(54) Titre : ARTICLES ABSORBANTS PORTABLES EN DEUX PIECES
(54) Title: TWO-PIECE WEARABLE ABSORBENT ARTICLES

(57) Abrégé/Abstract:
A wearable absorbent article to be worn by a wearer about the lower torso, comprising: a chassis having a chassis longitudinal length and comprising a chassis front region, a chassis rear region, and a chassis lateral axis between front and rear regions and equally dividing the chassis longitudinal length, the chassis also comprising a first insert fastener component disposed thereon; a disposable absorbent insert having an insert longitudinal length and comprising an insert forward region, an insert rearward region, and an insert lateral axis between the forward and rearward regions and equally dividing the insert longitudinal length; the article characterized in that: the insert further comprises a pair of elasticized standing cuffs and a first insert indicium disposed thereon; the chassis is asymmetric across the chassis lateral axis, and the insert is asymmetric across the insert lateral axis; the chassis and the insert are adapted to function on or fit the wearer optimally with the insert forward region disposed proximate to the chassis front region, the insert rearward region disposed proximate to the chassis rear region, the chassis front region and insert forward region disposed proximate to a torso front region of the wearer's lower torso, and the chassis rear region and insert rearward region disposed proximate to a torso rear region of the wearer's lower torso; and the first insert indicium is adapted to provide information to a user concerning correct front-rear orientation of the insert with respect to the chassis or the wearer.
(54) Title: TWO-PIECE WEARABLE ABSORBENT ARTICLES

(57) Abstract: A wearable absorbent article to be worn by a wearer about the lower torso, comprising: a chassis having a chassis longitudinal length and comprising a chassis front region, a chassis rear region, and a chassis lateral axis between front and rear regions and equally dividing the chassis longitudinal length, the chassis also comprising a first insert fastener component disposed thereon; a disposable absorbent insert having an insert longitudinal length and comprising an insert forward region, an insert rearward region, and an insert lateral axis between the forward and rearward regions and equally dividing the insert longitudinal length; the article characterized in that: the insert further comprises a pair of elasticized standing cuffs and a first insert indicium disposed thereon; the chassis is asymmetric across the chassis lateral axis, and the insert is asymmetric across the insert lateral axis; the chassis and the insert are adapted to function on or fit the wearer optimally with the insert forward region disposed proximate to the chassis front region, the insert rearward region disposed proximate to the chassis rear region, the chassis front region and insert forward region disposed proximate to a torso front region of the wearer's lower torso, and the chassis rear region and insert rearward region disposed proximate to a torso rear region of the wearer's lower torso; and the first insert indicium is adapted to provide information to a user concerning correct front-rear orientation of the insert with respect to the chassis or the wearer.
— before the expiration of the time limit for amending the
claims and to be republished in the event of receipt of
amendments (Rule 48.2(h))
TWO-PIECE WEARABLE ABSORBENT ARTICLES

BACKGROUND OF THE INVENTION

It is likely that reusable diapers made of cloth have been in use since the invention of cloth. Reusable cloth diapers, however, have disadvantages relating to sanitation in handling and the need for effectively laundering and sanitizing soiled diapers for re-use.

The introduction of disposable diapers in relatively recent times has mitigated these disadvantages for many. Generally, upon removal from a wearer, a soiled disposable diaper need not be emptied, laundered or handled to any significant extent, but rather, may be discarded as is. Any soiled areas of the wearer’s body may then be cleaned, and a clean new disposable diaper may be placed on the wearer as necessary.

For economic reasons, currently most disposable diapers are made of substantial proportions of materials derived from petroleum, such as polypropylene and/or polyethylene. These materials often appear in the form of spun fibers forming cloth-like nonwoven web materials, or alternatively or in addition, films.

In recent years concerns have arisen concerning the “environmental footprint” of human activities of all kinds. The manufacture and use of diapers is no exception, particularly in view of the growing human population, i.e., the growing number of babies. One view seems to be that use of disposable diapers is detrimental to the environment because the materials of which they are typically made may be derived from non-renewable resources and require substantial amounts of energy in their manufacture. Additionally, because disposable diapers typically are not re-used or recycled, their use may be deemed by some to be unsatisfactorily taxing upon disposal facilities such as landfills. If the alternative is reusable cloth diapers, however, another view seems to be that the increased use of energy (e.g., for operating equipment, heating laundry water, and treating wastewater) and chemicals (e.g., detergents and water treatment agents), necessary for laundering soiled diapers at the rate they are typically used, and treating the associated wastewater, present their own set of stresses on the environment. As may be appreciated, analysis concerning which alternative is more “environmentally friendly” is complicated, and undisputed conclusions either way do not yet appear to exist.

Regardless of which alternative one may believe is more environmentally friendly, however, it appears that in developed nations, today’s disposable diapers are generally favored over reusable cloth diapers among caregivers of babies and young children. This is probably
attributable to the advantages of reducing or eliminating the unpleasantness, sanitary concerns, and extra work and/or expense associated with handling and laundering soiled reusable cloth diapers. Additionally, many types of disposable diapers currently available are believed superior to cloth diapers at conveying and storing urine away from the skin and/or protecting the skin with skin care compositions, thereby helping to avoid skin conditions such as diaper rash.

Manufacture of wholly disposable diapers is generally considered a capital-intensive business. This is a consequence of the complex machinery required to produce product from incoming material streams at economically-feasible production rates, which often exceed 450 or more articles per manufacturing line, per minute. Any innovation which has the potential to simplify the process or the equipment required, or reduce material costs, has the corresponding potential to reduce per-article costs for the manufacturer and the consumer.

In view of the concerns set forth above, it would be advantageous if a wearable absorbent article were available that provides advantages afforded by both disposable and reusable diapers, while reducing the respective disadvantages of these alternatives. It also would be advantageous if a construction were provided that could simplify manufacturing processes and/or reduce costs.

**BRIEF DESCRIPTION OF THE DRAWINGS**

Fig. 1 is a perspective view of a wearable absorbent article as it might appear being worn by a wearer about the lower torso;

Fig. 2A is a plan view of a chassis opened and laid flat, outer surface facing the viewer;

Fig. 2B is a plan view of a chassis opened and laid flat, inner surface facing the viewer;

Fig. 3 is a perspective view of a disposable absorbent insert shown apart from a chassis, as it might appear in a free-standing, relaxed state;

Fig. 4 is a plan view of a disposable absorbent insert shown stretched out and laid flat, body-facing surfaces facing the viewer;

Fig. 5A is a cross sectional view of an example of an insert such as shown in Fig. 4, taken at line 5A-5A in Fig. 4;

Fig. 5B is a cross sectional view of an example of an insert such as shown in Fig. 4, taken along line 5B-5B in Fig. 4;

Fig. 5C is a cross sectional view of another example of an insert such as shown in Fig. 4, taken along line 5C-5C in Fig. 4;

Fig. 5D is a cross sectional view of another example of an insert such as shown in Fig. 4, taken along line 5D-5D in Fig. 4;
Fig. 5E is a cross sectional view of another example of an insert such as shown in Fig. 4, taken along line 5E-5E in Fig. 4; and

Fig. 5F is a cross sectional view of another example of an insert such as shown in Fig. 4, taken along line 5F-5F in Fig. 4.

DETAILED DESCRIPTION OF THE INVENTION

Definitions

For purposes of this description, the following terms have the meanings set forth:

“Absorbent insert” means a component of a wearable absorbent article that is adapted to contain and/or absorb urine, feces, menses or any combination thereof, and is adapted to be installable and removable as a modular unit, from a chassis.

“Chassis” means a component of a wearable absorbent article that is adapted to be worn about the lower torso of a wearer, and is adapted to support an absorbent insert and hold the insert next to the wearer’s body.

“Disposable", when referring to an absorbent insert, means that the absorbent insert is not adapted or intended to be effectively sanitarily laundered in an ordinary household laundering process and ordinary household equipment, and thereby is ordinarily unsuitable for sanitary and effective reuse so as to provide as-new intended functions and performance, following soiling by exudates and removal from a chassis. By way of non-limiting examples, effective laundering may be frustrated or prevented, causing the insert to be disposable, by inclusion of materials and/or construction: that do not retain their substantial as-new physical shape or structure through ordinary household laundering and drying so as to be effective as-new in reuse; that absorb aqueous liquids and cannot be sufficiently dried/dehydrated in ordinary household drying equipment and ordinary drying cycles so as to be effective as-new in reuse; that dissolve or substantially degrade in ordinary household laundering or drying, causing the insert to be substantially damaged or rendered useless; and/or that cannot be effectively cleaned of exudate material through ordinary laundering, so as to be sanitary and otherwise acceptable for re-use.

“Fastener component” means any component of a system that effects removable fastening, attachment or holding of a first structure to a second structure. The system may have a single fastener component, for example, an adhesive patch on the first structure adapted to adhere to one or more types of surfaces on the second structure, or a hook, or patch of hooks on the first structure, adapted to catch on one or more types of surfaces on the second structure. By way of further example, any structure such as a pocket, strap, hook, buckle, etc. on a first structure
adapted to capture and retain, in whole or in part, the second structure, is a “fastener component” as used herein. The system also may comprise two or more fastener components, for example, respective components of a hook-and-loop fastening system (such as VELCRO), respective surfaces having a cohesive material applied thereto; male and female snap fastener components, a button and button hole, slot or loop, other fastenably cooperating elements, etc. Other examples of fastener components include zipper components, “zip lock” engaging components, loops, posts, pockets, bands or straps, microfasteners, macrofasteners, and fastener components such as described in U.S. Patents Nos. 6,936,039; 6,893,388; 6,669,618; 6,432,098; and 6,251,097, and U.S. Published Applications, Pub. Nos. 2005/0234419; 2005/0215971; 2005/0215970; 2005/0130821; 2004/0023771; 2003/0233082; 2003/0119641; 2003/0088220; and 2002/0169431.

“Lateral” (and forms thereof), with respect to a wearer, means along a direction generally transverse or across the direction extending from the front to the rear of the wearer, or vice versa. With respect to a component of a wearable absorbent article, “lateral” (and forms thereof), means along a direction generally transverse or across the direction extending along the component as it would be properly situated on a wearer, from the front to the rear of the wearer, or vice versa.

“Longitudinal” (and forms thereof), with respect to a wearer, means along a direction generally extending from the front to the rear of the wearer, or vice versa. With respect to a component of a wearable absorbent article, “longitudinal” (and forms thereof), means along a direction generally extending along the component as it would be properly situated on a wearer, from the front to the rear of the wearer, or vice versa.

“Reasusable”, when referring to a chassis, means a chassis that is adapted to permit removal of at least a first insert, and replacement thereof with at least a second insert, without substantial destruction of any components of the chassis that are necessary to provide the substantial as-new functionality of the chassis, and without the necessity of any repair or reconstruction following such insert replacement.

“Use,” with respect to a chassis, means one event of the wearing of the chassis until the time an absorbent insert is replaced.

“User” means a caregiver or other person who may apply a wearable absorbent article to a wearer. Where the wearer is capable of donning the wearable absorbent article him/herself, the wearer is also a “user”.

“Wearer” means a person who may wear a wearable absorbent article as described herein.
“Wearable absorbent article” means any article designed to be worn about the lower torso and to contain and/or absorb urine, feces, menses or any combination thereof. “Wearable absorbent article” includes but is not limited to baby or children’s diapers (of the “tape”-fastenable, otherwise fastenable, “pull-up” or any other variety), training pants and adult incontinence pants, briefs and the like.

**Two-Piece Wearable Absorbent Articles**

Fig. 1 depicts an example of a wearable absorbent article 10 having certain features, as it might appear while being worn by a wearer. Wearable absorbent article 10 may include and outer chassis 20, having front waist edge 21, rear waist edge 22, and a pair of leg opening edges 23.

Figs. 2A and 2B depict a chassis 20 as it may appear opened and laid flat. In Fig. 2A, the outer surfaces of chassis 20 face the viewer; in Fig. 2B, the inner surfaces of chassis 20 face the viewer. Front and rear waist edges 21, 22 are depicted at the top and bottom of the drawings, respectively. Chassis 20 may have crotch region 26, front region 27, rear region 28 and a pair of fastening ears 29 laterally extending from rear region 28. Chassis 20 will have a length from the forwardmost portion of front waist edge 21 to the rearwardmost portion of rear waist edge 22, and a chassis lateral axis 45 equally dividing this length. Thus, front region 27 is forward of chassis lateral axis 45, and rear region 28 is rearward of chassis lateral axis 45. Chassis 20 may have disposed thereon one or more insert fastener components such as front and rear insert fastener components 33, 32.

Fig. 3 depicts a disposable absorbent insert 50 that may form an inner component of the wearable absorbent article 10, shown in perspective view as it might appear in a free-standing, relaxed state, apart from chassis 20. Insert 50 may be designed to contain and/or absorb body exudates, and may be made of pliable materials as will be described further below. Insert 10 has forward region 54 and rearward region 55, and may include front fastener component 56 and rear fastener component 57. Insert 10 may include a body-facing liner or topsheet 51, outer liner or backsheet 52, and a pair of standing cuffs 53. Referring to Fig. 4, insert 50 will have a length from the forwardmost portion of forward region 54 to the rearwardmost portion of rearward region 55, and an insert lateral axis 70 equally dividing this length. Thus, forward region 54 is forward of insert lateral axis 70, and rearward region 55 is rearward of insert lateral axis 70.

Referring to Figs. 2B and 3, insert 50 may have rear fastener component 57 disposed thereon. Alternatively, or in addition, chassis 20 may have rear insert fastener component 32 disposed thereon. Similarly, insert 50 may have front fastener component 56 disposed thereon.
Alternatively, or in addition, chassis 20 may have front insert fastener component 32 disposed thereon. If a two-component fastening system is used, fastener component pairs 57, 32 and 56, 33 may be cooperating components that effect fastening therebetween when these respective components are brought together. Thus, in the example depicted, in order to install absorbent insert 50 into chassis 20, a user may lay chassis 20 flat, inner surface 25 facing up, stretch and orient insert 50 such that rear fastener component 57 faces rear insert fastener component 32 and front fastener component 56 faces front insert fastener component 33, and bring these respective fastener component pairs 57, 32 and 56, 33 together to effect fastening therebetween.

If it is desired that chassis 20 be reusable, for chassis 20 to remain substantially sanitary and useful (without requiring laundering or disposal) after removal and replacement of an insert, it may be desired that all parts of chassis 20 remain substantially unsoiled after an exudation of waste (especially fecal matter) by the wearer. Thus, it may be desired that when insert 50 is installed within a chassis 20, there is no non-removable portion or component of chassis 20 that lies over or covers a substantial portion of wearer-facing surfaces of insert 50 (expressed differently, no non-removable portion or component of chassis 20 is situated between a substantial portion of insert 50 and the wearer when the wearable absorbent article is worn), at least in the areas proximate to wearer body features that discharge exudates. Thus, it may be desired that chassis 20 include no non-removable cover sheet or the like that covers or contains substantial portions of wearer-facing surfaces of insert 50 within chassis 20, nor any overlying structures such as pockets, straps or flaps that substantially wrap or cover the insert proximate to exudate discharge points, or lie substantially between insert 50 and the wearer’s anus and/or genitals, when the wearable absorbent article is worn. If chassis 20 lacks such overlying structures, this may increase the likelihood that the wearer’s exudates will contact only insert 50, and not portions of chassis 20.

Referring to Figs. 1, 2A and 2B, it can be seen that wearable absorbent article 10 may be placed on a wearer by wrapping chassis 20 between the wearer’s legs and under the buttocks such that crotch region 26 is between the wearer’s legs, bringing front waist edge 21 and rear waist edge 22 into the positions approximately as shown in Fig. 1, and then securing fastening ears 29 to front region 27, thereby forming a pant-like garment about the wearer as suggested in Fig. 1. When insert 50 has been installed into chassis 20, insert 50 will then be disposed within chassis 20, next to the wearer, with the standing cuffs 53 oriented and extending longitudinally adjacent the inner portions of leg edges 23 (i.e., longitudinally between the wearer’s legs).
Examples of Possible Chassis Details

Fastening System

Referring to Figs. 2A and 2B, to enable fastening of fastening ears 29 to front region 27, fastening ears 29 may have chassis fastener components 30 disposed thereon. Alternatively, or in addition, front region 27 may have disposed thereon one or more receiving fastener components 31 disposed thereon. Fastener components 30, 31 may be selected so as to be cooperative to effect fastening of ears 29 to front region 27.

In one example, chassis fastener components 30 may include a patch of hooks, and receiving fastener component 31 may include a patch of loops. An example of a suitable hook-and-loop fastening system is a VELCRO system (a product of Velcro Industries B.V.) A hook-and-loop fastening system provides certain advantages. Because the respective hook and loop components are supplied in sheet form, they may be cut into suitably shaped patches that can be affixed to a cloth or nonwoven substrate by various mechanisms, including adhesive bonding, mechanical bonding, ultrasonic bonding, sewing, stitching, serging, edging, and the like. If patches of hooks or loops are affixed to fastening ears 29 to form chassis fastener components 30, as suggested by Fig. 2B, a laterally extended patch of cooperating hook or loop material can be affixed to chassis front region 27 to form a receiving fastener component 31, as suggested by Fig. 2A. By providing for fastening of ears 29 to front region 27 at laterally varying locations thereon, this arrangement provides for easy and simple adjustability of waist opening size of the wearable absorbent article.

In another example, as noted above, the chassis fastening system may include other types of fastener components. To provide for waist opening size adjustability, fastening components disposed on fastening ears 29 that cooperate with extended surfaces or multiple cooperating fastening components disposed on front region 27 may be used. Receiving fastening elements may be multiply disposed on front region 27 in laterally arranged, varying locations, allowing for fastenability of respective ears 29 to front region 27 at laterally varying locations.

Referring to Fig. 2B, chassis 20 also may have one or more respective fastener protectors 39 disposed thereon. This feature may prevent fastening elements having features likely to randomly and unintentionally engage and catch on portions of the chassis, or other articles, during storage, carrying, laundering and similar/related activities, from doing so, thereby avoiding potential bunching, entangling and/or damage to either chassis 20 or other articles during such activities. For example, if fastening components 30 are patches of hooks, appropriately placed fastener protectors 39 may include patches of corresponding loops. This
can enable the user to holdably fold over the portions of ears 29 that include hook components, thereby sheathing them and preventing them from snagging other articles when chassis 20 is not being worn.

**Materials**

Chassis 20 and/or layers or portions thereof may be made of any knitted, woven or nonwoven textile or textile-like material that is appropriately compatible with skin of the intended wearer(s). Chassis 20 may be constructed of durable and/or semi-durable materials. Generally, only for purposes of reference in this description, “durable” refers to a woven or knitted textile material of any kind that may be used as a component of a washable clothing article; and “semi-durable” refers to a nonwoven material or laminate thereof that when used as a chassis material can withstand more than one use with an insert without losing its structural integrity to an extent that renders it unserviceable. Thus, chassis 20 may be constructed of materials and construction that make it reusable and/or washable.

Durable materials of which chassis 20 may be constructed may include any natural or synthetic textile materials known in the diaper, pant, underwear, performance clothing, sport clothing, or general clothing or textile arts. Durable materials may include woven or knitted textiles made of natural fibers such as cotton, linen, wool, bamboo, hemp, silk, rayon, and the like, as well as blends of any of these fibers with any other(s), or with synthetic fibers. Examples of synthetic fibers suitable for use as components of durable materials include polyester, nylon, spandex and/or other elastomer fibers. Durable chassis materials also may include breathable water repellent materials such as GORE-TEX (a product of W. L. Gore & Associates, Inc., Elkton, MD), fabrics comprising microencapsulated phase-change polymer materials such as OUTLAST COMFORTTEMP fabrics (products of Outlast Technologies, Boulder, CO – see U.S. Patent Nos. 6,514,362 and US 6,207,738, for example), COOLMAX (a product of Invista, Wichita, KS), and the like.

Suitable durable materials may be formed in any weave or knit fabric form, including birdseye fabric, terry, fleece, flannel, knits, stretch knits, sherpa, suedecloth, microfleece, satin, velour, Burley knits, etc. Suitable examples include POLARTECH POWER DRY, POWER STRETCH and WIND PRO (products of Polartec, LLC, Lawrence, MA). Knitted textiles, which may be more inherently stretchable and elastic than woven or nonwoven materials, may impart better fit, comfort and/or appearance to the chassis. Incorporation of fibers of spandex or other elastomer also may also enhance stretchability and elasticity, and thereby impart better fit, comfort and/or appearance to the chassis, than textiles not including such elastomeric fibers.
Specific suitable examples for durable chassis materials include jersey knits of blends of: rayon (93%) and spandex (7%) fibers; modal (94%) and spandex (6%) fibers; cotton and spandex fibers; and bamboo and spandex fibers. Materials that have stretch capability of equal to or greater than about 2X may be desired. Suitable examples of materials may have basis weights of about 0.09-0.15 gram/in.² per layer, or other basis weights.

Durable chassis materials may be selected to impart desired comfort, appearance and performance to chassis 20. In some circumstances it may be desired to select durable chassis materials which are sufficiently inexpensive to allow for disposal, if soiled extensively or damaged, with minimized issues of cost or conscience.

Semi-durable chassis materials may include any natural or synthetic nonwoven web and/or film materials known in the diaper or pant arts. Semi-durable materials of which chassis 20 may be constructed may include non-woven web materials of polypropylene and/or polyethylene fibers, polyester fibers, and any other synthetic fibers used to form nonwoven web materials used as components of disposable diapers, and blends thereof. Natural fibers such as cotton, linen, wool, bamboo, hemp, silk, rayon, and the like may be blended with synthetic fibers to form such a nonwoven web suitable as a component layer of chassis 20.

Non-limiting examples of fibers, nonwovens and laminates of nonwovens and films that might be considered for use as semi-durable chassis materials may be found in U.S. Patents Nos. 7,223,818; 7,211,531; 7,060,149; 6,964,720; 6,905,987; 6,890,872; 6,884,494; 6,878,647; and 5,518,801; and U.S. Published Applications Nos. 2008/0319407; 2008/0045917; 2007/0293111; 2007/0287983; 2007/0287348; 2007/0249254; 2007/0203301; and 2005/0164587.

Semi-durable chassis materials also may be selected to impart desired comfort, appearance and performance to chassis 20. In some circumstances it also may be desired to select semi-durable chassis materials which are sufficiently inexpensive to allow for disposal, if soiled extensively or damaged, with minimized issues of cost or conscience.

The chassis also, or additionally, may include a laminated or substantially separate film layer, which may be elastic, to provide enhanced liquid penetration resistance and/or elastic properties. Elastic properties also can be added or enhanced via the addition of other materials to the chassis in layer, band or strip fashion, including elastic strands, bands, scrim, and the like. A film layer may be laminated with a durable material or semi-durable material. A film layer may include an elastomer based on KRATON (a product of Kraton Polymers U.S., LLC, Houston, Texas), or by way of further example, VISTAMAXX available from ExxonMobil Chemical Company, Houston, TX; FLEXAIRE, EXTRAFLEx or FABRIFLEX (products of Tredgar
Film Products Corporation, Richmond, VA), and various latex-free elastomeric sheets available from Fulflex Elastomers Worldwide (Greenville, TN).

Inclusion of an elastomeric material, either as a fibrous component of a cloth or nonwoven layer, or as a film layer, provides for improved stretchability and elasticity where it may be deemed useful to accommodate the wearer’s anatomy and movements, such as over the wearer’s buttocks and/or around the waist areas, and improved fit and comfort. Additionally, where a film layer may be included, it may impart additional liquid containment capability to the chassis. A film layer may include a film that is substantially liquid impermeable, but vapor permeable, so as to provide breathability and reduce humidity within the chassis while it is being worn, reducing chances for overhydration of the skin where liquid containment capability is desired.

Referring to Fig. 2A, in one example outer surface 24 may be formed by a first layer of a durable or semi-durable material. The material selected may include fibers having hydrophobic properties, providing enhanced liquid containment attributes to such first layer. In another example, however, it may be desirable in some circumstances for the selected material to include hydrophilic fibers, or fibers treated to be hydrophilic, so as will cause the material to more readily absorb and/or transmit liquid therethrough. This may serve to provide supplemental absorbency within the chassis for the event in which liquid exudates escape the insert, or to provide one way of communicating to the user that liquid exudates have escaped the insert. Additionally, in some circumstances it may be desirable that the material selected have soft tactile properties so as to have a pleasant feel that the user and/or wearer find attractive. The material also may be selected so as to have a desired appearance, including but not limited to coloration, sheen, texture, etc.

Referring to Fig. 2B, in another example inner surfaces 25 may be formed by a second layer of a durable or semi-durable material. The material selected may include fibers having hydrophobic properties, providing enhanced liquid containment attributes to the second layer. In another example, however, it may be desirable in some circumstances for the selected material to include hydrophilic fibers, or fibers treated to be hydrophilic, so as will cause the material to more readily absorb and/or transmit liquid therethrough. This may serve to provide supplemental absorbency within the chassis for an event in which liquid exudates escape the insert, to provide one way of communicating to the user that liquid exudates have escaped the insert and/or to provide a layer that tends to draw moisture away from the skin, for a drier, more comfortable feel. Additionally, in some circumstances it may be desirable that the material selected have soft
tactile properties so as to have a pleasant feel against the skin, particularly in areas where no portion of an insert is expected to be present between the chassis and the wearer’s skin. In another example, the second layer of material may be formed of a textile material having enhanced elasticity, such as by inclusion of fibers of an elastomeric material (such as spandex). In another example, an intermediate film layer may be included, laminated or not laminated with another layer.

Forming the chassis 20 of more than one layer, for example, two, or more, layers, as described above, may provide various benefits. A second layer (and any additional layers) may provide supplemental tensile strength in both the lateral and longitudinal directions across the chassis 20. Additionally, a first layer may be selected for a first set of properties, and a second layer may be selected for a second set of properties. For example, material forming a first layer may be selected for having comparatively greater elasticity and a particular texture, color and/or other appearance-related properties, and material forming a second layer may be selected for having comparatively greater hydrophobicity and/or softness to the skin for purposes of an inner layer, the two layers in combination imparting a combination of desirable attributes to the chassis. Additionally, a plurality of layers may better serve to conceal bumps, corners, seams or other features of an insert, as compared with a single layer, for a smoother, more attractive appearance.

In addition to forming differing layers of differing materials, it may be desirable to form a single layer of differing materials, for example, differing materials in the respective front, crotch and/or rear regions of the chassis. Such differing materials may be joined at a seam such as inner seam 40 and/or outer seam 41. For example, the material predominately forming the inner surface of rear region 28 may be selected primarily for its elasticity features, which may better serve to provide snug fit about wearer body contours and accommodate wearer movement (i.e., about the buttocks and hips). By comparison, the material predominately forming the inner surface of front region 27 and/or crotch region 26 might be selected primarily for its hydrophobicity features, which may better serve to contain liquid exudates.

Layers or other elements of the chassis may be joined to each other via any suitable mechanism, including, for example, adhesives, mechanical bonding, ultrasonic bonding, sewing, stitching, serging, edging, and the like.

Elasticized Waistbands, Leg Bands

Referring again to Figs. 1, 2A and 2B, front waist band portion 34, rear waist band portion 35, and leg band portions 36 are depicted. One or more of these band portions 34, 35, 36
may be formed of one or more strands or strips of an elastomeric polymer material such as spandex, enveloped by a nonwoven or textile material, which may include the edges of the material forming the inner and/or outer layers of chassis 20, to form and elasticize the respective band portions. The elastic material may be affixed to or within a chassis layer in a strained condition, or at zero applied strain. Textile material(s) enveloping the elastic strand(s) or strip(s) may be sewn around elastic strand(s) or strip(s) to hold them in place within the respective band portions. If the elastic material is strained prior to, and while, being enveloped and affixed to form these band portions during the manufacturing process, upon relaxation the enveloping material and adjacent chassis material may be caused to gather and form ruffles 37 thereafter, which constitute gathered chassis material. This can serve to promote snug fit, wearer comfort and appearance. The band portion may be disposed along the edge of the chassis, and in some circumstances it may be desired to have the band portion situated along substantially the entire length of the leg and/or waist openings so as to form bands that substantially or completely encircle the wearer's legs and/or waist while chassis 20 is worn. The gathered material within ruffles 37 can serve to accommodate linear stretching of waist band portions 34, 35 and leg band portions 36. This arrangement including elasticized leg band portions 36 as described, not only may provide for better fit about the wearer's legs, but also may enable the chassis 20, when formed of appropriately sized and shaped material, to form a pouch-like structure 75 in the crotch region (see Fig. 1) when worn, which may serve to provide space within the chassis to accommodate the insert 50 (Fig. 3) and help hold it in place within chassis 20, in a substantially laterally centered position within the crotch region. This may be deemed advantageous in examples in which an insert 50 is attached within chassis 20 by fastener components only located proximate to the respective ends of insert 50, and not at any longitudinally intermediate locations, as described further below. Additionally, the snug fit provided by such elasticized leg band portions 36 may serve to enhance containment capability of the wearable absorbent article.

One or more of waist band portions 34, 35 and leg band portions 36 may be elasticized in the manner described above, or by other mechanisms. For example, elasticized band/strip material such as that used to form elastic waistbands and legbands of conventional cloth underwear and briefs may be separately produced, and affixed to the materials forming chassis 20 in any suitable manner, during the manufacture thereof.

In another example, one or more of waist band portions 34, 35 and leg band portions 36 may be formed of elastic material simply affixed about the leg opening and/or waist opening edges by use of adhesive and/or compression bonding. In another example, an elastic strip
material may formed by affixing a plurality of strained elastomeric strands or strips to one or more strips of unstrained nonwoven web material, or film. When the resulting elastic strip material is allowed to relax, the unstrained material forms transverse rugosities that comprise gathered unstrained material, which will accommodate stretching of the elastic strip material. By affixing the elastic strip material thereabout, the elastic strip material may be used to form one or more of waist band portions 34, 35 and/or leg band portions 36.

**Anchoring Bands**

Chassis 20 also may include an anchoring supplement such as anchoring band 38 disposed on or in the chassis rear region 28 as indicated in Figs. 2A, 2B. As suggested in Figs. 2A and 2B, anchoring band 38 may be affixed along a layer, or disposed between layers, forming inner surfaces 25 and outer surfaces 24 of chassis 20. Anchoring band 38 may include an elastomeric or elasticized strip or band of material, affixed to chassis 20 at locations proximate to its rearward corners or proximate to fastening ears 29. Thus, anchoring band 38 may be partially or substantially force-decoupled along its lateral length from the layer(s) forming the inner and outer surfaces of chassis 20, via attachment to the chassis only by the ends of anchoring band 38, or only at a limited number of selected intermediate lateral locations along anchoring band 38. For example, anchoring band 38 might be attached to chassis 20 only at the ends of anchoring band 38. In another example, anchoring band 38 might be attached to chassis 20 only at the ends and at the lateral center of anchoring band 38. This substantially force-decoupled arrangement allows anchoring band 38 and surrounding portions of chassis 20 to stretch and move substantially independently of one another, which may promote better fit and comfort. In another example, however, anchoring band 38 may be an elastic band, strip or strap laminated with or otherwise affixed to a layer of stretchable material forming either of or both the inner and outer surfaces of the chassis, along substantially the entire length of anchoring band 38.

When strained laterally by application to the wearer, anchoring band 38 may serve to provide, or supplement, lateral tensile forces in the article about the wearer's waist, thereby tending to draw the waist opening snug, enhancing fit and enhancing securement of the wearable absorbent article about the wearer's waist. The elastic modulus of the anchoring band may be higher than the elastic modulus of the surrounding, adjacent, or coextensive chassis materials.

An anchoring band, or system of one or more anchoring band members, may have any additional features described in, for example, co-pending U.S. Publication Nos. 2008-0004591; 2008-0188822; 2008-0125739; 2008-0004593; 2008-0004592; 2008-0004586; 2008-0004587; 2008-0004590; 2008-0004582; 2008-0004583; 2008-0004584; and 2007-0287983; 2008-
In another example, instead of, or in addition to, being oriented substantially laterally as suggested by the depicted location of anchoring band 38 in Figs. 2A and 2B, one or more members forming anchoring bands may be oriented diagonally between the longitudinal and lateral directions. For example, as suggested in Fig. 2A, a pair of diagonal anchoring bands 38a may have respective waist ends thereof affixed at a location area proximate to corners of the chassis and/or fastening ears 29, and respectively extend toward both the lateral and longitudinal center of chassis 20, as suggested in Fig. 2A. The respective center ends of bands 38a may be affixed to the chassis at locations proximate the lateral center of the chassis as suggested in Fig. 2A, and bands 38a may be either force-decoupled or force-coupled to the chassis along the lengths of bands 38a, as described above. In an example wherein an insert is connected to an anchoring band for additional longitudinal support as described further below, diagonal anchor bands such as diagonal anchor bands 38a may serve to provide supplementary longitudinal tension along chassis 29, providing supplemental longitudinal support therewithin.

**Chassis Asymmetry**

In order to enhance and/or maximize fit, wearer comfort and appearance of the chassis 20, it may be desirable to fashion chassis 20 so as to accommodate anatomical contours and body movements of the intended wearer. For example, as suggested by Figs. 2 A and 2B, chassis 20 may have differing shape and/or greater material surface area in the rear region 28 than in the front region 27. Differing shape and/or greater material surface area in the rear region may serve to better cover the buttocks through movements of the wearer (including sitting and/or bending forward at the hips), while lesser material surface area in the front region may serve to avoid material bunching and/or an ill-fitting appearance, particularly when the wearer is in positions including sitting and/or bending forward at the hips. As a result, the chassis may be asymmetric in shape or surface area across chassis lateral axis 45.

For purposes of this description, when used with respect to a chassis, "asymmetric" and "asymmetry" mean that features, geometry (e.g., shape), materials and/or construction on one side of chassis lateral axis 45 differ substantially in some respect from those on the other side of chassis lateral axis 45. Such asymmetric construction results from having various features of chassis 20 designed to accommodate the body features and functions of the intended wearer as they differ front-to-rear, to enhance containment/absorbency performance, comfort, fit and/or
appearance of the wearable absorbent article, and/or to economize on use of materials.

"Asymmetric" and "asymmetry" do not refer to differences across the chassis lateral axis that are attributable to features that may be included on a chassis only for purposes of: purely cosmetic coloration or surface decoration; fastening an insert (such as fastener components described herein); bundling, folding, storing or carrying the chassis; indicia for orienting an insert within a chassis or vice versa (such as orientation indicia described herein), or for other purposes substantially unrelated to the body features and functions of the intended wearer as they differ front-to-rear, to affect performance, comfort, fit and/or physical appearance of the wearable absorbent article, and/or to economize on use of materials.

Other asymmetries across chassis lateral axis 45 may be present as well. For example, as suggested by Figs. 2A and 2B, relatively localized chassis fastener components 30 may be respectively disposed on fastening ears 29, while a relatively laterally extended receiving fastener component 31 may be disposed on chassis front region 27, for purposes of waist opening adjustability as explained above. Fastening ears 29 may form lateral extensions from rear region 28 that are not present in kind on front region 27. These are examples of differences that create functional and structural asymmetries of the chassis across chassis lateral axis 45. Because an absorbent article of the type described herein is usually changed while the wearer is substantially facing the user, such arrangement enhances user convenience by locating these fastening and waist opening adjustability features at the wearer's front abdominal region, facing the user.

In another example of asymmetry, materials of differing composition, construction and/or properties may predominately form forward region 27 as compared with rearward region 28. For example, the material(s) forming rear region 28 may be selected for enhanced stretch/elastic properties, as compared with material(s) forming front region 27. In this example, material(s) with enhanced stretch/elastic properties may serve to better accommodate, stretch and contract over contours of the buttocks, and accommodate body movements such as sitting and bending forward at the hips, thereby providing better coverage and fit.

In still another example of asymmetry, chassis 20 may have structures such as elastic bands, anchor bands and/or other members which differ between front region 27 and rear region 28.

It will be appreciated, therefore, that chassis asymmetry across chassis lateral axis 45 is a result of design and construction of the chassis so as to have only one front region and only one rear region, i.e., the front and rear regions are not interchangeable, if the fit, comfort, performance and appearance of chassis 20 are to be optimal.
Examples of Possible Absorbent Insert Details

Examples of features of an absorbent insert 50 will be described with reference to Figs. 3, 4 and 5A-F.

As noted above, Fig. 3 depicts a disposable absorbent insert 50 that may form an inner component of a wearable absorbent article as described herein, shown in perspective view as it might appear in a free-standing, relaxed state, apart from a chassis. Fig. 4 depicts an example of an insert 50 shown stretched out and laid flat (against elastic-induced contraction to a position similar to that shown in Fig. 3), body-facing surfaces facing the viewer. Figs. 5A-5F depict cross sections of an insert 50 as indicated in Fig. 4, in various possible examples.

Insert 50 may have a topsheet 51 and backsheet 52 forming an envelope-like enclosure for absorbent core materials such as those described further below. Topsheet 51 and backsheet 52 may be affixed together along longitudinal seams 64, and along lateral seams 69. Insert 50 also may have longitudinal standing cuffs 53 affixed therealong.

Topsheet

Topsheet 51 may be formed of a liquid-permeable nonwoven web material. It may be desired that material forming topsheet 51 is compliant, soft-feeling, and non-irritating to the wearer's skin. It may be desired that at least a portion of topsheet 51 may be liquid pervious, permitting liquids to readily penetrate through its thickness. A suitable topsheet may be manufactured from a wide range of materials, such as porous foams, reticulated foams, apertured plastic films, or woven or nonwoven materials of natural fibers (e.g., wood or cotton fibers), synthetic fibers (e.g., polyester or polypropylene fibers), or a combination of natural and synthetic fibers. If topsheet 51 includes fibers, the fibers may be spunbond, carded, wet-laid, meltblown, hydroentangled, or otherwise processed as is known in the art.

One suitable material comprising a nonwoven web of staple-length polypropylene fibers is manufactured by Veratec, Inc., a Division of International Paper Company, of Walpole, MA under the designation P-8. Additional suitable materials comprising formed films are described in U.S. Patents Nos. 3,929,135; 4,324,246; 4,342,314; 4,463,045; and 5,006,394. Other suitable topsheets 30 may be made in accordance with U.S. Patents Nos. 4,609,518 and 4,629,643. Suitable examples of formed and/or apertured films may include products produced by The Procter & Gamble Company of Cincinnati, Ohio as DRI-WEAVETM, and by Tredegar Corporation, based in Richmond, VA, as FRESHFEELTM. Suitable topsheet materials also may include laminates of films and nonwoven webs produced by Tredegar as COMFORTFEELTM, COMFORTQUILT™, SOFTQUILT™ and COMFORTAIRE™.
In some circumstances it may be desired that at least a portion of topsheet 51 is made of a hydrophobic material or is treated to be hydrophobic in order to isolate the wearer's skin from liquids contained in absorbent core 71. If topsheet 51 is generally made of a hydrophobic material, it may be desired that at least a portion of the upper surface of topsheet 51 is treated to be hydrophilic so that liquids will transfer through the topsheet more rapidly. Topsheet 51 can be rendered hydrophilic by treating it with a surfactant or by incorporating a surfactant into the topsheet. Suitable methods for treating topsheet 51 with a surfactant include spraying the topsheet material with the surfactant and/or immersing the material into the surfactant. A more detailed discussion of such a treatment and hydrophilicity is contained in U.S. Patents Nos. 4,988,344 and 4,988,345. A more detailed discussion of some suitable methods for incorporating a surfactant in the topsheet can be found in U.S. Statutory Invention Registration No. H1670. In another example, however, topsheet 51 may include an apertured web or film which is hydrophobic. This may be accomplished by foregoing the hydrophilizing treatment step from the production process and/or applying a hydrophobic treatment to the topsheet material, such as a polytetrafluoroethylene compound like SCOTCHGUARD™ or a hydrophobic lotion composition, as described below. In such examples, it may be desired that the apertures be large enough to allow the penetration of aqueous fluids like urine without significant resistance otherwise attributable to hydrophobicity.

Any portion of topsheet 51 may be coated with a lotion as is known in the art. Examples of suitable lotions include those described in U.S. Patents Nos. 5,607,760; 5,609,587; 5,635,191; 5,643,588; 5,968,025 and 6,716,441. The lotion may function alone or in combination with another agent as the hydrophobizing treatment described above.

Topsheet 51 may also include or be treated with antibacterial agents, some examples of which are disclosed in U.S. Statutory Invention Registration H1732.

Topsheet 51, backsheet 52 or any portion of the topsheet or backsheet may be embossed and/or matte finished to provide a more cloth-like appearance.

Topsheet 51 may be fully or partially elasticized or may be foreshortened so as to provide a void space between topsheet 51 and core 71. Exemplary structures including elasticized or foreshortened topsheets are described in more detail in U.S. Patents Nos. 4,892,536; 4,990,147; 5,037,416; and 5,269,775.
Backsheet

Backsheet 52 is generally that outer liner portion of insert 50 forming the garment-facing surface thereof, and prevents the exudates absorbed and contained within insert 50 from wicking through and soiling the chassis. In some circumstances it may be desired that backsheet 52 is substantially impervious to liquids.

Backsheet 52 may be formed of a film, a nonwoven, or a laminate of a film and a nonwoven. Backsheet 52 may be formed of a substantially liquid-impermeable laminate or composite of film and non-woven web. Backsheet 52 may be formed of a substantially liquid impermeable nonwoven web, or laminate of nonwoven web and substantially liquid impermeable film, so as to contain and isolate liquid exudates from the chassis, outer clothing and/or environment of the wearer. At the same time, backsheet 52 may be vapor permeable to provide for breathability of the insert and the wearable absorbent article, reducing humidity in the areas between the insert and the wearer's body, and helping reduce the likelihood of skin irritation and/or rashes that may result from over-hydration of the skin.

The material forming backsheet 52 may include a thin plastic film such as a thermoplastic film having a thickness of about 0.012 mm (0.5 mil) to about 0.051 mm (2.0 mils). Suitable backsheet materials also may be breathable materials which permit vapors to escape while still preventing liquid from passing therethrough. Suitable examples may include those manufactured by Tredegar Corporation, based in Richmond, VA, and sold under the trade names CPC2, X15306, X10962 and X10964 film. Other examples may include microporous films such as manufactured by Mitsui Toatsu Co., of Japan under the designation ESPOIR NO™ and by Exxon Chemical Co., of Bay City, TX, under the designation EXXAIRE™, and monolithic films such as manufactured by Clopay Corporation, Cincinnati, OH under the name HYTREL™ blend PI 8-3097. Some additional examples may include breathable composite materials as described in PCT Application No. WO 95/16746; and U.S. Patents Nos. 5,938,648; 5,865,823; and 5,571,096. In other examples, backsheet 52 may comprise elastomeric films, foams, strands, or combinations of these or other suitable materials with nonwovens or synthetic films.

Backsheet 52 may be joined to topsheet 51, absorbent core 71 or any other element of insert 50 by any suitable attachment mechanism known in the art. For example, the attachment mechanism may include a continuous line or layer of adhesive, a patterned layer of adhesive, or an array of separate lines, spirals, or spots of adhesive. One example of an attachment mechanism comprises an open pattern network of filaments of adhesive as disclosed in U.S. Patent No. 4,573,986. Other suitable attachment mechanisms include several lines of adhesive
filaments which are swirled into a spiral pattern, as is illustrated by the apparatus and methods shown in U.S. Patents Nos. 3,911,173; 4,785,996; and 4,842,666. Adhesives which have been found to be satisfactory are manufactured by H. B. Fuller Company of St. Paul, Minnesota and marketed as HL-1620™ and HL-1358-XZPTM. Alternatively, the attachment mechanism may comprise heat bonds, pressure bonds, ultrasonic bonds, dynamic mechanical bonds, or any other suitable attachment mechanisms or combinations of these attachment mechanisms known in the art.

It will be appreciated that the chassis described above can be constructed of materials and construction so as to bear and sustain a majority of the structural loading generally imposed upon a disposable diaper, through stretching and accommodation of the wearer's anatomical features and body movements, and through absorption, swelling and added weight resulting from the wearer's exudations of waste. Thus, lesser requirements for structural strength of an insert might be present with use of such a chassis, as compared with strength required of inside components of a disposable diaper. Therefore, an article such as described herein may include a disposable absorbent insert manufactured from materials that are different from those ordinarily used in the manufacture of disposable diapers, such as petroleum-derived materials, e.g., polyethylene and polypropylene. For example, a disposable absorbent insert having one or more of a topsheet, backsheet, standing cuffs and/or other components formed of wood and/or other cellulose fiber-based products (e.g., paper), in addition to the materials identified above, is contemplated. If resistance to aqueous liquid penetration or substantial liquid impermeability is desired, e.g., for a backsheet and/or standing cuffs, a material formed of ordinarily hydrophilic fibers such as paper may be coated or impregnated with a hydrophobic material, such as a skin-compatible oil or wax, to impart the desired resistance to aqueous liquid penetration.

**Absorbent Core**

Referring to Figs. 5A-F, insert 50 may have an absorbent core 71 within the envelope-like structure formed by topsheet 51 and backsheet 52. Absorbent core 71 may comprise any absorbent material which is generally compressible, conformable, non-irritating to the wearer's skin, and capable of absorbing and retaining liquids such as urine and other certain body exudates. Absorbent core 71 may comprise a wide variety of liquid-absorbent materials commonly used in disposable diapers and other absorbent articles such as comminuted wood pulp, which is generally referred to as airfelt. Examples of other suitable absorbent materials include creped cellulose wadding; meltblown polymers, including coform; chemically stiffened, modified or cross-linked cellulosic fibers; tissue, including tissue wraps and tissue laminates;
absorbent foams; absorbent sponges; superabsorbent polymers; absorbent gelling materials; or any other known absorbent material or combinations of materials.

Absorbent core 71 may include liquid acquisition/distribution material 65, and storage material 66. Generally, acquisition/distribution material 65 may have comparatively rapid absorption and wicking properties, but also may have limited absorption capacity. Conversely, generally, storage material 66 may have comparatively slower absorption and wicking properties, but also may have greater absorption capacity. Thus, acquisition/distribution material 65 may serve to rapidly absorb and distribute gushes of liquid such as urine, while storage material 66, having greater absorption capacity, may serve to absorb such liquid from the acquisition/distribution material and store it for the time needed until the insert may be replaced.

Absorbent core 71 may be manufactured in a wide variety of sizes and shapes (e.g., rectangular, hourglass, "T"-shaped, etc.). The configuration and construction of absorbent core 71 may also be varied (e.g., the absorbent core(s) or other absorbent structure(s) may have varying caliper zones, hydrophilic gradient(s), a superabsorbent gradient(s), or lower average density and lower average basis weight acquisition zones; or may comprise one or more layers or structures). Examples of absorbent structures for use as absorbent core 71 may include those described in U.S. Patents Nos. 4,610,678; 4,673,402; 4,834,735; 4,888,231; 5,137,537; 5,147,345; 5,342,338; 5,260,345; 5,387,207; and 5,625,222.

To reduce the overall size and/or thickness of the absorbent core, and thereby improve wearer comfort and reduce the volume of disposable waste created by a soiled insert, it may be desired to construct an absorbent core using the lowest volumes of core materials possible within performance constraints. Toward this end, examples of suitable materials and constructions for a suitable absorbent core are described in, but are not limited to, copending U.S. Publication No. 2008-0312617.

Sublayer

Insert 50 may also include a sublayer disposed between topsheet 51 and backsheet 52. The sublayer may be any material or structure capable of accepting, storing or immobilizing bodily exudates. Thus, the sublayer may include a single material or a number of materials operatively associated with each other. Further, the sublayer may be integral with another element of insert 50 or may be one or more separate elements joined directly or indirectly with one or more elements of insert 50. Further, the sublayer may include a structure that is separate from the core 71 or may include or be part of at least a portion of the core 71.
Suitable materials for use as the sublayer may include large cell open foams, macro-porous compression resistant nonwoven highlofts, large size particulate forms of open and closed cell foams (macro and/or microporous), highloft nonwovens, polyolefin, polystyrene, polyurethane foams or particles, structures comprising a multiplicity of vertically oriented looped strands of fibers, absorbent core structures described above having punched holes or depressions, and the like. One example of a sublayer includes a mechanical fastening loop landing element, having an uncompressed thickness of about 1.5 millimeters available as XPL-7124 from the 3M Corporation of Minneapolis, Minnesota. Another example includes a 6 denier, crimped and resin-bonded nonwoven highloft having a basis weight of 110 grams per square meter and an uncompressed thickness of 7.9 millimeters which is available from the Glit Company of Wrens, Georgia. Other suitable absorbent and nonabsorbent sublayers are described in U.S. Patents Nos. 6,680,422 and 5,941,864. Further, the sublayer, or any portion thereof, may include or be coated with a lotion or other known substances to add, enhance or change the performance or other characteristics of the element.

**Standing Cuffs**

Insert 50 also may have a pair of longitudinal standing cuffs 53 attached partially or entirely along the length thereof. Suitable longitudinal standing cuffs (in various published examples identified as “leg cuffs”, “barrier cuffs” “gasketing cuffs,” etc., may be formed of materials and construction such as described in, but not limited to, U.S. Patents Nos. 5,769,838 and 4,597,760; and copending U.S. Published Application No. 2007/0239130. As shown in Fig. 3, standing cuffs 53 may have one or more strands or strips of cuff elastics 58a, 58b disposed longitudinally therealong. If such cuff elastics 58a, 58b are pre-stretched prior to being affixed to the web material forming standing cuffs 53, resulting longitudinal tensile forces therealong will cause the web material forming standing cuffs 53 to gather as shown, and cause the cuffs to extend from the body of the insert (upwardly relative to Fig. 3), or causing them to “stand”. This feature causes standing cuffs 53 to form a gasketing structure along the wearer’s body when the article including insert 50 is worn, longitudinally on either side of the anatomical features where waste is exuded. Thus, standing cuffs 53 may serve to enhance the exudate containment capability of insert 50 and, as a result, of the wearable absorbent article. As with backsheet 52, standing cuffs 53 may be formed of a substantially liquid impermeable web so as to contain and isolate liquid exudates from the chassis, outer clothing and environment of the wearer. At the same time, standing cuffs 53 may be vapor permeable to provide for breathability of the insert and the wearable absorbent article, reducing
humidity in the areas between the insert and the wearer’s body, and helping reduce the likelihood of skin irritation and/or rashes that may result from over-hydration of the skin.

In another example, the material forming standing cuffs 53 may be integral with the material forming backsheat 52, such as described in, by way of non-limiting example, copending U.S. Published App. No. 2007/0239130. In this particular example, referring to and relative to the view in Fig. 3, a continuous piece of material may form one standing cuff 53, wrap beneath the insert to form backsheet 52, and wrap up the other side to form the other standing cuff 53. This example of a wraparound construction may provide improved liquid containment capability to insert 50, by eliminating seams along the outer liquid-containing surfaces that include standing cuffs 53 and backsheet 52. In some circumstances, however, manufacturing and/or economic constraints may discourage such construction, or else, it may be desirable for the materials forming standing cuffs 53 and backsheet 52 to have differing properties. For example, in some applications it may not be deemed necessary for standing cuffs 53 to be substantially liquid impervious, if they are otherwise formed of a nonwoven web material comprising closely situated hydrophobic fibers, which may still tend to repel and contain fluid, but may be generally more breathable than substantially liquid impervious laminates including films. In this event, improved strength and liquid containment attributes can still be imparted by having the material forming standing cuffs 53 wrap only partially beneath the lower longitudinal corners of the insert, and affixed at seams beneath the insert, rather than at its outermost lower corners as suggested by Fig. 5.

Insert Asymmetry

Referring to Fig. 4, insert 50 will have an insert lateral axis 70 that equally divides its longitudinal length. Insert 50 may have a structure that is asymmetric across insert lateral axis 70. For purposes of this description, with used with respect to an insert, “asymmetric” and “asymmetry” mean that features, geometry (e.g., shape), materials and/or construction on one side of insert lateral axis 70 differ substantially in some respect from those on the other side of insert lateral axis 70. Such asymmetric construction results from having various features of insert 50 designed to accommodate the body features and functions of the intended wearer as they differ front-to-rear, to enhance containment/absorbency performance, comfort, fit and/or appearance of the wearable absorbent article, to economize on use of materials and/or to reduce volume of disposable waste. “Asymmetric” and “asymmetry” do not refer to differences across the insert lateral axis that are attributable to features that may be included on an insert only for purposes of: purely cosmetic coloration or surface decoration; fastening to a chassis (such as
fastener components described herein); user grasping of the insert (such as a grasping structure described herein); as indicia for orienting an insert within a chassis (such as orientation indicia described herein); or for other purposes substantially unrelated to the body features and functions of the intended wearer as they differ front-to-rear, to affect performance, comfort, fit and/or physical appearance of the wearable absorbent article, to economize on use of materials and/or to reduce volume of disposable waste.

As one example, topsheet 51 may one or more have apertures 63 therethrough, predominately in the rearward region 55 as suggested in Fig. 4. Apertures 63 can permit liquid or low viscosity fecal material to penetrate topsheet 51 and reach absorbent materials in absorbent core 71 more rapidly than would occur without such apertures, enhancing liquid feces absorption and containment capability of insert 50.

In another example, a feces management feature may be disposed in the rear of the article, including one or more pockets, spacers, openings in suspended elasticized topsheets, and similar features, for example, as described in copending U.S. Publication No. 2006-0058766. Thus, topsheet 51 may comprise one or more larger apertures in the rear region to provide for unrestricted or comparatively less restricted movement of solid or higher viscosity waste therethrough. The size of an aperture may be important in achieving the desired fecal waste encapsulation performance. If the aperture is too small, the waste may not pass through the aperture, either due to poor alignment of the exudation point and the aperture location, or due to fecal masses having a size greater than the aperture. If the aperture is too large, however, the area of skin that may be exposed to "rewet" from the contained waste matter is increased. An aperture may have an area of between about 10 cm² and about 50 cm². In some circumstances it may be desired that an aperture has an area of between about 15 cm² and 35 cm².

An insert may have asymmetry in its absorbent core (absorbent core asymmetry). Absorbent core asymmetry may result from arrangement of materials and features within the absorbent core to locate particular materials and features of the absorbent core where they are most needed and/or most effective, in accordance with features and functions of wearer anatomy as they differ front-to-rear.

For example, all or a portion of the rearward region 55 of insert 50 may include acquisition/distribution material 71 but less or no storage material 66 as compared with forward region 54, as may be seen by comparison of Figs. 5A and 5B, 5C and 5D, and 5E and 5F, respectively. By this particular absorbent core asymmetry, storage material 66 may be located predominately in the front of the wearable absorbent article when worn. This may provide a
predominate proportion of the insert's urine storage capacity closer to the urine exudation point of the wearer to reduce the likelihood of leakage, and remove potentially uncomfortable and/or unsightly size and bulk from between the wearer's legs or the wearer's backside area, particularly relevant when storage material 66 becomes swollen with absorbed liquid. Additionally, this particular asymmetry provides for economization of the amount of storage material 66 used, by locating it in only a portion of the insert rather than substantially along the entire insert. The liquid storage capacity of the forward region of the absorbent core may be greater than that of the rearward region of the absorbent core as measured by the Teabag Centrifuge Capacity test disclosed in U.S. Patent No. 6,278,037. The liquid storage capacity of the forward region of the absorbent core may be at least about 10%, 20%, 50%, or even 100% or more greater than that of the rearward region. With such an arrangement, acquisition/distribution material 65 located in both forward and rearward regions 54, 55 can serve to acquire and move liquid (usually, urine) to the storage material 66 located predominately in the forward region 54.

Referring to Figs. 5A, 5C and 5E, for example, absorbent material 66 in forward region 54 may be, respectively, dispersed within acquisition/distribution material 65 (Fig. 5A), contained within a separate liquid permeable structure or envelop 67 in fluid communication with acquisition/distribution material 65 (Fig. 5C); or dispersed on, or within an adherent matrix of, retaining material 68, such as described in co-pending U.S. Publication No. 2008-0312617, and in fluid communication with acquisition/distribution material 65 (Fig. 5E). Conversely, the rearward region 55 may predominately contain acquisition/distribution material 65, but less storage material 66 as compared with forward region 54, or none (Figs. 5B, 5D, 5F).

In another example, storage material 66 and acquisition/distribution material 65 may occupying differing, distinct layers of absorbent core 71, as suggested by Fig. 5C. It may be desirable in some circumstances to make the layer containing acquisition/distribution material 65 larger in surface area (i.e., plan view surface area relative to the insert laid flat, as shown in Fig. 4) than the layer containing storage material 66, or vice versa. For example, if the layer containing acquisition/distribution material 65 is formed so as to have a larger surface area laterally across the insert in the forward region 54, this may serve to provide space for a greater quantity of acquisition/distribution material in the forward region. This may impart greater capacity in the forward region to rapidly absorb and distribute relatively large gushes of urine discharged toward the forward region, as may be desired for wearable absorbent articles for, e.g., older male babies and toddlers - enhancing containment capability of the insert.
In another example, however, such as for newborns and young babies, large gushes of urine might not be expected, but comparatively substantial quantities of liquid or low-viscosity fecal material may be. Thus, a wearable absorbent article for this group of intended wearers may include an acquisition/distribution layer of larger size, occupying a greater surface area, in the rearward region 55 of the insert. This may impart greater capacity in the rearward region to rapidly absorb gushes of liquid or low viscosity fecal material discharged toward the rearward region, and thereby enhance containment capability of the insert.

It also may be desired to dispose a thickening agent in the absorbent core in the rearward region 55 of the insert. A thickening agent may be useful for providing additional assurance that liquid or low viscosity fecal material will be thickened and thereby more immobilized, and more likely to be contained within the insert.

Insert 50 also may have overall shape / backsheet asymmetry. For example, viewed in a laid-flat position as shown in Fig. 4, insert 50 may occupy a larger surface area on one side of insert lateral axis 70 than on the other. This may be useful for purposes of comfort, performance and/or economization in use of backsheet material(s). For example, in conjunction with including a predominate proportion of storage material 66, the forward region 54 of insert 50 may occupy a larger surface area, associated with a larger space within the insert to contain the storage material, allowing for the insert to remain flatter, particularly relevant when the absorbent material becomes swollen with absorbed liquid. Such larger surface area may be greater on one side of insert lateral axis 70 than the surface area occupied by the rearward region 55 on the other side of insert lateral axis 70.

Insert 50 also may have a narrowed region in the area which rests in the crotch region of the chassis. This narrowing in the crotch region may serve to enhance wearer comfort by eliminating size and bulk between the legs. Referring to Fig. 2B, it may also serve to better enable the crotch region 26 of chassis 20 to contain and maintain a laterally centered position of insert 50, by ensuring that insert 50, by having limited quantities of absorbent materials therein and limited width, does not swell beyond the space capacity of crotch region 26 of chassis 20. Such narrowing may continue, for example, into the rear portion of the insert, thereby creating overall shape / backsheet asymmetry.

Insert 50 may also be asymmetrical across insert lateral axis 70 in other ways, to serve the same, related or other purposes as those described above.

It will be appreciated, therefore, that insert asymmetry across insert lateral axis 70 is a result of design and construction of the insert so as to have only one front region and only one
rear region, i.e., the front and rear regions are not interchangeable, if the fit, comfort, performance and appearance of insert 50 are to be optimal.

**Grasp Structures**

Referring to Figs. 3 and 4, insert 50 also may include respective forward and rearward user grasp structures 59, 61. User grasp structures 59, 61 may be provided to enable the user to quickly and easily grasp insert 50 proximate its respective ends.

Grasp structures as shown and/or suggested may enable the user to more quickly grasp and stretch insert 50 from a contracted position similar to that depicted in Fig. 3, to an extended position similar to that depicted in Fig. 4, which may be desirable for installing insert 50 into a chassis. If user grasp structures 59, 61 are centered proximate to the respective ends of insert 50 as shown, this may also provide visual assistance to the user for co-locating respective centered fastener component pairs, described in more detail below.

Additionally, user grasp structures 59, 61 may serve to enable the user to quickly and easily grasp insert 50 proximate to its respective ends, which as a result of their distance from exudation points on a wearer’s body, are less likely to be soiled at the time replacement of insert 50 becomes necessary or desirable. Thus, the user may be better enabled to avoid contacting the wearer’s exudates with the user’s hands when removing a soiled insert 50 from a chassis 20.

User grasp structures 59, 61 may include tab-like extensions as shown in Figs. 3 and 4, with free ends unattached to the chassis 20 when insert 50 is installed therein, which are easily graspable. User grasp structures may have different forms as well. By way of non-limiting example, user grasp structures may take the form of loop-like extensions (not shown) extending from the ends of insert 50, finger holes (not shown) through insert 50 proximate the ends thereof, and other structures that facilitate grasping and pulling of insert 50 at locations proximate to its ends.

**Insert/Chassis Fastener Components: Orientation Indicia: Other Possible Features**

Referring back to Figs. 2B, 3 and 4, as previously noted, chassis 20 may have one or more insert fastener components such as front and/or rear insert fastener components 33, 32 disposed thereon. Insert 50 may have front and/or rear fastener components 56, 57 disposed thereon. Respective front and/or rear fastener components 56, 57 on insert 50 may be selected and/or adapted to be cooperative to enable fastening with respective front and/or rear insert fastener components 33, 32 disposed on chassis 20.
Types, Locations and Localization of Fastening Locations

In one example, to enable fastening of respective front and rear fastener components 56, 57 of insert 50 with respective front and rear insert fastener components 33, 32 on chassis 20, respective fastening pairs 56, 33 and 57, 32 may include cooperating fastener components. An example of a suitable hook-and-loop fastening system is a VELCRO system, a product of Velcro Industries B.V., components of which are available from Velcro USA, Inc., Manchester, New Hampshire. A hook-and-loop fastening system provides certain advantages. Because the respective hook and loop components are supplied in sheet or strip form, they may be cut into suitably shaped patches that can be affixed to a cloth substrate by various mechanisms, including adhesive bonding, mechanical bonding, ultrasonic bonding, sewing, stitching, serging, edging, and the like. If respective hook-and-loop patches are used as fastener components, relative ease of fastening, simplicity and convenience for the user (as compared with, for example, fastener components such as a button and button hole) are one among several advantages provided, because fastening is effected simply by placing the fastener components in face-to-face contact and applying gentle pressure.

Some types of hook components may, in some circumstances, tend to snag or catch undesirably on a variety of materials in addition to intended corresponding loop components, while most types of loop components currently available do not have this tendency. Thus, in some circumstances it may be desired that patches of loop components form one or both of insert fastening elements 33, 32, while patches of hook components form one or both of fastening elements 56, 57. This arrangement places a non-snagging insert fastening component on the chassis. This may be desirable in some circumstances, such as when the chassis 20 is designed to be reusable – reducing the likelihood that components on a chassis 20 will undesirably snag on other parts of chassis 20 or on other articles, such as clothing articles, being stored or laundered along with chassis 20.

However, fastening pairs 56, 33 and 57, 32 need not necessarily include respective components of a hook-and-loop fastening system, and need not necessarily include respective components of a two-component fastening system. Rather, a fastening system may require only one fastening component, or use other types of fastener components. Fastener components used may be adapted to engage, retain, and otherwise hold the insert or a portion thereof. A fastener component on chassis 20 may include a patch of adhesive; a structure having a region of relatively high coefficient of friction; a pocket; flap; strap; or other capturing, holding and/or retaining surface, device or structure. Thus, in one example, the inside of chassis 20 may include
a pocket structure situated on or along the inner surface 25 of chassis 20, in, e.g., the front region 27. Such a pocket structure may have an opening facing downward or upward (relative to the wearer in a standing position, and relative to Fig. 2B). The pocket structure may be adapted to receive, fit and capture, for example, the forward edge and a portion of forward region 54 of insert 50. Such a fastener component may be provided in lieu of, or in addition to, other fastener components disposed at the front region of the chassis 20 and forward region of insert 50. With such a structure and a suitably adapted insert, to install the insert the user may insert the forward edge of insert 50 into the pocket structure, and then fasten the rearward portion of insert 50 into the rear region of the chassis 20 by any other rear fastener component(s) provided.

Also, a fastener component in any form, including a respective component of a fastening pair 56, 33 and 57, 32 may be disposed on either of insert 50 or chassis 20. For example, a hook patch may be disposed on either of insert 50 or chassis 20, with a cooperating loop patch disposed on the other of insert 50 or chassis 20.

An insert fastener component such as component 32 on chassis 20 may be attached or connected to an anchor band 38, or diagonal anchor band 38a. This may provide, as one advantage, the distribution of structural loading resulting from the weight of absorbed or contained exudates, as described in one or more of the patent applications cited above, in the description of anchor bands.

Fastening locations may be multiply disposed, for example, at each of the four corners of insert 50 and corresponding locations on chassis 20, and even at other locations along insert 50 and chassis 20, created by fastener components suitably selected and disposed.

In another example, however, a fastening system such as either of fastener component pairs 56, 33 and 57, 32 may form a singularized and localized fastening location proximate each of, or either, the forward/front and/or rearward/rear ends/regions as suggested in the Figures. Having only two respectively singularized, localized fastening locations substantially laterally centered on the insert and the chassis, as suggested in Figs. 2B and 3, provides an advantage of simplicity and ease of installation for the user, by presenting only two locations at which the user must co-locate and fasten insert 50 to chassis 20.

Additionally, having a single, localized fastening location proximate only one or two ends of insert 50, such as suggested in the Figures, provides a partially force-decoupled attachment of insert 50 within chassis 20. With this force-decoupled arrangement, the portions of chassis 20 surrounding fastener component(s) 33, 32, such as waistband portions 34, 35, and front and rear regions 27, 28, may laterally stretch and contract substantially independently of and unimpeded
by the structure of insert 50 and portions thereof. This may avoid lateral bunching of the ends of insert 50 with lateral contraction of the chassis 20, and/or, conversely, may avoid having the structure of insert 50 restrict chassis 20 from stretching or contracting laterally, as a result of a more force-coupled arrangement therebetween. Such lateral bunching or restricting otherwise may be incidental to fastening insert 50 within chassis 20 in a manner that force-couples a greater portion of the width of insert 50 to chassis 20, e.g. by use of more than one fastening location across the width of insert 50 proximate a given longitudinal location, or by use of a laterally delocalized/extended continuous fastening location along a larger portion of the width of insert 50. Force-decoupling, therefore, may provide for enhancement of fit, appearance and wearer comfort, as well as improved capability for maintenance of intended insert shape and performance while worn.

Thus, in one example, referring to Fig. 4, a patch of hook components forming a fastening component 56 attached to insert 50 may be substantially laterally centered on the insert as suggested in the figure, and may have an width \( W_f \) attached along insert 50 that extends no more than about 50% of the lateral width \( W_i \) of the insert 50 at forward region 54. This provides that no more than about 50% of the width of the insert 50 at, e.g., forward region 54, will be force-coupled to the chassis by operation of the patch of hook components, and that, correspondingly, about 50% of such width (i.e., that portion of width \( W_i \) that is not attached to, or force-coupled to, the insert along width \( W_f \)) is force-decoupled from the chassis 20 when insert 50 is installed therein. In some circumstances, it may be desired that the portion of the lateral width of forward region 54 and/or of rearward region 55 of insert 50 that is force-decoupled from the chassis is even greater than about 50%. Thus, it may be desired that the width \( W_f \) of a fastening component 56 or 57, comprising, e.g., a continuously attached patch of hooks, is no more than about 40%, no more than about 30%, or even no more than about 20%, of the lateral width \( W_i \) of the insert at the region where the fastening component is situated. In another example, it may be desired in some circumstances that at least about 50% of the lateral width of the insert 50 in the front and/or rear region 54, 55, is force-decoupled from the chassis. In some circumstances it may be desired that more than about 50%, more than about 60%, more than about 70%, or even more than about 80%, of the lateral width of the insert at any longitudinal location, is force-decoupled from the chassis when installed therein.

Other fastener components that provide such singularized and relatively laterally localized fastening locations, providing limited force-coupling across the lateral width of insert 50, are possible.
Insert Lateral Stiffeners

Referring to Fig. 3, and from the description of standing cuffs 53 with cuff elastics 58a,
58b set forth above, it can be appreciated that, if longitudinal tensile forces are imparted by pre-
strained cuff elastics 58a, 58b, standing cuffs 53 may tend to pull the respective outer corners of
insert 50 longitudinally toward each other. If there is not structure present to resist this pull, the
outer corners of insert 50 may buckle and bunch, and standing cuffs 53 may collapse or
otherwise be loose and less effective as gasketing structures against the wearer’s body. In one
example, one way of providing resistive structure is to either include insert-chassis fastener
systems disposed at fastening locations at, or extending to, the corners of insert 50, and
corresponding locations along the inner surfaces 25 of chassis 20. In some circumstances,
however, this may be undesirable for reasons of cost and/or complexity. It also may sacrifice the
advantages of having only one singularized/localized fastening location proximate each end of
insert 50, as described above.

If only one singularized and relatively localized fastening location is provided at one or
both ends of insert 50 as described immediately above, and sized and located so as to be in a
laterally centered position as suggested by the Figures, it may be desirable to include a lateral
stiffening component proximate to one or both of such ends. Referring to Figs. 3 and 4, lateral
stiffeners 60 and 62 may be included. Such lateral stiffeners may serve to aid the user in
engaging the insert with the chassis, and to help insert 50 maintain its intended shape and
configuration while being worn beneath a chassis.

Lateral stiffeners 60, 62 may be affixed to, or incorporated within, insert 50 proximate the
ends thereof as suggested by the Figures. In addition to increasing the tendency of insert 50 to
maintain optimal shape while in use, such lateral stiffeners may increase the tendency of the
respective ends of insert 50 to stay open and flat before insert 50 is installed in a chassis.
Because the ends of insert 50 may otherwise be folded over or bunched while being stored and/or
carried by the user before installation, lateral stiffeners may enhance user convenience, by
caus[ing} the ends of insert 50 to maintain or seek a shape/configuration that requires less
manipulation by the user to install it in a chassis.

Referring to Fig. 4, one or more lateral stiffeners 60, 62 may be formed of any flat, sheet-
like or card-like material, or any flat, stiffened assembly. In one example, a lateral stiffener may
be formed by folding over portion of an insert (such as an end portion) to create a stiffened
region comprising folded layers of material. In another example, lateral stiffeners 60, 62 may be
formed by depositing onto the ends of insert 50 lateral bands or strips of liquid or semi-liquid
adhesive or other material that cures or cools to a stiffened state, and thereby imparts added stiffness to the substrate to which it is applied. In another example, lateral stiffeners may be formed of cardboard or like material. One example of suitable stiffener material is 0.031 in. thick VOLARA foam supplied in sheet form (a product of Sekisui Voltek, LLC, Lawrence, MA). Stiffener materials may be laminated with or adhesively applied to portions of insert 50 to be stiffened, or applied, affixed or included by any other suitable method.

The lateral stiffeners may increase planar and/or lateral stiffness of the areas of insert 50 in which they are located, as compared with portions of the insert adjacent such stiffeners with respect to a plan view (such as Fig. 4). As a measure of relative stiffness of a stiffened portion (i.e., a portion including a lateral stiffener), compared with stiffness of an adjacent non-stiffened portion of an insert, Buckling Forces of each portion may be measured and compared according to the Buckling Force Test Method set forth in copending Published U.S. Application, Pub. No. 2007/0142798. The ratio of the Buckling Force of a portion of an insert having a lateral stiffener to the Buckling Force of an adjacent portion may be at least about 2.0, but in some circumstances it may be desired that the ratio be at least about 2.5, or even 4.0, or even 10.0, or more. It may be desired that the portions of insert 50 including one or more lateral stiffeners 60, 62 are sufficiently stiff to effectively resist the tension forces in standing cuffs 53 and substantially maintain standing cuffs 53 in their gasketing configurations while insert 50 is in use, and substantially maintain the corners of insert 50 in laterally extended positions, preventing buckling or bunching of the same. The amount of stiffness desired may depend upon various factors including the inherent stiffness of the insert materials without a supplemental lateral stiffener, and the amount and/or range of tension in the standing cuffs when the article is worn. At the same time, for purposes of wearer comfort and safety, it may be desirable that the portions of the insert including the one or more lateral stiffeners 60, 62 are pliable enough to flex comfortably with the wearer’s body movements, and to collapse before any form of contusion or impalement injury hazard would be presented. It also may be desirable that stiffened portions are elastic in nature, in they will tend to return to a substantially flat configuration after being bent, folded or twisted.

Lateral stiffeners 60, 62 may be located adjacent or near one or both ends of insert 50 and may extend laterally from the lateral center thereof to stiffen the insert along a substantial portion of its width. The one or more lateral stiffeners may have a width of from about 50% to about 100% of the lateral width of the insert, or may extend beyond the longitudinal edges of other materials forming the insert. The lateral stiffeners may have any longitudinal dimension,
although, in some circumstances, a longitudinal dimension less than 25% of the insert length may better assure comfort for the wearer, and therefore, may be desired. In some examples, the longitudinal dimension of a lateral stiffener may range from about 5 mm to about 50 mm. A stiffener also may extend longitudinally beyond the lateral edge of other materials forming the insert. One or both ends of the insert may include a lateral stiffener. In examples wherein the insert comprises more than one lateral stiffener, the respective lateral stiffeners may have differing shapes, dimensions, stiffness, thickness, color, structure, placement, material(s) or composition. A lateral stiffener also may include, or be integral with, a grasp structure as described above, and as suggested in Fig. 3 (lateral stiffener 60 is depicted as integral with grasp structure 59).

Targeting and Orientation Indicia

The insert and/or chassis may comprise one or more insert targeting indicia to indicate, facilitate and/or compel correct positioning and association of portions of the insert within the chassis. The insert targeting indicia may comprise verbal or non-verbal instructive indicia, visual targeting indicia, cooperating geometrical features, cooperating types of fastener components, or cooperating designs of fastener components sized and formed to indicate or compel the engagement of the insert with the correct region of the chassis so as to enable the optimum performance of the wearable absorbent article. Other examples of possible targeting indicia components include one or more cooperating colors, shapes, patterns, lines, outlines, silhouettes, other geometrical features, protrusions or depressions, textures, patterns, targeting lines or crosshairs, bulls-eye representations, and the like, disposed on the chassis and/or the insert to indicate correct positioning of the insert within the chassis. In one example, the inner surface of the chassis may be imprinted with an outline of an insert, or a silhouette of an insert.

Targeting indicia also may comprise at least two cooperating components, one on the chassis 20 and one on insert 50, such that when these two components are associated, the respective components of chassis/insert system will be properly oriented with respect to one another and will perform most optimally. In one example, the inner surface of the chassis may be imprinted with a first arrow pointing at an insert location, and the insert may be imprinted with a second arrow pointing at the first arrow when the insert and chassis are correctly relatively positioned.

Indicia may be cognitively correlating, or non-correlating, a correlation indicating a correct optimal placement, and a non-correlation indicating an incorrect sub-optimal placement. Respective cognitively correlating targeting indicia may include an indicium on the chassis that
cognitively correlates with an indicium on the insert, indicating to the user the correct relative positioning and engagement of the insert and the chassis. For example, respective cognitively correlating indicia on the insert and chassis may have a common color, shape, or texture. (As used herein, "common color" includes any first color and recognizable shades or variants thereof, which in view of all features of the article is visibly and cognitively distinguishable from another color.)

Referring to Figs. 2B, 3 and 4, when an insert 50 is asymmetrical as described above, it may have only one optimal forward region 54 and only one optimal rearward region 55. Similarly, when a chassis 20 is asymmetrical as described above, it may have only one optimal front region 27 and only one optimal rear region 28. Thus, in the event either or both of these asymmetries are substantial, installation of insert 50 into chassis 20 with incorrect relative front-rear orientation may cause the wearable absorbent article not to fit and/or function optimally. Accordingly, it may be desirable in some circumstances to incorporate one or more indicia into the chassis 20 and/or insert 50 that are adapted to inform the user as to the correct respective front-rear orientation of these components. Such indicia may provide such information to the user functionally, tactility and/or visually.

Functional indicia may include fastener components that function properly, effectively and/or optimally with correct front-rear orientation, but do not function properly, effectively and/or optimally with incorrect front-rear orientation.

For example, referring to Figs. 2B and 3, front insert fastener component 33 on chassis 20 may be cooperative to effect optimal/maximum fastening security only with front fastener component 56 on insert 50, but not with rear fastener component 57 on insert 50. Similarly, rear insert fastener component 32 on chassis 20 may be cooperative to effect optimal/maximum fastening security only with rear fastener component 57 on insert 50, but not with front fastener component 56 on insert 50.

In a more specific example, front insert fastener component 33 on chassis 20 may include a patch of loops, while front fastener component 56 on insert 50 may include a patch of hooks. Correspondingly, rear insert fastener component 32 on chassis 20 may include a patch of hooks, while rear fastener component 57 on insert 50 may include a patch of loops. Thus, in this particular example, if a user mistakenly attempts to fasten rear fastener component 57 on insert 50 (loops) to front insert fastener component 33 on chassis 20 (loops), proper or optimal fastening will not be effected, which will communicate to the user that he/she must rotate insert 50 by 180 degrees to install it with correct/optimal front-rear orientation on the chassis.
In another specific example, front insert fastener component 33 on chassis 20 may include a female snap fastener component, while front fastener component 56 on insert 50 may include a male snap fastener component. Correspondingly, rear insert fastener component 32 on chassis 20 may include a male snap fastener component, while rear fastener component 57 on insert 50 may include a female snap fastener component. Thus, in this particular example, if a user mistakenly attempts to fasten rear fastener component 57 on insert 50 (female snap fastener component) to front insert fastener component 33 on chassis 20 (female snap fastener component), the components will not fit properly together and proper/optimal fastening will not be effected, which will communicate to the user that he/she must rotate insert 50 by 180 degrees to install it with correct/optimal front-rear orientation.

Thus, functional indicia may include any fastener components that will function properly and/or optimally to effect fastening and maximum fastening security between insert 50 and chassis 20 when the two are properly oriented, but will not function properly or optimally otherwise. Additionally, functional indicia are not necessarily limited to fastener components. Functional indicia also may be embodied in other features of the chassis and insert that affect how the two fit or function together in correct, optimal front-rear orientation versus incorrect (reverse), sub-optimal front-rear orientation. Thus, functional indicia may additionally be associated with or combined with another functional element of the chassis or insert. Indicia may be associated with elements of the chassis such as a waistband, side panel, stretch element, leg cuff, physical retention fastener component (e.g., a pocket or retaining strap), and the like. Indicia may be associated with elements of the insert, such as a waist cap, waist band, standing cuff, fecal management feature, insert positioning aid, insert stiffening aid, insert removal aid, or insert disposal aid.

From the foregoing it will be appreciated that other forms of functional orientation indicia are possible, within the principle of the foregoing description.

In other possible examples, instead of respective functionally cooperative/uncooperative pairs of components as described above, insert 50 and chassis 20 may include respective non-functional indicia, such as tactile or other sensory indicia.

For example, the front insert and chassis fastener components may be selected or formed so as to have a first tactile attribute, while the rear insert and chassis components may be selected or formed so as to have a second tactile attribute. In another example, features of the insert and chassis may have features such as 3-dimensional shapes that are mating or geometrically
cooperating with optimal front-rear orientation, but not mating or geometrically cooperating with reversed, suboptimal front-rear orientation.

In other possible examples, instead of or in addition to respective functionally cooperative/uncooperative pairs of fastener components or tactile indicia components as described above, insert 50 and chassis 20 may include respective visual indicia. Chassis 20 may include respective front and rear visual indicia 73, 74 disposed on the front region 27 and rear region 28, respectively. Respective visual indicia disposed on insert 50 and chassis 20 may be adapted to provide a visual cue to the user of correct/optimal orientation and placement of insert 50 within chassis 20.

For example, components of visual indicia and a visual cue may involve use of a common color. In one particular example, front and/or rear visual indicia 73, 74 disposed on chassis 20 may comprise respective common colors visibly distinct from one another. Insert 50 may have respective cooperating indicia disposed or embodied thereon. Thus, for example, forward and rearward user grasp structures 59, 61 on insert 50 may bear or be colored with colors respectively common and corresponding with those comprised by front and/or rear visual indicia 73, 74. More particularly, for example, front visual indicium 73 and an insert feature such as forward user grasp structure 59 may both bear or be colored a first common color, and rear visual indicium 74 and a feature such as rearward user grasp structure 61 may either or both be colored a second common color, visibly distinguishable from the first common color.

In another particular example, front and rear visual indicia 73, 74 disposed on chassis 20 may embody, or bear images of, respective shapes to match, or cognitively correlate visually correlate with, corresponding shapes embodied, or pictured on, insert features such as forward and rearward user grasp structures 59, 61. More particularly, for example, front visual indicium 73 and forward user grasp structure 59 may both embody or bear images of circles, and rear visual indicium 74 and rearward user grasp structure 61 may both embody or bear images of triangles.

In another particular example, front and rear visual indicia 73, 74 disposed on chassis 20 may bear images of words or symbolic indications for “front” and “rear”, to match corresponding words or symbolic indications on insert features such as forward and rearward user grasp structures 59, 61. In a more particular example, front visual indicium 73 and forward user grasp structure 59 may both bear an image of the letter “F” (i.e., for “front”), and rear visual indicium 74 and rearward user grasp structure 61 may both bear an image of the letter “R” (i.e., for “rear”).
In another particular example, front and/or rear visual indicia 73, 74 disposed on chassis 20 may embody, or bear images of, respective portions of expectedly user-recognizable shapes, characters, objects, etc., to match corresponding portions of expectedly user-recognizable shapes, characters, objects, etc., embodied, or pictured on, insert features such as forward and/or rearward user grasp structures 59, 61. In a more particular example, front visual indicium 73 and forward user grasp structure 59 may both embody or bear respective portions of a first image that, when brought together properly, form a cognitively complete image of an expectedly user-recognizable first shape, character, object, etc.; and/or rear visual indicium 74 and rearward user grasp structure 61 may both embody or bear respective portions of a second image that, when brought together properly, form a cognitively complete image of an expectedly user-recognizable second shape, character, object, etc., distinctive from the first.

In yet another particular example, visual orientation indicia may be simplified into a single pair of visual indicia appearing, respectively, on chassis 20 and insert 50. In one such example, an inner surface 25 of chassis 20 may bear an image of an arrow pointing longitudinally toward front edge 21, and insert 50 may bear an image of an arrow pointing longitudinally toward its forward end.

Examples of other suitable visual orientation indicia adapted to provide orientation information may include alphanumeric text including words, arrows, symbols, diagrams, pictographs, icons, cartoons, schematics, and any other visual indicia.

It may be desired that indicia associated with the front portions of the chassis and insert will not cognitively correlate, or will cognitively not correlate, with indicia associated with rear portions of the chassis and insert, and vice versa, when the user views both sets of indicia.

From the foregoing it will be appreciated that other forms of visual orientation indicia are possible, within the principle of the foregoing description.

* * *

A two-piece wearable absorbent article having some or all of the features described herein may provide advantages over both conventional wholly reusable cloth diapers and conventional wholly disposable diapers. The potential for use of semi-durable materials, and more so durable materials, to form a chassis, provides for a chassis that may be used more than once, and, depending upon the materials selected, used and laundered many times. A chassis having some or all of the features described herein may eliminate the necessity for a disposable chassis structure, thereby reducing the volume of soiled waste the user must dispose of, as compared with typical disposable diapers. Additionally, because the possibility of a reusable
chassis that bears most of the structural loading generally imposed upon a disposable diaper is presented, disposable absorbent portions may have more simplified designs, reducing manufacturing and material costs as compared with those of disposable diapers. The possibility for making a disposable absorbent insert of non-traditional renewable materials (such as paper) is presented. At the same time, a disposable absorbent insert and chassis having some or all of the features described herein may in many circumstances prevent most or all soiling of the chassis by the wearer's exudates, thereby mitigating sanitation and odor problems associated with handling and storage, reducing the frequency of laundering necessary, and reducing the need for laundering resources, efforts and/or expenses, associated with conventional cloth diapers. A disposable absorbent insert having some or all of the features described herein also may provide better absorbency and better isolation of exudates from both the wearer's skin, and the wearer's clothing and environment, than conventional cloth diapers.

Use of durable materials for a chassis also may provide other incidental benefits, in creating choices in use of materials for improved and/or more appealing comfort, fit, designs, colors, patterns, etc. as compared with disposable diapers. A chassis having features described herein provides a wide variety of choices for making a wearable absorbent article look more attractive and/or more like an article of clothing or outerwear. In addition to the foregoing advantages, the use of an insert having an asymmetric structure together with orientation indicia allows for the design of an insert tailored to wearer anatomy and bodily functions as they differ front-to-rear, better performance, and increased economy in design, construction and use of materials, while enabling the user to ensure correct front-rear orientation of the insert within the chassis. Other advantages are apparent from the description above.

The dimensions and values disclosed herein are not to be understood as being strictly limited to the exact numerical values recited. Instead, unless otherwise specified, each such dimension is intended to mean both the recited value and a functionally equivalent range surrounding that value. For example, a dimension disclosed as "40 mm" is intended to mean "about 40 mm."

The citation of any document, including any cross-referenced or related patent or application is not an admission that it is prior art with respect to any invention disclosed or claimed herein or that it alone, or in any combination with any other reference or references, teaches, suggests or discloses any such invention. Further, to the extent that any meaning or definition of a term in this document conflicts with any meaning
or definition of the same term in a document cited herein, the meaning or definition assigned to that term in this document shall govern.

While particular embodiments of the present invention have been illustrated and described, it would be obvious to those skilled in the art that various other changes and modifications can be made without departing from the invention described herein.
What is claimed is:

1. A wearable absorbent article to be worn by a wearer about the lower torso, comprising:

   a chassis having a chassis longitudinal length and comprising a chassis front region, a chassis rear region, a chassis lateral axis between front and rear regions and equally dividing the chassis longitudinal length, and a pair of elasticized leg band portions, the chassis also comprising a first insert fastener component disposed thereon, and a first chassis indicium disposed thereon;

   a disposable absorbent insert having an insert longitudinal length and comprising an insert forward region, an insert rearward region, and an insert lateral axis between the forward and rearward regions and equally dividing the insert longitudinal length, and a pair of elasticized standing cuffs, the insert comprising an absorbent core disposed between a top sheet and a bottom sheet, wherein the top sheet is provided with one or more apertures in the rearward region for receiving feces, each aperture having an area between about 10cm² and about 50cm², the insert also comprising a first fastener component disposed thereon, and a first insert indicium disposed thereon;

   wherein the chassis is asymmetric across the chassis lateral axis, and the absorbent insert is asymmetric across the insert lateral axis;

   wherein the chassis and the insert are adapted to function on and/or fit the wearer optimally with the insert forward region disposed proximate to the chassis front region, the insert rearward region disposed proximate to the chassis rear region, the chassis front region and insert forward region disposed proximate to a torso front region of the wearer’s lower torso, and the chassis rear region and insert rearward region disposed proximate to a torso rear region of the wearer’s lower torso;

   wherein the first fastener component and the first insert fastener component are adapted to effect fastening of the insert to the chassis when said first respective fastener components are brought together; and
wherein the first chassis indicium and the first insert indicium are adapted to provide information to a user concerning correct front-rear orientation of the insert with respect to the chassis.

2. The article of Claim 1 further comprising:

a second chassis indicium disposed on the chassis; and

a second insert indicium disposed on the insert;

wherein the second chassis indicium and the second insert indicium are adapted to provide information to the user concerning correct front-rear orientation of the insert with respect to the chassis.

3. The article of Claim 1 further comprising:

a second insert fastener component disposed on the chassis; and

a second fastener component disposed on the insert;

wherein the second fastener component and the second insert fastener component are adapted to effect fastening of the insert to the chassis when said second respective fastener components are brought together.

4. The article of Claim 1 wherein:

the first insert fastener component comprises the first chassis indicium; and

the first fastener component comprises the first insert indicium.

5. The article of Claim 2 further comprising:

a second insert fastener component disposed on the chassis; and

a second fastener component disposed on the insert;

wherein the second fastener component and the second insert fastener component are adapted to effect fastening of the insert to the chassis when said second respective fastener components are brought together, and
wherein

the first insert fastener component comprises the first chassis indicium;
the first fastener component comprises the first insert indicium;
the second insert fastener component comprises the second chassis indicium;
the second fastener component comprises the second insert indicium; and

wherein the first insert fastener component is not cooperative with the second fastener component to effect fastening, and/or the second insert fastener component is not cooperative with the first fastener component to effect fastening.

6. The article of Claim 1 wherein the first chassis indicium and the first insert indicium comprise respective visual or tactile elements that are adapted to provide a visual or tactile cue concerning correct front-rear orientation of the insert with respect to the chassis and/or the wearer.

7. The article of Claim 6 wherein the respective visual or tactile elements comprise one or more elements selected from the group consisting of:

an arrow or directional symbol;
an outline of a portion of the insert disposed on the chassis, and a portion of the insert that substantially conforms to the outline;
a word, or abbreviation of a word, having a meaning substantially similar to “front”, “forward”, “rear” or “rearward”;
a common color comprised by each of the first chassis indicium and the first insert indicium;
respective matching or complementary words (or abbreviations thereof) or symbols comprised by the first chassis indicium and the first insert indicium;
respective substantially complementary portions of a recognizable image comprised by the first chassis indicium and the first insert indicium;
a substantially common image comprised by each of the first chassis indicium and the first insert indicium;

a substantially common shape comprised by each of the first chassis indicium and the first indicium;

substantially matching sizes or arrangements of the first chassis indicium and the first insert indicium;

respective matching or complementary directional orientation of the first chassis indicium and the first insert indicium;

respective mating or fitting physical features comprised by the first chassis indicium and the first insert indicium, or combinations thereof.

8. The article of any one of Claims 1 to 7, wherein the chassis is reusable.

9. A disposable absorbent insert for use with a chassis adapted to be worn about a wearer's lower torso, the insert having a longitudinal length, and comprising:

an insert forward region, an insert rearward region, an insert lateral axis between the forward and rearward regions and equally dividing the longitudinal length, and a pair of elasticized standing cuffs, the insert comprising an absorbent core disposed between a top sheet and a bottom sheet, wherein the top sheet is provided with one or more apertures in the rearward region for receiving feces, each of the apertures having an area between about 10cm² and about 50cm², the insert also comprising a first fastener component disposed thereon, and a first insert indicium disposed thereon;

wherein the absorbent insert is asymmetric across the insert lateral axis;

wherein the first fastener component is adapted to cooperate with a first insert fastener component disposed on a chassis to effect fastening of the insert to the chassis when said first respective fastener components are brought together; and
the first insert indicium provides information to a user concerning correct front-rear orientation of the insert with respect to the chassis and/or the wearer.

10. The insert of Claim 9 further comprising a second insert indicium disposed thereon, wherein the second insert indicium provides information to a user concerning correct front-rear orientation of the insert with respect to the chassis and/or the wearer.

11. The insert of Claim 9 further comprising a second fastener component disposed thereon, wherein the second fastener component is adapted to cooperate with a second insert fastener component disposed on the chassis to effect fastening of the insert to the chassis when said second respective fastener components are brought together.

12. The insert of Claim 9 wherein the first fastener component comprises the first insert indicium.

13. The insert of Claim 10 further comprising:

   a second fastener component disposed thereon,

   wherein the second fastener component is adapted to cooperate with a second insert fastener component disposed on the chassis to effect fastening of the insert to the chassis when said second respective fastener components are brought together;

   wherein

   the first fastener component comprises the first insert indicium;

   the second fastener component comprises the second insert indicium; and

   the second fastener component is not cooperative with the first insert fastener component to effect fastening; and/or the first fastener component is not cooperative with the second insert fastener component to effect fastening.
14. The insert of Claim 9 wherein the first insert indicium comprises a visual or
tactile element that provides a visual or tactile cue concerning correct front-rear
orientation of the insert with respect to the chassis and/or the wearer.

15. The insert of Claim 14 wherein the visual or tactile element is selected from the
group consisting of:

an arrow or directional symbol;

a portion that substantially conforms to an outline disposed on the chassis;

a word, or abbreviation of a word, having a meaning substantially similar to
"front", "forward", "rear" or "rearward";

a color in common with a color comprised by a chassis indicium;

a word (or abbreviation thereof) that is matching or complementary to a word (or
abbreviation thereof) comprised by a chassis indicium;

a symbol that is matching or complementary to a symbol comprised by a chassis
indicium;

a first portion of a recognizable image that is substantially complementary to a
second portion of a the image comprised by a chassis indicium;

an image that is substantially common with an image comprised by a chassis
indicium;

a shape that is substantially common with a shape comprised by a chassis
indicium;

a size or arrangement of the first insert indicium that substantially matches a size
or arrangement of a chassis indicium;

a directional orientation that matches or complements a directional orientation of
a chassis indicium;

a physical feature that mates or fits with a physical feature of a chassis indicium;
or
combinations thereof.