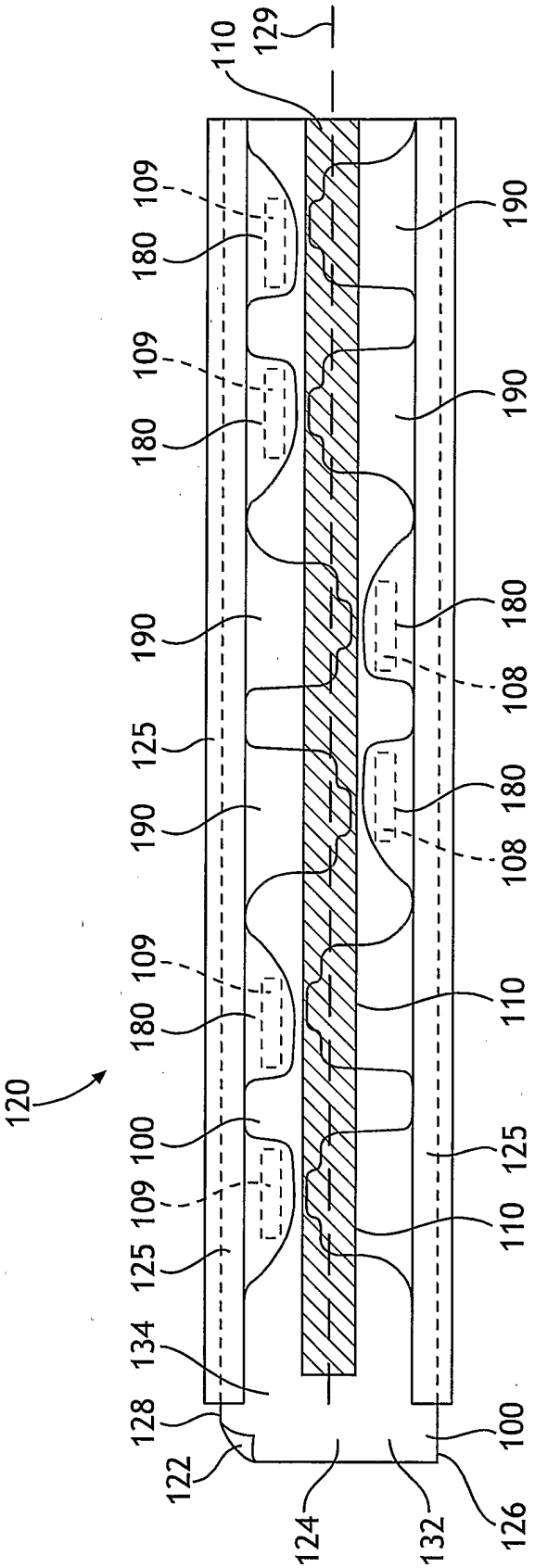


FIG. 4

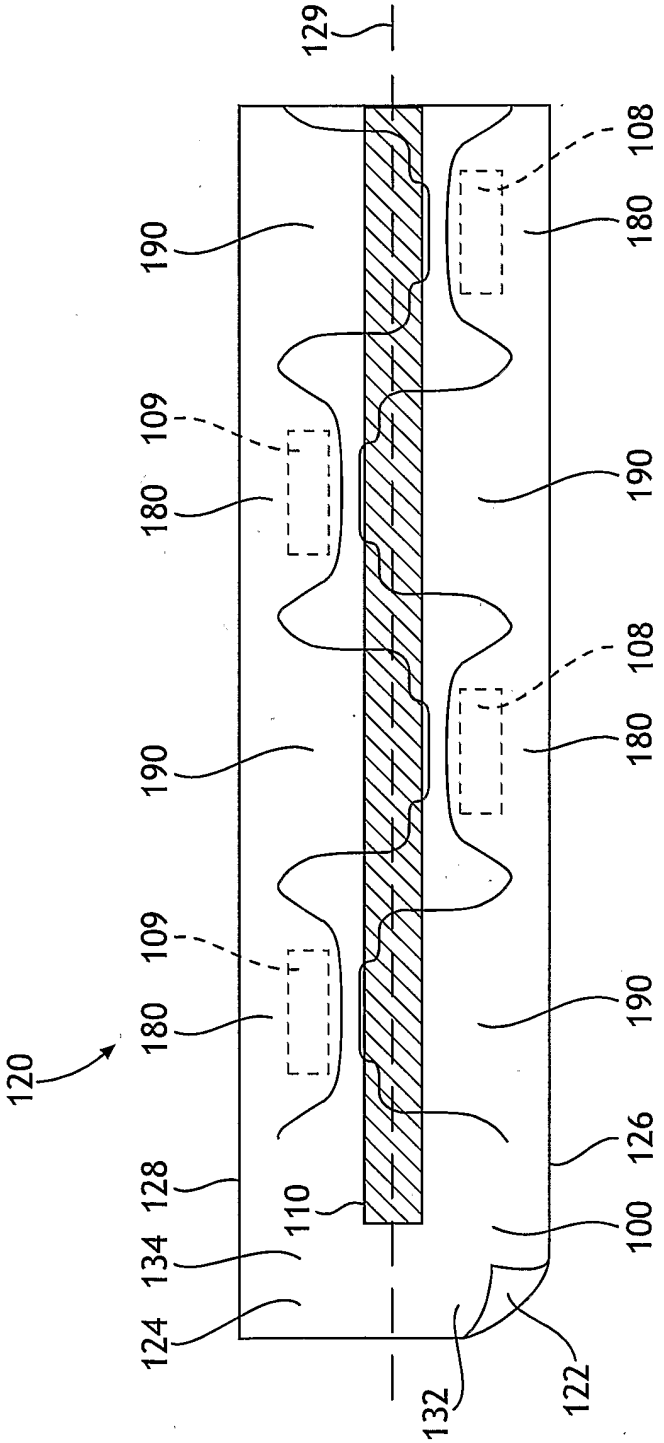

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FIG. 5

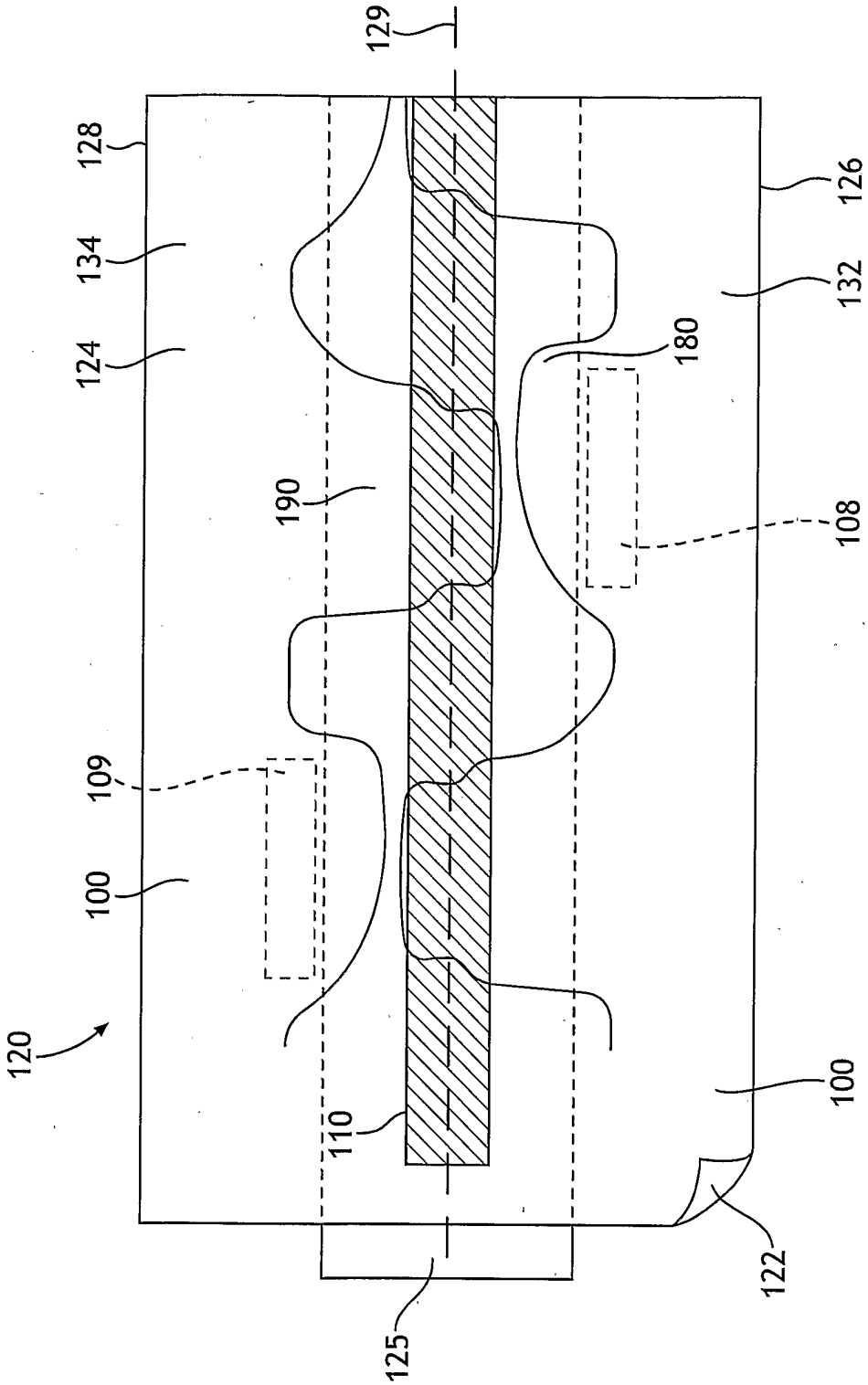


FIG. 6

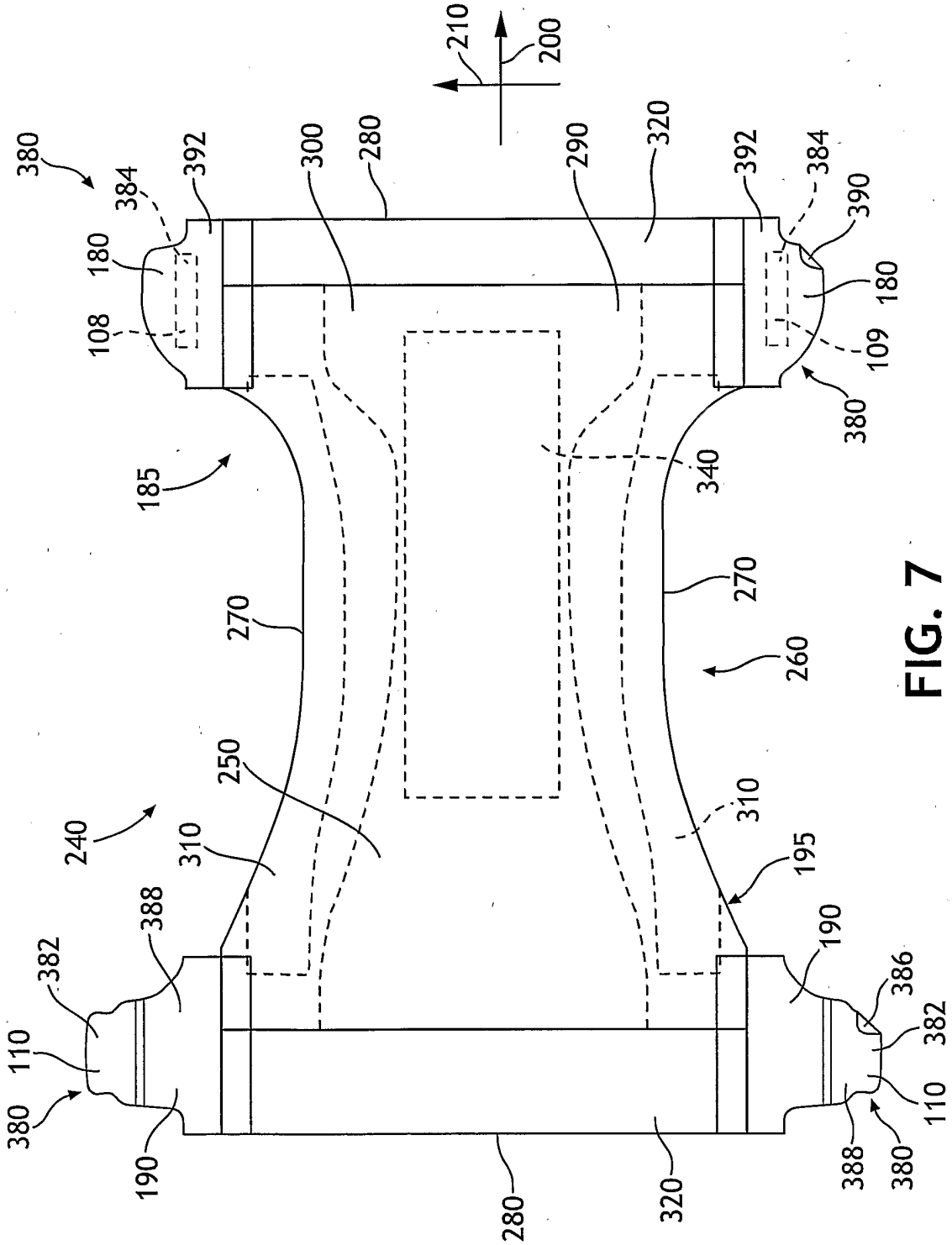

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FIG. 7

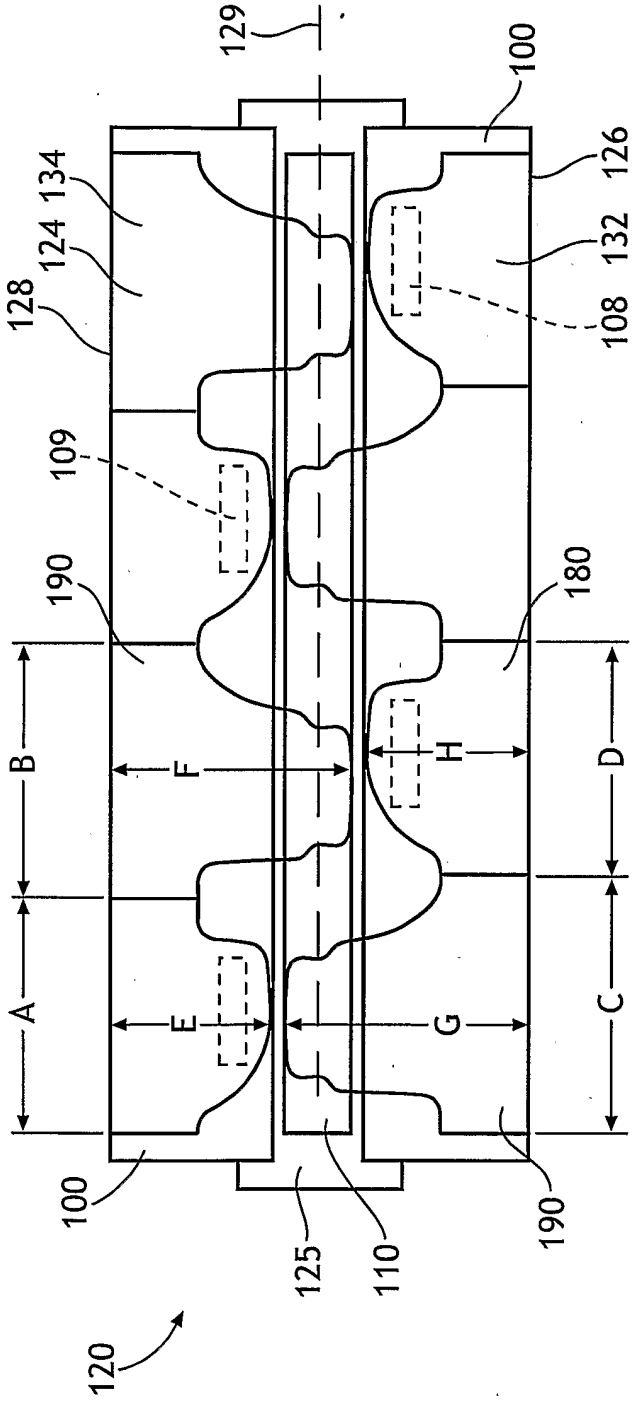

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FIG. 8

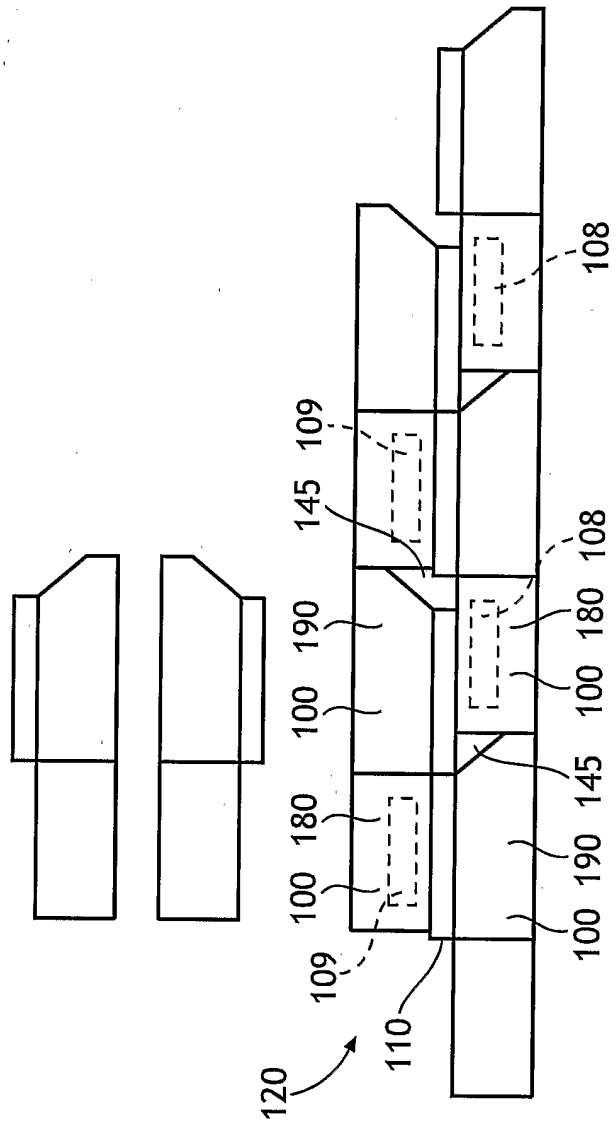


FIG. 9

INTERNATIONAL SEARCH REPORT

Int nal Application No
PCT/US2005/005532

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A61F13/15 A61F13/56

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)
IPC 7 A61F

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)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	US 5 705 013 A (NEASE ET AL) 6 January 1998 (1998-01-06) column 11, line 15 - line 54; figures 8,10,11	2-5
A	US 6 514 233 B1 (GLAUG FRANK S) 4 February 2003 (2003-02-04) abstract; figures	2-5
A	EP 1 350 498 A (SCA HYGIENE PRODUCTS AB) 8 October 2003 (2003-10-08)	
A	DE 94 22 298 U1 (KIMBERLY-CLARK WORLDWIDE, INC) 28 October 1999 (1999-10-28)	

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
2 June 2005	10/06/2005

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Mirza, A

INTERNATIONAL SEARCH REPORT

Information on patent family members

In onal Application No
PCT/US2005/005532

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