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

DISPOSABLE PULL-ON DIAPER AND PROCESS FOR MAKING THE SAME

5 TECHNICAL FIELD OF THE INVENTION

This invention relates to a disposable pull-on diaper for absorption and containment of bodily discharges.

BACKGROUND ART OF THE INVENTION

10 A disposable pull-on diaper disclosed in Japanese Utility Model Application No. 1993-39531A includes a tape fastener extending in parallel to a periphery of a waist-hole. The tape fastener is attached to one of front and rear waist regions and adapted to be unfolded in a waist-circumferential direction
15 toward the other waist region and to be anchored thereon. The tape fastener is certainly useful to tuck a possible slack of the diaper put on a wearer's body in the waist-circumferential direction.

The tape fastener in the diaper disclosed in the
20 above-cited Application is coated on its inner surface with an adhesive. However, a distal end portion of the tape fastener is not coated with an adhesive and easily gripped with the fingers. The diaper may sometimes encounter a serious problem

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particularly when the diaper is put on an infant. Specifically, the infant may grip the distal end portion of the tape fastener and pull it from curiosity and result in bringing pollution to the adhesive surface of the tape fastener or twining together
5 of the tape member. Eventually, the tape fastener may fail to function.

It is an object of this invention to improve the conventional pull-on diaper as disclosed in the above-cited Application so as to eliminate an anxiety that the tape fastener
10 might be unintentionally unfolded.

DISCLOSURE OF THE INVENTION

This invention includes a disposable pull-on diaper on a first aspect and a process for making such a diaper in a second
15 aspect.

According to the first aspect of this invention, there is provided a disposable pull-on diaper having a front waist region, a rear waist region, a crotch region, the front and rear waist regions being joined together along transversely opposite
20 lateral edge portions extending in a vertical direction in the front and rear waist regions so as to form a waist-hole and a pair of leg-holes, and a pair of tape fasteners secured to one of the front and rear waist regions on an outer surface thereof

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in a vicinity of the lateral edge portions so that the tape fasteners are unfolded in a transverse direction of the front and rear waist regions.

The disposable pull-on diaper further comprises the
5 lateral edge portions being formed with joining zones in which the lateral edge portions are joined together, and each of the tape fasteners including a tape member extending in the transverse direction and having longitudinally opposite end portions of which the one defines a proximal end portion and
10 the other defines a distal end portion, the proximal end portion being secured to one of the front and rear waist regions while the distal end portion overlaying the lateral edge portions of this waist region and being releasably attached to the joining zone so as to serve as a finger-grip, the tape member being formed
15 between the proximal end portion and the distal end portion with an intermediate portion adapted to be anchored on the other of the front and rear waist regions as the tape fastener is unfolded in the transverse direction.

This invention on the first aspect includes the following
20 embodiments.

The tape member is releasably welded to a material forming the lateral edge portions in the joining zones.

The tape member is releasably in mechanical engagement

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with the material forming the lateral edge portions in the joining zones.

According to the second aspect of this invention, there is provided a process for making the disposable pull-on diaper comprising steps of overlaying and joining a front waist region and a rear waist region together along transversely opposite lateral edge portions of the waist regions and of securing a pair of tape fasteners to one of the front and rear waist regions on an outer surface thereof so as to extend in a transverse direction.

The process according to this invention on the second aspect further comprises steps of securing one end portion of the tape member having an intermediate portion between longitudinally opposite end portion thereof adapted to be anchored on one of the front and rear waist regions to one of the front and rear waist regions on an outer surface thereof, overlaying the other end portion of the tape member upon the lateral edge portion so as to lie on an outermost side of the lateral edge portion, subjecting the other end portion together with the lateral edge portions of the front and rear waist regions overlaid upon each other to a treatment of pressing with or without heating so as to form a joining zone in which the lateral edge portions are joined together and simultaneously

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to releasably attach the other end portion of the tape member to the joining zone.

According to this invention on the second aspect, the process further comprises a step of securing the other end
5 portion of the tape member to the joining zone by melting at least one of a thermoplastic synthetic resin contained in the lateral edge portions and a thermoplastic synthetic resin contained in the end portion of the tape member, the
10 thermoplastic synthetic resin contained in the lateral edge portions has a softening point or a melting point lower than that of the thermoplastic synthetic resin contained in the other end portion of the tape member.

BRIEF DESCRIPTION OF THE DRAWINGS

15 Fig. 1 is a partially cutaway perspective view showing a pull-on diaper constructed in accordance with this invention;

Fig. 2 is a sectional view taken along a line II - II in Fig. 1 showing a hone and an anvil also; and

Fig. 3 is a perspective view of the diaper illustrating
20 a manner in which the tape fasteners are used.

DESCRIPTION OF THE BEST MODE FOR WORKING OF THE INVENTION

Details of the disposable pull-on diaper according to

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this invention and the process for making this will be more fully understood from the description given hereunder in reference to the accompanying drawings.

Fig. 1 shows a partially cutaway disposable pull-on
5 diaper as viewed from the rear side. The diaper 1 comprises
a liquid-pervious topsheet 2, a liquid-impervious backsheet 3
and a liquid-absorbent core 4 disposed between these sheets 2,
3. From the viewpoint of its configuration, the diaper 1 is
composed of a front waist region 6, a rear waist region 7 and
10 a crotch region 8 so as to define a waist-hole 9 and a pair of
leg-holes 11. As viewed in Fig. 1, the rear waist region 7 lies
on near side. The top- and backsheets 2, 3 extend outward beyond
a peripheral edge of the core 4 and are overlaid and
intermittently joined together along the extensions thereof
15 using an adhesive or a heat-sealing technique so as to form
transversely opposite lateral edge portions 12, 13 of the front
and rear waist regions 6, 7, longitudinal end zones 16, 17 of
these front and rear waist regions 6, 7, respectively, and
transversely opposite lateral edge portions 14, 14 of the crotch
20 region 8, i.e., zones extending in a leg-circumferential
direction. The front and rear waist regions 6, 7 are overlaid
together in the vicinity of the lateral edge portions 12, 13
and joined together rather firmly in joining zones 15 comprising

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a plurality of short lines arranged intermittently in a vertical direction along marginal side edges of the respective lateral edge portions 12, 13. Along the longitudinal end zones 16, 17 of the front and rear waist regions and along the lateral edge portions 14, 14 extending in the leg-circumferential direction, waist elastic members 18 and leg elastic members 19 are secured in a stretched state to an inner surface of at least one of the top- and backsheets 2, 3, respectively. It should be noted that the expression used herein "rather firmly" means that the lateral edge portions 12, 13 well resist against mutual separation thereof so far as the diaper 1 is under the normal condition of use but a positive intention to separate these lateral edge portions 12, 13 one from another, for example, forceful pulling them one from another in the waist-circumferential direction causes these lateral edge portions 12, 13 to be separated one from another. It should be also understood that such separation includes a case in which the lateral edge portions 12, 13 are peeled off one from another in the joining zones 15 and a case in which the lateral edge portions 12, 13 are separated one from another as a result of breakage of the topsheet 2 or the backsheet 3 in these lateral edge portions 12, 13.

A pair of tape fasteners 30 are attached to the lateral

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edge portions 13, 13 of the rear waist region 7, respectively. Each of the tape fasteners 30 is formed of tape material extending on in a transverse direction of the diaper 1 and folded on the rear waist region 7. The tape fastener 30 has a fixed
5 end portion 32 secured to the backsheet 3 in the associated lateral edge portion 13 and a free end portion 31 serving as a finger grip releasably attached to the backsheet 3 in the associated lateral edge portion 13 so as to overlay the associated joining zone 15. The free end portion 31 may be
10 released from the backsheet 3 and then pulled outward in the transverse direction of the diaper 1 to unfold the tape fastener 30 as indicated by imaginary lines.

Fig. 2 is a sectional view taken along a line II - II in Fig. 1, showing also a hone 51 and an anvil 52 for supersonic
15 embossing used to form the joining zones 15. The tape fastener 30 comprises a first tape section 36 extending rather linearly to define an upper layer as viewed in Fig. 2 and a second tape section 37 folded substantially in Z-shape under the first tape section 36. The second tape section 37 has an inner end portion
20 38 folded upward and secured to an under surface of the first tape section 36 by means of an adhesive 41 and an outer end portion opposite to the inner end portion 38 i.e., the proximal end portion 32 secured to the backsheet 3 by means of the adhesive

41. The first tape section 36 is coated on its substantially entire under surface except for its outer end portion, i.e., the distal end portion 31 with a self-adhesive 43. The first tape section 36 has an inner end portion 42 extending inward of the diaper 1 beyond the inner end portion 38 of the second tape section 37 and releasably attached to the backsheet 3 by means of the self-adhesive 43. The first tape section 36 has an intermediate portion 33 defined between the distal end portion 31 and the inner end portion 42 and releasably attached to an upper surface of the second tape section 37 by means of the self-adhesive 43. The distal end portion 31 is releasably integrated with the joining zone 15 in the associated lateral edge portion 13. The expression used herein "releasably" means that, when the fastener 30 is actually used, the distal end portion 31 may be gripped with the fingers and pulled in a direction indicated by an arrow P to separate the distal end portion 31 easily from the associated joining zone 15 and to extend the tape fastener 30 outward beyond the associated lateral edge portion 13.

In such diaper 1, stock material for the topsheet 2 is selected from the group including a thermoplastic synthetic resin film, a nonwoven fabric made of thermoplastic synthetic resin fibers and a composite nonwoven fabric made from a mixture

of thermoplastic synthetic resin fibers and natural or chemical fibers. A stock material for the backsheet 3 is selected from the group including a thermoplastic synthetic resin film and a laminated sheet of such film and a nonwoven fabric which is
5 made of thermoplastic synthetic fibers. The film for the top- and backsheets 2, 3 may be, for example, of a polyethylene resin. The fiber for the top- and backsheets 2, 3 may be resin such as polyethylene, polypropylene, nylon or polyester. It is also possible to use conjugated fibers of side-by-side type or
10 sheath-and-core type of these fibers as the fiber for the top- and backsheets 2, 3. To connect the front and rear waist regions 6, 7 to each other along the lateral edge portions 12, 13 thereof, the top- and backsheets 2, 3 overlaid along the lateral edge portions 12, 13 thereof may be subjected to a process of
15 embossing, heat-embossing or supersonic embossing to form the joining zones 15. In such process, the top- and backsheets 2, 3 are locally pressed so that the film and/or the fiber constituting these sheets 2, 3 may be mechanically entangled together at the pressed locations and thereby inseparably
20 integrated together. Particularly the process of supersonic embossing results not only in such mechanical entangling of the film and/or the fiber of thermoplastic resin but also in melting and integration of one or both of the film and/or the fiber.

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Fig. 2 illustrates a hone 51 and an anvil 52 for the process of supersonic embossing are placed above and below the lateral edge portions 12, 13 placed upon each other. These lateral edge portions 12, 13 may be squeezed between the hone 51 and the anvil 52 under a supersonic effect to form the joining zones 15.

Regarding the tape fastener 30, a film of a thermoplastic synthetic resin such as polyethylene, polypropylene, nylon or polyester is preferably used to form at least the free end portion 31 of the first tape section 36, more preferably to form the first tape section 36 as a whole. The film or the fiber forming the distal end portion 31 preferably has a softening point or a melting point higher than that of the film or the fiber forming the backsheet 3 which the former is opposed in the joining zone 15. A stock material for the second tape section 37 may be selected from the group including a film of a thermoplastic synthetic resin, a nonwoven fabric of thermoplastic synthetic resin fibers and an elastically stretchable elastomer of a thermoplastic synthetic resin. To attach the tape fastener 30 formed as has been described above to the diaper 1, the tape fastener 30 is placed upon the lateral edge portion 12 or 13 of the diaper 1 with the distal end portion 31 defining the outermost portion of the fastener 30 and then subjected to the process of embossing, for example, under the

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heat or supersonic effect to form the joining zone 15. Thereupon, surfaces of the topsheet 2 opposed to each other or the topsheet 2 and the backsheet 3 are inseparably welded together while the backsheet 3 having a relatively low softening or melting point and the distal end portion 31 of the tape fastener 30 having a relatively high softening or melting point are releasably integrated together at an attaching strength as low as that of so-called temporary attaching. When the backsheet 3 and the free end portion 31 respectively have a softening or melting point approximate to each other, a thickness of the distal end portion 31 may be dimensioned to be larger than a thickness of the backsheet 3, for example, at least trebled with respect to that of the backsheet 3 to ensure that the free end portion 31 can be easily separated from the backsheet 3 without any significant damage thereof even after having been subjected to the process of a simple embossing or a heat-embossing.

Fig. 3 illustrates a manner in which the tape fastener 30 is actually used. Having been released from the associated joining zone 15, the tape fastener 30 may be unfolded toward the front waist region 6 and anchored on an appropriate zone of the front waist region 6 by means of the self-adhesive 43 so as to tuck a baggy dimension in the waist-circumferential

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direction. Though not illustrated, the tape fastener 30 can be used also to retain the used diaper 1 in a rolled up state for disposal.

As will be apparent from the foregoing description, the
5 tape fastener 30 has its free end portion 31 temporarily attached to the associated lateral edge portion 12 or 13 of the diaper 1 so that the free end portion 31 may be easily separated therefrom to use the tape fastener 30. However, it is not likely that the tape fastener 30 might be unintentionally unfolded even
10 if the diaper wearing infant touches the fastener 30 in curiosity. The self-adhesive 43 may be replaced by a hook member or a loop member constituting so-called mechanical fastener commonly known, for example, by the trade name of Magic Tape. When the self-adhesive 43 is replaced by the hook member
15 of these paired members, the waist region 6 or 7 on which this hook member should be attached is provided with a landing zone defined by the loop member. It should be understood that, if the backsheet 3 is formed by a nonwoven fabric, this nonwoven fabric itself can be used as the landing zone. This invention
20 is not limited to the construction in which the front and rear waist regions 6, 7 are overlaid along the lateral edge portions 12, 13 thereof as seen in the embodiment shown in Fig. 1. For example, this invention can be implemented in the other various

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manners, for example, these lateral edge portions 12, 13 may extend and alternately overlap one another in the waist-circumferential direction of the diaper 1. While Fig. 2 illustrates the second tape section 37 folded substantially in a Z-shape as viewed in its cross-section, the manner in which the second tape section 37 is folded is not specified. For example, the length as well as the number of layers presented by the folded second tape section 37 may be selectively varied.

In the disposable pull-on diaper according to this invention, the tape fasteners secured to the waist region respectively have the distal end portions temporarily attached to the waist region but there is no anxiety that these distal end portions might be unintentionally separated from the waist region even if the diaper wearing infant touches them in curiosity.

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C L A I M S

1. A disposable pull-on diaper having a front waist region,
a rear waist region, a crotch region, said front and rear waist
5 regions being joined together along transversely opposite
lateral edge portions extending in a vertical direction in said
front and rear waist regions so as to form a waist-hole and a
pair of leg-holes, and a pair of tape fasteners attached to one
of said front and rear waist regions on an outer surface thereof
10 in a vicinity of said lateral edge portions so that said tape
fasteners are unfolded in a transverse direction of said front
and rear waist regions, said disposable pull-on diaper further
comprising:

said lateral edge portions being formed with joining
15 zones in which said lateral edge portions are joined together;
and

each of said tape fasteners including a tape member
extending in said transverse direction and having
longitudinally opposite end portions of which the one defines
20 a proximal end portion and the other defines a distal end portion,
said proximal end portion being secured to one of said front
and rear waist regions while said distal end portion overlaying
said lateral edge portions of said waist region and being

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releasably attached to said joining zone so as to serve as a finger-grip, said tape member being formed between said proximal end portion and said distal end portion with an intermediate portion adapted to be anchored on the other of said front and rear waist regions as said tape fastener is unfolded
5 in said transverse direction.

2. The diaper according to Claim 1, wherein said tape member is releasably welded to a material forming said lateral edge
10 portions in said joining zones.

3. The diaper according to Claim 1 or 2, wherein said tape member is releasably in mechanical engagement with said material forming said lateral edge portions in said joining
15 zones.

4. A process for making a disposable pull-on diaper comprising steps of overlaying and joining a front waist region and a rear waist region together along transversely opposite lateral edge portions of said waist regions and of securing a
20 pair of tape fasteners to one of said front and rear waist regions on an outer surface thereof so as to extend in a transverse direction, said process further comprising steps of:

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securing one end portion of said tape member having an intermediate portion between longitudinally opposite end portions thereof adapted to be anchored on one of said front and rear waist regions to one of said front and rear waist regions on an outer surface thereof, overlaying the other end portion of said tape member upon said lateral edge portion so as to lie on an outermost side of said lateral edge portion, subjecting said other end portion together with said lateral edge portions of said front and rear waist regions overlaid upon each other to a treatment of pressing with or without heating so as to form a joining zone in which said lateral edge portions are joined together and simultaneously to releasably attach said other end portion of said tape material to said joining zone.

5. The process according to Claim 4, wherein said other end portion of said tape member is secured to said joining zone by melting at least one of a thermoplastic synthetic resin contained in said lateral edge portions and a thermoplastic synthetic region contained in said other end portion of said tape member, said thermoplastic synthetic resin contained in said lateral edge portions has a softening point or a melting point lower than that of said thermoplastic synthetic resin contained in said other end portion of said tape member.