

[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 which is disposed between the front waistline region and the back waistline region, a pair of leg-hole opening units being formed therein, the disposable diaper being provided with an absorber running across the crotch region and extending toward the front waistline region and the back waistline region.

[0003]

Here, in Patent Literature 1, there is disclosed a technique of, in such a disposable diaper, in order to notify a wearing assistant of a replacement time of the disposable diaper, providing in a crotch region a hydrophilic agent as an indicator, the hydrophilic agent causing a visual change if the indicator comes into contact moisture.

[Citation List]

[Patent Literature]

[0004]

[Patent Literature 1] Japanese Unexamined Patent Application Publication No. 2004-337385

[Summary of Invention]

[0005]

However, in a case where a wearer is a younger infant, although a disposable diaper have to be frequently replaced with another one and also have to be frequently replaced at midnight, in the disposable diaper described in Patent Literature 1, a sufficient countermeasure is not taken in view of the circumstance as mentioned above.

[0006]

Also, in a case where a wearer is an elder infant, the wearer is prone to move around here and there even at the time of wearing the disposable diaper; and therefore, the disposable diaper must be worn by the wearer within a short period of time, and it is difficult to stably wear the disposable diaper described in Patent Literature 1 by the wearer.

[0007]

Further, in the disposable diaper described in Patent Literature 1, at the time of wearing, a crotch region of the disposable diaper and the excretion part of the wearer are spaced from each other too much.

[0008]

Therefore, in the disposable diaper described in Patent Literature 1, even in a case where the wearer is in the middle of excretion, there has been a problem that there may be a possibility that an indicator cannot inform the replacement time of the disposable diaper.

[0009]

For example, in the disposable diaper described in Patent Literature 1, an excretion position of the wearer and an layout region of the indicator are not coincident with each other, it is assumed that there may be a case in which the indicator does not react with moisture (does not produce discoloration), although the wearer is in excretion.

[0010]

Specifically, a wearing position of the disposable diaper has been displaced from an appropriate position to the left or right; and therefore, bodily fluid is absorbed at an end in a product widthwise direction of an absorber; and however, it is assumed that there may be a case in which the indicator that is provided at a center in the product widthwise direction does not produce discoloration.

[0011]

Further, the crotch region of the disposable diaper and the excretion part of the wearer are spaced from each other; and therefore, in a case where the wearer is in the middle of excretion at a posture of laying on the back, the bodily fluid is not absorbed by the absorber in the crotch region, and the bodily fluid is absorbed by the absorber in the back waistline region. As a result, it is assumed that there may be a case in which only the indicator that is positioned at the backside of the wearer does not produce discoloration.

[0012]

In particular, in a case where the wearer wears a rompers, a wearing assistant visually checks the indicator for leakage by opening only the crotch region of the rompers and then determines whether or not the wearer has excreted; and therefore, in a case where only the indicator that is positioned at the backside of the wearer does not produce discoloration, the wearing assistance comes to think that the wearer has not excreted.

[0013]

Previously, the replacement time of a disposable diaper has been multiply determined by touching or inhaling the disposable diaper based on the wearing assistant's rule of thumb.

[0014]

However, in recent years, due to an increasing number of cases in which a wearing assistant is unfamiliar with child care or due to reduction of time for child care of the wearing assistant, there has increased the number of circumstances in which the wearing assistant greatly depends on an indicator as to determination of the replacement time of a disposable diaper, and there has been a growing need to cause the indicator to appropriately produce discoloration.

[0015]

Also, a sense of cleanliness of wearing assistants are yearly stronger and stronger, the wearing assistants' desire to replace the disposable diaper if the wearer has excreted becomes stronger, there may also be a case in which the eccentricity of discoloration of the indicator accelerates excessive replacement of the disposable diaper.

[0016]

Accordingly, the present invention has been made in view of such a circumstance, and it is an object of the present invention to provide a disposable diaper which is capable of being stably worn by a wearer, the disposable diaper enabling an indicator to appropriately react with moisture.

[0017]

First aspect of the present invention is summerized as a disposable diaper comprising: a front waistline region; a back waistline region; a crotch region which is disposed between the front waistline region and the back waistline region; a pair of leg-hole opening units being formed therein; an absorber running across the crotch region and extending to 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; and a product widthwise direction which is orthogonal to the product longitudinal direction, the disposable diaper comprising: a leg elastic member which is formed to run across the crotch region and extend from the front waistline region to the back waistline region, along the leg-hole opening units; a waistline retaining unit which extends along the product widthwise direction in the front waistline region and the back waistline region and

which is configured to retain the disposable diaper at a body of a wearer; and a crotch stretching unit which is stretchable and which is formed at a position running across a center in the product widthwise direction in the crotch region and overlapping a region in which the absorber is disposed, wherein the crotch stretching unit is provided so as to be spaced from a respective one of the waistline retaining unit and the leg elastic member; a non-stretch region is provided at a respective one of the front waistline region side and the back waistline region side of the product longitudinal direction of the crotch stretching unit; there is provided an indicator which runs across the crotch stretching unit and extending in the product longitudinal direction and which is configured to cause a visual change if the indicator comes into contact with moisture; and the change can be visually recognized from a non-skin contact surface side of the disposable diaper.

[Brief Description of Drawings]

[0018]

[Fig. 1] Fig. 1 is an exploded plan view (a skin contact surface side S2) of a disposable diaper according to a first embodiment of the present invention.

[Fig. 2] Fig. 2 is an exploded plan view (a non-skin contact surface side S1) of the disposable diaper according to the first embodiment of the present invention.

[Fig. 3] Fig. 3 is a sectional view of the disposable diaper according to the embodiment, taken along the line F1-F1 shown in Fig. 1 and Fig. 2.

[Fig. 4] Fig. 4 is a sectional view of the disposable diaper according to the embodiment, taken along the line F1-F1 shown in Fig. 1 and Fig. 2.

[Fig. 5] Fig. 5 is a sectional view of the disposable diaper according to the embodiment, taken along the line F2-F2 shown in Fig. 1 and Fig. 2.

[Description of Embodiments]

[0019]

(First Embodiment of the Present Invention)

With reference to Fig. 1 to Fig. 5, a disposable diaper 10 according to a first embodiment of the present invention will be described.

[0020]

It is noted that in the description of the drawings below, identical or similar symbols are assigned to identical or similar portions. However, it should be noted that the drawings are schematic and ratios of respective dimensions and the like are different from actual ones.

[0021]

Therefore, a specific dimension and the like should be determined in view of the following description. Moreover, among the drawings, the respective dimensional relations or ratios may differ.

[0022]

It is to be noted that although explanation is made citing a tape-type disposable diaper 10 as an example in the present embodiment, the present invention is also applicable to a pant-type disposable diaper 10.

[0023]

Fig. 1 is an exploded plan view of the disposable diaper 10 according to the embodiment when the disposable diaper is seen from a non-skin contact surface side S1; Fig. 2 is an exploded plan view of the disposable diaper 10 according to the embodiment when the disposable diaper is seen from a skin contact surface side S2; Fig. 3 and Fig. 4 are sectional views of the disposable diaper 10 according to the embodiment, taken along the line F1-F1 shown in Fig. 1; and Fig. 5 is a sectional view of the disposable diaper 10 according to the embodiment, taken along the line F2-F2 shown in Fig. 1.

[0024]

The exploded plan view of Fig. 1 and Fig. 2 are a diagram in which an elastic member 71 (leg elastic member) of leg stretching unit 75 and leg side gathers 80 are in an elongated state such that wrinkles are not formed in a topsheet 50 and side flap 70, for example, that configure the disposable diaper 10.

[0025]

As illustrated in Fig. 1 and Fig. 2, the disposable diaper 10 according to the present embodiment includes a front waistline region 20, a crotch region 25, and a back waistline region 30.

[0026]

Here, the front waistline region 20 is the portion that is in contact with the front waistline portion (an abdominal portion) of the wearer, the back waistline region 30 is the portion that is in contact with a back waistline portion (a back portion) of the wearer, and the crotch region 25 is the portion that positioned between the front waistline region 20 and the back waistline region 30.

[0027]

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.

[0028]

Herein, a crotch unit 200 is formed within the crotch region 25, and a region closer to a ventral side of a wearer than the crotch unit 200 is defined as a front waistline region 20 while a region closer to a dorsal side of the wearer than the crotch unit 200 is defined as a back waistline region 30.

[0029]

Further, a pair of leg-hole opening units 35 is formed in the disposable diaper 10. The leg-hole opening units 35 are provided to side ends in the product widthwise direction W of the disposable diaper 10, respectively, and are parts that are arranged along the leg holes of a wearer in a state where the disposable diaper 10 is worn by the wearer.

[0030]

The disposable diaper 10 according to present invention includes an absorber 40 spanning the crotch region 25 and extending toward at least one of the front waistline region 20 and the back waistline region 30 from the crotch region 25.

[0031]

As illustrated in Fig. 3 to Fig. 5, the absorber 40 is configured by an absorbent core 40a and a core wrap 40b.

[0032]

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

[0033]

The core wrap 40b is a sheet for wrapping the absorbent core 40a. A part of at least the skin surface contact side S2 of the core wrap 40b is configured by various fibrous nonwoven fabrics or a tissue sheet having liquid-permeability.

[0034]

For example, an air-through fibrous nonwoven cloth, a spunbond nonwoven cloth, or an SMS (spunbond - meltblown - spunbond) nonwoven cloth 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 as the component configuring the core wrap 40b.

[0035]

Further, as illustrated in Fig. 3 to Fig. 5, at the top side (skin contact surface side S2) of the absorber 40 is provided a liquid-permeable topsheet 50, and on the back side (non-skin contact surface side S1) of the absorber 40 is provided a backsheet 60a.

[0036]

Also, as shown in Fig. 3 to Fig. 5, the back surface side (the non-skin contact surface side S1) of the backsheet 60a is provided with one shingle sheet 61 (for example, a film) spanning the crotch region 25 to extend to the front waistline region 20 and the back waistline region 30, and the back surface side (the non-skin contact surface side S1) of the sheet 61 is provided with an exterior sheet 60.

[0037]

Herein, in a region which spans the crotch region 25 and extends to the front waistline region 20 and the back waistline region 30, design which is visually recognizable from the non-skin contact surface side S1 of the disposable diaper 10, are provided. The design is provided on the sheet 61.

[0038]

A side flap 70 is provided at both side edges in the product widthwise direction W of the absorber 40. The side flaps 70 are made of one or two or more pieces of nonwoven fabrics overlapping one another.

[0039]

Further, as shown in Fig.1 and Fig. 2, a fastening tape 90 is provided in each of the pair of side flaps 70.

[0040]

The fastening tape 90 extends in the product widthwise direction W in the back waistline region 30, and is mounted to the non-skin contact surface of the front waistline region 20, whereby the fastening tape is configured to retain the disposable diaper 10 at the wearer's body.

[0041]

The target units 95 are disposed on the non-skin contact surface of the front waistline region 20, and the pair of fastening tapes 90 are configured to securely attach to the target units 95.

[0042]

The disposable diaper 10 according to the embodiment constitutes a waistline retaining unit which extends along the product widthwise direction W in the front waistline region 20 and the back waistline region 30 and which is configured to retain the disposable diaper 10 at the wearer's body by way of the fastening tape 90, the front waistline region 20 (the target units 95), and the back waistline region 30.

[0043]

Here, a waistline retaining unit in the back waistline region 30 is a range extending in a product widthwise direction W from a region in which an engagement member of the fastening tape 90 is provided, and a waistline retaining unit in the front waistline region 20 is a range extending in the product widthwise direction W from a region in which a target unit 95 is provided.

[0044]

Furthermore, as shown in Fig. 1 and Fig.2, the disposable diaper 10 according to the present embodiment includes a crotch stretching unit 200a that is formed in the crotch region 25 and is stretchable.

[0045]

Specifically, the crotch stretching unit 200a is formed within the crotch unit 200, more specifically, is across the center in the product widthwise direction, and within an absorber-arranged region in which the absorber 40 is arranged within the crotch region 25. It is to be noted that a configuration of the crotch stretching unit 200a will be explained later in detail.

[0046]

Furthermore, as shown in Fig. 1 and Fig. 2, a surface side of the absorber 40 (a side of the topsheet 50) includes a pair of leg stretching units (leg gathers) 75 that are formed along the leg-hole opening units 35 and are stretchable at least in the product longitudinal direction L.

[0047]

The leg stretching units 75 are configured to be longer than the crotch stretching unit 200a in the product longitudinal direction L, and are provided at the outer side from the crotch stretching unit 200a in the product widthwise direction W.

[0048]

It is sufficient if the leg stretching unit 75 be configured so as to be able to stretch a leg-hole opening unit 35 in the product longitudinal direction L, it is also sufficient if this stretching unit be disposed along the leg-hole opening unit 35, or alternatively, it is sufficient if a part of the leg stretching unit 75 be disposed in a state in which the part thereof is inclined with respect to the leg-hole opening unit 35.

[0049]

Also, the leg stretching unit 75 is a portion which is substantially stretched in the product longitudinal direction L by stretchable sheet or the like, and is also based on a conceptual idea of eliminating a portion at which the stretchable sheet is disposed in a state in which a stretching force is not attained. It is to be noted that a configuration of the leg stretching unit 75 will be described later in detail.

[0050]

<Leg Side Gathers 80>

Furthermore, as shown in Fig. 1, a pair of leg side gathers 80 extending along the product longitudinal direction L may be provided at the inner side of the pair of leg stretching units 75 (towards the center in the product widthwise direction W).

[0051]

The leg side gathers 80 are provided at inside ends in the product widthwise direction W of the side flap 70, and are rising-type stretching gathers disposed to be inner in the product widthwise direction W than the leg stretching unit 75.

[0052]

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.

[0053]

The side flap 70 is folded back to the side of topsheet 50 at an inside end in the product widthwise direction W, and is laminated in two layers.

[0054]

As shown in Fig. 3 and Fig. 4, an elastic member 71 (See, Fig. 3 and Fig. 4) in a state of being stretched out in the product longitudinal direction L is provided between laminated pieces of the side flap 70. The leg side gathers 80 are made up of the side flaps 70 and the elastic members 71.

[0055]

The leg side gathers 80 include a joining portion 81 joined to the topsheet 50 or the backsheet 60a, and a free end portion 82 provided with the elastic member 71.

[0056]

Of a free end portion 82, a central portion in the product longitudinal direction L including a crotch region 25 is shrunk in the product longitudinal direction L by the elastic member 71, and makes up a shrinking unit 84.

[0057]

The leg side gathers 80 rise, with a joining portion 81 being a proximal end, at the time of wearing of the disposable diaper 10, and come into contact with a wearer's skin with the shrinking unit 84 of the free end portion 82 being an apex part. That is, the joining portion mentioned above is obtained as a proximal portion of the rise of the leg side stretching unit.

[0058]

It is to be noted that the shrinking unit 84 is a portion which is substantially shrunk in the product longitudinal direction L by the elastic member 71, and is also based on a conceptual idea of eliminating a portion at which the elastic member 71 is disposed in a state in which a shrinking force is not attained.

[0059]

Also, Fig. 1 and Fig. 2 show leg side gathers 80 by applying the shaded line to a joining portion 81 at which a side flap 70 and a topsheet 50 (or backsheet 60a and the like) are joined with each other.

[0060]

A plurality of joining portions 81 are provided, wherein a first joining portion 81A is disposed to be outer in the product longitudinal direction L than the shrinking unit 84, and a second joining portion 81B is disposed to be outer in the product widthwise direction W than the shrinking unit 84.

[0061]

Therefore, the leg side gathers 80 are configured so that the central portion in the product longitudinal direction L including the crotch region 25 rises towards the wearer's side.

[0062]

Among the joining portions 81 of the leg side gathers 80, the first joining portion 81A disposed to be outer in the product longitudinal direction L than the shrinking unit 84 is joined with the topsheet 50.

[0063]

Among the joining portions 81 of the leg side gathers 80, the second joining portion 81B disposed to be outer in the product widthwise direction W than the shrinking unit 84 is disposed between a crotch stretching unit 200a and a leg stretching unit 75 in the product widthwise direction W.

[0064]

The second joining portion 81B is joined with a backsheet 60a (and, an exterior sheet 60 at part in the product longitudinal direction L) at a full length in the product longitudinal direction L. It should be noted, the backsheet 60a which is disposed between the absorber 40 and the exterior sheet 60, and functions as a leakage preventing sheet.

[0065]

It is to be noted that, as the joining portions 81 of the leg side gathers 80, a variety of configurations can be employed. Such joining portions 81 may be portions extending from the crotch region 25 to the front waistline region 20 and the back waistline region 30 in the product longitudinal direction L, the portions being joined with the topsheet 50, for example, or alternatively, such joining portions may be portions joined with the backsheet 60a or the exterior sheet 60 so as to be outer in the product widthwise direction W than an absorbent core 40a, and is configured so as to be a proximal end of a rise.

[0066]

Also, it is sufficient if the leg side gathers 80 be rising-type gathers disposed to be inner in the product widthwise direction W than the leg stretching unit 75, and it is a matter of course that a structure of the leg side gathers 80 known in the prior art can be employed without being limitative to the structure mentioned above.

[0067]

<Waist Stretching Unit (Waist Gathers) 100>

Furthermore, the disposable diaper 10 may include a waist stretching unit 100 formed in the back waistline region 30 and stretchable in the product widthwise direction W.

[0068]

Specifically, the waist stretching unit 100 is provided between a pair of fastening tapes 90 in the product widthwise direction W, and is configured so as to contract an interval between the fastening tapes 90 in the product widthwise direction W.

[0069]

In the present embodiment, the waist stretching unit 100 is configured from a stretchable sheet member. The member configuring the waist stretching unit 100 is not particularly restricted, but a member that is as thin as possible with a low rigidity, and has a small width reduction rate is preferably used.

[0070]

Here, a waist stretching unit 100 is composed of a material with a low bending rigidity, whereby the waist stretching unit 100 is easily bent along the wearer's body, and the waist stretching unit 100 can be fit to be taken along the wearer's body without applying a burden to the wearer's body.

[0071]

Also, the waist stretching unit 100 is composed of a material with a small width reduction rate, thereby restraining shrinkage in the product longitudinal direction W of the disposable diaper 10 in a case where the disposable diaper 10 extends in the product widthwise direction W, and making it possible to restrain the disposable diaper 10 from hanging down to the wearer's crotch side in the wearer's waistline (waist).

[0072]

In the present embodiment, a stretch film having a basis weight of 20 to 45 g/m² is used as the waist stretching unit 100.

[0073]

After being stretched up to 1.25 to 2.5 times the length of the non-elongated state (natural state), the waist stretching unit 100 is adhered onto the exterior sheet 60 with a hot-melt adhesive or heat processing.

[0074]

In the embodiment, the waist stretching unit 100 may be disposed between the exterior sheet 60 and the backsheet 60a. However, in a configuration in which a core wrap 40b extends to be outer in the product longitudinal direction L than the absorbent core 40a, the waist stretching unit 100 may be disposed between the core wrap 40b and the backsheet 60a (or the exterior sheet 60).

[0075]

A position of the waist stretching unit 100 is not limitative in particular. Also, in a region in which the absorber 40 is not disposed, the waist stretching unit 100 may be disposed between the side flap 70 and the backsheet 60a (or the exterior sheet 60).

[0076]

It is to be noted that, although the waist stretching unit 100 according to the present embodiment is configured to be stretched in the product widthwise direction W, it may be configured so as to be stretched in both in the product widthwise direction W and the product longitudinal direction L.

[0077]

<Low Rigidity Region 210 in Absorber 40 >

Herein, the absorber 40 has a low rigidity region 210 in the back waistline region 30, the low rigidity region 210 having a smaller basis weight than the other area of the absorber 40 or having no existence of the absorbent core 40a.

[0078]

Furthermore, the low rigidity region 210 is formed so as to extend up to the vicinity of an end E9 at the side of the back waistline region 30 in the product longitudinal direction L of the absorber 40.

[0079]

A width of the low rigidity region 210 in the product widthwise direction W becomes larger as approaching the end E9 at the side of the back waistline region 30 in the product longitudinal direction L of the absorber 40.

[0080]

More specifically, the low rigidity region 210 has a wedge shape in the plan view of the disposable diaper 10.

[0081]

Furthermore, the absorber 40 has a stretch suppression region 220 as a region in which stretch in the product widthwise direction W is suppressed as compared to the other region.

[0082]

Herein, the stretch suppression region 220 is formed at each of the outer sides in the product widthwise direction W of the low rigidity region 210, as shown in Fig. 1.

[0083]

Furthermore, a boundary between the stretch suppression region 220 and the low rigidity region 210 is formed in an arc shape projecting toward the center in the product widthwise direction W. Yet further, the absorber 40 positioned outside the low rigidity region 210 in the product widthwise direction W is formed in a trapezoidal shape projecting toward the end E9 at the side of the back waistline region 30.

[0084]

With such a configuration, a wearing helper can be given an image of a shape of the buttocks of a wearer.

[0085]

Especially in a case of the disposable diaper 10 being the tape-type disposable diaper 10, at the time of spreading the disposable diaper 10 under the body of a wearer, the absorbent core 40a is set in the above-described shape or the waist stretching unit 100 of the back waistline region 30 is set in the above-described shape, so that a wearing helper can be reminded of a position in which the buttocks of the wearer should be placed, thereby making it possible to put the disposable diaper 10 in a more appropriate position.

[0086]

It is to be noted that the waist stretching unit 100 and the absorber 40 are configured so as to at least partially overlap with each other in a planar view of the disposable diaper 10.

[0087]

Specifically, the waist stretching unit 100 is configured so as to overlap with at least a part of the low rigidity region 210 in a planar view of the disposable diaper 10.

[0088]

It is to be noted that, although the waist stretching unit 100 is arranged so as to overlap with a part of the low rigidity region 210 in the present embodiment, it may be arranged so as to overlap with the whole of low rigidity region 210.

[0089]

Due to formation of the low rigidity region 210 described above, stretch of the waist stretching unit 100 is not interrupted, and the low rigidity region 210 is narrowed even when the waist stretching unit 100 is contracted, thereby narrowing an interval between pieces of the absorber 40 outside the low rigidity region 210 in the product widthwise direction W, so that the absorber 40 hardly rises up in an unintended shape.

[0090]

It is to be noted that, in consideration of preventing the leakage of bodily waste, the low rigid region 210

preferably has a smaller width than that of the waist stretching unit 100.

[0091]

Furthermore, when the absorber 40 is contracted by the waist stretching unit 100 in the product widthwise direction W to narrow the interval between the pieces of the absorber 40 outside the low rigidity region 210 in the product widthwise direction W, within the low rigidity region 210, the area closer to the end E9 at the side of the back waistline region 30 is greatly pulled near the center in the product widthwise direction W as compared to the area closer to the crotch region 25, thereby causing a difference in a contraction amount in the product widthwise direction W between the area closer to the end E9 at the side of the back waistline region 30 and the area closer to the crotch region 25, so that the back waistline region 30 rises up.

[0092]

That is, since the disposable diaper 10 is provided with the waist stretching unit 100 that is stretchable in the product widthwise direction W, and the low rigidity region 210 that is formed in a wedge shape, a cup shape in which the disposable diaper 10 expands toward the non-skin contact surface side S1 is more likely to be formed at the time of wearing the disposable diaper 10.

[0093]

Furthermore, in the present embodiment, in the low rigidity region 210, the absorbent core 40a does not exist while the waist stretching unit 100 exists so as to overlap with the low rigidity region 210. Therefore, in the low rigidity region 210, the area closer to the end E9 at the side of the back waistline region 30 is greatly pulled near the center in the product widthwise direction W, as compared to the end position of the absorbent core 40a, thereby making rise-up of the back waistline region 30 more prominent, so that formation of the cup shape can be achieved more stably.

[0094]

In the present embodiment, the waist stretching unit 100 exists over the side edge in the product widthwise direction W of the absorbent core 40a, so that the disposable diaper 10 can be formed in a cup shape while the absorbent core 40a in a position closer to the end E9 at the side of the back waistline region 30 in the product longitudinal direction L can be made to actively follow the body of a wearer.

[0095]

Furthermore, at least a part of the waist stretching unit 100 and the low rigid region 210 exists in a region extending from the pair of fastening tapes 90 in the product widthwise direction.

[0096]

Therefore, even at the time when the disposable diaper 10 is put on a wearer in a state where the wearer is laid down on the disposable diaper 10 spread underneath, the waist stretching unit 100 existing over the side edge in the product widthwise direction W of the absorbent core 40a is not spread under the body of the wearer.

[0097]

Accordingly, the side edge of the waist stretching unit 100 is stretched out by pulling the pair of fastening tapes 90, which makes it easy to make a position closer to the side of the waist within the cup shape be made to follow the body of a wearer more certainly.

[0098]

In the present embodiment, the absorbent core 40a outside the low rigidity region 210 in the product widthwise direction W is formed in a shape projecting toward the side of the back waistline region 30. Therefore, as described above, in addition to the fact that the cup shape in which the disposable diaper 10 expands toward the non-skin contact surface side S1 is easily formed, a surface area of the absorbent core 40a is maintained, so that the leakage of bodily waste from the end of the absorbent core 40a can be prevented.

[0099]

In the present embodiment, the low rigidity region 210 is formed in a wedge shape in a planar view of the disposable diaper 10, and a boundary between the absorbent core 40a and the low rigidity region 210 is formed in an arc shape so as to project toward the crotch region 25. It is to be noted that a radius of the arc is 50 mm to 200 mm.

[0100]

Therefore, a length (width) in the product widthwise direction W of the low rigidity region 210 (in a natural state) becomes larger in a non-linear manner as approaching the end E9 at the side of the back waistline region 30 in the product longitudinal direction L, thereby making rise-up of the back waistline region 30 more prominent, so that the cup shape can be easily formed more stably.

[0101]

Furthermore, since the boundary between the absorbent core 40a and the low rigidity region 210 is formed in an arc shape projecting toward the crotch region 25, the back waistline region 30 is formed in an round cup shape because of contraction of the low rigidity region 210, thereby resulting in a shape which can easily follow the round buttocks of a wearer.

[0102]

Furthermore, formation of the low rigidity region 210 results in formation of a shape projecting toward the side of the back waistline region 30 at each of left and right sides, in the end E9 at the side of the back waistline region 30 of the absorber 40. Such a shape of the absorber 40 reminds of placing the buttocks of a wearer, thereby producing an effect that a wearing helper can easily position the disposable diaper 10 in a more appropriate position for a wearer.

[0103]

<Bending Rigidity of Absorber 40>

The bending rigidity in the embodiment is based on the rigidity value conforming to the Taber method (JISP8125), and is measured by the following method.

[0104]

First, in a state in which the disposable diaper 10 is expanded, a sample of a portion targeted to be measured for bending rigidity (for example, absorber 40) is taken.

[0105]

The sample is defined as dimensions of 70 mm (a length in the product widthwise direction W) x 38 mm (a length in the product longitudinal direction L) as to the portion targeted to be measured for bending rigidity. In a case where an elastic member is included in the samples, such an elastic member is removed. It is to be noted that as a testing instrument for measuring rigidity values, a Taber stiffness tester manufactured by Yasuda Seiki Manufacturing Co., Ltd is used. Also, the number of samples is 10, measurement is carried out as to each of the samples, and the average value thereof is defined as a rigidity value.

[0106]

Procedures for such measurement are as described in the following items (a) to (e).

[0107]

(a) A thickness (A) of a sample taken is measured.

[0108]

(b) Next, the sample is pinched to an extent such that it comes into contact with a center of a chuck (a lower side) of the testing instrument.

[0109]

(c) A total of left and right gaps between a supporting roller and the sample is adjusted to (A) x 0.80 (mm).

[0110]

(d) Auxiliary weights are appropriately selected so that an indicated load scale is within the range of 15% to 85% of the maximum scale.

[0111]

(e) The sample is rotated in both of the leftward and rightward directions, the rotation is stopped at a point at which a 15-degree supporting marked line and a center mark of a pendulum are coincident with each other, and the scale of the testing instrument is read. The numeric value at the left side of the scale is defined as (B), and the numeric value at the right side of the scale is defined as (C).

[0112]

The rigidity value is obtained by the following formula.

[0113]

Formula: Rigidity value (mN X m) = ((B) + (C))/2 (Auxiliary weight coefficient) X 9.81 X 10⁻²

It is to be noted that in a case where the width of a piece to be tested cannot be taken as 38 mm, conversion to a bending moment of 38 mm in width is carried out.

[0114]

The higher the thus measured rigidity value is, the higher the bending rigidity is, and the lower the rigidity value is, the lower the bending rigidity is.

[0115]

<Configuration of Fastening tape and Target unit>

The fastening tape 90 is installed in the region of the side flaps 70 corresponding to the back waistline region 30.

[0116]

Specifically, as shown in Fig. 1, 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.

[0117]

The hook sheet 92 is a region in which the engagement members are provided, and the waistline retaining unit mentioned above is a region extending in the product widthwise direction W from the hook sheet 92.

[0118]

The hook sheet 92 is fixed to (specifically, joined with) the base sheet 91.

[0119]

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.

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 total 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.

[0120]

The target unit 95 is provided on a non-skin contact surface of the exterior sheet 60 of the front waistline region 20. 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 cloth can be employed.

[0121]

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

[0122]

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

[0123]

Also, the exterior sheet 60 of the disposable diaper 10 is formed of nonwoven cloth, and a pattern indicating a mounting position of the fastening tape 90 is printed on a non-skin contact surface of the backsheet 60a or the exterior sheet 60. Alternatively, a sheet of such a pattern is disposed at a non-skin contact surface side S1 of the backsheet 60a or the exterior sheet 60, whereby the target unit 95 can be obtained as well.

[0124]

<Leg Stretching Unit 75>

The leg stretching unit 75 is disposed along the leg-hole opening unit 35 provided to be outer in the product widthwise direction W than the absorber 40, and is configured to be stretchable in the product longitudinal direction L.

[0125]

The leg stretching unit 75 has a widthwise internal end region 75I in which a position in the product widthwise direction W in the crotch region 25 is positioned at the innermost side.

[0126]

The leg-hole opening unit 35 and the leg stretching unit 75, in particular, extends toward the outside of the product widthwise direction W, as it faces from the crotch region 25 to the outside of the product longitudinal direction L in the back waistline region 30.

[0127]

It is to be noted that the widthwise inner end region 75I of the leg stretching unit 75 may be continuously disposed in the product longitudinal direction L, or alternatively, does not need be continuous in the product longitudinal direction L.

[0128]

In the embodiment, although a region in which the position in the product widthwise direction W of the leg-hole opening unit 35 is positioned at the innermost side in the crotch region is coincident with the widthwise inner end region 75I of the leg stretching unit 75, these regions do not always need to be coincident with each other.

[0129]

In the present embodiment, the leg stretching unit 75 is configured with a stretchable sheet. For example, a stretch film formed by melting a thermoplastic elastomer resin, such as urethane and styrene, and then, converting into the shape of a film, a stretchable nonwoven fabric formed from such stretchable fibers, or a composite sheet formed by pasting together non-stretchable sheets that have been partially cut into a stretchable film and stretchable nonwoven fabric or have been made fragile can be used as the stretchable sheet.

[0130]

Furthermore, rather than the stretchable sheet, the leg stretching unit 75 may also be configured through an alternate, parallel arrangement of thread-like or stripe-like elastic members made from polyurethane elastic fibers and natural rubber.

[0131]

Alternatively, for example, the leg stretching unit 75 may be composed of a predetermined number of elastic members (for example, three elastic members).

[0132]

The leg stretching unit 75 is disposed between the side flap 70 and the exterior sheet 60. Alternatively, in a region in which the backsheet 60a disposed between the absorber 40 and the exterior sheet 60 is provided, the leg stretching unit 75 is disposed between the backsheet 60a and the side flap 70.

[0133]

Specifically, the width (the width of the product widthwise direction W in the natural state of the disposable diaper 10) of the stretchable sheet member is preferably 5 mm to 45 mm, preferably 12.5 mm to 35 mm, in at least the crotch region 25.

It is to be noted that such measurement was carried out using a spring tape measure produced by Shinwa Rules Co., Ltd. (a tape unit: glass fiber-containing vinyl chloride coating) in such a manner as to be taken along a measurement object area (10 samples).

[0134]

Here, if the width of such an stretchable sheet member is less than 5 mm, the sheet member is taken along the wearer's crotch unit at a substantially facial side, whereby a partially tightening force does not concentrate, and an advantageous effect of lowering a burden on the wearer's skin by an elastic element is not attained; or if the width of the stretchable sheet member exceeds 45 mm, a region along the leg-hole opening unit 35 becomes too wide in comparison with a length in the product widthwise direction W of the entire disposable diaper 10, the stretchable sheet rolls up to the wearer's body side or easily turns up.

[0135]

The stretch rate of the leg stretching units 75 is preferably 1.5 to 2.2 times. For example, in the present embodiment, the stretch rate of the leg stretching units 75 may be set to 1.8 to 2.0 times.

[0136]

It is to be noted that a ratio of expansion and contraction means degree of expansion and contraction of the leg stretching unit 75 in an expansion and contraction direction (the product longitudinal direction L in the present embodiment) and is determined as follows.

[0137]

Ratio of expansion and contraction = (length of the expansion and contraction direction of the leg stretching unit 75 in the maximum stretched state) / (length of the expansion and contraction direction of the leg stretching unit 75 in a natural state)

It is to be noted that the stretch rate as used herein is to be measured as described below, for example.

[0138]

Firstly, in a case where the disposable diaper 10 is inserted into a package, for example, the disposable diaper 10 is then taken out of the package.

[0139]

Next, a disposition region of the leg stretching unit 75 is cut out. At this time, an area including the exterior sheet 60 joined with the leg stretching unit 75 is also cut out. An extension rate of a sample of the leg stretching unit 75 after cutout is measured, and the extension rate of the leg stretching unit 75 is measured.

[0140]

Each of the samples is left as is for 60 minutes in an atmospheric environment of 20 degrees Centigrade $\pm$ 2 degree Centigrade and a relative humidity of 60% $\pm$ 5%RH, and a length of the leg stretching unit 75 is measured along a stretching direction. This length is defined as "a length of the leg stretching unit 75 in a

natural state”.

[0141]

Secondly, the length of the stretching direction of the desired region of the open-type disposable diaper in this state (that is, in the natural state), and the length of the stretching direction of the desired region, when the open-type disposable diaper is stretched from its natural state until wrinkles caused by the elastic members cannot be visually checked, are measured. This length is defined as “a length of the leg stretching unit 75 in the stretched state”.

[0142]

By employing these results of measurement and then carrying out computation by the formula mentioned above, the stretch rate is measured.

[0143]

Furthermore, the interval between the inner ends of the pair of the left-right leg stretching units 75 in the product widthwise direction W widens from the crotch region 25 towards the front waistline region 20, and also widens from the crotch region 25 towards the back waistline region 30.

[0144]

In a case where the disposable diaper 10 is worn on the wearer's body, the leg stretching unit 75 is disposed in a shape in which the diaper shrinks at the crotch and stretches toward the front and back waistlines, whereby the leg stretching unit 75 can be taken along the wear's bodyline more significantly, and is disposed in a state in which the leg stretching unit 75 is preferably stretched along the wearer's leg line.

[0145]

Further, the interval (D1 in the figure) at the ends of the front waistline region 20 of the pair of left-right leg stretching unit 75 is narrower than the interval (D2 in the figure) at the ends of the back waistline region 30 of the pair of left-right leg stretching unit 75.

[0146]

The interval is obtained by measuring the distance between the inner ends of the pair of the left-right leg stretching units 75 in the product widthwise direction W, after the open-type disposable diaper 10 has been stretched in the product longitudinal direction L and the product widthwise direction W from the natural state until the state where wrinkles cannot be visually recognized, and retained in that state.

[0147]

The extension of the skin surface of the body of the wearer is particularly large in the hip, and is remarkable at a position towards the outer widthwise direction. Furthermore, the leg stretching unit 75 is in contact with the body of the wearer. Because $D2 > D1$, even when the movement of the wearer is added to the disposable diaper 10, the leg stretching unit 75 in the hip can extend while being in contact with the body, and even when the amount of change of the stretching is large, the leg stretching unit 75 do not become stiff. Therefore, the shifting of the disposable diaper 10 can be controlled by the leg stretching unit 75.

[0148]

Furthermore, an interval between the both legs of a wearer is shaped so as to become the narrowest in the crotch unit and stretch as approaching from the crotch unit to the ventral side and the dorsal side. The leg-hole opening unit 35 and the leg stretching unit 75 are shaped so as to extend from the crotch region 25 to the outer side of the product longitudinal direction L and the outer side of the product widthwise direction W, which allows the leg-hole opening unit 35 and the leg stretching unit 75 to be arranged along the leg hole of a wearer, thereby preventing local concentration of stress, achieving close contact with the wearer at a relatively low stretch rate, and making it possible to reduce burden on the skin.

[0149]

The leg stretching unit 75 is configured so as to curve and shrink the disposable diaper 10 along the wearer's leg hole. An end in the product longitudinal direction L of the leg stretching unit 75 is disposed so as to stretch in the product widthwise direction W, and is also disposed in the vicinity of a waistline retaining unit. Therefore, the end in the product longitudinal direction L of the leg stretching unit 75 acts to shrink in the product widthwise direction W together with the waistline retaining unit.

[0150]

<Crotch Stretching unit 200a>

Next, a shape of the crotch stretching unit 200a will be explained.

[0151]

The crotch stretching unit 200a is configured to maintain a flat shape in a part of the crotch region 25 at the time of putting the disposable diaper 10 on a wearer, as compared to the other part of the absorber 40.

[0152]

Herein, the crotch stretching unit 200a may be stretchable in the product longitudinal direction L, may be stretchable in the product widthwise direction W, or may be stretchable in both in the product longitudinal direction L and the product widthwise direction W.

[0153]

For example, the crotch stretching unit 200a is provided to be individually spaced from the leg stretching unit 75, and at a position overlapping with the absorbent core 40a (in the embodiment, at a position between a core wrap 40b wrapping the absorbent core 40a and the backsheet 60a), this crotch stretching unit is configured so as to shrink by 60% or more of the length (in the natural state) in the product widthwise direction W of the absorbent core 40b at such a position.

[0154]

Thus, a portion at which the absorbent core 40a is disposed is shrunk by the crotch stretching unit 200a, 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.

[0155]

On the other hand, the absorbent core 40a positioned in the front waistline region 20 or the back waistline region 30 that is positioned outside the crotch stretching unit 200a in the product longitudinal direction L is not contracted by the crotch stretching unit 200a.

[0156]

Therefore, in a state where the disposable diaper 10 is held around the hip or the waist of a wearer by means of the fastening tapes 90, the crotch stretching unit 200a maintained in a flat shape in the crotch region 25 of the disposable diaper 10 does not come in too close contact with the body and as a result, the crotch stretching unit 200a is arranged along the body appropriately.

[0157]

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

[0158]

As a result, the front waistline region 20 and the back waistline region 30 rise up from the crotch stretching unit 200a, thus improving the fitting property of the disposable diaper 10 with respect to a wearer.

[0159]

That is, due to contraction of the crotch stretching unit 200a, the disposable diaper 10 can be worn stably in a

manner that the crotch region 25 of the disposable diaper 10 is arranged in the crotch unit of a wearer.

[0160]

Furthermore, the crotch stretching unit 200a is configured in a stretchable manner, so that a part of the crotch region 25 of the disposable diaper 10 is contracted to result in formation of uneven wrinkles in the surface of a clothing side (non-skin contact surface side S1) of the disposable diaper 10.

[0161]

As a result, it is possible to remind visually and tactually a wearing helper of the fact that the crotch unit 200 clearly exists in the disposable diaper 10 according to the present embodiment.

[0162]

It is to be noted that the crotch stretching unit 200a may be made from a stretchable sheet.

[0163]

By making the crotch stretching unit 200a 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.

[0164]

For example, as such a stretchable sheet member, a stretchable film obtained by melting a thermoplastic elastomer resin such as urethane or styrene to form a film shape, a stretchable nonwoven fabric made from stretchy resin, a composite sheet obtained by pasting an non-stretchable sheet partially cut out or weakened onto the stretchable film or the stretchable nonwoven fabric, and the like can be used.

[0165]

Furthermore, rather than the stretchable sheet, the crotch stretching unit 200a may also be configured through an alternate, parallel arrangement of thread-like or stripe-like stretchable elastic members made from polyurethane elastic fibers and natural rubber.

[0166]

In such a case, in view of the rigidity of the absorbent core 40a and the rigidity of other members configuring the open-type disposable diaper 10, the thickness of the elastic members and the arrangement pitch can be selected appropriately, however, when the main body of the open-type disposable diaper 10 is in the natural state (non-stretched state), the entire side edge in the product widthwise direction W of the absorbent core 40a is preferable to be in a contracted state.

[0167]

Also, in order to uniformly shrink the absorbent core 40a by the crotch stretching unit 200a, it is preferable that intervals between elastic members be 7 mm or less, and 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 between elastic members adjacent to each other be 2 mm or less.

[0168]

Specifically, the stretch rate of the crotch stretching unit 200a is preferably 1.2 times to 1.8 times. For example, in the present embodiment, the stretch rate of the crotch stretching unit 200a may be set to 1.4 times.

[0169]

The stretch rate implies the extent of stretching of the crotch stretching unit 200a in the stretching direction (product longitudinal direction L in the present embodiment), and is stipulated as below:

[0170]

Stretch rate = (Length of the stretching direction of the crotch stretching unit 200a in the maximum stretched state) / (Length of the stretching direction of the crotch stretching unit 200a in the natural state)

It is to be noted that the stretch rate as used herein is to be measured as described below, for example.

[0171]

Firstly, in a case where the disposable diaper 10 is sealed in package or the like, the disposable diaper 10 is taken out from the package, and in that state, the diaper is left for 60 minutes in an atmospheric environment of 20 degrees Centigrade $\pm$ 2 degree Centigrade and a relative humidity of 60 % $\pm$ 5% RH, and then, a length of the crotch stretching unit 200a is measured in a stretching direction. This length is defined as "a length of the crotch stretching unit 200a in a natural state".

[0172]

Secondly, a length in a stretching direction of a desired region in such a state (that is, a natural state) and a length in a stretching direction of a desired region at the time of extension from the natural state up to a state in which wrinkles exerted by an elastic member cannot be visually checked are measured. This length is defined as "a length of the crotch stretching unit 200a in a stretched state".

[0173]

By employing these results of measurement and then carrying out computation by the formula mentioned above, a stretch rate is measured.

[0174]

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

[0175]

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.

[0176]

Namely, if a stretch rate of the crotch stretching unit 200a is 1.2 times or less, a shrinkage of the crotch stretching unit 200a in a natural state is not sufficient in degree; a shrinkage in an absorber disposition region in the crotch region 25 of the disposable diaper 10 is small in degree in comparison with a case in which the crotch stretching unit 200a is not provided; it becomes insufficient for the crotch region 25 of the disposable diaper 10 to form a flat shape so as to be taken along the body at the wearer's crotch; and the disposable diaper 10 is easily displaced from the wearer's body.

[0177]

On the other hand, when the stretch rate of the crotch stretching unit 200a is more than 1.8 times, the contraction size in the contraction direction of the crotch stretching unit 200a becomes too large, because of which the region where the crotch stretching unit 200a 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.

[0178]

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

[0179]

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).

[0180]

The Inventor successfully verified that, when the amount of shrinkage in the product longitudinal direction L

of the crotch stretching unit 200a 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 200a is easily preferably taken along the wearer's body.

[0181]

Here, if the amount of shrinkage in the product longitudinal direction L of the crotch stretching unit 200a is larger than 8%, the crotch stretching unit 200a 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.

[0182]

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

[0183]

Furthermore, a center O2 of the crotch stretching unit 200a in the product longitudinal direction L is arranged closer to the side of the front waistline region 20 as compared to a center O1 of the disposable diaper 10 in the product longitudinal direction L. Furthermore, the crotch stretching unit 200a is arranged so as to span the center O1 of the disposable diaper 10 in the product longitudinal direction L.

[0184]

Furthermore, the crotch stretching unit 200a is formed in a position including the center O1 of the disposable diaper 10 in the product longitudinal direction L.

[0185]

Yet further, it is configured that a length (in a natural state) in the product longitudinal direction L of the back waistline region 30 is longer than a length (in a natural state) in the product longitudinal direction L of the front waistline region 20.

[0186]

Specifically, a ratio of a length (in a natural state) in the product longitudinal direction L of the back waistline region 30 to a length (in a natural state) in the product longitudinal direction L of the front waistline region 20 is preferably between 1.1 and 1.6, more preferably between 1.2 and 1.5.

[0187]

When such a ratio exceeds 1.6, a balance between the ventral side and the dorsal side of the disposable diaper 10 is degraded, so that in a case where the crotch stretching unit 200a is positioned along the crotch region 25, the front waistline region 20 comes in too close contact or the back waistline region 30 is covered more than necessary.

[0188]

Specifically, the body of a wearer is generally in a state where the buttocks are projecting more than the abdomen, so that the disposable diaper 10 is made in a more suitable shape with respect to a complex shape of the body of the wearer by setting the above-described ratio within the aforementioned range on the condition that the crotch stretching unit 200a and the crotch unit of the wearer are positioned to each other.

[0189]

That is, it is possible to prevent partial projection of the disposable diaper 10 due to the existence of an undersized part or an unnecessary gap between the disposable diaper 10 and the body due to the existence of an oversized part.

[0190]

Furthermore, especially in a case of infants and toddlers who use the disposable diaper 10 around the time before or after they start walking, it is considered preferable that they take a posture that the body is shaped into a curl oriented to the ventral side, and in such a posture, the skin at a side of the buttocks is more likely to be stretched, so that the disposable diaper 10 is made in a state suitable for the body of infants and toddlers who tend to take such a posture, by setting the above-described ratio within the aforementioned range.

[0191]

When one example is cited, with respect to a product length of 400 mm (a length in a natural state in the product longitudinal direction L) of the disposable diaper 10, the front waistline region 20 is set to 130 mm (a length in a natural state in the product longitudinal direction L); the crotch unit 200 is set to 80 mm (a length in a natural state in the product longitudinal direction L); and the back waistline region 30 is set to 190 mm (a length in a natural state in the product longitudinal direction L).

[0192]

In such a case, a ratio of a length (in a natural state) between the front waistline region 20 and the back waistline region 30 is approximately 1.46. By setting such a ratio, not only the crotch stretching unit 200a but also the entire of the disposable diaper 10 in the product longitudinal direction L can be made to further follow along the body of a wearer.

[0193]

That is, with such a configuration, by determining the position in the front-back direction of the crotch stretching unit 200, the disposable diaper 10 is fit appropriately into the body of a wearer, thereby making it possible to achieve more certainly the object of the present invention, that a design of the disposable diaper 10 is caused to work in conjunction.

[0194]

Since the state where the crotch stretching unit 200a is contracted is a different mode from the non-contracted state in the absorber-arranged region that is closer to the side of the front waistline region 20 and the back waistline region 30 than the crotch stretching unit 200a, in a case of putting the disposable diaper 10 on a wearer, it becomes easy to put it in a manner to position the crotch stretching unit 200a to the crotch unit of the wearer.

[0195]

Furthermore, with such arrangement, in a state where an area of the absorbent core 40a provided with the crotch stretching unit 200a is contracted, the rigidity or thickness of this area becomes different from the rigidity or thickness of the other area of the absorbent core 40a, thereby making it easy for a wearing helper to recognize an area to be fit to the crotch unit of the wearer in the crotch region 25 of the disposable diaper 10.

[0196]

Furthermore, after the disposable diaper 10 has been worn, the crotch stretching unit 200a maintains its flat shape in the crotch unit of a wearer so the disposable diaper 10 itself as to be in a three-dimensional shape, thereby making it possible to make the crotch region 25 of the disposable diaper 10 follow the crotch unit of the wearer, which makes it more certain that the disposable diaper 10 is wore while the crotch region 25 and the crotch unit of the wearer fit to each other.

[0197]

Yet further, as shown in Fig. 1, it may be configured that a length W5 (in a natural state) in the product widthwise direction W in the center position O2 of the crotch stretching unit 200a in the product longitudinal direction L is shorter than a length W6 (in a natural state) in the product widthwise direction W at the end of the crotch stretching unit 200a in the product longitudinal direction L.

[0198]

With such a configuration, since the shape as seen from the exterior of the crotch stretching unit 200a is an hourglass shape like a crotch unit of women's underwear, for example, at the time of putting the disposable diaper 10 on a wearer, it is possible for a wearing helper to put it in a manner that the crotch stretching unit 200a is arranged at the crotch unit of the wearer and to visually confirm that a wearing position is appropriate.

[0199]

Furthermore, also in while the disposable diaper 10 is worn, it is possible to remind a wearing helper of the fact that the disposable diaper 10 has the crotch unit 200 and to give an image even more like underwear.

[0200]

As shown in Fig. 1, at the crotch region 25 of the absorber 40, a notch 110 and a notch 120 are formed. The notch 110 and the notch 120 are regions in which the absorbent core 40a making up the absorber 40 does not exist.

[0201]

In the embodiment, the notch 110 and the notch 120 come under parts of low rigidity in which a basis weight of the absorbent core 40a is lower than a site of another absorbent core 40a.

[0202]

It is to be noted that in place of forming the notch 110 and the notch 120, it may be configured to set a basis weight of the absorbent core 40a smaller than the other area of the absorbent core 40a.

[0203]

As shown in Fig. 1, the notch 110 and the notch 120 are formed along the edge in the product longitudinal direction L of the crotch stretching unit 200a.

[0204]

It is to be noted that, even in a case where the notch 110 and the notch 120 are formed, it is preferable that 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 be continuous without being completely separated from each other. In particular, it is preferable that these cores be continuous in the product widthwise direction W.

[0205]

The notch 110 and the notch 120 are configured so that the length (in the natural state) in the product longitudinal direction L increases as these notches go to the outside of the product widthwise direction W.

[0206]

Due to such a shape, the outside of the product widthwise direction W of the absorbent core 40a becomes more easily shrinkable; and therefore, a flat "bottom" can be formed in the disposable diaper 10.

[0207]

Also, the absorbent core 40a positioned at the side of the front waistline region 20 than the notch 110 and the absorbent core 40a positioned at the side of the back waistline region 30 than the notch 120 rise up from the flat "bottom", and easily curves so as to be taken along roundness of the wearer's body (an abdominal part and a femoral part); and therefore, the shape of the disposable diaper 10 itself can be more close to the shape of the wearer's body.

[0208]

As shown in Fig. 1, an edge at the side of the back waistline region 30 may be formed in an arc shape than an edge at the side of the front waistline region 20 of the notch 110 and the notch 120.

[0209]

Specifically, the edge at the side of the front waistline region 20 of the notch 110 is shaped so that the center of arc is positioned closer to the side of the back waistline region 30 as compared to the aforementioned edge,

while the edge at the side of the back waistline region 30 of the notch 120 is shaped so that the center of arc is positioned closer to the side of the front waistline region 20 as compared to the aforementioned edge.

[0210]

Due to such a shape, a deformation along the roundness of the wearer's body of the disposable diaper 1 is prone to occur more easily and significantly.

[0211]

The edge at the side of the front waistline region 20 in the product longitudinal direction L of the notch 110 makes up a first inflection unit 115 while the edge at the side of the back waistline region 30 in the product longitudinal direction L of the notch 120 makes up a second inflection unit 125.

[0212]

It is to be noted that the first inflection unit 115 and the second inflection unit 125 are configured to extend in the product widthwise direction W to function as a bending base point of the disposable diaper 10.

[0213]

Here, the notch 110 and the notch 120 are formed so as to keep a first inflection unit 115 and a second inflection unit 125 in a better state.

[0214]

As a result, the crotch stretching unit 200a is configured so as not to work together with movement of the waistline retaining unit (that is, the front waistline region 20, the back waistline region 30 and fastening tape 90 making up the waistline retaining unit).

[0215]

As shown in Fig. 1 and Fig. 2, in the disposable diaper 10 according to the present embodiment, in a natural state, in a product natural state, the crotch stretching unit 200 may be symmetrical across the center line O of the product widthwise direction W, or may have a difference of 10% or less between a left width and a right width of the crotch stretching unit 200a while the center line O of the product widthwise direction W is set as a boundary.

[0216]

With the disposable diaper 10 according to the present embodiment, it is possible to make a state in which the crotch stretching unit 200a is put on the crotch unit of a wearer while spanning the center of the body of the wearer.

[0217]

Also, in the disposable diaper 10 according to the embodiment, the crotch stretching unit 200a is provided to be spaced from the waistline retaining unit and the elastic member 71 mentioned above.

[0218]

Further, in the disposable diaper 10 according to the embodiment, a non-stretch region is provided at the side of the front waistline region 20 and at the side of the back waistline region 30 of the product longitudinal direction L of the crotch stretching unit 200a.

[0219]

Furthermore, in the disposable diaper 10 according to the embodiment, as shown in Fig. 1 and Fig. 2, a length in the product widthwise direction W of the adsorbent core 40a is configured so as to be smaller from the front waistline region 20 toward the crotch region 25 and so as to be smaller from the back waistline region 30 toward the crotch region 25.

[0220]

Here, the crotch stretching unit 200a is provided in a region in which a length in the product widthwise direction W of the absorbent core 40a is smaller than a predetermined length.

[0221]

For example, the predetermined length is a length in the product widthwise direction W of the absorbent core 40a in a region in which a length in the product widthwise direction of the front waistline region 20 or the back waistline region 30 is large.

[0222]

Between a region in which the length in the product widthwise direction W of the absorbent core 40a and in a region in which the length in the product widthwise direction W of the front waistline region 20 and the back waistline region 30 is larger than the predetermined length, there is a difference in absorption capacity per a unit length in the product longitudinal direction L (for example, per 10 mm), and the absorption capability is smaller in the region in which the length is smaller than that in such a predetermined length.

[0223]

Therefore, in addition to the fact that a region in which a crotch stretching unit 200a is provided is taken along the wearer's body at the crotch stretching unit 200a, and in the region as mentioned above, even if the amount of excretion is small, an indicator 600 easily produce discoloration, and is close to the wearer's excretion opening; and therefore, in a case where the amount of absorption is small, the region as mentioned above is obtained as a region to cause first discoloration.

[0224]

Further, in the region in which the crotch stretching unit 200a is provided, a wrinkle exerted by the crotch stretching unit 200a arises; and therefore, the appearance of the indicator 600 looks differently depending on the discoloration region (the crotch stretching unit 200a) and the front waistline region 20 and the back waistline region 30 that exist in front and at rear thereof.

[0225]

In general, in the region in which the crotch stretching unit 200a is provided, a wrinkle exerted by the crotch stretching unit 200a arises; and therefore, the wearing assistant differently looks the appearance of discoloration of the indicator 600 as mentioned above depending on the region and the non-stretch region as mentioned above.

[0226]

In view of the foregoing descriptive matters, according to the structured as mentioned above, the wearing assistant does not replace the disposable diaper 10 in discoloration of the indicator 600 in the region as mentioned above, and can take a guide for replacing the disposable diaper 10 in discoloration of the indicator 600 in the non-stretch regions at the front waistline region 20 side and the back waistline region 30 side of the product longitudinal direction L in the region as mentioned above.

[0227]

As a result, an appropriate replacement timing of the disposable diaper 10 can be notified while excessive replacement of the disposable diaper 10 is restrained.

[0228]

In a natural state of the disposable diaper 10, at a respective one of the skin contact surface side and the non-skin contact surface side of the absorbent core 40a, the disposable diaper is configured so that unevenness (wrinkle) to exists due to shrink of the crotch stretching unit 200a.

[0229]

Here, the disposable diaper is configured so that the unevenness (wrinkle) that is formed at the skin contact surface side is high in height of the unevenness and is large in pitches of unevenness in comparison with the unevenness (wrinkle) that is formed at the non-skin contact surface side.

[0230]

At the skin contact surface side of the absorbent core 40a, in order to prevent liquid flow of bodily wastes, it is necessary that the height of unevenness is high and the pitches are large, whereas at the non-skin contact surface side of the absorbent core 40a, in order to establish a visually recognizable state while varying visual recognition property of the indicator 600, it is preferable to control the height of unevenness so as to be low and the pitches so as to be small.

[0231]

For this purpose, it is necessary that a stretchable sheet is disposed at the non-skin contact surface side than the absorbent core 40a, and is configured so that the thickness of the product structure at the skin contact side is smaller than the stretchable sheet, and the thickness of the non-skin contact surface side is smaller than the stretchable sheet.

[0232]

<Indicator>

As shown in Fig. 2, the disposable diaper 10 according to the embodiment is provided with the indicator 600.

[0233]

Here, the indicator 600 runs across the crotch stretching unit 200a and extends in the product longitudinal direction L, and is configured with a discoloration agent which causes a visual change if contact with moisture arises.

[0234]

According to the structure as mentioned above, the crotch stretching unit 200a is taken along the wearer's body (the crotch part) at the time of wearing, whereby the indicator 600 can stably exist at a position close to the wearer's excretion opening.

[0235]

As a result, it is possible to avoid a circumstance that the indicator 600 causes eccentric discoloration or a circumstance that discoloration of the indicator 600 arises only at the wearer's backside.

[0236]

Further, at the time of wearing, the wearer's excretion opening and the crotch stretching unit 200a are close to each other; and therefore, first discoloration of the indicator 600 can be stably produced in the crotch region 25 of the disposable diaper 10.

[0237]

The indicator 600 as mentioned above, as shown in Fig. 2, may be configured to extend in plurality in substantial parallel to the centerline O in the product widthwise direction W.

[0238]

Also, in a case where the crotch stretching unit 200a is composed of a liquid-impermeable stretchable sheet, as shown in Fig. 2, the indicator 600 is disposed at the skin contact surface side S2 of the stretchable sheet.

[0239]

On the other hand, in a case where the crotch stretching unit 200a is composed of a liquid-permeable stretchable sheet, as shown in Fig. 3, the indicator 600 is disposed at the non-skin contact surface side S1 of the crotch stretching unit 200a.

[0240]

It is to be noted that change (discoloration) of the indicator 600 as mentioned above can be visually recognized from the non-skin contact surface side S1 of the disposable diaper 10.

[0241]

For example, it is preferable that, in a case where the indicator 600 is disposed at the skin contact surface side S2 of the stretchable sheet, light beam transmittance of the stretchable sheet be 60% or more and 87% or less.

[0242]

For example, a method of measuring the light beam transmittance as mentioned above is carried out in conformance with the standards of JIS-K7105. Here, as a color-difference meter, there may be employed a cross illumination light measurement-type color-difference meter Z-300A available from Nippon Denshoku Industries Co., Ltd.

[0243]

Specifically, a sheet targeted to be measured, which has been taken out from the disposable diaper 10, is obtained as a sample of 5 mm in width and 5 mm in length, and a TT value is obtained by pinching the sheet with the use of a cloudiness meter. Then the TT value as mentioned above is recorded as full light beam transmittance (%).

[0244]

It is to be noted that such measurement is performed for 10 samples, and the average value may be light beam transmittance (%).

[0245]

According to the structure as mentioned above, it is easy for the wearing assistant to visually recognize change (discoloration) of the indicator 600 from the non-skin contact surface side S1 of the disposable diaper 10.

[0246]

A length (a width) of the product widthwise direction of the crotch stretching unit 200a is adapted to be 60% or more and 120% or less with respect to a length (a width) in the product widthwise direction of the shortest absorbent core 40a in a region in which the absorbent core 40a and the crotch stretching unit 200a overlap with each other.

[0247]

Also, the indicator 600 is configured to extend beyond the crotch stretching unit 200a in the product longitudinal direction L from the region in which the absorbent core 40a and the crotch stretching unit 200a overlap with each other.

[0248]

According to the structured as mentioned above, by way of the crotch stretching unit 200a, the absorbent core 40a and the indicator 600 are lifted so as to be taken along the wearer's body, and the disposable diaper 10 can be stably worn in a state in which the disposable diaper is taken along the wearer's body.

[0249]

In addition, at the time of wearing, the absorbent core 40a is partially shrunk due to the shrink of a stretchable sheet which constitutes the crotch stretching unit 200a, and in a case where the site is seen from the non-skin contact surface side (outside) of the disposable diaper 10, the appearance (shape) of an almost flat mode can be obtained, and the indicator 600a which is disposed at the crotch stretching unit 200a can be easily visually recognized.

[0250]

On the other hand, the length (the width) in the product widthwise direction of the crotch stretching unit 200a is too small in comparison with the length in the product widthwise direction of the absorbent core 40a, it is difficult to attain an advantageous effect of lifting up the absorbent core 40a so as to be taken along the wearer's body while maintaining the crotch stretching unit 200a so as to be flat.

[0251]

Alternatively, if the length (the width) in the product widthwise direction W of the crotch stretching unit 200a is too large in comparison with the length in the product widthwise direction W of the absorbent core 40a, a

region in which the absorbent core 40a is not disposed shrinks, and the rigidity outside of the product widthwise direction of the crotch stretching unit 200a increases.

[0252]

Thus, the crotch stretching unit 200a is easily hooled at the wearer's femoral part, and a sense of wearing is degraded.

[0253]

In addition, in the region in which the absorbent core 40a does not exist, the crotch stretching unit 200a is worn in a more significantly shrunk state; and therefore, overlapping between members easily arises, the crotch stretching unit 200a hardens, and a sense of wearing is degraded.

[0254]

<Manufacturing Method of Disposable Diaper 10>

Next, an example of a manufacturing method of the disposable diaper 10 according to the embodiment will be described. It is to be noted that a known method can be employed as to the manufacturing method that is not described in the embodiment. Also, the manufacturing method that will be described hereafter is merely provided as an example, and the disposable diaper 10 according to the embodiment can also be manufactured by another manufacturing method. The manufacturing method of the disposable diaper 10 as mentioned above includes at least the steps of: forming constituent elements; loading constituent elements; forming leg-holes, stretching and forming crotches; and cutting.

[0255]

In the step of forming constituent elements, the constituent elements constituting the disposable diaper 10 are formed. Specifically for example, the absorber 40 is molded by laminating an absorbent material.

[0256]

In the step of loading constituent elements, stretchable sheets constituting the leg stretching unit 75, other webs such as webs constituting the topsheet 50, a leakage preventing sheet, and constituent elements constituting the disposable diaper 10 such as absorber 40 are loaded on webs constituting the backsheet 60a.

[0257]

In the step of forming leg-holes, the topsheet 50, the exterior sheet 60, and the backsheet 60a are cut along the outside end in the MD direction of the leg stretching unit 75. In this manner, the leg-hole opening unit 35 that is disposed at the wearer's legs is formed.

[0258]

In the step of stretching and forming crotches, sheets constituting the crotch stretching unit 200a are conveyed in a non-stretched state (however, in a state in which a tension required for conveyance is applied), and the conveyed sheet is stretched by employing two rolls on the basis of a difference in velocity of stretching (press-stretching) rolls.

[0259]

Afterwards, the sheets as mentioned above are disposed in their stretched state on a transfer drum; the disposed sheets are cut into individual lengths of products on the transfer drum; the cut sheets are re-pitched together with the transfer drums as mentioned above; and the re-pitched sheets are transferred on a continuous web.

[0260]

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

[0261]

In so far as the disposable diaper 10 according to the embodiment is concerned, the absorbent core 40a that has been shrunk by the crotch stretching unit 200a is maintained to be flat along the wearer's body; and therefore, a lateral displacement or a longitudinal displacement at the time of wearing hardly arises.

[0262]

Also, in so far as the disposable diaper 10 according to the embodiment is concerned, while in wearing, a region which is maintained to be flat and in which the crotch stretching unit 200a has been disposed is hardly folded, and the indicator 600 is easily retained at a position which is always easily seen from the wearing assistant.

[0263]

In addition, in so far as the disposable diaper 10 according to the embodiment is concerned, the absorbent core 40a is shrunk in the region in which the crotch stretching unit 200a is disposed; and therefore, a total weight thereof is high in comparison with that of another region, and a gentle unevenness is formed on a surface of the absorber 40; and therefore, the surface flow of bodily fluid hardly arises, and the bodily fluid is stably absorbed.

[0264]

Further, in so far as the disposable diaper 10 according to the embodiment is concerned, in a case where the absorption capacity of the absorber 40 in the region in which the crotch stretching unit 200a is disposed has exceeded the limit, the indicator 600 in the non-stretch region as mentioned above produces discoloration; and therefore, the wearing assistant can replace the disposable diaper 10 with an appropriate timing while avoiding excessive replacement of the disposable diaper 10.

[0265]

As described above, the present invention has been described in detail by using the above-described embodiment. However, it is apparent to those skilled in the art that the present invention is not limited to the embodiment described in this description. The present invention can be modified and changed without departing from the gist and the scope of the present invention defined by the appended claims. Therefore, the description is aimed at illustration and explanation of the present invention, and does not have any meaning which limits the present invention.

[0266]

It is to be noted that all the contents of Japanese Patent Application No. 2012-247936 (which was filed on November 9, 2012) are incorporated in the present specification by reference.

[Industrial Applicability]

[0267]

It is possible to provide a disposable diaper which is capable of being stably worn by a wearer, the disposable diaper enabling an indicator to react with moisture.

[Explanation of Numerals]

[0268]

10... Disposable diaper

20... Front waistline region

25... Crotch region

30... Back waistline region

35... Leg-hole opening unit

40... Absorber

40a... Absorbent core

40b... Core wrap

50... Topsheet

60a... Backsheet

60... Exterior sheet
61... Sheet
70... Side flap
71... Elastic member
75... Leg stretching unit
80... Leg side gather
81... Joint portion
82... Free end portion
90... Fastening tape
95... Target unit
100... Waist stretching unit
110, 120... Notch
115... First inflection unit
125... Second inflection unit
200... Crotch unit
200a... Crotch stretching unit
600... Indicator

[CLAIMS]

[Claim 1]

A disposable diaper comprising:

- a front waistline region;
- a back waistline region;
- a crotch region which is disposed between the front waistline region and the back waistline region;
- a pair of leg-hole opening units being formed therein,
- an absorber running across the crotch region and extending to 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, the disposable diaper comprising:
 - a leg elastic member which is formed to run across the crotch region and extend from the front waistline region to the back waistline region, along the leg-hole opening units;
 - a waistline retaining unit which extends along the product widthwise direction in the front waistline region and the back waistline region and which is configured to retain the disposable diaper at a body of a wearer; and
 - a crotch stretching unit which is stretchable and which is formed at a position running across a center in the product widthwise direction in the crotch region and overlapping a region in which the absorber is disposed, wherein
 - the crotch stretching unit is provided so as to be spaced from a respective one of the waistline retaining unit and the leg elastic member;
 - a non-stretch region is provided at a respective one of the front waistline region side and the back waistline region side of the product longitudinal direction of the crotch stretching unit;
 - there is provided an indicator which runs across the crotch stretching unit and extending in the product longitudinal direction and which is configured to cause a visual change if the indicator comes into contact with moisture; and
 - the change can be visually recognized from a non-skin contact surface side of the disposable diaper.

[Claim 2]

The disposable diaper according to claim 1, wherein

- the absorber has an absorbent core;
- a length in the product widthwise direction of the absorbent core is configured to be smaller from the front waistline region to the crotch region and to be smaller from the back waistline region to the crotch region; and
- the crotch stretching unit is provided in a region in which the length in the product widthwise direction of the absorbent core is smaller than a predetermined length.

[Claim 3]

The disposable diaper according to claim 1 or claim 2,

Wherein

- the absorber has an absorbent core;
- a stretch rate of the crotch stretching unit is 1.2 times or more and 1.8 times or less;
- in a natural state of the disposable diaper, the disposable diaper is configured so that, at a respective one of a skin contact surface side and a non-skin contact surface side of the absorbent core, unevenness exists due to a shrink of the crotch stretching unit; and

the unevenness that is formed at the skin contact surface side is high at height and large in pitches in comparison with the unevenness that is formed at the non-skin contact surface side.

[Claim 4]

The disposable diaper according to any one of claims 1 to 3, wherein a ratio between a length in the product longitudinal direction of the back waistline region and a length in the product longitudinal direction of the front waistline region is 1.1 or more and 1.6 or less.

[Claim 5]

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

the absorber has an absorbent core; and

a ratio between the length in the product widthwise direction of the crotch stretching unit and the length in the product widthwise direction of the absorbent core is 60% or more and 120% or less.

[Claim 6]

The disposable diaper according to any one of claims 1 to 5, wherein a shrink quantity in the product longitudinal direction of the crotch stretching unit is 2% or more and 8% or less of the length in the product longitudinal direction of the disposable diaper.

[Claim 7]

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

the crotch stretching unit is composed of an stretchable sheet;

the stretchable sheet is provided at a non-skin contact surface side than the indicator; and

light beam transmittance of the stretchable sheet is 60% or more and 87% or less.