

S P E C I F I C A T I O N

DISPOSABLE ABSORBENT WEARING ARTICLE

5 TECHNICAL FIELD

[0001]

The present invention relates to disposable absorbent wearing articles and more particularly to disposable diapers for baby and/or adult, toilet-training pants for baby,
10 incontinent briefs, sanitary napkins of pants-type and the other articles adapted to receive and to absorb body waste such as urine, feces and the other body waste.

RELATED ART

[0002]

15 Such articles widely available may be classified into first, second and third types.

[0003]

An example of the article classified into the first type has front and rear waist regions, and a crotch region extending
20 between these two waist regions so as to have opposite outlines curved inward as viewed in a transverse direction wherein the article comprises inner and outer sheets forming together a cover (chassis) adapted to cover the wearer's torso and an

absorbent core sandwiched between these inner and outer sheets.

In such article of the first type, the front and rear waist regions and front as well as rear waist bands contiguous to these

waist regions are elasticized to be circumferentially

5 contractile along the waist line of the chassis. In a similar

manner, respective side flaps extending outward from opposite

side edges of the crotch region of the chassis are elasticized

along respective side edges thereof (i.e., gasket cuffs) so as

to be circumferentially contractile around the wearer's legs.

10 [0004]

An example of the article classified into the second type comprises a chassis (i.e., outer sheet) substantially same as

said chassis of the article classified into the first type in shape as well in size and a separately prepared liquid-absorbent

15 structure (referred to also as an absorbent inner) provided at

least in the crotch region of the chassis and including an

absorbent core therein. In such article of the second type also,

desired regions of the chassis are elasticized to be

contractible just as the chassis in the article of the first

20 type.

[0005]

An example of the article classified into the third type comprises an annular waist panel formed by front and rear waist

panels each having a relatively large width and extending in the transverse direction and a separately prepared liquid-absorbent structure (referred to hereinafter as absorbent chassis) connected between the front and rear waist panels and including an absorbent core therein. In such article of the third type also, desired regions at least of the chassis are elasticized to be contractible just as the chassis of the article classified into the first type.

[0006]

Each of these articles of the first, second and third types may be optionally provided with barrier leg-cuffs extending in the longitudinal direction along opposite side edges of the absorbent core or of the absorbent structure and having elasticized free edges.

[0007]

The article of the first, second and third types can be classified roughly into the articles of so-called open-type having the front and rear waist regions not joined to each other along the transversely opposite side edges thereof and the articles of so-called pull-on-type having the front and rear waist regions previously joined to each other along the transversely opposite side edges thereof. Figuratively, the articles of the first and second types have concave shape curved

inwardly while the article of the third type is substantially side toppling H-shaped as viewed when these articles are developed in both the longitudinal direction and the transverse direction.

5 [0008]

Typically, it is possible for the article of pull-on-type (referred to hereinafter simply as pull-on-article or pull-on-diaper) to be high speed mass-produced at a relatively low cost by use of "method of laterally oriented feeding mode".

10 [0009]

The term "pull-on-article" used herein refers to the diaper having a waist-opening as well as a pair of leg-openings previously defined so that the wearer's legs may be inserted into the diaper through the waist-opening and leg-openings and
15 the diaper is pulled up along the wearer's waist to put the diaper on the wearer's body.

[0010]

As used herein, the term "method of laterally oriented feeding mode" means a method advantageously employed to make
20 the pull-on-articles. In view of the fact that the pull-on-type article has its front and rear waist regions previously joined to each other along the respective opposite side edges, the component materials of the article are fed in a machine

direction so that individual completed articles being adjacent one to another may be moved in the machine direction with front and rear ends of the articles being oriented in a cross direction orthogonal to the machine direction. In this way, the component materials can be achieved and thereby the articles can be mass-produced at a high speed.

[0011]

The articles of the first, second and third types exploited as the pull-on-articles are suitable for mass-production at a low cost by "the method of laterally feeding mode". This is for the reason that, for the pull-on-type article, elastic elements adapted to elasticize the front and rear waist region as well as peripheral edges surrounding the wearer's legs so as to be contractible are linearly fed and arranged in the machine direction. However, it should be appreciated that, so far as the articles of the first and second types, the elastic elements adapted to elasticize the peripheral edges of the leg-openings are fed in the machine direction so as to describe sine curves undulating in the transverse direction (e.g., See JP 1993-31135 A). While these leg elastic elements may be construed as a whole to be fed in said machine direction, it is doubtless that these elastic elements are attached to describe the sine curve and

respective segments (i.e., a plurality of longitudinally divided segments of respective lines along which these elastic elements are attached) undesirably present unevenness in stretch ratio. As an adverse effect of such uneven stretch
5 ratio, for example, irregular gathers or frills appear in the side flaps of the chassis under contraction of the leg elastic elements or the side flaps being curled inwardly or outwardly in the vicinity of those irregular gathers or frills. In consequence, not only the article put on the wearer's body may
10 be disfigured but also fit of the article around the wearer's thighs and/or inguinal region may become uneven and may cause leak of body waste.

[0012]

In the case of the articles classified into the first and
15 second types, the chassis comprises a sheet material having a sufficiently large area to cover desired regions of the wearer's torso. However, use of the sheet material having such relatively large area may result in the article which is voluminous as a whole, particularly in the crotch region and
20 the vicinity thereof when the article is put on the wearer's body. Such excessive bulkiness makes the article put on the wearer's body appear to be undesirably "baggy". The leg elastic elements are typically attached, by adhesive, to the side flaps

defined by the portions of the chassis extending outward in the transverse direction from the opposite side edges of the absorbent core, the absorbent structure or the absorbent chassis. It should be noted here that the leg elastic elements
5 are usually attached to the side flaps along lines sufficiently spaced inward from the outer edges thereof to prevent the adhesive from being exposed and adversely affecting the wearer's skin. Consequentially, the side flaps partially extend outward in the transverse direction from the lines
10 defined by the elastic elements and the side flaps are formed with relatively large and uneven gathers or frills. Depending on how the user looks at it and/or depending on what the user prefers, the side flaps having such gathers or frills often present "not neat" appearance of the article when it is put on
15 the wearer's body.

[0013]

In the case of the article classified into the third type, in view of the fact none of sheet materials having relatively large area is required for the respective component members such
20 as the front and rear waist panels and the absorbent chassis, on one hand, and from a viewpoint of respective geometries thereof, the article is able to present in many case rather "neat" or "sporty" appearance when it is put on the wearer's

body. Such article presenting "neat" or "sporty" impression can be put on the body without any hesitation. Obviously, it should not be construed that all the articles of the third type present such desirable "neat" or "sporty" appearance.

5 [0014]

One example of the article classified into the third type is found in the disclosure of JP2006-525858T. PATENT DOCUMENT 1 discloses a garment in the form of the pull-on-type article (i.e., disposable diaper). This garment comprises an
10 absorbent structure (i.e., absorbent chassis) extending in the longitudinal direction and an annular elastic waist panel extending in the transverse direction and joined to front and rear ends of the absorbent chassis.

[0015]

15 The absorbent chassis comprises, in turn, a topsheet, a backsheet and an absorbent core sandwiched between these sheets. The absorbent chassis further includes side flaps respectively extending outward in the transverse direction from opposite side edges of the absorbent chassis and a pair of barrier leg
20 cuffs provided aside inward from the respective side flaps so as to rise above the topsheet when the diaper is put on the wearer's body. Laterally outer regions of the respective side flaps and free side edges of the respective barrier leg cuffs

are elasticized to be contractible by associated elastic elements attached to these regions so as to extend in the longitudinal direction.

[0016]

5 The annular elastic waist panel consists of a front waist panel and a rear waist panel joined to each other by seams arranged respective opposite side edges of the respective panels. The front and rear waist panels respectively include elasticized waist band regions, lateral elasticized regions
10 contiguously to inner sides of the respective elasticized waist band regions and opposed to and spaced from each other in the transverse direction, and non-elasticized regions extending between the respective lateral elasticized regions. The elasticized waist band regions and the lateral elasticized
15 regions are elasticized to be contractible by a plurality of elastic elements attached to these regions so as to extend in the transverse direction (circumferential direction around the waist). The respective non-elasticized regions are provided on inner surfaces thereof with patches printed with graphics
20 adapted to be looked therethrough from the exterior.

PATENT DOCUMENT 1: JP 2006-525858 T

DISCLOSURE OF THE INVENTION

PROBLEM TO BE SOLVED BY THE INVENTION

[0017]

The article of the third type according to the invention disclosed by JP2006-525858T is claimed to be distinguished from the articles of the first and second types in that this article
5 does not use the absorbent chassis having a relatively large area to cover substantially entire area of the desired regions of the wearer's torso. However, it is required for the absorbent chassis to have substantially the same degree of the absorbing capacity as the absorbent region or the absorbent
10 structure including the absorbent core in the articles of the first and second types. To meet this requirement, it is inevitable for the absorbent core included by the absorbent chassis to have the relatively large width as in the articles of the first and second types. Consequentially, the crotch
15 region of the article is squeezed between the wearer's thighs and undesirably deformed, resulting in that the wearer may experience feeling of incompatibility or causing leak of body waste.

[0018]

20 Despite such inevitable requirement, PATNET DOCUMENT 1 neither teaches nor suggests any means for effective solution of such problem. If the chassis having a relatively large area is not used as claimed, this invention should find an effective

means to prevent potential leak of body waste.

[0019]

It is an object of the present invention to provide an absorbent wearing article such that while an absorbent core has
5 a relatively large width as in the articles of the first and second types before the article is put on the wearer's body, opposite lateral zones of the absorbent core lying in the article's crotch region are regularly deformed inward so as to be opposed to each other as it put on the wearer's body, and
10 thereby to form absorbent barriers rising toward the wearer's crotch region for good fit of the article to the wearer's skin particularly in the vicinity of inguinal region.

[0020]

Another object of the present invention is to provide a
15 disposable absorbent wearing article having a means to promote or to assist said regular deformation.

[0021]

Still another object of the present invention is to provide the disposable absorbent wearing article able to
20 present more "neat" or "sporty" and elegant appearance when it is put on the wearer's body.

[0022]

The other objects of the present invention will be

understood from the following description of the present invention.

MEASURE TO SOLVE THE PROBLEM

[0023]

5 The present invention relates to an improvement in a disposable absorbent wearing article comprising a longitudinal center line and a transverse center line, a front waist region, a rear waist region and a crotch region, an elasticized waist panel defining the front and rear waist regions, and an
10 absorbent chassis defining respective parts of the front and rear waist regions and the crotch region and joined to a front part and a rear part of the elasticized waist panel.

[0024]

 The improvement according to the present invention is
15 characterized in that the absorbent chassis includes an absorbent core, the absorbent core is formed in its region lying in the crotch region but rather aside toward the front waist region with a pair of deformation guides symmetrically formed about the longitudinal center line, and at least opposite
20 lateral zones of the absorbent core are adapted to be deformed toward the wearer's crotch region by intermediary of the deformation guides under elastic contraction of at least a part of the elasticized waist panel lying in the front waist region.

[0025]

The present invention includes preferred embodiments as will be described below:

[0026]

5 The elasticized waist panel consists of a front waist panel and a rear waist panel and respective opposite side edges of the front and rear waist panels may be annularly joined together to form a waist-opening and a pair of leg-openings.

[0027]

10 The front and rear waist panels are provided with a plurality of elastic elements extending in the transverse direction and elasticized thereby so as to be contractible in the transverse direction.

[0028]

15 Auxiliary elastic elements are arranged on both sides of the deformation guides so that these auxiliary elastic elements may cooperate with contraction of the front waist panel to assist at least the absorbent core to be deformed by the intermediary of the deformation guides.

20 [0029]

Of the front and rear waist panels, at least the front waist panel has a pair of first elasticized regions opposed to and spaced from each other in the transverse direction and a

non-elasticized region lying between the pair of elasticized regions, and a front end region of the absorbent chassis lies at least in the non-elasticized region.

[0030]

5 Of the front and rear waist panels, at least the front waist panel has a second elasticized region lying adjacent the pair of first elasticized regions and defining a front waist band.

[0031]

10 The rear waist panel has a third elasticized region corresponding to the first elasticized region, a fourth elasticized region corresponding to the second elasticized region and a fifth elasticized region lying adjacent the third elasticized region and placed aside toward the crotch region,
15 a tensile stress of the fifth elasticized region in the transverse direction is set to be lower than those of the first through fourth elasticized regions, and a dimension of the rear waist panel in the longitudinal direction is larger than that of the front waist panel by a dimension of the fifth elasticized
20 region in the longitudinal direction.

[0032]

 The disposable absorbent wearing article further includes an absorbent structure comprising the absorbent core,

a liner facing the wearer's skin adapted to cover the side of the absorbent core facing the wearer's skin and a backsheet adapted to cover the side of the absorbent core facing away from the wearer's skin.

5 [0033]

The absorbent structure includes a pair of elasticized side flaps extending outward from the lateral zones of the absorbent structure as viewed in the transverse direction and the side flaps are provided with the auxiliary elastic elements.

10 [0034]

Each of the side flaps are elasticized by at least one elastic element in the form of strand extending in the longitudinal direction.

EFFECT OF THE INVENTION

15 [0035]

With the disposable absorbent wearing article according to the present invention put on the wearer's body, the opposite lateral zones of the absorbent core lying in the article's crotch region are deformed inward by the intermediary of the deformation guides formed in the absorbent core so as to be
20 opposed to each other and thereby to form the absorbent barriers against body waste adapted to rise toward the wearer's torso. In this way, these absorbent barriers assure good fitness to

the wearer's skin in the vicinity of the inguinal region. In consequence, the function to prevent body waste from leaking can be reliably improved.

[0036]

- 5 The other effects and advantages provided by the present invention will be understood from the following description of the invention based on several embodiments thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

[0037]

- 10 [FIG. 1] Perspective view of a disposable absorbent wearing article according to the present invention.

- [FIG. 2] Partially cutaway plan view showing the article as viewed from its inner side with front and rear waist regions peeled off from each other along seams along opposite side edges
15 of these waist regions followed by flatly developing these regions in a transverse direction as well as in a longitudinal direction.

- [FIG. 3] Partially cutaway plan view similar to Fig. 2 except that an absorbent chassis has been eliminated for convenience
20 of illustration.

 [FIG. 4] Schematic sectional view taken along the line IV-IV in Fig. 2.

 [FIG. 5] Schematic sectional view taken along the line V-V in

Fig. 2.

[FIG. 6] Schematic sectional view corresponding to Fig. 4 when the article is actually put on the wearer's body.

[FIG. 7] Schematic sectional view taken along the line VII-VII
5 in Fig. 2.

[FIG. 8] Schematic sectional view taken along the line VIII-VIII in Fig. 2.

IDENTIFICATION OF REFERENCE NUMERALS USED IN THE DRAWINGS

[0038]

- | | | |
|----|-----|--------------------------------------|
| 10 | 10 | disposable absorbent wearing article |
| | 11 | absorbent chassis |
| | 12 | annular elasticized waist panel |
| | 12A | front waist panel |
| | 12B | rear waist panel |
| 15 | 20 | absorbent structure |
| | 23a | absorbent core |
| | 31 | side flap |
| | 33 | elastic element |
| | 36 | deformation guide |
| 20 | 37 | auxiliary elastic element |
| | 40 | first elasticized region |
| | 42 | second elasticized region |
| | 43 | first elastic element |

44 second elastic element
45 third elasticized region
46 fourth elasticized region
47 fifth elasticized region
5 49 third elastic element
50 fourth elastic element
51 fifth elastic element

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0039]

10 As will be apparent from Figs. 1 and 2, the present invention will be described based on a pull-on-type diaper 10 as one example of the article according to the present invention. A diaper 10 has a longitudinal center line L1 and a transverse center line L2. It should be appreciated that these reference
15 denotions L1 and L2 will be eliminated in the following description.

[0040]

While the present invention is applicable to diapers of both a pull-on-type and an open-type, it will be preferable to
20 exploit the invention in the pull-on-type rather than in the open-type. In other words, while the diaper of open-type is not excluded from the applicability of the present invention, the disclosure thereof hereinafter will be exclusively based

on the diaper of pull-on-type (referred to hereinafter simply as pull-on diaper).

[0041]

As used herein, the term "diaper of open-type" refers to
5 the diaper with its the front and rear waist regions adapted to be joined along respective opposite side edges by fastening means such as mechanical fasteners to cover the lower torso of the wearer first when the diaper is actually put on the wearer's body.

10 [0042]

The diaper 10 is of the previously described third type and basically comprises an absorbent chassis 11 and an annular elasticized waist panel 12. The diaper 10 has an outer surface 13, an inner surface 14 opposed to the outer surface 13, a front
15 waist region 15, a rear waist region 16, a crotch region 17 extending between these front and rear waist regions 15, 16, a waist-opening 18 and a pair of leg-openings 19. The waist-opening 18 is defined by the annular elasticized waist panel 12 and a pair of leg-openings 19 is defined by the absorbent
20 chassis 11 and the annular elastic waist panel 12.

[0043]

The absorbent chassis 11 has a longitudinally longer rectangular shape contoured by opposite side edges 11a

extending in the longitudinal direction and opposite ends 11b, 11c extending in the transverse direction. The absorbent chassis 11 has front and rear end regions 11d, 11e partially defining the front and rear waist regions 15, 16, respectively, and an intermediate region 11f extending between these end regions 11d, 11e so as to define the crotch region 17.

[0044]

Referring to Figs. 4 and 5, the absorbent chassis 11 includes an absorbent structure 20. The absorbent structure 20 comprises a liquid-pervious liner facing the wearer's skin (i.e., topsheet) 21, a liquid-impervious backsheet 22, and an absorbent panel 23 formed by an absorbent core 23a having a sufficient capacity to absorb bodily fluids and a liquid-dispersant sheet 23b wrapping the absorbent core 23a. The absorbent chassis 11 further comprises a pair of end flaps 24 (See Fig. 2) formed by portions of the liner 21 facing the wearer's skin and the backsheet 22 extending outward in the transverse direction from the absorbent structure 20 at its opposite end regions, a pair of inner side flaps 25 formed by portions of the liner 21 facing the wearer's skin and the backsheet 22 extending in the longitudinal direction along the transversely opposite side edges of the absorbent structure 20 and optionally a pair of barrier leg cuffs 26 extending in the

longitudinal direction adjacently to the opposite lateral regions 20a of the absorbent structure 20.

[0045]

Along the pair of end flaps 24 and the pair of inner side
5 flaps 25, a portion of the liner 21 facing the wearer's skin and the backsheet 22 opposed to this portion of the liner 21, the liner 21 facing the wearer's skin and the surface of the absorbent panel 23 opposed to this liner 21, the backsheet 22 and the surface of the absorbent panel 23 opposed to this
10 backsheet 22, and the peripheral edge of the liner 21 facing the wearer's skin and the peripheral edge of the backsheet 22 opposed to each other are respectively bonded by hot melt adhesive (not shown) coated in an appropriate pattern such as a spiral pattern or stripe pattern.

15 [0046]

The absorbent structure 20 further includes a first sheet member 28 attached to a bottom surface of the absorbent structure 20 by hot melt adhesive coated zone 27 and respective portions of this first sheet member 28 extending outward from
20 the absorbent structure 20 in the transverse direction are folded back inward in the transverse direction. In the vicinity of respective folds 29, respective two layers of the first sheet member 28 partially folded back in this manner are bonded

together by hot melt adhesive 30 to form a pair of sleeve-like outer side flaps 31. The respective outer side flaps 31 cover the outer side edges of the respective inner side flaps 25. [0047]

5 Each of the barrier leg cuffs 26 comprises a prolongation 28a of the first sheet member 28 extending from the associated outer side flap 31 and a second sheet member 32 joined to the prolongation 28a by suitable joint means such as hot melt adhesive (not shown). The barrier leg cuff 26 has a proximal
10 edge 26a and a free edge 26b. As shown in Fig. 2, longitudinally opposite ends 26c of the barrier leg cuff 26 are folded back so that the free edge 26b as a whole may be directed outward in the transverse direction and surfaces of the end 26c opposed to each other as a result of folding back are joined together
15 by suitable joining means such as hot melt adhesive (not shown). Though not illustrated, it is also possible to fold back and fix the respective ends 26b so that the free edge 26b is directed inward as viewed in the transverse direction, if it is desired. [0048]

20 When the respective barrier leg cuffs 26 are formed of a second sheet member 32 different from the first sheet member 28 as in the case of the illustrated embodiment, these cuffs 26 may be formed of material different from that of the

respective outer side flaps 31 if it is necessary. However,
it is possible to form these cuffs of the first sheet member
28 alone. In addition, it is also possible to form the
respective barrier leg cuffs 26 of an independent sheet member,
5 i.e., using neither the first sheet member 28 nor the second
sheet member 32 and then to attach them to the absorbent
structure 20 along its opposite lateral zones, respectively.
[0049]

If the respective barrier leg cuffs 26 are independently
10 formed and attached to the absorbent structure 20 in this manner,
an alternative arrangement may be contemplated wherein the
respective inner side flaps 25 further extend outward in the
transverse direction so that the cuffs 26 may be attached to
the upper surfaces of these inner side flaps 25. Nonetheless,
15 the illustrated embodiment according to which the respective
outer side flaps 31 cover the respective inner side flaps 25
ensures practical benefits. Specifically, it is ensured to
prevent the outer side edges (often defined by cut edges of the
sheet) of the respective inner side flaps 25 from irritating
20 the wearer's skin.

[0050]

Referring to Figs. 2 and 4, the respective outer side
flaps 31 are elasticized to be contractible by attaching

strand-like elastic elements 33 under tension in the longitudinal direction within the sleeve-like structures thereof by hot melt adhesive (not shown). With the diaper put on the wearer's body, the respective outer side flaps 31 bows
5 inward as viewed in the transverse direction under contraction of the elastic elements 33 and elastically pressed against the wearer's thighs. It should be appreciated that two or more elastic elements 33 may be provided for each of the outer side flaps 31, if desired.

10 [0051]

In each of the barrier leg cuffs 26, the free edge 26b is elasticized to be contractible by attaching a plurality of strand-like elastic elements 34 under tension in the longitudinal direction within the sleeve-like structure of the
15 folded back second sheet member 32 by hot melt adhesive (not shown). Alternatively, the single sheet being elastically contractible and having a desired width may be used to form the free edge 26b of each of the barrier leg cuffs 26 instead of using a plurality of strand-like elastic elements 34.

20 [0052]

Now operation of the barrier leg cuff 26 will be described with reference to Figs. 4 and 6. With the diaper put on the wearer's body, the free edge 26b and the vicinity thereof swing

upward from the absorbent structure 20 toward the wearer's torso around a fulcrum line defined by the proximal edge 26a under contraction of the elastic elements 34. In this way, the free edge 26b and the vicinity thereof are elastically pressed
5 against the wearer's inguinal region and thighs in the vicinity of the inguinal region. While the respective proximal edges 26a are free from the elements or members (in the case of the illustrated embodiment, the transversely opposite side edges of the liner 21 facing the wearer's skin) facing the respective
10 proximal edges 26a so far as the illustrated embodiment is concerned, the respective proximal edges 26a may be bonded to such elements or members, if desired. In both cases, pockets 35 adapted to receive body waste are formed between the transversely opposite side edges of the absorbent structure 20
15 and the respective barrier leg cuffs 26. These pockets 35 cooperate with barriers against body waste defined by the respective free edges 26b and the vicinity thereof swinging upward as has been described above to improve a capacity of the article to contain body waste.

20 [0053]

Referring to Figs. 2 and 4, the diaper 10 is formed in the crotch region 17 (corresponding to the intermediate region 11f of the absorbent chassis 11) aside toward the front waist

region 15 (corresponding to the front end region 11d of the absorbent chassis 11) of the diaper 10 with a pair of deformation guides 36 extending substantially in the longitudinal direction symmetrically about the longitudinal center line L1. More specifically, these deformation guides 36 are arranged so that the distance therebetween is gradually reduced as these deformation guides 36 extend from the vicinity of the front waist region 15 toward the transverse center line L2. While this is one of preferred embodiments of the deformation guides 36, the present invention is not limited to such arrangement. For example, it is possible without departing from the scope of the invention to arrange the deformation guides 36 so as to extend in parallel to each other. As for the shape of cross section as well as the number of the deformation guides 36 also, there is no limitation. For example, each of the deformation guides 36 may have a V-shaped cross section and two or more guides may be formed on both sides of the longitudinal center line L1, respectively. In any case, with the diaper put on the wearer's body, the absorbent panel 23, eventually the opposite lateral regions 20a of the absorbent structure 20 bow along the pair of deformation guides 36 and symmetrically about the longitudinal center line L1 toward the wearer's torso so as to face each other (See Fig. 6). The opposite lateral regions 20a

bowing in this manner define absorbent barriers adapted to come in close contact with the wearer's inguinal region or the vicinity thereof.

[0054]

5 Outside the transversely opposite side edges of the absorbent panel 23, strand-like elastic elements 37 serving to facilitate or assist deformation along the deformation guides 36 extend in the longitudinal direction within the respective outer side flaps 31 and contractibly attached under tension to
10 the first sheet member 28 by hot melt adhesive (not shown) so that the respective elastic elements 37 may intersect elastic elements 43 for the elasticized front waist panel 12A to be hereinafter described in detail and may be interlinked therewith. In order to facilitate or assist deformation along
15 the guides 36, it is also possible to arrange the elastic elements 37 further close to the absorbent panel 23.

[0055]

 The respective elastic elements 33, 37 are set to have contractile force or tensile stress substantially at a same
20 level but lower than that of the respective elastic elements 34. It should be appreciated that the respective elastic elements 33 may be set to have contractile force or tensile stress higher than that of the respective elastic elements 37

as well as the respective elastic elements 34 if desired, or vice versa.

[0056]

In the illustrated embodiment, the respective
5 deformation guides 36 are exploited in slits extending through the absorbent core 23a in its thickness direction. According to a method for making the article of this type (disposable diaper), raw materials such as a mixture of short fibers, particles or powders are dispersed and accumulated in a mold
10 by exerting a negative pressure on an air-permeable bottom wall of the mold (i.e., under a suction) to mold the absorbent core 23a. In this case, the air-permeable bottom wall of the mold may be provided with non-meshy (i.e., air-impervious) regions corresponding to the respective deformation guides 36 to form
15 the slits along which none of the raw materials is accumulated.

[0057]

The respective deformation guides 36 are not limited to such slits but the other various configurations may be selected. For example, it is possible to implement these deformation
20 guides 36 as linear regions along which a mass of the raw materials per unit area is lower than a mass of the raw materials per unit in the remaining region of the absorbent core 23a. In this alternative embodiment of the deformation guide, it is

possible to employ a mold provided on its air-permeable bottom wall with an air-permeable salient appropriately protuberating in the depth direction of the mold. In this case, a thickness of the accumulated raw materials on this salient is smaller than
5 that in the remaining region of the absorbent core 23a and a mass per unit area is correspondingly smaller. It is also possible to compress the respective regions of the absorbent core 23a corresponding to the deformation guides 36 under heating or without heating to form the respective deformation
10 guides 36. In this case also, the mass of the deformation guide 36 per unit area is higher than in the remaining region of the absorbent core 23a.

[0058]

Rather than forming the respective deformation guides 36
15 in the absorbent core 23a alone, it is also possible to form them in the absorbent core 23a, the liquid-dispersant sheet 23b and the liner 21 facing the wearer's skin laminated one upon another so as to integrate these members one with another. In this case, such laminate is preferably compressed under heating
20 or without heating so that the respective deformation guides 36 may appear on the surface of the absorbent structure 20.

[0059]

Stock material for the liner 21 facing the wearer's skin

may be selected from the group consisting of a nonwoven fabric made of synthetic fibers having bodily fluid-pervious hydrophobic and/or hydrophilic nature, a porous plastic film and laminate thereof, all of which have been widely used in the
5 related technical field.

[0060]

Stock material for the backsheet 22 may be selected from the group consisting of a plastic film which is resistant to permeation of bodily fluids but moisture-pervious, a
10 hydrophobic fibrous nonwoven fabric and laminate thereof, all of which have been widely used in the related technical field.

[0061]

For the absorbent core 23a, a mixture of known art consisting of wooden fluff pulp, so-called super-absorbent
15 polymer particles or fibers having an absorbing capacity of several ten times their own weight and optionally thermoplastic staple fibers is suitable as stock material. The absorbent core 23a is contoured to have a concave shape curved inwardly and appropriately compressed in its thickness direction in order
20 to improve its shape retaining and liquid-absorbent/dispersant properties. Consequentially, the absorbent core 23a is often described to be rigid in comparison with the liner 21 facing the wearer's skin, the backsheet 22 and the first and second

sheet members 28, 32, and called as semirigid.

[0062]

As stock material for the first and second sheet members 28, 32, a hydrophobic fibrous nonwoven fabric, a plastic film
5 or laminate thereof, which is resistant to permeation of bodily fluids but moisture-pervious, all of which are well known in the related technical field is suitable.

[0063]

Referring to Fig. 3, the annular elastic waist panel 12
10 comprises the transversely longer rectangular front waist panel 12A contoured by an outer end 12a, an inner end 12b and transversely opposite side edges 12c and the substantially trapezoidal rear waist panel 12B contoured by an outer end 12d, an inner end 12e, transversely opposite side edges 12f and
15 transversely opposite inner oblique side edges 12g. The rear waist panel 12B has a dimension in the longitudinal direction larger than the front waist panel 12A by a dimension of fifth elasticized region 47 to be described later in more detail.

[0064]

20 The front waist panel 12A is formed of a laminate comprising of an inner sheet 38a and an outer sheet 39a. The outer sheet 39a has a dimension in the longitudinal direction larger than that of the inner sheet 38a and a prolongation 39c

thereof is folded back onto the inner sheet 38a (See Fig. 7) and bonded thereto by means of hot melt adhesive (not shown).
[0065]

The front waist panel 12A has a pair of first elasticized
5 regions 40 spaced from and opposed to each other in the transverse direction and being contractible in the transverse direction, an optional first non-elasticized region 41 extending between the pair of first elasticized regions 40 and a second elasticized region 42 adjacent to the side of the paired
10 first elasticized regions 40 close to the waist-opening 18 (i.e., upper edges of the respective first elasticized regions 40 as viewed in Fig. 3). The second elasticized region 42 defined a front waist band. The first and second elasticized regions 40, 42 are elasticized to be contractible in the transverse
15 direction by attaching a plurality of strand-like first and second elastic elements 43, 44 under tension in the transverse direction between the inner and outer sheets 38a, 39a (See Fig. 5) by hot melt adhesive (not shown).
[0066]

20 A pitch in the longitudinal direction at which the second elastic elements 44 are arranged is set to be smaller than a pitch in the same direction at which the first elastic elements 43 are arranged. Tensile stress of the second elasticized

region 42 in the transverse direction is set to be higher than that of the respective first elasticized region 40.

[0067]

The first non-elasticized region 41 lying in a middle of
5 the front waist panel 12A as viewed in the transverse direction may be defined, for example, by the steps as follow: First, the paired first elasticized regions 40 are coated with hot melt adhesive in an appropriate pattern, leaving the first non-elasticized region 41 not coated with such adhesive, then
10 continuous first elastic elements 43 are fed toward these respective regions so as to be fixed to the regions coated with the adhesive and these first elastic elements 43 are cut in the first non-elasticized region. Thereupon, the first elastic elements 43 automatically contract (snap back) since the first
15 non-elasticized region 41 is not coated with the adhesive. In consequence, the first elastic elements 43 having contractile force are no more substantially present in the first non-elasticized region 41. As used herein, the term "no more substantially present" suggests that extremely short end
20 portions of the first elastic elements 43 having snapped back toward the respective first elasticized regions 40 may be left in this non-elasticized region 41. While such process of cutting is preferred, it is also possible to cut off the segments

of the respective first elastic elements 43 extending over the first non-elasticized region 41 completely.

[0068]

The steps to define the first non-elasticized region 41 are not limited to those as have been described above and it can be defined by alternative steps different from those described above. For example, the segments of the first elastic elements 43 to extend across the first non-elasticized region 41 are placed without tension. In this case, the first non-elasticized region 41 also may be coated with hot melt adhesive and the segments of the first elastic elements 43 may be bonded without tension. It is also possible to deprive or restrict any contractibility of the first elastic elements 43 laid under tension in the first non-elasticized region 41 and thereby to define the first non-elasticized region 41.

[0069]

As will be apparent from the foregoing description, "non-elasticized region" refers to the non-elasticized region in which the elastic elements are substantially absent or the non-elasticized region in which the elastic elements are present but contractibility thereof are deprived.

[0070]

While not illustrated, reason for existence of the first

non-elasticized region 41 is: (a) just as in the case of the invention disclosed by JP2006-525853T, a patch printed with a graphic is attached to the inner surface of the first non-elasticized region 41 so as to make the graphic possible
5 to be seen through the first non-elasticized region 41 from the exterior, and/or (b) the absorbent panel 23 is protected against undesirable deformation such as gathers due to contraction of the first elastic elements 43. Particularly as for the reason for existence (a), the absence of the first elastic elements
10 43 in the first non-elasticized region 41 is preferable in order to make the graphic to be clearly visible.

[0071]

Like the front waist panel 12A, the rear waist panel 12B is formed of a laminate of the inner sheet 38b and the outer
15 sheet 39b. The outer sheet 39b has its dimension in the longitudinal direction larger than that of the inner sheet 38b and a prolongation 39d thereof is folded back onto the side of the inner sheet 38b (See Fig. 8) and bonded thereto by means of hot melt adhesive (not shown).

20 [0072]

The rear waist panel 12B has transversely paired third elasticized regions 45 corresponding to the first elasticized regions 40 and separated from and opposed to each other in the

transverse direction so as to be contractible in this direction,
a fourth elasticized region 46 corresponding to portions of the
first elasticized regions 40 and the second elasticized region
42 and lying adjacent to the side of the paired third elasticized
5 regions 45 close to the waist-opening 18 (i.e., lower edges of
the respective third elasticized regions 45 as viewed in Fig.
3), fifth elasticized regions 47 lying adjacent to the side of
the paired third elasticized regions 45 close to the
leg-openings 19 (i.e., upper edge of the paired third
10 elasticized regions 45) and optionally a second non-elasticized
region 48 corresponding to the first non-elasticized region 41
and extending between the paired third elasticized regions 45
as well as between the paired fifth elasticized regions 47. The
fourth elasticized region 46 defines a rear waist band and
15 cooperates with the front waist band to form the waist-opening
18. The third, fourth and fifth elasticized regions 45, 46,
47 are elasticized to be contractible in the transverse
direction by attaching a plurality of strand-like third, fourth
and fifth elastic elements 49, 50, 51 under tension in the
20 transverse direction between the inner and outer sheets 38a,
39a (See Fig. 5) by means of hot melt adhesive (not shown).
[0073]

Pitches in the longitudinal direction at which the third

and fourth elastic elements 49, 50 are set to be the same as those for the first and second elastic elements 43, 44. The pitch in the longitudinal direction at which the fifth elastic elements 51 are arranged is set to be larger than those for the first and third elastic elements 43, 49. Tensile stress of the third and fourth elasticized regions 45, 46 in the transverse direction is set to be same as that of the first and second elasticized regions 40, 42 in the transverse direction. Tensile stress of the fifth elasticized region 47 in the transverse direction is set to be lower than that of the third elasticized region 45 in the transverse direction. The tensile stresses of the respective elasticized regions in the transverse direction are represented by a relational expression: the second elasticized region 42 = the fourth elasticized region 46 > the first elasticized regions 40 = the third elasticized regions 45 > the fifth elasticized regions 47. Alternatively, the first elasticized regions 40 = the second elasticized region 42 = the third elasticized regions 45 = the fourth elasticized region 46 > the fifth elasticized regions 47.

[0074]

Now a method for measuring tensile stresses of the respective elasticized regions in the waist panel will be

described. First, the front and rear waist regions are peeled off from each other along the seams and the diaper 10 is flatly developed as seen in Fig. 2 and the respective elastic elements are stretched to the maximum stretched length in the transverse direction. The waist panels 12A, 12B as a whole are cut off from the diaper 10 and the respective elasticized regions are cut away from these waist panels 12A, 12B to obtain desired test pieces. Based on these test pieces, widths (dimensions in the longitudinal direction of the diaper 10) of the respective regions are measured. When the respective elasticized regions are cut off from the test pieces, the region defined between each pair of the adjacent elastic elements is cut along a longitudinal center line of this region. Then, each of the test pieces in a contracted state is fixed between a pair of chucks of Tensile Tester (manufactured by Shimadzu Corporation). A distance between these chucks is initially set to 100 mm and appropriately adjusted depending on the each of the test pieces. Now the test piece is stretched in the transverse direction of the diaper 10 at a rate of 100 mm/min and a load (mN) at 65% of the maximum stretched length is measured. Thus, tensile stress is calculated for each of the elasticized regions according to an equation: Measured value (mN) ÷ region width (mm) = tensile stress. As for the elasticized regions in the

side flaps and the barrier leg cuffs also, measurement may be carried out in the similar manner as has been described above.
[0075]

In each of the fifth elasticized regions 47, the number
5 of the fifth elastic elements 51 is fewer than the number of
the first through fourth elastic elements 43, 44, 49, 50 and
the tensile stress of the respective fifth elasticized regions
47 in the transverse direction is lower than those of the first
through fourth elasticized regions 40, 42, 45, 46 as has
10 previously been described in reference to the associated
drawings. With this unique arrangement, the respective fifth
elasticized regions 47 properly cover a desired area of the
wearer's buttock when the diaper 10 is put on the wearer's body,
forming a soft contact surface along a curve of the buttock.
15 In addition, that irregular frills would not appear and
disfigure the appearance of the diaper 10 put on the wearer's
body because none of the elastic elements is present along the
oblique inner side edges 12g.
[0076]

20 The number of the fifth elastic elements 51 is fewer than
the number of the third elastic elements 49 and therefore the
presence of these fifth elastic elements 51 would not
deteriorate desired visibility of the graphic even when these

fifth elastic elements 51 are continuous in the transverse direction. To further improve the soft contact, transversely opposite outer ends 51a of the fifth elastic elements 51 preferably terminate short of the oblique inner side edges 12g.

5 [0077]

As stock material for the inner and outer sheets 38a, 39a, 38b, 39b defining the front and rear waist panels 12A, 12B, a hydrophobic fibrous nonwoven fabric, a moisture-pervious plastic film or a laminate thereof is suitable. The other
10 features of the rear waist panel 12B are the same as those of the front waist panel 12A.

[0078]

Referring again to Figs. 1, 2 and 3, the absorbent chassis 11 has its front end region 11d joined to the inner surface of
15 the front waist panel 12A and its rear end region 11e joined to the inner surface of the rear waist panel 12B, in both cases, by hot melt adhesive or the other fastening means (not shown). The front and rear waist panels 12A, 12B are joined together along opposite side edges 12c of the front waist panel 12A and
20 along opposite side edges 12f of the rear waist panel 12B to define the annular waist band.

[0079]

The diaper 10 of such construction functions on the

wearer's body in the manner as will be described. The annular waist panel 12 contracts in the transverse direction (i.e., circumferentially with respect to the waist) as the respective elastic elements 43, 44, 49, 50, 51 contract. Particularly, contraction of the first elastic elements 43 in the front waist panel 12A cooperates with contraction of the auxiliary elastic elements 37 to deform the opposite lateral regions 20a of the absorbent structure 20 in the absorbent chassis 11 inward along the deformation guides 36 so that the lateral regions 20a rise in face-to-face relationship toward the wearer's crotch so as to form the absorbent barriers against body waste as exemplarily illustrated in Fig. 6. Thereupon, the opposite side flaps 31 and the opposite barrier leg cuffs 26 are also deformed inward in a face-to-face relationship under contraction of the elastic elements 33, 34, respectively. At the same time, the free edges 26b of the paired barrier leg cuffs 26 and the opposite side flaps 31 raise themselves toward the wearer's crotch. In this way, the opposite lateral regions 20a of the absorbent structure 20 and the free edges 26b of the paired barrier leg cuffs 26 raising themselves in this manner are elastically held in contact with the wearer's inguinal region so far as the diaper is properly put on the wearer's body. Similarly, the opposite side flaps 31 raising themselves also are elastically

held in contact with the wearer's thighs.

[0080]

The first elastic elements 43 associated with the front waist panel 12A lying adjacent the deformation guides 36
5 primarily contribute to said deformation of the opposite lateral zones 20a in the absorbent structure 20 and similarly the auxiliary elastic elements 37 lying adjacent the deformation guides 36 cooperate with the first elastic elements 43 to assist said deformation. These elastic elements 43 and
10 the auxiliary elastic elements 37 are preferably provided but not essential for the present invention.

[0081]

The present invention can be exploited by employing the previously described "method of laterally oriented feeding
15 mode". While the first through the fifth elastic elements 43, 44, 49, 50, 51 associated with the front and rear waist panels 12A, 12B, on one hand, and the elastic elements 33, 34, 37 associated with the absorbent chassis 11, on the other hand, are arranged to contract in the directions orthogonal to each
20 other, both the elastic elements associated with the absorbent chassis and the elastic members associated with the front and rear waist panels are linearly fed in the machine direction. After the associated elastic elements have been attached to the

absorbent chassis, the latter is turned by an angle of 90° and laminated on the front and rear waist panels. In this manner, all the elastic elements associated with the front and rear waist panels and the absorbent chassis are linearly fed and
5 attached thereto.

[0082]

While it has not been referred to with respect to the prior art, the wearing article having the absorbent core formed with deformation guides, for example, in the form of perforations
10 is well known. However, none of such prior art has disclosed the technique utilizing contraction of the waist panels to deform the absorbent core by the intermediary of the deformation guides. As far as the inventors know, this technique is believed to have a novelty for the present invention to be
15 patented. Generally in the case of the previously described pull-on-type diaper classified into the third type, the annular waist panel is preferably elasticized and, to meet this requirement, the annular waist panel is provided with a plurality of elastic elements. In general, particularly in
20 order to deform the absorbent core by the intermediary of the deformation guides, the absorbent core must be additionally provided on the opposite lateral zones thereof with elastic elements each having a relatively high tensile force. However,

when the elastic elements in the form of strands having relatively high tensile force are additionally provided to meet this requirement, these elastic elements might leave linear compression marks on the wearer's thighs or inguinal region
5 and/or might cause the wearer to experience uncomfortable pain.
The present invention can solve such problem also.

C L A I M S

[1] A disposable absorbent wearing article comprising:
a longitudinal center line and a transverse center line;

5 a front waist region, a rear waist region and a crotch
region;

an elasticized waist panel defining said front and rear
waist regions; and an absorbent chassis defining
respective parts of said front and rear waist regions and said
10 crotch region and joined to a front part and a rear part of said
elasticized waist panel, said disposable absorbent
wearing article being characterized in that:

said absorbent chassis includes an absorbent core;

said absorbent core is formed in its region lying in said
15 crotch region but rather aside toward said front waist region
with a pair of deformation guides symmetrically formed about
said longitudinal center line; and at least opposite lateral
zones of said absorbent core are adapted to be deformed toward
the wearer's crotch region by intermediary of said deformation
20 guides under elastic contraction of at least a part of said
elasticized waist panel lying in said front waist region.

[2] The wearing article according to Claim 1, wherein said

elasticized waist panel consists of a front waist panel and a rear waist panel and respective opposite side edges of said front and rear waist panels may be annularly joined together to form a waist-opening and a pair of leg-openings.

5

[3] The wearing article according to Claim 1 or 2, wherein said front and rear waist panels are provided with a plurality of elastic elements extending in said transverse direction and elasticized thereby so as to be contractible in said transverse
10 direction.

[4] The wearing article according to any one of Claims 1 through 3, wherein auxiliary elastic elements are arranged on both sides of said deformation guides so that said auxiliary
15 elastic elements may cooperate with contraction of said front waist panel to assist at least said absorbent core to be deformed by intermediary of said deformation guides.

[5] The wearing article according to Claim 2, wherein:
20 of said front and rear waist panels, at least said front waist panel has a pair of first elasticized regions opposed to and spaced from each other in said transverse direction and a non-elasticized region lying between said pair of elasticized

regions; and

a front end region of said absorbent chassis lies at least in said non-elasticized region.

5 [6] The wearing article according to Claim 5, wherein of said front and rear waist panels, at least said front waist panel has a second elasticized region lying adjacent said pair of first elasticized regions and defining a front waist band.

10 [7] The wearing article according to Claim 2, wherein:

said rear waist panel has a third elasticized region corresponding to said first elasticized region, a fourth elasticized region corresponding to said second elasticized region and a fifth elasticized region lying adjacent said third
15 elasticized region and placed aside toward said crotch region;

a tensile stress of said fifth elasticized region in said transverse direction is set to be lower than those of said first through fourth elasticized regions; and a dimension of said rear waist panel in said longitudinal direction is larger than
20 that of said front waist panel by a dimension of said fifth elasticized region in said longitudinal direction.

[8] The wearing article according to any one of Claims 1

through 7, further including an absorbent structure comprising
said absorbent core, a liner facing a wearer's skin adapted to
cover a side of said absorbent core facing the wearer's skin
and a backsheet adapted to cover a side of said absorbent core
5 facing away from the wearer's skin.

[9] The wearing article according to Claim 8, wherein said
absorbent structure includes a pair of elasticized side flaps
extending outward from lateral zones of said absorbent
10 structure as viewed in said transverse direction and said side
flaps are provided with said auxiliary elastic elements.

[10] The wearing article according to any one of Claims 1
through 9, wherein each of said side flaps are elasticized by
15 at least one elastic element in a form of strand extending in
said longitudinal direction.