

[DESCRIPTION]

[Title of Invention]

Disposable diaper

[Technical Field]

[0001]

The present invention relates to a disposable diaper having a fastening tape to securely attach a front waistline region and a back waistline region.

[Background Art]

[0002]

Conventionally, there is known a disposable diaper provided with a fastening tape to securely attach a front waistline region and a back waistline region (for example, refer to Patent Literature 1). The fastening tape of Patent Literature 1 is provided with: a base; and a hook member which is adhered to a part of a surface of the base. One end of the base is a joint portion to be joined with the disposable diaper. On the other hand, another end of the base is an extension unit extending to an outside end of a widthwise direction than the disposable diaper. The hook member is provided at the extension unit, and an outside end of the widthwise direction of the extension unit, the hook member is not disposed, and a gripping unit to be gripped by fingers at the time of wearing is provided.

[0003]

Also, in so far as a fastening tape manufacturing method is concerned, as shown in Fig. 12 of Patent Literature 1, a fastening tape is manufactured by cutting a laminate obtained by laminating a continuous body characterized in that bases are continuous and a continuous body characterized in that hook members are continuous. A cutting trajectory of the continuous bodies is a boundary between a tip end of the extension unit of one fastening tape and a proximal end of the extension unit of another fastening tape adjacent thereto. No waste material is present between such one fastening tape and such another fastening tape adjacent thereto, and materials can be efficiently utilized.

[Citation List]

[Patent Literature]

[0004]

[Patent Literature 1] Japanese Unexamined Patent Application Publication No. 2011-15796

[Summary of Invention]

[0005]

However, the fastening tape as mentioned above has entailed the following problem.

[0006]

In the fastening tape as mentioned above, fastening tapes are continuously formed, and a tip end shape of the extension unit of one fastening tape is a proximal end shape of the extension unit in another fastening tape which is adjacent thereto. For example, in order to make it easy to grip one end of such one fastening tape, it is considered to manufacture the adjacent fastening tapes while increasing intervals therebetween to increase an area of such one end. However, if the intervals between the adjacent fastening tapes are increased, an area of a joint portion of the fastening tapes also increases.

[0007]

In general, a fastening tape is composed of a member with a high rigidity in comparison with nonwoven fabric which constitutes a topsheet of a disposable diaper or pulp or the like which constitutes an absorber. The fastening tape is joined with side flaps of the disposable diaper, and the rigidity of a region in which the

fastening tape has been joined is higher than that of its periphery. Also, the fastening tape is joined with the side flaps or the like in the vicinity of a waistline or a leg-hole of a wearer. Therefore, if the joint portion of the fastening tape increases in length, an area of a region with a high rigidity increases, and there is an apprehension that a sense of discomfort at the time of wearing is strongly felt.

[0008]

On the other hand, if the adjacent fastening tapes are manufactured while the intervals therebetween is narrowed in order to reduce the area of the joint portion, an area of the extension unit to be gripped decreases, and there is apprehension that operability at the time of wearing is impaired.

[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 having a fastening tape which is capable of improving operability at the time of wearing while restraining a sense of discomfort at the time of wearing.

[0010]

A disposable diaper according to the present disclosure (disposable diaper 10) is summarized that the disposal diaper has: a front waistline region; a back waistline region; a crotch region which is positioned 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 which runs across the crotch region and which extends at least one of the front waistline region and the back waistline region; a side flap which runs across the front waistline region, the crotch region, and the back waistline region, and which is disposed at an outside of the product widthwise direction than the absorber; and

a pair of fastening tapes which extend to the outside of the product widthwise direction from the back waistline region of the side flap and which is securely attached to the front waistline region, wherein the fastening tape has: a base sheet which is coupled to the side flap; and a hook sheet in which a plurality of engagement members to engage with the front waistline region is provided and which is fixed to the base sheet; the base sheet has: a joint portion which is joined with the side flap; and a tip end 96 extending to the outside of the product widthwise direction than the hook sheet; a length of the product widthwise direction of the tip end 96 is 5 mm to 12 mm; a distance in the product longitudinal direction between an outside end of the product longitudinal direction of the joint portion and an outside end of the product longitudinal direction of the hook sheet is 2 mm to 12 mm; a length in the product longitudinal direction at a boundary between the hook sheet and the tip end 96 is two times or more of a distance in the product longitudinal direction between an inside end of the product longitudinal direction of the base sheet and an inside end of the product longitudinal direction of the hook sheet; and the hook sheet extends to an outside in the product longitudinal direction than a middle point between an outside end of the product longitudinal direction at the inside end of the product widthwise direction of the hook sheet and an outside end of the product longitudinal direction at the inside end of the product widthwise direction of the tip end.

[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 a plan view of a fastening tape according to an embodiment.

[Fig. 5] Fig. 5 is a view for explaining manufacturing steps of the fastening tape.

[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. The exploded views shown in Fig. 1 is a view 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 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.

[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. A structure of the fastening tape 90 will be described later in detail.

[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.

[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 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 total 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 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]

2. Configuration of Fastening Tape

Next, the fastening tape 90 will be described in detail on the basis of Fig. 4. Fig. 4 is a plan view of the fastening tape 90. 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.

[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 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.

[0041]

It is to be noted that, in a case where the base sheet 91 is composed of a laminate obtained by laminating a plurality of nonwoven fabrics, the nonwoven fabrics of which a total weight is 10 g/m² to 80 g/m² can be employed, and more preferably, nonwoven fabrics of 15 g/m² to 75 g/m² can be employed. In a case where a soft tape is obtained while strength (rupture strength) of a fastening tape is ensured, a softer fastening tape can be structured by laminating a plurality of nonwoven fabrics that one nonwoven fabric to have a joint portion and a non-joint portion on joint faces thereof.

[0042]

The base sheet 91 is disposed between a side flap 70 and an exterior sheet 60, and has: a first region R1 which is disposed while the first region overlaps with the side flap; and a second region R2 extending to the outside in the product widthwise direction than the side flap. Incidentally, it is sufficient if the base sheet is coupled to at least the side flap, and the base sheet may be a structure which is not coupled to an exterior sheet 60.

[0043]

The base sheet 91 has: a joint portion 93 which is joined with the side flap; and a tip end 96 extending to the outside in the product widthwise direction than a hook sheet 92. The joint portion 93 of the base sheet of the embodiment is a region which is joined with the side flap 70 or the exterior sheet. The joint portion 93 is provided in the first region R1. It is to be noted that, although the joint portion 93 is provided in a part of the first region R1, the joint portion may be provided all over the first region R1. The tip end 96 extends to the outside in the product widthwise direction than the hook sheet 92, and includes an outside end of the widthwise direction of the fastening tape 90.

[0044]

A length L11 of a product widthwise direction W of the tip end 96 of the base sheet 91 is 5 mm to 12 mm. At the tip end 96, the hook sheet 92 is a portion at which the hook sheet 92 is not provided and which is not securely attached to a target unit in a state in which the fastening tape 90 is securely attached to the target unit. The tip end 96 is a portion to be gripped when a wearing assistant attaches and removes the fastening tape 90. Therefore, it is desirable that the tip end 96 is a dimension such that the wearing assistant can easily grip the tip end. According to the tip end 96 of such a dimension, the wearing assistant can grip the tip end by his or her fingers, enabling a smooth attaching and removing operation of the fastening tape. Also, the wearing assistant can reliably grip the tip end 96, whereby fine adjustment of a attaching position of the fastening tape 90 is possible, and the fastening tape can be attached to an intended position. Therefore, operability at the time of wearing can be improved.

[0045]

A distance L12 in the product longitudinal direction between an outside end of the product longitudinal direction of the joint portion 93 and an outside end of the product longitudinal direction of the hook sheet is 2 mm to 12 mm. The hook sheet is a portion which is securely attached to the target unit, and a force of engagement can be increased by widely providing an area of the hook sheet. However, in the conventional fastening tape 90, if an attempt is made to increase the area of the hook sheet, an area of the joint portion 93 to join the fastening tape 90 also increases, and there is an apprehension that a sense of discomfort due to an increase of a region with a high rigidity also increases.

[0046]

However, the distance L12 between the outside end of the product longitudinal direction of the joint portion 93 and the outside end of the product longitudinal direction of the hook sheet is set to 2 mm to 12 mm, whereby the sense of discomfort at the time of wearing, exerted by the joint portion 93, can be restrained while the force of engagement exerted by the hook sheet is obtained.

[0047]

Also, a length L13 of the product longitudinal direction at a boundary between the hook sheet and the tip end 96 is two times or more of a distance L14 of the product longitudinal direction between an inside end of the product longitudinal direction of the base sheet 91 and an inside end of the product longitudinal direction of the hook sheet. A leg opening unit 35 which surrounds the leg-hole of a wearer is formed in a state in which the fastening tape 90 is securely attached to the target unit 95. The fastening tape 90 is positioned in the vicinity of the leg opening unit 35 in a state in which the leg opening unit 35 is formed. Therefore, when the wearer has moved his or her leg, the fastening tape 90 sometimes abuts against the wearer's leg. In particular, the inside end of the product longitudinal direction of the base sheet 91 easily abuts against the wearer's leg.

[0048]

In addition, the inside end of the product longitudinal direction of the base sheet 91 is a region which does not contribute to the force of engagement with the target unit. Therefore, it is desirable that the distance L14 in the product longitudinal direction between the inside end of the product longitudinal direction of the base sheet 91 and the inside end of the product longitudinal direction of the hook sheet be short, the shorter the distance is, the narrower the region that does not contribute to the force of engagement with the target unit is, to be thereby able to make it difficult for the fastening tape to abut against the wearer's leg.

[0049]

Further, the fastening tape 90 is in a tapered shape in which a length in the product widthwise direction is smaller from the inside in the product widthwise direction to the outside in the product widthwise direction. Therefore, in so far as the boundary between the hook sheet and the tip end 96 is concerned, the length of the

product longitudinal direction of the hook sheet is the smallest. The length L13 of the product longitudinal direction at the boundary between the hook sheet and the tip end 96 is twice or more of the distance L14 in the product longitudinal direction between the inside end of the product longitudinal direction of the base sheet 91 and the inside end of the product longitudinal direction of the hook sheet, whereby the force of engagement can be ensured while the abutment against the wearer is restrained.

[0050]

Furthermore, the hook sheet extends to the outside in the product longitudinal direction than a middle point C1 between the outside end of the product longitudinal direction at the inside end of the product widthwise direction of the hook sheet and the outside end of the product longitudinal direction at the inside end of the product widthwise direction of the tip end 96. The hook sheet is in a tapered shape in which the length of the product widthwise direction is smaller from the inside in the product widthwise direction to the outside in the product widthwise direction. Therefore, the forces of engagement exerted by the hook member are different from each other depending on the inside end in the product widthwise direction of the hook sheet and the outside end of the product widthwise direction of the hook sheet. Hence, dispersion arises in the force of engagement in the entire hook sheet.

[0051]

Moreover, the fastening tape 90 is positioned in the vicinity of the leg opening unit 35 in a state in which the leg opening unit 35 is formed, and when the wearer has moved his or her leg, a force of the fastening tape 90 to slip off from the target unit may act on somewhere. At this time, the force of the fastening tape 90 releasing from the target unit acts from the leg opening unit 35 side. If a difference between the force of engagement at the inside end of the product widthwise direction of the hook sheet and the force of engagement at the outside end of the product widthwise direction of the hook sheet is significant, the fastening tape 90 moves in a rotating direction on the basis of a portion at which the force of engagement is strong, and there may be displaced a position or a direction between the front waistline region and the back waistline region.

[0052]

However, the hook sheet extends to the outside of the product longitudinal direction than the middle point between the outside end of the product longitudinal direction at the inside end of the product widthwise direction of the hook sheet and the outside end of the product longitudinal direction at the inside end of the product widthwise direction of the tip end 96; and therefore, in a region all over the outside of the widthwise direction than a center in the widthwise direction of the hook sheet, the force of engagement at the inside end of the product widthwise direction of the hook sheet can be approximated, and the dispersion in the force of engagement can be restrained.

[0053]

The hook sheet extends to the outside in the product longitudinal direction than the middle point C2 between the outside end of the product longitudinal direction at the boundary between the first region and the second region and the outside end of the product longitudinal direction at the outside end of the product widthwise direction of the second region. Although the length of the product longitudinal direction of the fastening tape 90 is gradually smaller towards the outside of the product widthwise direction, for example, if the length is too small at the inside in the widthwise direction that is a base of the fastening tape 90, there is an apprehension that the area of the tip end 96 cannot be ensured or the force of engagement of the hook sheet on the tip end 96 side cannot be ensured. However, the hook sheet extends to the outside of the product longitudinal direction than the middle point C2 between the outside end of the product longitudinal direction of the boundary between the first region and the second region and the outside end of the product longitudinal direction at the

outside end of the product widthwise direction of the second region; and therefore, the area of the tip end 96 side of the fastening tape 90 can be increased.

[0054]

An external shape of the second region of the base sheet is in a curved shape. The second region of the base sheet is a region extending from the side flap, and is also a portion which is touched by hand at the time of wearing. The external shape of the second region of the base sheet is in the curved shape, thereby making it possible to improve operability while restraining stimulation to the hand. Also, in a case where the end of the base sheet unintentionally abuts against a leg or a hand, stimulation to the leg or the like and a linear pressure exerted by the end of the fastening tape can be kept to be low. Incidentally, it is sufficient if at least a part of the external shape of the second region of the base sheet is in a curved shape, and a part of the external shape of the second region of the base sheet may be in a linear shape.

[0055]

It is desirable that a distance L15 between the hook sheet 92 and the joint portion 93 be 2 mm to 12 mm. The joint portion 93 is joined with the side flap, and the hook sheet 92 is securely attached to the target unit 95 in a state in which the disposable diaper is worn; and therefore, a region between the hook sheet 92 and the joint portion 93 is a region which is not fixed to anywhere in the state in which the disposable diaper is worn and which is easily deformable. If a distance between the hook sheet 92 and the joint portion 93 is too large, deformation easily arises when an external force acts when the wearer has moved his or her leg, and it is difficult to maintain a state of engagement of the fastening tape 90. On the other hand, if the distance between the hook sheet 92 and the joint portion 93 is too small, there is no region to deform when the wearer has moved his or her leg or the like, and there is an apprehension that arbitrary movement of the wearer is blocked. The distance between the hook sheet 92 and the joint unit 93 is 2 mm to 12 mm, whereby the state of engagement of the fastening tape 90 can be maintained while the arbitrary movement is ensured.

[0056]

It is desirable that a convex unit 97 formed in a shape to be convex to the outside in the product longitudinal direction and a concave unit 98 formed in a shape to be concave to the inside in the product longitudinal direction are formed at the end in the product longitudinal direction of the base sheet. The convex unit 97 and the concave unit 98 are provided, whereby, when a force to deform the base sheet acts on somewhere, a stress can be dispersed at the end in the product longitudinal direction. Also, the end of the product longitudinal direction of the base sheet is in a curved shape having the convex unit 97 and the concave unit 98; and therefore, stimulation to the wearer's skin is reduced, and a sense of discomfort of the wearer can be reduced.

[0057]

The convex unit and the concave unit each are in the curved shape. The convex unit and the concave unit are continuously present at the ends in the product longitudinal direction of the base sheet, and the convex unit and the concave unit each are in the curved shape, whereby, in a case where the outside end of the fastening tape unintentionally abuts against a leg or a hand, stimulation to the leg or the like and the linear pressure exerted by the ends of the fastening tape can be kept to be low.

[0058]

The force of engagement between the fastening tape and the front waistline region is 0.3 N/30 mm to 1.5 N/30 mm. As a result a variety of inspections performed by the Applicant, if the force of engagement of the fastening exceeds 1.5 N/30 mm, there has been a tendency that persons targeted for testing (mothers having their infants) have an impression that the fastening tape is hardly attached and removed. On the other hand, if the force is smaller than 0.3 N/30 mm, it was found to not to be preferable, since there is given an impression that the fastening tape hardly engages with the diaper main body and further there is given an impression

that the fastening tape would have slipped off, although the fastening tape does not actually slip off. Therefore, it is desirable that the force of engagement between the fastening tape and the front waistline region be 0.3 N/30 mm to 1.5 N/30 mm.

[0059]

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

[0060]

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 base 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.

[0061]

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.

[0062]

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

[0063]

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.

[0064]

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.

[0065]

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.

[0066]

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 49a 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.

[0067]

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 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.

[0068]

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.

[0069]

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.

[0070]

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.

[0071]

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.

[0072]

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

[0073]

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.

[0074]

The center of the crotch stretching unit 200 in the product longitudinal direction L is disposed at the front waistline region 20 side 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.

[0075]

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

[0076]

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.

[0077]

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.

[0078]

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.

[0079]

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.

[0080]

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.

[0081]

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.

[0082]

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.

[0083]

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 unit 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 unit of the disposable diaper 10 to form a flat shape so as to be taken along the body at the wearer's crotch.

[0084]

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 200a is present 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.

[0085]

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.

[0086]

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 $(b - a)$.

[0087]

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.

[0088]

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.

[0089]

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.

[0090]

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.

[0091]

In such a case, in consideration of the rigidity of the absorbent core 40a and the rigidity of other constituent elements 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).

[0092]

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 total weight of the absorbent article 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 total weight of the absorbent article 40a is lower than that of any other portion of the absorbent core 40a.

[0093]

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.

[0094]

As the notch 115 and the notch 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 notch 115, and the absorbent core 40a positioned towards the back waistline region 30 from the notch 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).

[0095]

The edge towards the front waistline region 20 (back waistline region 30) of the notch 115 (notch 125) is arc shaped. The shape of the edge of the notch 115 (notch 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 occurs more easily and remarkably.

[0096]

4. Manufacturing Method of Disposable Diaper

Next, an example of a manufacturing method of an absorbent article according to the embodiment will be described. It is to be noted that, an existing method can be employed as to a method which is not described in the embodiment. Also, the manufacturing method that is described hereinafter is merely provided as an example, and the absorbent article can also be manufactured by another manufacturing method. The manufacturing method of the absorbent article includes at least the steps of: forming constituent elements; loading constituent elements; forming leg-holes; and cutting.

[0097]

In the step of forming constituent elements, the constituent elements constituting the absorbent article are formed. Specifically, for example, the absorber 40 is molded by laminating an absorbent material or the fastening tape 90 is formed. The fastening tape 90 is formed by cutting a laminate.

[0098]

Fig. 5 is a view for explaining the manufacturing steps of the fastening tape 90, and is also a view schematically showing a cutting mode of a laminate 100. The laminate 100 is a sheet member in which a continuous body of hook sheets characterized in that hook sheets are continuous is fixed onto a continuous body of base sheets characterized in that base sheets are continuous. The reference sign MD shown in Fig. 5 denotes a conveyance direction of the laminate, and the reference sign CD denotes a crossing direction. A dimension of the crossing direction of the laminate is two times or less of the product widthwise direction of the fastening tape 90. A cutting trajectory of the laminate is a state in which the fastening tape 90 are adjacent to each other in the crossing direction, and in which the fastening tapes 90 are adjacent to each other in the conveyance direction. By cutting out a fastening tape 90 from the laminate, a trim which is positioned between the fastening tapes 90 arises in a state before cutting. In Fig. 5, the trim region is indicated by applying the shading thereto.

[0099]

The trim is continuous in the conveyance direction, and a dimension in the crossing direction of the trim varies.

Therefore, a region which is different in tension strength from another one is provided at the trim. For example, a region A shown in Fig. 5 has a lower tension strength than a region B. The trim is a portion at which the fastening tape 90 is discarded after the tape has been cut out, and it is desirable that the trim be continuous from the viewpoint of re-collection for discarding. Also, when the trim is discarded, processing such as cutting processing is carried out by machine. At this time, if the trim is continuous, there is an apprehension that something is caught by the machine. However, the region that is different in tension strength from such another one is provided; and therefore, a region which is comparatively low in tension strength is easily separated at the time of machining processing. Therefore, by manufacturing such a fastening tape 90, the trim can be re-collected in a state in which the trim is continuous at the time of re-collection, and the trim is finely cut when a force is applied at the time of machining processing; and hence, discarding processing can be smoothly carried out.

[0100]

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

[0101]

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

[0102]

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 product widthwise direction W. In this manner, the disposable diaper 10 is manufactured.

[0103]

5. Operation and Effect

Tables 1 and 2 describe the evaluation results of comparison of the fastening tapes. As described in Tables 1 and 2, a test was performed for the fastening tapes according to example 1 through example 7, and Comparative Examples 1 through 4.

TABLE 1

	Length of Product Widthwise Direction of Tip End(mm)	Evaluation
Example 1	10	○
Example 2	5	○
Example 3	12	○
Comparative Example 1	3	×
Comparative Example 2	14	×

[0104]

As described in Table 1, a comparison evaluation was performed for the fastening tape according to examples 1 through 3, and comparative examples 1 and 2. In the test performed for comparison evaluation, the commercially available "Moony Nenne Shitate S size" disposable diapers manufactured by Unicharm

Corporation were used, and the samples for the evaluation test were prepared by sequentially replacing the fastening tape according to examples 1 through 3 and the fastening tape according to comparative examples 1 and 2 on the disposable diaper.

[0105]

In the evaluation testing, mothers who usually use the commercially available “Moony Nenne Shitate S size” disposable diapers manufactured by Unicharm Corporation were asked to carry out wearing and replacement of the respective samples as usual, and were asked to answer a question “Is it easy to carry out replacement as to the respective samples by gripping tip ends of fastening tapes?”. Incidentally, the testing was carried out as to each sample by changing persons targeted to be tested. Therefore, the persons targeted to be tested were asked to answer a question “Is it easy or difficult to replace the diapers by using the commercially available “Moony Nenne Shitate S size?”

[0106]

To the question as mentioned above, samples in excess of 70% in rate of the number of persons who had chosen (1) from the selections below were evaluated as O which is good in functional evaluation (texture). Also, samples of 70% or less in rate of the number of persons who had chosen (1) from the selections below were evaluated as X which is not sufficiently good in functional evaluation (texture).

- (1) Easy to replace
- (2) Difficult to replace

According to such evaluation testing, it is preferable that a length in the product widthwise direction of the tip end be in the range of 5 mm to 12 mm.

TABLE 2

	Distance in the product longitudinal direction between an outside end of the product longitudinal direction of the joint portion and an outside end of the product longitudinal direction of the hook sheet(mm)	Evaluation
Example 4	7	◎
Example 5	4	◎
Example 6	2	◎
Example 7	12	○
Comparative Example 3	14	×
Comparative Example 4	16	×

[0107]

As shown in Table 2, comparative evaluation was carried out as to fastening tapes according to Examples 4 to 7 and Comparative Examples 3 and 4. In the testing of the comparison evaluation, samples for use in evaluation testing were prepared by employing the commercially available “Moony Nenne Shitate S size” disposable diapers manufactured by Unicharm Corporation and re-attaching the fastening tapes according to Examples 4 to 7 and Comparative Examples 3 and 4 to the disposable diapers. Incidentally, as a base sheet, there was employed a laminate sheet obtained by laminating a spun bond nonwoven fabric of which a total weight is 70 g/m² and a spun bond nonwoven fabric of which a total weight is 20 g/m².

[0108]

In the evaluation testing, the mothers who usually use the commercially available “Moony Nenne Shitate S

size” disposable diapers manufactured by Unicharm Corporation were asked to carry out wearing and replacement as to the respective samples, the mothers were asked to check to see states of their babies’ skins at the joint portions of the fastening tapes after use, and 5-stage evaluation was made as to “Will it be soft up to the babies’ legs?”

[0109]

To the question as mentioned above, samples exceeding 70% in rate of the number of persons who had chosen (1) or (2) from the selections below were evaluated as “◎” which signifies that the samples are good in functional evaluation (texture), and samples of more than 60% of the number of persons who had chosen (1) or (2) from the selections below were evaluated as “○” which signifies that the samples are good in functional evaluation (texture). Samples of 60% or less in rate of the number of persons who had chosen (1) or (2) from the selections were evaluated as “X” which signifies that the samples are not sufficiently good in functional evaluation (texture).

- (1) Very good
- (2) Comparatively good
- (3) Fair
- (4) Not so good
- (5) No good

According to such evaluation testing, it is preferable that a distance in the product longitudinal direction between the outside end of the product longitudinal direction of the base sheet 91 of the joint portion and the outside end of the product longitudinal direction of the hook sheet be in the range of 2 mm to 12 mm.

[0110]

6. 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.

[0111]

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.

[0112]

It is to be noted that all the contents of Japanese Patent Application No. 2012-247993 (which was filed on November 12, 2012) are incorporated in the present specification by reference.

[Industrial Applicability]

[0113]

It is possible to provide a disposable diaper having a fastening tape which is capable of improving operability at the time of wearing while restraining a sense of discomfort at the time of wearing.

[Explanation of Numerals]

[0114]

- 10... Disposable diaper
- 20... Front waistline region
- 25... Crotch region
- 30... Back waistline region
- 35... Leg opening unit

40... Absorber
40a... Absorbent core
40b... Core wrap
50... Topsheet
60... Exterior sheet
60a... Backsheet
70... Side flap
75... Leg stretching unit
80... Leg side gather
81... Elastic member
85... Waistline stretching unit
90... Fastening tape
91... Base sheet
92... Hook sheet
93... Joint portion
95... Target unit
96... Tip end
97... Convex unit
98... Concave unit
115... Notch
125... Notch
200... Crotch stretching unit
L... Product longitudinal direction
W... Product widthwise direction

[CLAIMS]

[Claim 1]

A disposable diaper comprising:

a front waistline region;

a back waistline region;

a crotch region which is positioned 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 which runs across the crotch region and which extends at least one of the front waistline region and the back waistline region;

a side flap which runs across the front waistline region, the crotch region, and the back waistline region, and which is disposed at an outside of the product widthwise direction than the absorber; and

a pair of fastening tapes which extend to the outside of the product widthwise direction from the back waistline region of the side flap and which is securely attached to the front waistline region, wherein

the fastening tape comprises: a base sheet which is coupled to the side flap; and a hook sheet in which a plurality of engagement members to engage with the front waistline region is provided and which is fixed to the base sheet;

the base sheet comprises: a joint portion which is joined with the side flap; and a tip end extending to the outside of the product widthwise direction than the hook sheet;

a length of the product widthwise direction of the tip end is 5 mm to 12 mm;

a distance in the product longitudinal direction between an outside end of the product longitudinal direction of the joint portion and an outside end of the product longitudinal direction of the hook sheet is 2 mm to 12 mm;

a length in the product longitudinal direction at a boundary between the hook sheet and the tip end is two times or more of a distance in the product longitudinal direction between an inside end of the product longitudinal direction of the base sheet and an inside end of the product longitudinal direction of the hook sheet; and

the hook sheet extends to an outside in the product longitudinal direction than a middle point between an outside end of the product longitudinal direction at the inside end of the product widthwise direction of the hook sheet and an outside end of the product longitudinal direction at the inside end of the product widthwise direction of the tip end.

[Claim 2]

The disposable diaper according to claim 1, wherein

the base sheet comprises: a first region which is disposed so as to overlap with the side flap and in which the joint portion is provided; and a second region which extends to the outside of the product widthwise direction than the side flap and in which the tip end and the hook sheet are provided; and

the hook sheet extends to the outside of the product longitudinal direction than a middle point between an outside end of the product longitudinal direction at a boundary between the first region and the second region and an outside end of the product longitudinal direction at an outside end of the product widthwise direction of the second region.

[Claim 3]

The disposable diaper according to claim 2, wherein an external shape of the second region of the base sheet is in a curved shape.

[Claim 4]

The disposable diaper according to any one of claims 1 to 3, wherein a distance between the hook sheet and the joint portion is 2 mm to 12 mm.

[Claim 5]

The disposable diaper according to any one of claims 1 to 4, wherein a convex unit in a shape to be convex to the outside of the product longitudinal direction and a concave unit in a shape to be concave to an inside of the product longitudinal direction each are formed at an end of the product longitudinal direction of the base sheet.

[Claim 6]

The disposable diaper according to the claim 5, wherein the convex unit and the concave unit each are in a curved shape.

[Claim 7]

The disposable diaper according to any one of claims 1 to 6, wherein the base sheet is made of a nonwoven fabric of which a total weight is 30 g/m² to 120 g/m².

[Claim 8]

The disposable diaper according to any one of claims 1 to 6, wherein the base sheet is configured by a laminate obtained by laminating a nonwoven fabric of which a total weight is 10 g/m² to 80 g/m².

[Claim 9]

The disposable diaper according to any one of claims 1 to 8, wherein a force of engagement between the fastening tape and the front waistline region is 0.3 N/30 mm to 1.5 N/30 mm.