

[DESCRIPTION]

[Title of Invention]

Disposable diaper

[Technical Field]

[0001]

The present invention relates to a disposable diaper.

[Background Art]

[0002]

Conventionally, there is known a disposable diaper having a front waistline region, a back waistline region, and a crotch region, a pair of leg-hole opening units being formed, the disposable diaper being provided with a absorber running across the crotch region and extending the front waistline region and the back waistline region, the disposable diaper being also provided with a fastening tape in the back waistline region (for example, refer to Patent Literature 1).

[0003]

In the front waistline region of the disposable diaper of Patent Literature 1, there are provided target units to which fastening tapes are to be securely attached. The fastening tapes are disposed to be spaced from each other at a position of a left side of a wearer and at a position of a right side of the wearer. When the thus structured disposable diaper is worn by the wearer, the fastening tape in the back waistline region is pulled up close to the front waistline region's side, and subsequently, the fastening tape that is positioned at the left side of the wearer is securely attached to the target unit at the left side and then the fastening tape that is positioned at the right side of the wearer is securely attached to the target unit at the right side, whereby the disposable diaper can be worn by the wearer.

[0004]

When the disposable diaper is worn by the wearer, the attendant securely attaches the fastening tape in accordance with the target unit, and fixes the fastening tape as a guide for the position of the target unit. Also, the disposable diaper can be worn in accordance with the wearer's body by adjusting a position at which the fastening tape is attached to the target unit.

[Citation List]

[Patent Literature]

[0005]

[Patent Literature 1] Japanese Unexamined Utility Model Application Publication No. S56-7708

[Summary of Invention]

[0006]

However, the disposable diaper as mentioned above has entailed the following problem.

[0007]

In so far as the disposable diaper as mentioned above is concerned, the target unit at the left side and the target unit at the right side are spaced from each other and thus an area of the target unit is small in comparison with a target unit which is continuous in a widthwise direction. The area of the target unit as a guide for the position at which the fastening tape is to be secured is small and thus an attendant hardly attach the fastening tape to the target unit, and the area of the position at which the fastening tape is to be secured is small and thus there may arise a sense of insecurity that it is difficult to adjust the position according to the wearer's body.

[0008]

Also, in view of such a problem, it is considered to continuously provide the target unit in the widthwise direction. However, a center in the widthwise of a continuous target unit, corresponding to a region between the target unit at the left side and the target unit at the right side, is often a region which is not used in an wearer of an ordinary body size and to which the fastening tape is not substantially securely attached. If the target unit is provided in the region to which the fastening tape is not substantially securely attached, wastes of material arise.

[0009]

Accordingly, the present invention has been made in view of the problem described above, and it is an object of the present invention to provide a disposable diaper which is capable of restraining a sense of insecurity such as difficulty in wearing or difficulty in adjustment while restraining the wastes of material.

[0010]

A disposable diaper (A disposable diaper 10) according to the present disclosure is summarized that the diaper has: a front waistline region; a back waistline region; and a crotch region which is disposed between the front waistline region and the back waistline region; a product longitudinal direction which is oriented from the front waistline region to the back waistline region; a product widthwise direction which is orthogonal to the product longitudinal direction; an absorber running across the crotch region and extending to at least one of the front waistline region and the back waistline region; a pair of fastening tape extending from the back waistline region to both outsides in the product widthwise direction; a pair of target units to which the fastening tape is securely attached; and an exterior sheet to which the pair of target units are fixed and the fastening tape can be securely attached; wherein the pair of target units are disposed so as to be spaced from each other in the product widthwise direction; a first design is attached to the target units, and a second design which is similar to the first design in shape is attached to a region between the pair of target units of the exterior sheet.

[Brief Description of Drawings]

[0011]

[Fig. 1] Fig. 1 is an exploded plan view of a disposable diaper according to the embodiment.

[Fig. 2] Fig. 2 is a sectional view of the disposable diaper, taken along the line F1-F1 shown in Fig. 1.

[Fig. 3] Fig. 3 is a sectional view of the disposable diaper, taken along the line F2-F2 shown in Fig. 1.

[Fig. 4] Fig. 4 is an exploded rear view of the disposable diaper shown in Fig. 1.

[Description of Embodiments]

[0012]

Next, embodiments of a disposable diaper 10 according to the present invention will be described with reference to the drawings. It is to be noted that in the following description of the drawings, same or similar constituent elements are designated by same or similar reference numerals. However, it should be kept in mind that the drawings are schematic representations and are not drawn to scale unless otherwise specified. Moreover, the drawings do not necessarily reflect the actual dimensional relationships and ratios of component.

[0013]

Therefore, specific dimensions or the like should be determined in consideration of the following description. In addition, relations or ratios among such dimensions may be different from one drawing to another.

[0014]

1. Overall Schematic Structure of Disposable Diaper

Fig. 1 is an exploded plan view of the disposable diaper according to the embodiment. Fig. 2 is a sectional view of the disposable diaper 10, taken along the line F1-F1 shown in Fig. 1. Fig. 3 is a sectional view of the

disposable diaper, taken along the line F2-F2 shown in Fig. 1. Fig. 4 is an exploded rear view of the disposable diaper shown in Fig. 1. The exploded views shown in Fig. 1 and Fig. 4 are views of a state in which an elastic member 81 of a leg stretching unit 75 and a leg side gather 80 is stretched up to a state in which wrinkles of the topsheet 50 or the side flaps 70 or the like constituting the disposable diaper are not formed.

[0015]

The disposable diaper 10 has a front waistline region 20, a crotch region 25, and a back waistline region 30. the front waistline region 20 is a portion which comes into contact a front waistline part (a dorsal portion) of a wearer. Also, the back waistline region 30 is a portion which comes into contact with a back waistline part (a ventral portion) of the wearer. The crotch region 25 is positioned between the front waistline region 20 and the back waistline region 30.

[0016]

Also, in the disposable diaper 10, a pair of leg opening units 35 are formed. The leg opening units 35 are portions which are provided at side end parts in the product widthwise direction of the disposable diaper and which are disposed along the wearer's leg hole in a state in which the disposable diaper is worn by the wearer.

[0017]

In the present embodiment, the direction from the front waistline region 20 towards the back waistline region 30 is called the product longitudinal direction L, and the direction perpendicular to the product longitudinal direction L is called the product widthwise direction W.

[0018]

The disposable diaper 10 includes an absorber 40 running across the crotch region 25 and extending from the crotch region 25 to at least one of the front waistline region 20 and the back waistline region 30. The absorber 40 is configured by an absorbent core 40a and a core wrap 40b.

[0019]

The absorbent core 40a is same as in the conventional disposable diaper, and can be configured appropriately by using popular components and materials, such as ground pulp and high absorbent polymer. The absorbent core 40a is wrapped by the sheet-like core wrap 40b.

[0020]

The core wrap 40b is a sheet for wrapping the absorbent core 40a. A part of at least the skin surface side of the core wrap 40b is configured by various nonwoven fabrics or a tissue sheet having permeability. For example, an air-through nonwoven fabric, a spunbond nonwoven fabric, or an SMS (spunbond - meltblown - spunbond) nonwoven fabric having a mass of approximately 10 to 30 g/m², or a tissue sheet having a mass of approximately 10 to 30 g/m² can be used.

[0021]

On the top side (skin contact surface side) of the absorber 40 is provided the liquid-permeable topsheet 50. Furthermore, on the back side (non-skin contact surface side) of the absorber 40 is provided a liquid-impermeable backsheet 60a.

[0022]

A side flap 70 is provided in each side edge in the product widthwise direction W of the absorber 40. The side flaps 70 are running across the front waistline region 20, the crotch region 25 and the back waistline region 30 and are disposed at outside in a product widthwise direction than the absorber 40. The side flaps 70 are made of one or two or more pieces of nonwoven fabrics overlapping one another. Furthermore, a fastening tape 90 is provided in each of the pair of side flaps 70.

[0023]

The fastening tape 90 is provided in a pair, extends along the product widthwise direction W in the back waistline region 30, and is securely attached to a non-skin contact surface of the front waistline region 20, whereby the disposable diaper 10 is retained at the wearer's body.

[0024]

The target unit 95 is provided in a pair, is disposed on the non-skin contact surface in the front waistline region, and is structured so that the pair of fastening tapes 90 are respectively securely attached thereto. A structure of the target unit 95 will be described later in detail.

[0025]

In the embodiment, a waistline retaining unit is composed of the front waistline region 20, the back waistline region 30, and the fastening tape 90. The waistline retaining unit of the back waistline region 30 is a range extending in the widthwise direction from a region in which an engagement member of the fastening tape 90 has been provided. The waistline retaining unit of the front waistline region 20 is a range extending in the widthwise direction from a region in which the target unit 95 has been provided.

[0026]

Also, the disposable diaper 10 is provided with a crotch stretching unit 200 which is disposed in a region overlapping with the absorber of the crotch region 25. It is to be noted that a structure of the crotch stretching unit 200 will be described later in detail.

[0027]

At the side flaps 70, there are provided a pair of leg stretching units 75 which are disposed inside of product widthwise direction more significantly than the leg opening units 35 and which are stretchable in the product longitudinal direction L.

[0028]

The leg stretching unit 75 is longer than the crotch stretching unit 200 in the product longitudinal direction L, and is provided more outside than the crotch stretching unit 200 in the product widthwise direction W.

[0029]

It is sufficient if the leg stretching unit 75 is structured so that the leg opening unit 35 can be stretched in the product longitudinal direction, and the leg stretching unit may be disposed along the leg opening unit 35 or may be disposed in a state in which a part of the leg stretching unit is inclined as a guide for the leg opening unit 35.

[0030]

Also, the leg stretching unit 75 is composed of an elastic sheet or a yarn rubber or the like. The leg stretching unit 75 is a portion which substantially shrinks in the product longitudinal direction, and is also based on a conceptual idea of excluding a portion at which an elastic sheet has been disposed in a state in which a shrink force is not attained.

[0031]

Furthermore, a pair of leg side gathers 80 extending along the product longitudinal direction L are provided at the inner side of the pair of leg stretching units 75 (towards the center in the product widthwise direction W). The leg side gathers 80 are provided at inside ends in the product widthwise direction of the side flap 70, and are rising-type stretching gathers disposed to be inner in the product widthwise direction than the leg stretching unit 75. The leg side gathers 80 are disposed at inside ends in the product widthwise direction than the leg stretching units 75. As the leg side gathers 80, a known structure in the prior art can be employed, and specifically, these gathers may be composed of a sheet material other than that for the side flap 70.

[0032]

Also, between the pair of fastening tapes in the product widthwise direction, a waistline stretching unit 85 which is stretchable in the product widthwise direction is provided. The waistline stretching unit 85 shrinks between the fastening tapes in the product widthwise direction.

[0033]

In the embodiment, the waistline stretching unit 85 is composed of an elastic sheet. Although members constituting the waistline stretching unit 85 are not limited in particular, it is preferable to employ a member which is as thin as possible, which is low in bending rigidity, and which is small in widthwise inclusion rate. The waistline stretching unit 85 is composed of a material with a low bending rigidity, whereby the waistline stretching unit 85 is made bendable along the body, and the waistline stretching unit 85 can be fitted along the body without applying a load on the wearer's body. Also, the waistline stretching unit 85 is composed of a material with a small widthwise inclusion rate to thereby restrain the shrink in the product longitudinal direction of the disposable diaper in a case where the disposable diaper has been stretched in the product widthwise direction, and to be thereby able to restrain pulling down to the crotch side of the disposable diaper around the waistline of the wearer.

[0034]

In the embodiment, as the waistline stretching unit 85, an elastic film of 20 g/m² to 45 g/m² in basis weight was employed.

[0035]

The waistline stretching unit 85 is pulled to 1.5 times to 2.5 times of a length in a non-stretched state (a natural state) and subsequently is adhesively bonded with an exterior sheet 60 by hot melt adhesive agent or a heating treatment or the like

[0036]

In the embodiment, the waistline stretching unit 85 is disposed between the exterior sheet 60 and a backsheet 60a. However, in a structure in which a core wrap 40b extends to the outside in the product longitudinal direction more significantly than an absorbent core 40a, the waistline stretching unit 85 may be disposed between the core wrap 40b and the backsheet 60a or the exterior sheet 60. A position of the waistline stretching unit is not limited in particular. Also, in a region in which no absorber is disposed, this waist stretching unit may be disposed between a side flap 70 and the backsheet 60a or the exterior sheet 60.

[0037]

It is to be noted that, although the waistline stretching unit according to the embodiment is structured so as to stretch in the product widthwise direction, this waistline stretching unit may be structured so as to stretch in the product widthwise direction and the product longitudinal direction.

[0038]

The fastening tape 90 is installed in the region of the side flaps 70 corresponding to the back waistline region 30. The fastening tape 90 is provided with: a base sheet 91 coupled with the side flap 70; and a hook sheet 92 in which engagement hooks (not shown) as a plurality of engagement members are provided, and which is fixed to the base sheet 91. The hook sheet 92 is a region in which the engagement members are provided, and the waistline retaining unit as mentioned above is a region extending in the product widthwise direction from the hook sheet 92.

[0039]

The hook sheet 92 is fixed to specifically, joined with the base sheet 91. The hook sheet 92 and the base sheet 91 are desired to be joined such that the rigidity of the fastening tape 90 does not become more than necessary. Specifically, the hook sheet 92 and the base sheet 91 are desired to be joined by a hot-melt adhesive applied

intermittently in dot shape, line shape, or spiral shape. The hook sheet 92 and the base sheet 91 may also be joined with a heat seal.

[0040]

The base sheet 91 is configured by one layer of nonwoven fabric or two or more plurality of layers of nonwoven fabric layered on each other. A nonwoven fabric manufactured by a manufacturing method such as spun bond (SB) or spun bond-melt blown-spun bond (SMS) can be used as the base sheet 91. The basis weight of the nonwoven fabric (or a basis weight in the case of a plurality of layers) configuring the base sheet 91 is between 30 and 120 g/m², and desired to be between 40 and 90 g/m².

[0041]

2. Structure of Target Unit and Exterior Sheet

A pair of target units 95 is disposed in a symmetrical manner passing through the center in the product widthwise direction of the disposable diaper 10 and extending in the product longitudinal direction. The target units 95 are fixed to the non-skin contact side surface of the exterior sheet 60 of the front waistline region. The target units 95 are provided to be spaced from each other at a position corresponding to the left side of the wearer and at a position corresponding to the right side thereof, so that a pair of fastening tapes are respectively securely attached thereto.

[0042]

The target unit 95 is configured so as to be hooked by an engagement hook of a fastening tape, and functions as a loop of an engagingly locking system of hook and loop. As the target unit 95, for example, air-through nonwoven fabric can be employed.

[0043]

As the target unit 95, for example, there can be employed a textile nonwoven fabric or a polyolefin-based thermoplastic synthetic resin film made of polyolefin-based thermoplastic synthetic resin fibers. Also, a loop mounted to the target unit can be formed of a polyolefin-based thermoplastic synthetic resin.

[0044]

Further, as the target unit 95, there may be employed a bulky nonwoven fabric, a part of which is embossed to thereby prevent scuffing of a surface of the nonwoven fabric.

[0045]

To the target unit, a first design M11 is imparted. It is sufficient if the first design M11 is structured so as to be visible from the non-skin contact side surface of the disposable diaper 10, and is imparted to at least the non-skin contact side surface of the target unit 95.

[0046]

In the embodiment, the first design M11 is a diamond-shaped design which is disposed in a lattice shape, and is formed by way of emboss processing of a nonwoven fabric which constitutes the target unit 95.

[0047]

To the exterior sheet 60 to which the target unit 95 is fixed, a second design M12 is imparted. It is sufficient if the second design M12 is structured so as to be visible from the non-skin contact side surface of the disposable diaper 10, and is imparted to at least the non-skin contact side surface of the exterior sheet 60.

[0048]

In the embodiment, the second design M12 is a diamond-shaped design which is disposed in a lattice shape, and is formed by way of emboss processing of a nonwoven fabric which constitutes the exterior sheet 60. The diamond-shaped design as the first design is greater than the diamond-shaped design as the second design.

[0049]

Also, the exterior sheet 60 is structured so that the fastening tape can be securely attached thereto. The exterior sheet may be composed of a nonwoven fabric or may be a sheet member in which there is provided a loop member in which a hook member is to be hooked on the non-skin contact surface's side.

[0050]

It is sufficient if the first design M11 and the second design M12 may be similar to each other in shape, these designs may be in the same dimensional shape or may be similar to each other in shape, dimensions of which are different from each other, but shapes of which are identical to each other. Incidentally, it is sufficient if the first design M11 and the second design are similar to each other in at least external shape, and is also based on a conceptual idea of including a structure in which the numbers of lines obtained as a contour or thicknesses of lines are different from each other. Also, in a case where the first design and the second design are polygonal, the first design and the second design are in polygonal shapes in which the numbers of corners are identical to each other, and is also based on a conceptual idea of including a structure in which angles of corners are different from each other.

[0051]

In a region between the pair of target units of the exterior sheet, the second design M12 that is similar to the first design M11 in shape is imparted. The first design M11 that is imparted to the target unit and the second design M12 that is imparted to the region between the pair of target units are similar to each other in shape and thus the pair of target units and the region between the target units of the exterior sheet can be visually integrated with each other.

[0052]

Therefore, while a target to be securely attached by the fastening tape is the pair of target units 95, an attendant integrally recognizes the region between the target units to be thereby able to restrain a sense of insecurity exerted by a small area of a respective one of the target units.

[0053]

Further, the fastening tape can be securely attached to the region between the target units of the exterior sheet, for example, and thus, even in a case where the fastening tape has been attached to a position having overflowed from the target units, in particular, the region between the target units, it is possible to attach the fastening tape to the front waistline region and then retain the disposable diaper 10 at the wearer's body.

[0054]

The region between the pair of target units 95 is often a region which is not used in a wearer of an ordinary body size and to which the fastening tape is not substantially securely attached. If a target unit is provided in such a region, wastes of material arises. Further, in the target unit 95 made of a material of which rigidity is higher than that of a sheet member constituting the exterior body such as the exterior sheet 60, if a layout region of the target units 95 increases, the rigidity of the entire disposable diaper increases, and there is an apprehension that a sense of wearing is impaired. However, the target units 95 are provided so as to be spaced from each other at the left and right to be thereby able to restrain waists of material and to restrain impairment of the sense of wearing exerted by the rigidity of the target units.

[0055]

Also, the target units are disposed so as to be spaced from each other at the left and right, whereby the position at the center in the widthwise direction of the disposable diaper can be recognized by touching the region between the target units. This is preferable in a case where the center in the widthwise direction of the disposable diaper cannot be visually recognized at a dark night, for example. Further, the target units are disposed so as to be spaced from each other at the left and right, whereby the rigidity at a respective one of

portions at which the target units have been disposed is higher than that of the region between the target units, and wrinkles hardly arises in the regions in which the target units have been disposed.

[0056]

The exterior sheet and the target units are made of a nonwoven fabric. A basis weight of the nonwoven fabric is 15 g/m² to 100 g/m², for example. As a fiber material employed in the nonwoven fabric, a composite fiber having a core-clad structure is selected. This composite fiber is made of a resin of which a clad component is lower in melting point than a resin constituting a core component. A composition rate of these resins is preferable 50% or more, and is further preferably 100%.

[0057]

As a fiber material, there can be employed a composition of which the core component/clad component is, for example, PP (polypropylene)/PE (polyethylene), PP/low melting point PP, PET (polyethylene terephthalate)/low melting point PET, PET/PE without being limitative thereto. As a fiber to be mixed with the fiber material, the one which is well-compatible with the clad component resin of the fiber material is selected. For example, polyamide such as rayon, PET, PP, nylon or the like, or a fiber such as acryl, urethane, cotton or the like can be selected without being limitative thereto.

[0058]

The thickness of the fiber material is 1 dtex to 15 dtex, and is preferably 1.5 dtex to 9 dtex. If the thickness is less than 1 dtex, the strength of a single yarn is too low, and a fiber is easily cut at the time of engagement with a male member, web formation at a card becomes difficult, and the productivity lowers. In a case where the thickness is 15 dtex, the texture is impaired, the number of fibers per unit weight decreases, and the strength of engagement with the male member extremely lowers.

[0059]

A length of the fiber material to be used is 25 mm to 100 mm, and is preferably 30 mm to 60 mm. In a case where the length is less than 25 mm, the fiber is too short, which causes fluffing to arise, or alternatively, if the length exceeds 100 mm, formation of webs at the card becomes difficult, and the productivity lowers.

[0060]

It is preferable that the exterior sheet be constituted by employing a crimped fiber. As the crimped fiber, for example, there can be employed a fiber obtained by employing a heat shrink crimping approach. In a case where the heat shrink crimping approach is employed, a composite fiber according to a side-by-side type or a core-clad type made of polypropylene and polyethylene, for example, is spun, and then crimping can be developed by a heat shrink difference due to a difference in the melting point. In particular, it is preferable to employ a composite fiber which is obtained by a heat shrink crimping approach according to an eccentric core-clad type while polypropylene is employed as a core and copolymer of ethylene/propylene is employed as a clad, since a desired crimping count, a crimping rate, a crimping and stretching rate, a crimping and restoring rate or the like can be adjusted. By employing a nonwoven fabric employing a crimped fiber, a bulky nonwoven fabric can be produced, a good texture can be achieved while a design due to embossment is easily visually recognized.

[0061]

The exterior sheet and the target units are disposed on the non-skin contact side surface of the disposable diaper, and a wearer or the like often comes into contact therewith. The exterior sheet and the target units are composed of a nonwoven fabric, whereby a skin contact comfort can be improved. Also, the exterior sheet and the target units are composed of the nonwoven fabric, whereby a fiber constituting the nonwoven fabric functions as a loop member, and engagement with a hook member of the fastening tape is possible without providing an additional loop member.

[0062]

The first design M11 and the second design M12 of the embodiment are formed by way of emboss processing, and the embossment rate of a target unit is structured to be higher than the embossment rate of the exterior sheet. The embossment rate used herein designates a ratio of an area in which embossment with respect to an entire area has been formed. The embossment rate of the target unit is higher and thus fluffing of fiber can be restrained, and in particular, when the fastening tape is repeatedly attached and removed, fluffing of the fiber that constitutes a nonwoven fabric can be restrained.

[0063]

Also, although the first design M11 and the second design M12 of the embodiment are embossment portions which have been formed by way of emboss processing, the structures of the first design M11 and the second design M12 are not limitative thereto.

[0064]

For example, at least one of the first design M11 and the second design M12 may be formed by any one of emboss processing, thermal deposition, and ultrasonic sealing. The first design M11 or the second design M12 is formed by any one of emboss processing, thermal deposition, and ultrasonic sealing, whereby the design can be easily imparted to a nonwoven fabric at a site targeted to be formed, during the manufacturing process. Also, a temperature, a pressure, and an oscillation frequency are adjusted to thereby easily control a degree of a portion which is to be a design (such as contrast, being made conspicuous or inconspicuous with respect to the periphery, or sharpening up the contour) and thus a visually recognizable design can be obtained.

[0065]

Also, at least one of the first design M11 and the second design M12 may be composed of a colored portion of the backsheet that is disposed between the exterior sheet and the absorber. The colored portion can be provided on a surface of the exterior sheet's side of the backsheet. By providing the colored portion at the backsheet, the colored portion can be provided without losing a texture or softness of the nonwoven fabric of the exterior sheet with which the wearer or the attendant most frequently comes into contact.

[0066]

In addition, the exterior sheet and the target units that made of a nonwoven fabric may be that there are provided a plurality of arrays of protrusive fiber dense portions which are high in basis weight of fiber materials and a plurality of arrays of groove-shaped fiber sparse portion which are provided between these fiber dense portions and which are lower in basis weight of fiber materials than that of the fiber dense portions, and the fiber dense portions or the groove portions may be the first design M11 or the second design M12.

[0067]

In addition, it may be that the first design M11 and the second design M12 made of any one of the structures as mentioned above are provided, and a design different from different from a respective one of the first design M11 and the second design M12 is imparted by another structure. Specifically, it may be that the first design M11 and the second design M12 made of emboss processing are provided, and a stripe-shaped design made of a fiber dense portion and a fiber sparse portion is imparted to the target unit or the entire exterior sheet.

[0068]

A third design M13 which is different from the respective one of the first design M11 and the second design M12 is imparted to the region between the pair of target units. The third design M13 is a colored portion which has been printed at the backsheet, and is also a character design. The third design M13 is provided at a position which does not overlap with the pair of target units 95.

[0069]

The third design M13 is different from the first design M11 and the second design M12. A paraphrase “different designs” signifies that at least external shapes are different from each other, and are also based on a conceptual idea that similar designs in shape are not included.

[0070]

The third design M13 that is different from the respective one of the first design M11 and the second design M12 is imparted to the region between the pair of target units to thereby enable the attendant to keep track of the position at the center in the widthwise direction of the region between the pair of target units by way of the third design M13 of which a shape is different from those of the first design M11 and the second design M12. The position at the center in the widthwise direction of the region between the pair of target units correspond to the center in the product widthwise direction of the disposable diaper.

[0071]

The attendant positions the center in the product widthwise direction of the disposable diaper to the center of the wearer's body at the time of wearing the disposable diaper. The third design M13 is provided at the center in the widthwise direction of the region between the pair of target units, whereby the attendant easily carries out alignment at the time of wearing. The third design M13 is a position which does not overlap with the pair of fastening tapes and thus the attendant can always visually recognize the design in a state in which the fastening tapes are securely attached to the target units.

[0072]

Also, in a comparatively dark place such as at night as well, it is desirable that the third design M13 be more conspicuous than a respective one of the first design M11 and the second design M12 in order to carry out alignment of the disposable diaper as a guide for the third design M13.

[0073]

Specifically, a dimension of the third design M13 is set to be greater than a respective one of a dimension of the first design M11 and a dimension of the second design M12 or a color of the third design M13 and a color of the first design M11 and a color of the second design M12 are formed as a combination of component colors, and the color of the first design M11 and the color of the second design M12 are not formed as the combination of component colors, whereby the third design M13 can be made more conspicuous than the respective one of the first design M11 and the second design M12. For example, as a design of dark color, a design with more black color, less white color, and more pure color can be selected.

[0074]

A force of engagement between the fastening tape and the region between the pair of target units of the exterior sheet is lower than a force of engagement between the fastening tape and the target units.

[0075]

A hook sheet 92 is not bonded with a tip end of the fastening tape (an outside end of the widthwise direction in an exploded state shown in Fig. 1), and this tip end is obtained as a grip portion which is gripped by the wearer when detaching operation of the fastening tape.

[0076]

In a state in which the fastening tape is securely attached to the target units 95, the tip end of the fastening tape (the outside end of the widthwise direction in the exploded state shown in Fig. 1) is positioned inside of the product widthwise direction more significantly than the hook sheet 92 of the fastening tape. Therefore, when the fastening tape is removed from the target units 95, the wearer pulls the fastening tape from the inside of the product widthwise direction toward the outside of the product widthwise direction.

[0077]

At this time, for example, in a case where the hook sheet 92 of the fastening tape is securely attached so as to

run across the target units 95 and the region between the target units, the hook sheet 92 and the exterior sheet are disengaged from each other and then the hook sheet 92 and the respective one of the target units are disengaged from each other. By removing them in this manner, the force of engagement between the fastening tape and the region between the pair of target units of the exterior sheet is lower than the force of engagement between the fastening tape and the respective one of the target units and thus the fastening tape can be smoothly removed.

[0078]

Further, a leg opening unit 35 is formed to surround the leg-hole of a wearer in a state in which the fastening tape 90 is securely attached to the target units 95. Therefore, there may be a case in which, when the wearer moves his or her legs, a force of the fastening tape being released from the target units acts thereon. At this time, the force for the fastening tape being released from the target units acts from the leg opening unit 35 side. Hence, the force acts on the target units more strongly than on the region between the target units.

[0079]

At this time, the force of engagement between the fastening tape and the respective one of the target units is higher than the force of engagement between the fastening tape and the region between the pair of target units of the exterior sheet and thus even in a case where the force of the fastening tape being released from the target units has acted thereon, the fastening tape and the respective one of the target units can be hardly disengaged from each other. Therefore, the worn state can be maintained.

[0080]

It is to be noted that measurement of the "force of engagement" in the specification is carried out by the following measurement method.

[0081]

The force of engagement was measured by employing an autograph testing instrument (AG-X10plus) available from Shimadzu Corporation. Specifically, a sample obtained by cutting out, at a width of 30 mm, a hook sheet and a substrate sheet from a fastening tape targeted to be measured, was prepared (in a case where it is impossible to cut out them at the width of 30 mm, the results were determined by conversion into the width of 30 mm). Similarly, a sample obtained by cutting out a target unit (an exterior sheet) to which a fastening tape is engagingly attached was prepared.

[0082]

Next, both of the samples were crimped by moving a 700 g roller (85 mm in diameter, 45 mm in width) along the attaching and removing direction of a main fastening tape at a velocity of 5 mm per minute. By setting both of the crimped samples to the Autograph testing instrument, a force of engagement between these samples at a pulling velocity of 300 mm per minute was measured (unit: N/30 mm). At this juncture, a pulling direction was set so that a hook sheet surface is at an angle of 135 degrees with respect to a target tape surface. Also, a peeling direction of the hook sheet was a main direction at the time of removing the fastening tape from the target units.

[0083]

A length L11 in the product widthwise direction of one of the pair of target units is 50 mm to 90 mm, and a length L12 in the product widthwise direction of such one of the pair of target units is 30 mm to 50 mm. A length L13 in the product widthwise direction of a region between the pair of target units of the exterior sheet is 20 mm to 50 mm. Also, a distance between the outside ends in the product widthwise direction of the pair of target units is 120 mm to 230 mm.

[0084]

A length in the product longitudinal direction of the fastening tape is 20 mm to 40 mm from the viewpoint that

the force of engagement is ensured and leg feeding is not blocked. It is preferable that the length L12 in the product longitudinal direction of the target units be larger by 10 mm or more than the length in the product longitudinal direction of the fastening tape. Also, the length in the product longitudinal direction of the target units is not too large, whereby it is possible to provide a guide for a fastening position of the fastening tape, and an appropriate position can be guided without losing the fastening position.

[0085]

A width in the product widthwise direction of a grip portion which is a tip end of the fastening tape is on the order of 10 mm from the viewpoint of operability. Also, a width in the product widthwise direction of the hook sheet is 15 mm to 30 mm from the viewpoints of stability of engagement and operability. It is sufficient if the length L11 in the product widthwise direction of one of the target units is a dimension at which at least the hook sheet is securely attached, and the length can be set to 50 mm to 90 mm. Also, the length L11 in the product widthwise direction of one of the target units is larger than a length in the widthwise direction of the hook sheet and thus the mounting position of the hook sheet can be changed and can be adjusted according to an abdominal convex side. Further, the length L13 in the product widthwise direction between the pair of target units of the exterior sheet is 20 mm to 50 mm and thus a design of a recognizable size can be provided.

[0086]

It is to be noted that measurement of the "length" in the specification is carried out by the following measurement method.

[0087]

In a case where the disposable diaper 10 was sealed in a package or the like, the diaper was taken out from the package, and in that state, a sample having been left for 12 hours under an atmosphere of 20 degrees Centigrade $\pm$ 2 degrees Centigrade and 60% $\pm$ 5%RH in relative humidity was employed.

[0088]

Next, by employing a spring measure available from Shinwa Rules Co., Ltd. (tape: glass fiber vinyl chloride coating), a length of this state of the disposable diaper 10 was measured so as to be taken along a site targeted to be measured. Here, with respect to 10 samples, the measurement as mentioned above was carried out in the respective states, and an average value thereof was obtained as the length.

[0089]

3. Shape of Crotch Stretching unit

Hereinafter, a shape of the crotch stretching unit 200 will be explained. The crotch stretching unit 200 is configured to maintain a flat shape in a part of the crotch region at the time of putting the disposable diaper on a wearer, as compared to the other part of the absorber 40. The crotch stretching unit 200 is stretchable configured at least in the product longitudinal direction L or in the product widthwise direction W.

[0090]

The crotch stretching unit 200 is provided so as to be individually independent of the leg stretching unit 75, and at a position which overlaps with the absorbent core 40a (at a position between the core wrap 40b enveloping the absorbent core 40a and the backsheet 60a), this crotch stretching unit is structured so as to shrink 60% or more of the length in the product widthwise direction of the absorbent core 40a at the position that overlaps therewith. Thus, a portion at which the absorbent core 40a has been disposed is shrunk by the crotch stretching unit 200, whereby the absorbent core 40a shrinks, and a flat shape is easily maintained in comparison with a portion at which the absorbent core 40a does not shrink.

[0091]

On the other hand, the absorbent core 40a that is positioned at the front waistline region or the back waistline region that is positioned outside of the product longitudinal direction more significantly than the crotch

stretching unit 200 is not shrunk by the crotch stretching unit 200. Therefore, in a state of being retained around the wearer's waist or waistline by the fastening tape, the crotch stretching unit 200 that is maintained in a flat shape at the crotch portion of the disposable diaper does not excessively come into intimate contact with the body, and as a result, the crotch stretching unit 200 is appropriately disposed along the body.

[0092]

Also, in a case where the crotch stretching unit 200 is stretchable along the product longitudinal direction L, the front waistline region 20 and the back waistline region 30 are easily risen up due to the shrink of the crotch stretching unit 200, and at the time of wearing, a crotch region which is flat along the body can be formed at the wearer's crotch portion.

[0093]

As a result, the front waistline region 20 and the back waistline region 30 are risen up from the crotch stretching unit 200 and thus the fitting property of the disposable diaper 10 is improved.

[0094]

That is, the disposable diaper 10 can be stably worn so that the crotch region 25 of the disposable diaper 10 is disposed at the wearer's crotch portion due to the shrink of the crotch stretching unit 200.

[0095]

Further, the crotch stretching unit 200 may be structured so as to run across the center of the disposable diaper 10 in the product longitudinal direction L and extend to the front waistline region 20 side and the back waistline region 30 side.

[0096]

Furthermore, the center of the crotch stretching unit 200 in the product longitudinal direction L is disposed at the front waistline region 20 side more significantly than the center of the disposable diaper 10 in the product longitudinal direction L.

[0097]

On the other hand, in a case where movement of the wearer has arisen (in particular, when the wearer lifts his or her legs at the laydown posture, stands up or sits down), the stretching quantity of the skin on the surface of the wearer's body (the variation quantity of the length) is greater in ventral side (buttocks part) than in dorsal side.

[0098]

The center of the crotch stretching unit 200 in the product longitudinal direction L is disposed at the front waistline region 20 side more significantly than the center of the disposable diaper 10 in the product longitudinal direction L, whereby the length in the product longitudinal direction L of the back waistline region 30 in a natural state of the disposable diaper 10 can be larger than the length in the product longitudinal direction L of the front waistline region 20. Therefore, even in the case where the movement of the wearer has arisen, it is possible to restrain a circumstance that the front waistline region 20 and the back waistline region 30 of the disposable diaper 10 move in an orientation along the product longitudinal direction L.

[0099]

It is to be noted that the crotch stretching unit 200 is preferably configured by a stretchable sheet member.

[0100]

By making the crotch stretching unit 200 from the stretchable sheet member, the absorbent core 40a in the region in which the stretching sheet member is arranged is uniformly contracted, thereby making it easier to maintain a flat shape. It is to be noted that the stretchable sheet member may be made from, for example, a similar stretchable sheet to that of the leg stretching unit 75.

[0101]

Also, in place of the elastic sheet as mentioned above, a plurality of yarn-shaped or belt-shaped elastic members made of a polyurethane elastic fiber or a natural rubber are disposed, whereby the crotch stretching unit 200 may be structured. In this case, in order to uniformly shrink the absorbent core 40a by the crotch stretching unit 200, it is preferable that intervals between elastic members be 7 mm or less or it is more preferable that the intervals be 5 mm or less. In addition, in order to uniformly shrink the absorbent core 40a, it is desirable that a difference in intervals of the elastic members adjacent to each other be 2 mm or less.

[0102]

The stretch rate of the crotch stretching unit 200 is specifically, preferably 1.2 to 1.8 times. For example, in the present embodiment, the stretch rate of the crotch stretching unit 200 set to 1.4 times. A ratio of expansion and contraction means degree of expansion and contraction (product longitudinal direction L) of the crotch stretching unit 200 and is determined as follows.

[0103]

Ratio of expansion and contraction = (length in the expansion and contraction direction of the crotch stretching unit 200 in the maximum stretched state) / (length in the expansion and contraction direction of the crotch stretching unit 200 in a natural state)

It is to be noted that the measurement of ratio of expansion and contraction is the same as the leg stretching unit of the above, description thereof will be omitted.

[0104]

By thus setting the stretch rate of the crotch stretching unit 200 to 1.2 to 1.8 times, it is possible to favorably follow the stretching of the skin of the wearer.

[0105]

For example, when the wearer is slouchy such that the front side of the body is cringing, the skin at the side of the hip portion of the wearer stretches by approximately 30% as compared to the state when the body has been stretched out.

[0106]

Namely, if a stretch rate of the crotch stretching unit 200 is less than 1.2 times, a shrinkage of the crotch stretching unit 200 in a natural state is not sufficient in degree; a shrinkage in an absorber disposition region in the crotch portion of the disposable diaper 10 is small in degree in comparison with a case in which the crotch stretching unit 200 is not provided; it becomes insufficient for the crotch portion of the disposable diaper 10 to form a flat shape so as to be taken along the body at the wearer's crotch.

[0107]

On the other hand, when the stretch rate of the crotch stretching unit 200 is more than 1.8 times, the contraction size in the contraction direction of the crotch stretching unit 200 becomes too large, because of which the region where the crotch stretching unit 200 exists easily comes in close contact with the body of the wearer rather than running along it, and the disposable diaper (10 easily shifts to the lower side of the wearer.

[0108]

Also, the amount of shrinkage in the product longitudinal direction L of the crotch stretching unit 200 may be configured so as to be 2% to 8% of a length in the product longitudinal direction L of the disposable diaper 10.

[0109]

It is to be noted that the amount of shrinkage is a difference between a length "b (mm)" in a stretched state to an extent such that wrinkles become sufficiently small and a surface of a sample is close to be smooth and a length "a (mm)" in a natural state in an orientation along the stretching direction of the sample, and this amount can be computed by (b - a).

[0110]

The Inventor successfully verified that, when the amount of shrinkage in the product longitudinal direction L of the crotch stretching unit 200 is 2% to 8% of the length in the product longitudinal direction L of the disposable diaper 10, in the course of attaching the disposable diaper 10 to the wearer, the crotch stretching unit 200 is easily preferably taken along the wearer's body.

[0111]

Here, if the amount of shrinkage in the product longitudinal direction L of the crotch stretching unit 200 is larger than 8%, the crotch stretching unit 200 shrinks too much; the length in the product longitudinal direction L of the disposable diaper 10 is insufficient; it becomes difficult to wear the disposable diaper 10 on the wearer's body; or alternatively, the disposable diaper 10 and the wearer's body excessively come into intimate contact with each other at the crotch region 25, and are easily displaced from each other.

[0112]

On the other hand, if the amount of shrinkage in the product longitudinal direction L of the crotch stretching unit 200 is less than 2%, it becomes difficult to attain an advantageous effect of the crotch stretching unit 200 itself that the disposable diaper 10 is brought into close contact with the wearer's body.

[0113]

Furthermore, a center of the crotch stretching unit 200 in the product longitudinal direction L is arranged closer to the side of the front waistline region 20 as compared to a center of the disposable diaper 10 in the product longitudinal direction L. Furthermore, the crotch stretching unit 200 is arranged so as to span the center of the disposable diaper 10 in the product longitudinal direction L.

[0114]

In such a case, in consideration of the rigidity of the absorbent core 40a and the rigidity of other components making up the disposable diaper 10, the thickness or arrangement pitch can be arbitrarily selected for an elastic member to be used. However, it is preferable to make the entire region of side edge unit in the product widthwise direction W of the absorbent core 40a be in a contracted state at the time when a main body of the disposable diaper 10 is made in a natural state (non-stretched state).

[0115]

Also, in the crotch region 25 of the absorber 40, a cutout 115 (a cutout 125) is formed. The cutout 115 and the cutout 125 are regions in which the absorbent core 40a constituting the absorber 40 does not exist. In the embodiment, the cutout 115 and the cutout 125 come under low rigidity portions at which a basis weight of the absorbent core 40a is lower than that of any other portion of the absorbent core 40a. It is to be noted that, in place of forming the cutout 115 and the cutout 125, regions of the cutout 115 and the cutout 125 may be such that the basis weight of the absorbent core 40a is lower than that of any other portion of the absorbent core 40a.

[0116]

The cutout 115 and the cutout 125 exist along an edge in the product longitudinal direction L of the crotch stretching unit 200. Incidentally, it is preferable that, even if the cutout 115 and the cutout 125 are formed, the absorbent core 40a that is positioned in the front waistline region 20 and the back waistline region 30 and the absorbent core 40a that is positioned in the crotch region 25 are continuous in the product widthwise direction, in particular, without being completely being separated from each other.

[0117]

As the cutout 115 and the cutout 125 run towards the outer side of the product widthwise direction W, the length in the product longitudinal direction L (natural state of the disposable diaper 10) keeps on widening. As a result of such a shape, the outer side of the product widthwise direction W of the absorbent core 40a can constrict easily, and thus, a flat "bottom unit" is formed in the disposable diaper 10. Furthermore, the

absorbent core 40a positioned towards the front waistline region 20 from the cutout 115, and the absorbent core 40a positioned towards the back waistline region 30 from the cutout 125 rise up from the "bottom unit", and can easily curve along the roundness of the body of the wearer (the abdomen and the hip).

[0118]

Furthermore, the edge towards the front waistline region 20 (back waistline region 30) of the cutout 115 (cutout 125) is arc shaped. The shape of the edge of the cutout 115 (cutout 125) is such that the center of the arc is positioned in the back waistline region 30 (front waistline region 20) from the edge. As a result of such a shape, the deformation along the roundness of the body of the wearer arises more easily and remarkably.

[0119]

4. Method of manufacturing absorbent article

Next, an example of a method of manufacturing the absorbent article according to the present embodiment is explained. As far as the method that is not described in the present embodiment is concerned, the existing method can be used. Furthermore, the manufacturing method explained below is only an example, and the absorbent article can also be manufactured by other manufacturing methods. The method of manufacturing the absorbent article includes at least a component-forming step, a component-loading step, a leg-hole-forming step, and a cutting step.

[0120]

In the component-forming step, components configuring the absorbent article are formed. Specifically, for example, an absorbent material configuring the absorber is deposited to form the absorber 40.

[0121]

In the component-placing step, elastic sheets constituting the leg stretching unit 75; other webs such as webs constituting the topsheet; and components constituting the disposable diaper 10 such as the leakage preventing sheet, the absorber, and the leg stretching unit 75 or the like are placed on the webs constituting the backsheet.

[0122]

In the leg-hole forming step, the topsheet 50, the exterior sheet 60, and the backsheet 60a are cut. In this manner, a leg opening unit 35 which is disposed at the wearer's leg hole is formed.

[0123]

In the cutting step, a continuous body in which the topsheet 50, the backsheet 60a, the absorber 40 are arranged is cut into a size of a single product in the product widthwise direction W. In this manner, the disposable diaper 10 is manufactured.

[0124]

5. Other Embodiments

As described above, although the contents of the present invention were disclosed through the embodiments of the present invention, it is not to be understood that the statements and drawings forming a part of this disclosure limit the present invention. From this disclosure, a variety of alternate modes, examples, and operational techniques would be self-evident to one skilled in the art.

[0125]

As described above, needless to say, the present invention includes various embodiments and the like not described here. Accordingly, the scope of the present invention is defined only by the appended claims in view of the above description.

[0126]

It is to be noted that all the contents of Japanese Patent Application No. 2012-247497 (which was filed on November 9, 2012) are incorporated in the present specification by reference.

[Industrial Applicability]

[0127]

A disposable diaper which is capable of restraining a sense of insecurity such as difficulty in wearing or difficulty in adjustment while restraining wastes of material can be provided.

[Explanation of Numerals]

[0128]

10... Disposable diaper

20... Front waistline region

20E... Outside end

25... Crotch region

30... Back waistline region

30E... Outside end

35... Leg opening unit

35I... Inside end

40... Absorber

40a... Absorbent core

40b... Core wrap

50... Topsheet

60... Exterior sheet

60a... Backsheet

70... Side flap

75... Leg stretching unit

77... Buttock part stretching unit

77F... Front end

80... Leg side gather

81... Elastic member

85... Waistline stretching unit

90... Fastening tape

91...Base sheet

92... Hook sheet

95... Target unit

115... Cutout

125... Cutout

200... Crotch stretching unit

M11... First design

M12... Second design

M13... Third design

L... Product longitudinal direction

W... Product widthwise direction

[CLAIMS]

[Claim 1]

A disposable diaper having: a front waistline region; a back waistline region; and a crotch region which is disposed between the front waistline region and the back waistline region, the disposable diaper having: a product longitudinal direction which is oriented from the front waistline region to the back waistline region; and a product widthwise direction which is orthogonal to the product longitudinal direction, the disposable diaper comprising:

- an absorber running across the crotch region and extending to at least one of the front waistline region and the back waistline region;

- a pair of fastening tape extending from the back waistline region to both outsides in the product widthwise direction;

- a pair of target units to which the fastening tape is securely attached; and

- an exterior sheet to which the pair of target units are fixed and the fastening tape can be securely attached, wherein

 - the pair of target units are disposed so as to be spaced from each other in the product widthwise direction;

 - a first design is attached to the target units; and

 - a second design which is similar to the first design in shape is attached to a region between the pair of target units of the exterior sheet.

[Claim 2]

The disposable diaper according to claim 1, wherein the exterior sheet and the target units are made of a nonwoven fabric.

[Claim 3]

The disposable diaper according to claim 1 or 2, wherein at least one of the first design and the second design is formed by any one of emboss processing, thermal deposition, and ultrasonic sealing.

[Claim 4]

The disposable diaper according to claim 1 or 2, comprising: a backsheet which is disposed between the exterior sheet and the absorber, wherein

- a colored portion is provided on a surface of the exterior sheet's side of the backsheet, and

- at least one of the first design and the second design is composed of the colored portion of the backsheet.

[Claim 5]

The disposable diaper according to any one of claims 1 to 4, wherein

- a third design which is different from a respective one of the first design and the second design is imparted to a region between the pair of target units; and

- the third design is provided at a center in the product widthwise direction of the region between the pair of target units and at a position which does not overlap with the pair of target units.

[Claim 6]

The disposable diaper according to any one of claims 1 to 5, wherein

- a force of engagement between the fastening tape and the region between the pair of target units of the exterior sheet is lower than a force of engagement between the fastening tape and the target units.

[Claim 7]

The disposable diaper according to any one of claims 1 to 6, wherein

- a length in the product widthwise direction of one of the pair of target units is 50 mm to 90 mm;

- a length in the product longitudinal direction of the one of the pair of target units is 30 mm to 50 mm; and

a length in the product widthwise direction of the region between the pair of target units of the exterior sheet is 20 mm to 50 mm.