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DISPOSABLE SANITARY ARTICLE

This invention relates to a disposable sanitary article such as a disposable diaper, a diaper cover, training pants or pants for an incontinent patient.

Disposable diapers of open-type are well known, which include a pair of tape fasteners extending transversely outward from transversely opposite side edges in a rear waist region and a target tape strip attached to the outer surface of the front waist region. According to a specific embodiment of such well known diapers, a hook member adapted to be combined with a loop member to constitute a mechanical fastener commonly known by the trade name of "VELCRO" or "MAGIC TAPE" is attached to the inner surface of the tape fastener and the rectangular loop member serving as the target tape strip is attached to the outer surface of the front waist region in a desired landing zone for the hook member. The tape fastener may be detachably anchored on the target tape strip to connect the front waist region to the rear waist region of the diaper.

Such a diaper is well known from, for example, the disclosures of Japanese Patent Application Publication Nos. 1997-38139A, 1997-191908A, 1998-309299A and 1998-328237A. In the diapers disclosed in these Publications, a non-stretchable

loop member is used as the target tape strip.

In the case of the diaper having an elastic stretchability, the non-stretchable loop member as the target tape strip attached to the front waist region which is in non-stretched state inevitably restricts stretchability of the front waist region in its target tape strip attached zone. In this zone, the initial stretchability of the diaper is substantially lost.

It is an object of this invention to provide a disposable sanitary article having an elastic stretchability improved so that, even when one of front and rear waist regions being in its non-stretched state is provided on its outer surface with a target tape strip, the initial stretchability of the waist region in its zone having the target tape strip attached thereto may be maintained.

According to this invention, there is provided a disposable sanitary article having transversely opposite side edges and longitudinally opposite ends, comprising the article being configured with a first waist region, a second waist region and a crotch region extending between the first and second regions, a pair of tape fasteners attached to the transversely opposite side edges in the first waist region and a non-stretchable target tape strip attached to the second waist

region on its outer surface so that the tape fasteners are detachably anchored on the target tape strip.

The disposable sanitary article further comprises the first and second waist regions and the crotch region, or at least the first and second waist regions being elastically stretchable longitudinally and transversely or at least transversely of the article and the target tape strip being formed with a plurality of slits extending longitudinally of the article parallel to and spaced apart from one another transversely of the article and being attached to the second waist substantially in its non-stretched state. The expression "substantially in its non-stretched state" includes both a state in which the second waist region is not stretched at all and a state in which the second waist region is slightly stretched.

The disposable sanitary article according to this invention is elastically stretchable lengthwise and breadthwise, at least breadthwise, and provided on the outer surface of the front (second) or rear (first) waist region thereof with the target tape strip. The feature of this invention that the target tape strip is formed with a plurality of longitudinally extending slits enables the target tape strip attached zone of the relevant waist region to maintain the

stretchability of this waist region as completely as possible.

In the case of the perforated lines fully extending between the upper and lower ends of the target tape strip so that the target tape strip can be torn off along these perforated lines, the portion of the article exposed between each pair of the adjacent torn off pieces of the target tape strip can be stretched transversely outward without being restricted by the presence of the target tape strip.

In the case of the target tape strip formed with a plurality of slits fully extending between the vicinities of the upper end and the lower end of the target tape strip or the target tape strip form with a plurality of first slits longitudinally extending from the upper end to the vicinity of the lower end and a plurality of second slits longitudinally extending from the lower end to the vicinity of the upper end of the target tape strip. Specifically, the respective slits of the target tape strip are opened transversely outward as the article is stretched transversely outward. In this manner, the zone of the article in which the target tape strip can be stretched transversely outward by a dimension corresponding to the total dimension by which the slits can be opened transversely outward.

Fig. 1 is a perspective view depicting one embodiment of a partially cutaway diaper according to this invention;

Fig. 2 is a sectional view taken along line A - A in Fig. 1;

Fig. 3 is a perspective view depicting the diaper of Fig. 1 as front and rear waist regions connected together around a wearer's body;

Fig. 4 is a sectional view taken along line B - B in Fig. 3;

Fig. 5 is a perspective view depicting the diaper according to the embodiment different from that depicted by Fig. 1 as partially broken away;

Fig. 6 is a perspective view depicting the diaper of Fig. 5 as the front and rear waist regions connected together around a wearer's body;

Fig. 7 is a perspective view depicting the diaper according to the embodiment different from those depicted in Figs. 1 and 5 as partially broken away; and

Fig. 8 is a perspective view depicting the diaper of Fig. 7 as the front and rear waist regions are connected together around a wearer's body.

Details of a disposable sanitary article according to

this invention will be more fully understood from the description given hereunder with reference to the accompanying drawings.

Fig. 1 is a perspective view depicting a partially cutaway diaper 1 and Fig. 2 is a sectional view taken along line A - A in Fig. 1. The diaper 1 comprises a liquid-pervious topsheet 2, a liquid-impervious backsheet 3 and a liquid-absorbent core 4 disposed between the topsheet 2 and the backsheet 3 and joined to the inner surface of the topsheet 2.

The diaper 1 is configured to define a front waist region 20 destined to lie on the side of a wearer's belly, a rear waist region 22 destined to lie on the side of the wearer's back and a crotch region 21 extending between these front and rear waist regions 20, 22. The diaper 1 has transversely opposite side edges 1a longitudinally extending parallel to each other and curving inward transversely of the diaper 1 in the crotch region 21 and longitudinally opposite ends 1b transversely extending in parallel to each other.

Of the diaper 1, both the topsheet 2 and the backsheet 3 are made of a nonwoven fabric which is elastically stretchable lengthwise and breadthwise. Portions of the topsheet 2 and the backsheet 3 extending outward longitudinally and transversely beyond a peripheral edge of the core 4 are placed upon and

intermittently joined to each other.

In the rear waist region 22, the transversely opposite side edges 1a are provided with a pair of tape fasteners 5, respectively, extending transversely outward therefrom. In the front waist region 20, the backsheet 3 is provided on its outer surface with a target tape strip 6 serving as a landing zone for the tape fasteners 5.

Each of the tape fasteners 5 has its proximal end 5b disposed between the topsheet 2 and the backsheet 3 and joined to the respective inner surfaces of these sheets 2, 3 by an adhesive agent (not shown). A hook member 7 as a component of a mechanical fastener is joined to a free end 5a of the tape fastener 5 on its inner surface by an adhesive agent (not shown).

The target tape strip 6 is formed by a loop member as the other component of the mechanical fastener and shaped in a transversely larger rectangle which is contoured by transversely opposite side edges 6a longitudinally extending in parallel to each other and longitudinally opposite ends 6b, 6c transversely extending in parallel to each other. The target tape strip 6 is formed with a plurality of perforated lines 8 (slits) which longitudinally extend between the upper and lower ends 6b, 6c and are transversely spaced apart from one another by a desired dimension so that the target tape strip 6 may be

torn off along the perforated lines 8. The target tape strip 6 is joined to the backsheet 3 which is in its non-stretched state by plural lines of adhesive 9 longitudinally extending between each pair of the adjacent perforated lines 8 and being transversely spaced apart from one another by a desired dimension.

Fig. 3 is a perspective view depicting the diaper 1 as the front and rear waist regions 20, 22 connected together around a wearer's body and Fig. 4 is a sectional view taken along line B - B in Fig. 3. Referring to Fig. 3, the respective inner surfaces of the tape fasteners 5 are detachably anchored on the outer surface of the target tape strip 6 thereby to form a waist-opening 10 and a pair of leg-openings 11. The front and rear waist regions 20, 22 are stretched transversely outward and the target tape strip 6 is tensioned transversely outward as the diaper 1 is put on a wearer's body. Under a tension exerted thereon transversely outward, the target tape strip is forcibly divided into a plurality of pieces.

The topsheet 2 and the backsheet 3 extending between each pair of the adjacent lines of adhesive 9 have their elastic stretchability free from restriction by the target tape strip 6 since this target tape strip 6 is torn off along the perforated lines 8 into a plurality of separated pieces. Thus, the sheets

2, 3 can be stretched transversely outward.

Referring to Figs. 3 and 4, the topsheet 2 and the backsheet 3 are stretched transversely outward between each pair of the adjacent target tape pieces which are, in turn, transversely spaced apart from one another by a desired dimension except the zone of the target tape strip 6 on which the respective tape fasteners 5 are anchored. The topsheet 2 and the backsheet 3 contract again and the pieces of the target tape strip 6 which have been transversely spaced one from another are connected to one another again as the tape fasteners 5 are disengaged from the target tape strip 6.

Fig. 5 is a perspective view depicting the partially cutaway diaper 1 according to the embodiment different from that depicted by Fig. 1 and Fig. 6 is a perspective view depicting the diaper 1 of Fig. 5 as the front and rear waist regions 20, 22 connected together around a wearer's body. Referring to Fig. 6, the respective inner surfaces of the tape fasteners 5 are detachably anchored on the outer surface of the target tape strip 6. Similarly to the diaper 1 of Fig. 1, the diaper 1 according to this alternative embodiment comprises the liquid-pervious topsheet 2, the liquid-impervious backsheet 3 and a liquid-absorbent core 4 disposed between the topsheet 2 and the backsheet 3 and is longitudinally configured to define

the front waist region 20, the rear waist region 22 and the crotch region 21 extending between these front and rear waist regions 20, 22. The diaper 1 has transversely opposite side edges 1a longitudinally extending parallel to each other and curving inward transversely of the diaper 1 in the crotch region 21 and longitudinally opposite ends 1b transversely extending parallel to each other.

Of the diaper 1, the backsheet 3 is made of a plastic film having elastic stretchability in its transverse direction and the topsheet 2 is made of a non-stretchable nonwoven fabric being substantially identical in shape as well as in size to the backsheet 3 which is under tension. Portions of the topsheet 2 and the backsheet 3, the latter being under transverse tension, extending outward longitudinally and transversely beyond a peripheral edge of the core 4 are placed upon and intermittently joined to each other. The core 4 is joined to the inner surface of the topsheet 2. Referred to Fig. 5, the topsheet 2 contracts as the backsheet 3 is relieved of the tension and contracts, resulting in formation of many gathers in the portion of the topsheet 2 placed upon the backsheet 3.

In the rear waist region 22, the transversely opposite side edges 1a are provided with a pair of tape fasteners 5,

respectively, extending transversely outward therefrom. In the front waist region 20, the backsheet 3 is provided on its outer surface with the target tape strip 6 serving as a landing zone for the tape fasteners 5. The hook member 7 is joined to the tape fastener 5 on its inner surface. The target tape strip 6 is formed by a loop member shaped in a transversely larger rectangle and divided in two halves in the vicinity of the middle zone of the front waist region 20.

The target tape strip 6 is formed with a plurality of slits 8 which longitudinally extend between the vicinities of the upper 6b and the lower end 6c and are transversely spaced apart from one another. The target tape strip 6 is joined to the backsheet 3 which is in its non-stretched state by plural lines of adhesive 9 longitudinally extending between each pair of the adjacent perforated lines 8.

In the front waist region 20 of the diaper 1, the respective slits 8 of the target tape strip 6 can be stretched transversely outward, as will be seen in Fig. 6, so portions of the topsheet 2 and the backsheet 3 extending between each pair of the adjacent lines of adhesive 9 can be stretched transversely outward by the corresponding dimension.

The target tape strip 6 is divided in two halves in the vicinity of the middle zone of the front waist region 20.

Therefore, a zone 12 of the backsheet 3 extending over the substantially middle zone of the front waist region 20 maintains its initial elastic stretchability without being restricted by the presence of the target tape strip 6, so both the topsheet 2 and the backsheet 3 can be stretched transversely outward in the zone 12.

Fig. 7 is a perspective view depicting the diaper 1 according to the embodiment different from those depicted in Figs. 1 and 5, and Fig. 8 is a perspective view depicting the diaper 1 of Fig. 7 as the front and rear waist regions 20, 22 are connected together around a wearer's body. Referring to Fig. 8, the respective inner surfaces of the tape fasteners 5 are detachably anchored on the outer surface of the target tape strip 6. Similarly to both the diaper 1 of Fig. 1 and the diaper 1 of Fig. 5, the diaper 1 according to this alternative embodiment basically comprises the liquid-pervious topsheet 2, the liquid-impervious backsheet 3 and the liquid-absorbent core 4 disposed between the topsheet 2 and the backsheet 3 and is longitudinally configured to define the front waist region 20, the rear waist region 22 and the crotch region 21 extending between these front and rear waist regions 20, 22 wherein the diaper 1 has transversely opposite side edges 1a longitudinally extending in parallel to each other and curving inward

transversely of the diaper 1 in the crotch region 21 and longitudinally opposite ends 1b transversely extending in parallel to each other.

Of the diaper 1, both the topsheet 2 and the backsheet 3 are made of a nonwoven fabric which is elastically stretchable lengthwise and breadthwise. Portions of the topsheet 2 and the backsheet 3 extending outward longitudinally and transversely beyond a peripheral edge of the core 4 are placed upon and intermittently joined to each other. The core 4 is joined to the inner surface of the topsheet 2.

In the rear waist region 22, the transversely opposite side edges 1a are provided with a pair of tape fasteners 5 and release tape strips 14 associated with the tape fasteners 5, respectively, extending transversely outward therefrom. In the front waist region 20, the backsheet 3 is provided on its outer surface with the target tape strip 6 serving as a landing zone for the tape fasteners 5.

The tape fasteners 5 are coated on the respective inner surfaces with pressure-sensitive adhesive 13. The target tape strip 6 is made of a plastic film shaped in a rectangle which is transversely larger. Prior to actual use of the diaper 1, the tape fasteners 5 are temporarily fixed to the release tape strips 14 by means of the pressure-sensitive adhesive 13. When

the diaper 1 is actually put on a wearer's body, the tape fasteners 5 are fixed to the outer surface of the tape fasteners 5 by means of the pressure-sensitive adhesive 13.

The target tape strip 6 is formed with a plurality of first slits 8a which longitudinally extend from the upper end 6b to the vicinity of the lower end 6c and a plurality of second slits 8b extending from the lower end 6c to the vicinity of the upper end 6b of the target tape strip 6. The first and second slits 8a, 8b alternate transversely of the target tape strip 6. The target tape strip 6 is joined to the non-stretched backsheet 3 by plural lines of adhesive 9 longitudinally extending between each pair of the adjacent first and second slits 8a, 8b.

In the front waist region 20 of the diaper 1, the respective slits 8 of the target tape strip 6 can be stretched transversely outward, as will be seen in Fig. 8, so portions of the topsheet 2 and the backsheet 3 extending between each pair of the adjacent lines of adhesive 9 can be stretched transversely outward by the corresponding dimension.

The topsheet 2 may be preferably made of a non-stretchable or stretchable nonwoven fabric treated to become hydrophilic. In addition to these non-stretchable or stretchable nonwoven fabric, a non-stretchable or stretchable porous plastic film also may be used as a stock material for the topsheet 2.

The backsheet 3 may be made of a stretchable plastic film, a stretchable nonwoven fabric, or a laminated sheet consisting of a plastic film and a nonwoven fabric both having desired stretchability. It is also possible to use a composite sheet consisting of a non-stretchable plastic film, a non-stretchable nonwoven fabric and a sheet or elastic threads made of elastomer such as a natural or synthetic rubber having elastic stretchability and disposed between the plastic film and the nonwoven fabric as a stock material for the backsheet 3. The nonwoven fabric used as the stock material for the backsheet 3 is preferably hydrophobic.

The nonwoven fabric may be selected from a group including those of spun lace, needle punch, melt blown, thermal bond, spun bond and chemical bond types.

The core 4 comprises a mixture of fluff pulp and high absorption polymer grains compressed to a desired thickness and entirely covered with a water-pervious sheet such as tissue paper (not shown). Joining of the sheets 2, 3 and attaching of the core 4 may be carried out using adhesive such as a hot melt adhesive agent or a pressure-sensitive adhesive agent or a heat-sealing technique.

According to these embodiments as illustrated, the diaper 1 can be laterally stretched within a predetermined ratio.

Assumed that the front and rear waist regions 20, 22 and the crotch region 21 are laterally stretched from their non-stretched state, these regions 20, 22, 21 can be stretched within a stretch ratio of 30 - 200 %.

While the target tape strip 6 has been described to be attached to the front waist region 20 which is in non-stretched state, it is also possible to attach this to the front waist region 20 being in a slightly stretched state. Expression "slightly stretched state" means the state in which the front waist region 20 has been laterally stretched at a ratio higher than 0% but lower than 30 %.

It is also possible to provide the free end 5a of the tape fastener 5 on its inner surface with a loop member. As will be apparent, the target tape strip 6 should be provided in the form of a hook member so far as the loop member is incorporated in the tape fastener 5.

For the diaper 1 according to this invention, the transverse pitch as well as the number of the perforated lines 8 or the slits 8 (first and second slits 8a, 8b) are not specified. However, it is preferred to minimize the pitch and to maximize said number. The increased number of the perforated lines 8 or the slits 8 can correspondingly enlarge the dimension by which the target tape strip 6 and therefore the front waist

region 20 to which the target tape strip 6 is attached are able to be laterally stretched.

It is unnecessary for the adhesive lines 9 to present along the perforated lines 8 or the slits 8 and these adhesive lines 9 are preferably arranged to be laterally spaced apart from and extend parallel to one another. In other words, the target tape strip 6 may be attached to the front waist region 20 by means of the adhesive lines 9 laterally spaced apart from and extending parallel to one another.

This invention is applicable to, in addition to the disposable diaper 1, a diaper cover, training pants or pants for incontinent patient.



WHAT IS CLAIMED IS:

1. A disposable sanitary article having transversely opposite side edges and longitudinally opposite ends, comprising:

a first waist region;

a second waist region;

a crotch region extending between said first and second waist regions;

a pair of tape fasteners attached to said transversely opposite side edges in said first region; and

a non-stretchable target tape strip attached to said second waist region on its outer surface so that said tape fasteners is detachably anchored on said target tape strip;

said disposable sanitary article further comprising:

said first and second waist regions and said crotch region, or at least said first and second waist regions being elastically stretchable longitudinally and transversely or at least transversely of the article; and

said target tape strip being formed with a plurality of slits extending longitudinally of the article parallel to and spaced apart from one another transversely of the article and being attached to said waist region substantially in its



non-stretched state.

2. The disposable sanitary article according to Claim 1, wherein said target tape strip has transversely opposite side edges extending longitudinally of the article and longitudinally opposite upper and lower ends extending transversely of the article and wherein said slits extend between vicinities of said upper end and said lower end of said target tape strip.

3. The disposable sanitary article according to Claim 1, wherein said target tape strip has transversely opposite side edges extending longitudinally of the article and longitudinally opposite upper and lower ends extending transversely of the article and wherein said slits comprise a plurality of first slits extending from said upper end to the vicinity of said lower end of said target tape strip and a plurality of second slits extending from said lower end to the vicinity of said upper end of said target tape strip so that said first slits and said second slits are alternately arranged transversely of the article.

4. The disposable sanitary article according to Claim 1,



wherein said slits are formed by perforated lines along which said target tape strip may be torn off.

5. The disposable sanitary article according to Claim 1, wherein said target tape strip is attached to said sanitary article by plural lines of adhesive spaced one from another transversely of the article and each extending longitudinally of the article.

6. The disposable sanitary article according to Claim 1, wherein said sanitary article basically comprises a liquid-pervious topsheet, a liquid-impervious backsheet and a liquid-absorbent core disposed between said topsheet and said backsheet.