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DISPOSABLE DIAPER WITH ELASTICIZED WAIST REGIONS

The present invention relates to a disposable diaper for absorbing and containing body exudates.

Most of conventional disposable diapers, whether they are of developed types or pull-on types, includes a plurality of elastic members extending circumferentially in front and rear waist regions and secured under appropriate tension to a backsheet. Upon relief of these elastic members from the tension, the front and rear waist regions become elastic and the diaper is prevented by a contractile force from slipping down. The elastic members exposed from the backsheet would come in direct contact with a wearer's skin and not only create a feeling of discomfort against a wearer but also leave their pressure marks on the wearer's skin. To avoid this problem,



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the topsheet has usually been bonded to the backsheet so as to cover the elastic members with these sheets.

To cover the elastic members with both the topsheet and the backsheet, these two sheets are usually bonded together intermittently in zones occupied by the presence of said elastic members. However, such an arrangement may often increase a rigidity in the zones and creates a feeling of discomfort against a wearer.

In view of the problem as has been described above, it is an object of the present invention to provide a disposable diaper advantageously making it unnecessary to cover the elastic members with the topsheet and the backsheet and offering a good feeling to a wearer.

The object set forth above is achieved, according to

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the invention, by a disposable diaper comprising a liquid-pervious topsheet, a liquid-impervious backsheet and a liquid-absorbent core disposed between the topsheet and the backsheet which define a front waist region, a rear waist region and a crotch region extending between the front waist region and the rear waist region and a plurality of elastic members extending circumferentially in said front and rear waist regions.

In such a disposable diaper, the present invention is characterized by that elastic members are encircled one line by one line with parts of said backsheet by 1/2 or more of peripheries.

According to another preferred embodiment of the present invention, the backsheet comprises a plastic film and a nonwoven fabric laminated on an outer surface of the plastic

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film and the elastic members are encircled one line by one line with parts of said nonwoven fabric by 1/2 or more of their peripheries.

Fig. 1 is a perspective view showing an embodiment of disposable diaper according to the present invention as partially broken away;

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

Fig. 3 is a view similar to Fig. 2 showing another embodiment of the present invention; and

Fig. 4 is a view similar to Fig. 2 showing still another embodiment of the present invention.

A disposable diaper according to the present invention

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will be more specifically described with reference to the accompanying drawings.

Fig. 1 is a perspective view showing an embodiment of disposable diaper 1 according to the present invention as partially broken away.

A disposable diaper 1 comprises a liquid-pervious topsheet 2 made of a nonwoven fabric, a liquid-impervious backsheet 3 made of a plastic film and a liquid-absorbent core 4 disposed between these topsheet 2 and the backsheet 3 and bonded to an inner surface of at least one of these two sheets 2, 3 by means of adhesive agent.

As viewed longitudinally of the diaper 1, i.e., orthogonally to a circumferential direction of the diaper, the diaper 1 is configurationally composed of a front waist region 10, a rear waist region 11 and a crotch region 12

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extending between these front and rear waist regions 10, 11.

The front and rear waist regions 10, 11 are placed flat upon

each other along their transversely opposite side edges and

joined together at a plurality of spots 5 intermittently

arranged along the respective side edges to form a

waist-opening 6 and a pair of leg-openings 7. A plurality

of elastic members 8 extend circumferentially of the front

and rear waist regions 10, 11 and are secured under

appropriate tension to an inner surface of the backsheet 3.

Some of these elastic members 8 transversely extend across

the core 4. Each of the leg-openings 7 is provided along its

peripheral edge with a plurality of elastic members 9 which

are also secured under appropriate tension to the inner

surface of the backsheet 3. The topsheet 2 and the backsheet

3 extend outwards beyond transversely opposite side edges of

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the core 4 and these extensions thereof are placed upon each other and joined together to form a side flap 13 around each of the leg-openings 7. Upon relief of the elastic members 8, 9 from their tensions, gathers are formed in the front and rear waist regions 10, 11 as well as around the leg-openings 7, respectively.

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

Each of the elastic members 8 circumferentially extending in the waist regions has its substantially entire peripheral surface covered with the inner surface of the backsheet 3 as will be apparent from its cross-section shown in Fig. 2. The elastic members 8 are intermittently secured to the inner surface of the backsheet 3. In order to assure that each of the elastic members 8 should substantially not

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be exposed from the backsheet 3, the elastic member 8 is covered with the inner surface of the backsheet 3 so that, as viewed in its cross-section, $1/2$ or more, preferably $2/3$ or more of its periphery may be covered with the inner surface of the backsheet 3.

Though not shown, the peripheral surfaces of the respective elastic members 8 may be covered with the inner surface of the backsheet 3 using a first pair of rolls, a second pair of rolls provided downstream of the first pair of rolls, a third pair of rolls arranged downstream of the second pair of rolls and an applicator arranged between the first pair of rolls and the second pair of rolls to intermittently apply the elastic members 8 with adhesive agent. The elastic members 8 travel together with the backsheet 3 longitudinally of these elastic members 8 from

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the first pair of rolls to the third pair of rolls. One of the second rolls is formed on its peripheral surface with a plurality of grooves each extending completely around the peripheral surface and presenting a circular-arc-shaped cross-section slightly larger than the cross-section of the elastic member 8.

A differential speed of revolution between the first pair of rolls and the second pair of rolls generate a tension in the elastic members 8 being travelling from the first pair of rolls to the second pair of rolls and the elastic members 8 thus tensioned are applied, in this course, with adhesive agent by the applicator. Now the elastic members 8 are placed against the inner surface of the backsheet 3 and further travel together with the latter to the second pair of rolls. On the second pair of rolls, the elastic members 8 are received

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in the grooves and the outer surface of the backsheet 3 is placed against the peripheral surface of the roll formed with the grooves. Thereupon, the elastic members 8 are pressed into the respective grooves and the backsheet 3 also is partially pressed by these elastic members 8 into the respective grooves. In this way, the elastic members 8 are secured to a part of the backsheet 3 in the respective grooves and have their peripheral surfaces covered with the backsheet 3. The backsheet 3 to which the elastic members 8 have been bonded travels to the third pair of rolls. The elastic members 8 are preferably made of string-like natural rubber, synthetic rubber, etc. each presenting a circular or oval cross-section. The elastic members 8 are secured to the backsheet 3 preferably using hot melt adhesive.

Figs. 3 and 4 are sectional views respectively showing

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alternative embodiments of the present invention somewhat differing from the embodiment shown in Fig. 2.

The embodiment shown by Fig. 3 is similar to the embodiment shown by Fig. 2 so far as the diaper comprises the liquid-pervious topsheet 2, the liquid-impervious backsheet 3 and the liquid-absorbent core 4 disposed between these two sheets 2, 3. This embodiment differs from the embodiment shown in Fig. 2 in that the elastic members 8 are secured to the outer surface of the backsheet 3. The elastic members 8 circumferentially extending in the waist regions have their substantially entire peripheral surfaces secured to and covered with the outer surface of the backsheet 3 as will be apparently understood from their cross-sections shown in Fig. 3.

According to the embodiment shown by Fig. 4, the

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backsheet 3 comprises a plastic film 3a and a nonwoven fabric 3b laminated on an outer surface of the plastic film 3a. The elastic members 8 circumferentially extending in the waist regions have their substantially entire peripheral surfaces bonded to and covered with an inner surface of the nonwoven fabric 3b as will be apparently understood from their cross-sections shown in Fig. 4. It is also possible to secure the elastic members 8 to an outer surface of the nonwoven fabric 3b. Also in these alternative embodiments as shown in Figs. 3 and 4, the respective elastic members are covered with the outer surface of the backsheet 3 or with the nonwoven fabric 3b forming a part of the backsheet 3 so that, as viewed in their cross-sections, $1/2$ or more, preferably $2/3$ or more of their peripheries may be covered with the outer surface of the backsheet 3 or the nonwoven fabric 3b forming the part

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of the backsheet 3.

The disposable diaper according to the present invention advantageously makes it unnecessary to cover the elastic members with both the topsheet and the backsheet. The area over which the topsheet should be bonded to the backsheet can be reduced by a total area occupied by the presence of the elastic members and thereby a feeling to wear the diaper is improved.

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WHAT IS CLAIMED IS:

1. A disposable diaper (1) comprising 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) so that the diaper (1) may be longitudinally composed of a front waist region (10), a rear waist region (11) and a crotch region (12) extending between the front and rear waist regions (10, 11), and a plurality of elastic members (8) extending circumferentially in said front and rear waist regions (10, 11), said disposable diaper (1) being characterized in that:

said elastic members (8) are encircled one line by one line with parts of said backsheet (3) by 1/2 or more of their peripheries.

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2. A disposable diaper (1) according to Claim 1, wherein said backsheet (3) comprises a plastic film and a nonwoven fabric laminated on an outer surface of said plastic film and said elastic members (8) are encircled one line by one line with parts of said nonwoven fabric by 1/2 or more of their peripheries.