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

DISPOSABLE WEARING ARTICLE AND PROCESS FOR MAKING THE SAME

5 TECHNICAL FIELD OF THE INVENTION

This invention relates to a disposable wearing article having tape fasteners and a process for making the same.

BACKGROUND ART OF THE INVENTION

10 The pants-type disposable diaper disclosed in Japanese Utility Model Application No. 1994-77719A comprising a liquid-pervious topsheet, a liquid-impervious backsheet and a liquid-absorbent member interposed between these two sheets wherein the front and rear waist regions of this diaper are
15 joined together to form a waist-hole and leg-holes. This known pants-type diaper is provided in an intermediate region defined between the waist-hole and the leg-holes with elastic members adapted to contract in a waist-surrounding direction and thereby form gathers in the waist-surrounding direction. Tape
20 fasteners respectively having distal ends are attached to the outer surface of the backsheet so that the distal ends are oriented in the waist-surrounding direction.

In the pants-type diaper disclosed in the above-cited

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Application, the tape fasteners are attached to side flaps in which the absorbent member is not present. The tape fasteners are usually made of low stiffness tape material and, if a contractile force of the waist-surrounding elastic members is relatively high, these tape fasteners are apt to be deformed and thereby to make it difficult to take the distal ends between fingers at once. In addition, the tape fasteners lie inside transversely opposite lateral edges of the diaper and therefore it is difficult to find the distal ends on the side flaps and to take these distal ends between fingers at a glance.

It is an object of this invention to improve such a wearing article so that distal ends of the respective tape fasteners attached to the wearing article may be easily and quickly taken between fingers.

DISCLOSURE OF THE INVENTION

In accordance with this invention, there is provided a disposable wearing article having a surface destined to face the wearer's body and a surface destined to face the wearer's clothes, the article being contoured by front and rear ends extending in parallel to each other in a transverse direction and a pair of lateral edges extending in parallel to each other in a longitudinal direction orthogonal to the transverse

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direction, the article being composed of, in the longitudinal direction, a crotch region, a front waist region put aside from the crotch region toward the front end and a rear waist region put aside from the crotch region toward the rear end, the front
5 or rear waist region being provided on the surface destined to face the wearer's clothes in the vicinity of the lateral edges with tape fasteners, respectively, each of the tape fasteners comprising a tape member having a fixed end portion firmly bonded to the surface destined to face the wearer's clothes and
10 a free end portion longitudinally opposed to the fixed end portion and adapted to be taken between the fingers so that the tape member may be unfolded from the fixed end portion toward the free end portion as the free end portion is taken between the fingers and pulled, and lower surface of the tape member
15 destined to face the wearer's clothes is at least partially coated with a self-adhesive agent.

The disposable wearing article further comprises the tape member attached thereto so that at least a part of the free end portion may extend outwardly beyond the lateral edge and upper
20 and lower surfaces of the part are of non-adhesive nature.

This invention includes the following embodiments.

(1) The tape member is in a folded state so that the tape member may be unfolded from the fixed end portion toward the free end

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portion when the article is actually used, and comprises, in such a folded state, a first tape section defining a top layer of the folded tape member and having the free end portion and a first end portion longitudinally opposed to the free end
5 portion and a second tape section underlying the first tape section so as to face the surface destined to face the wearer's clothes and having the fixed end portion and a second end portion longitudinally opposed to this fixed end portion and connected to the first end portion of the first tape section.

10 (2) The first end portion of the first tape section extending from the free end portion to the first end portion includes a prolongation extending inwardly with respect to the article beyond the second end portion of the second tape section and the prolongation is temporarily bonded to the surface of the
15 article destined to face the wearer's clothes.

(3) A third tape section is interposed between the first tape section and the second tape section to connect these first and second tape sections to each other, the third tape section having one end portion connected to the first end portion of
20 the first tape section, the other end portion opposed to the one end portion and connected to the second end portion of the second tape section, and an intermediate portion defined between the one end portion and the other end portion and

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temporarily bonded to the first tape section and/or the second tape section so that these first - third tape sections may present a Z- or inverted Z-shape as the tape member is folded.

(4) The first end portion of the first tape section extends
5 beyond the one end portion of the third tape section in the transverse direction and is temporarily bonded to the fixed end portion of the second tape section extending beyond the one end portion of the third tape section in the transverse direction.

(5) The disposable wearing article is a pants-type disposable
10 diaper composed of a front waist region, a rear waist region and a crotch region extending between these two waist regions, the front and rear waist regions being connected to each other in the vicinity of lateral edges thereof so as to define a waist-hole and a pair of leg-holes, the tape fasteners being
15 attached to the surface destined to face the wearer's clothes of the front or rear waist region in the vicinity of the respective lateral edges so that the longitudinal direction of the tape fasteners may coincide with a waist-surrounding direction of the diaper and the free end portions of the
20 respective tape fasteners may at least partially extend outwardly in the waist-surrounding direction beyond the lateral edges of the front or rear waist region.

(6) The disposable wearing article further includes, in the

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front and rear waist regions and the crotch region, a liquid-absorbent core having its surface destined to face the wearer's body and flaps formed by sheet members extending outwardly from a peripheral edge of the core wherein the tape
5 fasteners are attached to the surface destined to face the wearer's clothes in the flaps.

(7) Elastic members are attached in a stretched state to the front or rear waist region provided with the tape fasteners so as to extend in the transverse direction between the lateral
10 edges of this waist region and the tape fasteners are attached to the surface destined to face the wearer's clothes in the front or rear waist region so as to cover the elastic members from outside.

(8) The surface destined to face the wearer's clothes to which
15 the tape fasteners are attached is made of a sheet being elastically stretchable in the transverse direction.

(9) The free end portions at least partially extend outwardly beyond the lateral edges by 0.7 mm or more.

In accordance with this invention, there is also provided
20 a process for making a disposable wearing article having a surface destined to face the wearer's body and a surface destined to face the wearer's clothes, the article being contoured by front and rear ends extending in parallel to each

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other in a transverse direction and a pair of lateral edges extending in parallel to each other in a longitudinal direction orthogonal to the transverse direction, the article being composed of, in the longitudinal direction, a crotch region, 5 a front waist region put aside from the crotch region toward the front end and a rear waist region put aside from the crotch region toward the rear end, the front or rear waist region being provided on the surface destined to face the wearer's clothes in the vicinity of the lateral edges with tape fasteners adapted 10 to be unfolded outwardly from the front or rear waist region in the transverse direction beyond the lateral edges.

The process further comprises the steps of feeding a sheet forming the surface destined to face the wearer's clothes to which the tape fasteners are attached, including zones destined 15 to define the lateral edges of the wearing article so that a plurality of the sheets are connected one to another along the zones destined to define the lateral edges and thereby to form a continuum of the sheets which is elastically stretchable in the transverse direction in the vicinity of the zones destined 20 to define the lateral edges in the transverse direction, applying a first adhesive agent to a single tape member having upper and lower surfaces on the lower surface at longitudinally opposite end portions except for a longitudinally middle

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portion to bond firmly the end portions to the surface destined to face the wearer's clothes, applying a second adhesive agent to zones defined between the middle portion and respective the end portions to bond temporarily the zones to the surface destined to face the wearer's clothes so as to form an adhesive tape unit, feeding the tape unit onto one side of the continuum of the sheet so that a longitudinal direction of the tape unit may coincide with the transverse direction and the middle portion may extend across the zone destined to define the lateral edge, bonding the tape unit to the one side by means of the first adhesive agent, then cutting the continuum of the sheet together with the tape unit along the zone destined to define the lateral edge to obtain individual sheets each forming the surface destined to face the wearer's clothes which has contracted in the transverse direction more remarkably than the tape unit in the vicinity of the lateral edges and bonding the tape fasteners to the sheet in the vicinity of the lateral edges to obtain the tape fasteners at least partially extending outwardly beyond the lateral edges.

This invention of the process includes the following embodiments.

(1) The sheet is elastically stretchable in the transverse direction and fed in the transverse direction in an elastically

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stretched state.

(2) The sheet comprises a non-stretchable sheet and thread-like elastic members bonded to the sheet while these thread-like elastic members are being stretched in the transverse direction.

(3) The tape fasteners at least partially extend outwardly beyond the lateral edges by 0.7 mm or more.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a partially cutaway plan view showing a disposable diaper as a typical embodiment of this invention;

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

Fig. 3 is a diagram illustrating a manner in which the tape fasteners are used;

Fig. 4 is a diagram illustrating another manner in which the tape fasteners are used;

Fig. 5 is a diagram illustrating a part of the process for making the disposable diaper;

Fig. 6 is a sectional view taken along a line VI - VI in Fig. 5;

Fig. 7A is a diagram illustrating important parts of the diaper by the process partially different from the process of

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Fig. 5 and Fig. 7B is a sectional view taken along a line Y - Y in Fig. 7A;

Fig. 8 is a view similar to Fig. 2 but showing one preferred embodiment of this invention;

5 Fig. 9 is a view similar to Fig. 2 but showing another preferred embodiment of this invention;

Fig. 10 is a view similar to Fig. 2 but showing still another preferred embodiment of this invention;

10 Fig. 11 is a partially cutaway perspective view showing a pants-type disposable diaper as another typical embodiment of this invention;

Fig. 12 is a sectional view taken along a line XII - XII in Fig. 11; and

15 Fig. 13 is a perspective view of the pants-type disposable diaper to illustrate a manner in which the tape fasteners are used.

DESCRIPTION OF THE BEST MODE FOR WORKING OF THE INVENTION

20 Details of the disposable wearing article and a process for making the same according to this invention will be more fully understood from the description given hereunder in reference to the accompanying drawings.

Fig. 1 is a partially cutaway plan view showing an

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open-type disposable diaper 1 and Fig. 2 is a sectional view taken along a line II - II in Fig. 1. The diaper 1 comprises a liquid-pervious topsheet 2 facing the wearer's body, a liquid-impervious backsheet 3 facing the wearer's clothes and
5 a liquid-absorbent core 4 interposed between these two sheets 2, 3. Fig. 1 shows this diaper 1 with the backsheet 3 lying on the upper side and the topsheet 2 lying on the lower side. The diaper 1 is contoured by front and rear ends 11, 12 extending in parallel to each other in a transverse direction (in a
10 horizontal direction as viewed in Fig. 1) and a pair of lateral edges 13 extending in parallel to each other in a longitudinal direction which is orthogonal to the transverse direction. The diaper 1 is composed of, in the longitudinal direction, a crotch region 8, a front waist region 6 extending from the crotch region
15 8 to the front end 11 and a rear waist region 7 extending from the crotch region 8 to the rear end 12. In the crotch region 8, the lateral edges 13 curve inwardly in the transverse direction of the diaper 1. Portions of the top- and backsheets 2, 3 extending outwardly beyond a peripheral edge of the core
20 4 are overlaid and joined together by means of hot melt adhesive agents (not shown) to form a front end flap 16, a rear end flap 17 and side flaps 18. In the front and rear end flaps 16, 17, waist-surrounding elastic members 19 are bonded in a stretched

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state to the inner surface of at least one of the top- and
backsheets 2, 3. In the side flaps 18, leg-surrounding elastic
members 21 are stretched along the curving sections of the
respective lateral edges 13 and bonded in such a stretched state
5 to the inner surface of at least one of the top- and backsheets
2, 3. Tape fasteners 30 are attached to the backsheet 3 of the
side flaps 18 in the rear waist region 7 in the vicinity of the
respective lateral edges 13. The tape fasteners 30 are folded
so that these fasteners 30 may be unfolded so as to extend
10 outwardly beyond the respective lateral edges 13. The top- and
backsheets 2, 3 respective have front and rear ends 2a, 2b, 3a,
3b and lateral edges 2c, 3c defining the front and rear ends
11, 12 and the lateral edges 13 of the diaper 1.

As will be apparent from Fig. 2, each of the tape fasteners
15 30 comprises an upper tape section 31, a lower tape section 32
and an intermediate tape section 33 lying between these two tape
sections 31, 32 and connecting to them to each other. The upper
tape section 31 has an inner end portion 36 lying inside the
diaper 1, an outer end portion 37 at least partially extending
20 outwardly beyond the lateral edge 13, and an intermediate portion
38 lying inside the lateral edge 13. These portions 36 - 38
are coated on the lower surfaces thereof with a second
self-adhesive agent 39. In Fig. 2, a dimension by which the

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outer end 37 extends outwardly beyond the lateral edge 13 is indicated by S and this dimension S in the diaper 1 is preferably 0.7 mm or longer. The lower tape section 32 lies inside the lateral edge 13 and is opposed to the surface of the diaper 1 facing the wearer's clothes. The lower tape section 32 also has an inner end portion 41, an outer end portion 42 and an intermediate portion 43. In the case of the lower tape 32 of the tape fastener 30 comprising three tape sections 31, 32, 33 as illustrated, at least the inner end portion 41 functions as a fixed end portion of the tape fastener 30 and is firmly fixed to the backsheet 3 by means of first adhesive agent 44. In the preferable embodiment of the lower tape section 32 as shown, the inner end portion 41, the intermediate portion 43 and the outer end portion 42 except for its zone in which the outer end portion 42 is connected to the intermediate tape section 33 are fixed to the backsheet 3 by means of the first adhesive agent 44 with which these portions are coated. The lower tape section 32 has its outer end portion 42 partially connected to the intermediate tape section 33 by means of the first adhesive agent 44. The intermediate tape section 33 also lies inside the lateral edge 13 and has an inner end portion 46, an outer end portion 47 and an intermediate portion 48. These portions are coated on the lower surfaces thereof with a third

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self-adhesive agent 49.

Of the upper tape section 31, a zone of its inner end portion 36 extending inwardly beyond the inner end portion 46 of the intermediate tape section 33 is temporarily bonded to the surface of the diaper facing the wearer's clothes, in the case of the illustrated embodiment, to the upper surface 32a of the lower tape section 32 and firmly bonded to the upwardly folded inner end portion 46 of the intermediate tape section 33. The second self-adhesive agent with which the upper tape section 31 is coated is covered with a film strip 51 on an appropriate area of the outer end portion 37 at least including the area extending outwardly beyond the lateral edge 13 by a dimension S in the longitudinal direction of the upper tape section 31. In this way, the outer end 37 becomes substantially non-adhesive on its both surfaces and thereby forms a free end portion of the tape fastener 30 destined to be taken between fingers. The intermediate portion 38 of the upper tape section 31 is temporarily bonded to upper surface 33a of the intermediate tape section 33 underlying the intermediate portion 38 of the upper tape 31. The intermediate tape section 33 except the inner end portion 46 bonded to the upper tape section 31 and the outer end portion 47 bonded to the outer end portion 42 of the lower tape section 32, i.e., the intermediate

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portion 48 thereof is temporarily bonded to upper surface 32a of the lower tape section 32 by means of the third self-adhesive agent 49. It should be noted here that the intermediate tape section 33 may be temporarily bonded to any one of the upper
5 tape section 31 and the lower tape section 32 without departing from the scope of this invention.

The upper tape section 31, the intermediate tape section 33 and the lower tape section 32 are thus assembled as a continuous member in a Z-shape folded state prior to use of the
10 article. The outer end portion 37 of the upper tape section 31 may be taken between fingers together with the film strip 51 and pulled outwardly of the diaper 1 as indicated by an arrow P to separate the temporarily bonded portions one from another and thereby to unfold the tape fastener 30 so that the upper
15 tape section 31 and the intermediate tape section 33 may extend as indicated by imaginary lines. To facilitate the second self-adhesive agent 39 to be peeled off from the lower tape section 32 and the intermediate tape section 33 and to facilitate the third self-adhesive agent 49 to be peeled off
20 from the lower tape section 32, adhesive force of the second adhesive agent 39 and third self-adhesive agent 49 may be adjusted to be lower than that of the first adhesive agent 44 and/or these tape sections 32, 33 may be previously coated with

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silicone oil or the like. In such tape fastener 30, the outer end portion 37 of the upper tape section 31 extends outwardly beyond the lateral edge 13 of the diaper 1 and therefore the outer end portion 37 of the fastener 30 can be quickly taken
5 between fingers even when a plurality of gathers are formed around the waist of the diaper 1 as the elastic members 19 contract and consequently it becomes difficult to find the tape fastener 30 from these gathers. To ensure such effect, it is sufficient that merely a part of the outer end portion, for
10 example, outer end corners of the upper tape section 31 extend outwardly from the lateral edge 13 by 0.7 mm or more. The inner end portion 36 of the upper tape section 31 and the intermediate tape section 33 are detachably attached to the lower tape section 32 but not directly to the backsheet 3, so there is no
15 anxiety that the backsheet 3 might be damaged even if such detachable attachment is repeated.

Figs. 3 and 4 are diagrams illustrating manners in which the tape fasteners 30 are used. Fig. 3 shows the diaper 1 put on the wearer's body with the tape fasteners 30 unfolded
20 outwardly from the rear waist region 7 and temporarily bonded to the surface of the front waist region 6 facing the wearer's clothes by means of the second self-adhesive agent 39. Fig. 4 shows the used diaper 1 rolled up and retained by the tape

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fasteners 30 in such a rolled up state. In this manner, the tape fasteners 30 are useful not only for putting the diaper 1 on the wearer's body but also for rolling up and disposal of the used diaper 1.

5 Fig. 5 is a diagram illustrating a part of the process for continuously making the diaper 1 of Fig. 1. In a series of steps (1) - (3) indicated in a lower part of Fig. 5, a leftward direction is designated as a machine direction MD. In the step (1), continuum of diapers comprising continuous
10 liquid-pervious web 62, continuous liquid-impervious web 63 and cores 4 interposed between the web 62 and the web 63 so as to be arranged intermittently at desired intervals in the machine direction MD is fed in the direction MD. The web 62 comprises a plurality of the topsheets 2 successively connected one to
15 another along transversely opposite lateral edges 2c of the respective topsheets 2 and defines a lower layer as viewed in Fig. 5. Similarly, the web 63 comprises a plurality of the backsheets 3 successively connected one to another along transversely opposite lateral edges 3c of the respective
20 backsheets 3 and defines an upper layer as viewed in Fig. 5. Around the respective cores 4, these two webs 62, 63 are overlaid and joined together by means of hot melt adhesive agents (not shown). Between these two webs 62, 63, in addition to the cores

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4, thread-like waist-surrounding elastic members 119 and leg-surrounding elastic members 121 are interposed and bonded to these webs in a stretched state. The web 63 is elastically stretchable in the machine direction MD and bonded to the web 62 as the web 63 is being stretched at a desired percentage in the machine direction MD. The continuum of diapers 65 has a dimension in a cross direction CD orthogonal to the machine direction MD corresponds to a longitudinal dimension of the diaper 1 and imaginary lines A in Fig. 5 correspond to the lateral edges 13 of the individual diapers 1. The core 4 lies in a middle zone between each pair of the adjacent imaginary lines A, A and circular portions are cut out from the webs 62, 63 overlaid each other in substantially middle zones on the respective imaginary lines A to form openings 66. Even after these openings 66 have been formed, conveyor means (not shown) for the continuum 65 provides a vacuum suction effect under which the web 63 remains stretched in the machine direction MD.

In sub-steps (a) - (d) of the step (2) as indicated on upper part of Fig. 5, tape fastener units 67 are successively fed and attached to the continuum 65 running in the machine direction MD so that the units 67 may straddle the imaginary lines A, respectively.

In the step (3), the continuum 65 of diapers is cut

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together with the units 67 along the imaginary lines A to obtain the individual diapers 1 each shown in Fig. 1. In the diaper 1 obtained in this manner, the web 63 which has been in a stretched state in the continuum 65 elastically contracts in the transverse direction to form the backsheet 3. Contraction of the web 63 causes the web 62 bonded to the web 63 to contract with formation of gathers. Thereupon, a peripheral edge of the opening 66 is bisected to form the circular arc-shaped lateral edges 13 of the diaper 1 in its crotch region 8. In the diaper 1 in Fig. 5, the waist-surrounding elastic members 119 as well as the leg-surrounding elastic members 121 are in a stretched state.

In a series of sub-steps (a) - (d) indicated on the upper part of Fig. 5, the individual units 67 are formed. The units 67 are non-stretchable in the longitudinal direction thereof. In the sub-step (a), continuum of the units 367 destined to be cut into the individual units 67 is fed from the right to the left in Fig. 5. In the sub-step (b), the continuum 367 is transversely cut into the individual units 67. In the sub-step (c), the unit 67 obtained in the sub-step (b) is rotated by 90° so that the longer sides of the respective unit 67 may extend in the machine direction MD. In the sub-step (d), the unit 67 having been rotated in this manner is fed to the continuum of

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diapers 65. It is possible to feed the continuum of units 367 in the cross direction CD instead of feeding it in the machine direction MD as in the illustrated embodiment. In this case, the individual units 67 obtained by cutting the continuum 367
5 may be fed to the continuum of diapers 65 in the cross direction CD.

Fig. 6 is a sectional view of continuous diapers 65 to which the units 67 shown in Fig. 5 have been attached, as taken along a line VI - VI. The unit 67 is symmetric about an imaginary
10 line A and its substantially left half is not illustrated. This unit 67 comprises the first tape section 131 extending in the machine direction MD across the imaginary line A, the lower tape section 32 bonded to the liquid-impervious web 63 by means of the first adhesive agent 44 on both sides of the imaginary line
15 A and the intermediate tape section 33 temporarily bonded to the upper surface 32a of the lower tape section 32 by means of the third adhesive agent 49 on both sides of the imaginary line A. The first tape section 131 is temporarily bonded to the upper surface of the intermediate tape section 33 by means of the
20 self-adhesive agent 139 which is, in turn, covered with the plastic film strip 151 in the vicinity of the imaginary line A corresponding to the longitudinally middle zone of the unit 67. The continuum of diapers 65 is cut together with the unit

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67 along the imaginary line A. After having been cut, the web 63, the web 62 bonded to the web 63 and the waist-surrounding elastic members 119 contract together in the horizontal direction as viewed in Fig. 6, i.e., in the transverse direction of the diaper 1 but the unit 67 does not contract. Consequently, the individual diaper 1 and the tape fasteners 30 attached thereto as shown in Fig. 1 is obtained. In the individual diaper 1 obtained in this manner, the liquid-pervious web 62 and the liquid-impervious web 63 define the topsheet 2 and the backsheet 3, respectively, and the lateral edges 2c, 3c of the top- and backsheets 3 as well as the lateral edges 13 of the diaper 1 are formed along each pair of the adjacent imaginary lines A. The first tape section 131, the self-adhesive agent 139 and the plastic film strip 151 are bisected along the imaginary line A to form the upper tape section 31, the second self-adhesive agent 39 and the film strip 51 of the tape fastener 30 in Fig. 2. The lower tape section 32 and the first adhesive agent 44 respectively correspond to the lower tape section 32 and the first adhesive agent 44 in Fig. 2 while the intermediate tape section 33 and the third self-adhesive agent 49 respectively correspond to the intermediate tape section 33 and the third self-adhesive agent 49 in Fig. 2. Of two tape fasteners 30 obtained from a single unit 67 shown in Fig. 6, the one lying

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on the right side with respect to the imaginary line A is folded in a Z-shape and the one lying on the left side with respect to the imaginary line A is folded in an inverted Z-shape.

Assumed that the tape unit 67 is fed with elastic tension
5 in its longitudinal direction in the step of Fig. 6, an amount of contraction of the top- and backsheets 2, 3 occurring in the vicinity of the lateral edges 13 of the diaper 1 may be adjusted to be larger than an amount of contraction occurring in the upper tape section 31 of the tape fastener 30, preferably by 0.7 mm
10 or more after the continuum of diaper 65 has been cut together with the tape unit 67 to obtain the diaper 1 shown in Fig. 1.

In the process for continuously making the individual diapers 1, cutting of the web 63 being in a stretched state together with the tape unit 67 causes only the web 63 to contract
15 or causes the web 63 to contract by an amount larger than an amount by the tape unit 67 contacts. With a consequence, the outer end portion 37 of the tape fastener 30 spontaneously extends outward beyond the lateral edge 13.

Of Fig. 7A and Fig. 7B, Fig. 7A illustrates important
20 parts of the diaper 1 obtained by shifting the units 67 and/or the elastic members 119 in the course of the process of Fig. 5 so that the tape fasteners 30 may overlies the waist-surrounding elastic members 19 with the backsheet 3

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therebetween and Fig. 7B illustrates a section thereof as taken along a line Y - Y. In the steps (1) and (2) illustrated by Fig. 5, the elastic members 119 are in a stretched state between each pair of the adjacent imaginary lines A, A and bonded to the inner surface of the web 62 and/or the web 63. In the step (3), when the elastic members 119 contract in the vicinity of the line A - A as the continuum of diapers 65 is cut, the top- and backsheets 2, 3 also contract to form gathers. The tape fastener 30, on the other hand, does not contract and, as will be seen in Fig. 7B, the tape fastener 30 extends outwardly beyond the lateral edge 13 by an amount of contraction occurring in the top- and backsheets 2, 3. The tape fasteners 30 for the diaper 1 obtained in this manner have the same function as those for the diaper 1 obtained in the manner illustrated by Fig. 5. In this diaper 1, the elastic members 19 contract in the direction opposed to the direction in which the tape fasteners 30 are unfolded so that a high peeling force is exerted between each pair of the adjacent tape sections and facilitates these tape sections to be peeled off one from another as the tape fasteners are unfolded. It is also possible to handle the elastically stretchable web in a stretched state as the web 62 in Fig. 5 to obtain the topsheet 2 in Figs. 7A and 7B. In this case, the web 62 elastically contracts together with the elastic

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members 119 as the web 62 is cut along the imaginary lines A, A.

Fig. 8 is a view similar to Fig. 2 but showing one preferred embodiment of this invention. In the tape fastener 30 of this
5 diaper 1, the inner end portion 36 of the upper tape section 31 terminates on the inner end portion 46 of the intermediate tape section 33 without extending inwardly beyond the inner end portion 46 of the intermediate tape section 33 to the inside of the diaper 1.

10 Figs. 9 and 10 are views similar to Fig. 2 but showing the other two preferred embodiments of this invention. The tape fastener 30 shown in Figs. 9 and 10 comprises the upper tape section 31 and the lower tape section 932. Referring to Fig. 9, the inner end portion 941 of the lower tape section 932 is
15 folded upwardly and firmly bonded to the lower surface of the upper tape section 31 by means of the first adhesive agent 44 while the outer end portion 942 of the lower tape section 932 is folded downwardly and firmly bonded to the upper surface of the backsheet 3 by means of the first adhesive agent 44. The
20 upper tape section 31 is similar to the upper tape section 31 shown in Fig. 2 in that the inner end portion 36 thereof extends inwardly beyond the inner end portion 941 of the lower tape section 932 to the inside of the diaper 1 and temporarily bonded

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to the backsheet 3 by means of the second self-adhesive agent 39. The outer end portion 37 at least partially extends outwardly beyond the lateral edge 13 of the diaper 1. With this tape fastener 30, the outer end portion 37 may be taken between
5 the fingers and pulled outwardly away from the diaper 1 in the direction indicated by the arrow P to peel off the inner end portion 36 of the upper tape section 31 from the backsheet 3 and thereby to extend the upper and lower tape section 31, 932 outwardly from the backsheet 3. In the tape fastener 30 shown
10 in Fig. 10, the lower tape section 932 rectilinearly extends with both its inner end portion 941 and its outer end portion 942 not folded and these end portions 941, 942 are firmly bonded to the upper tape section 31 and the backsheet 3 by means of the first adhesive agent 44. This tape fastener 30 also may
15 be pulled in the direction P to peel off the inner end portion 36 of the upper tape section 31 from the backsheet 3 and to extend the upper tape section 31 and the lower tape section 932 outwardly beyond the lateral edge 13 of the diaper 1. As will be understood from Figs. 9 and 10, this tape fastener 30
20 comprises the upper tape section 31 having the deformable outer end portion 37 to be taken between the fingers and the lower tape section 932 having the inner end portion 942 for fixation to the backsheet 3 so that these end portions 37, 942 may define

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longitudinally opposite end portions as the upper and lower tape sections 31, 932 are unfolded from each other. This embodiment allows the intermediate tape section 33 in Fig. 2 to be eliminated. However, this tape fastener 30 is shorter than that
5 according to the previously described embodiment by the length of the intermediate tape section 33. While the tape fastener 30 shown in Figs. 9 and 10 has its construction simpler than those shown in Figs. 2 and 8 and is available at a correspondingly lower cost, the backsheet 3 is apt to be damaged as the outer
10 end portion 37 of the tape fastener 30 is pulled to peel off the upper tape section 31 from the backsheet 3.

Fig. 11 is a partially cutaway perspective view showing a pants-type disposable diaper 201 as another typical embodiment of this invention. The diaper 201 comprises the
15 liquid-pervious topsheet 202, the liquid-impervious backsheet 203 and the liquid-absorbent core 204 interposed between these two sheets 202, 203 so as to form the front waist region 206, the rear waist region 207 and the crotch region 208. The front and rear waist regions 206, 207 have transversely opposite
20 lateral edges 213 overlaid and joined together at the zones 210 arranged intermittently along these lateral edges 213 in the vertical direction so as to define the waist-hole 271 and the leg-holes 272. These holes 271, 272 are provided along

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peripheral edges thereof with the waist-surrounding elastic members 219 and the leg-surrounding members 221, respectively, attached in a stretched state thereto. In the vicinity of the lateral edges 213 of the rear waist region 207, the tape fasteners 230 like the tape fastener 30 shown in Fig. 2 are attached to the diaper 201. The outer end portions 237 of the respective fasteners 230 partially extend outwardly beyond the respective lateral edges 213 of the diaper 201.

Fig. 12 is a sectional view taken along a line XII - XII in Fig. 11. The front and rear waist regions 206, 207 of the diaper 201 are overlaid together in the vicinity of the lateral edges 213 of these regions 206, 207. The top- and backsheets 202, 203 of the front and rear waist regions 206, 207 are joined together at the zones 210 to form flat laminated portions 240 extending laterally of the diaper 201 (See Fig. 11 also). Portions of the tape fastener 230 similar to those of the tape fastener 30 shown in Fig. 2 are designated by the similar reference numerals added with 200. In this diaper 201, the outer end portion 237 of the upper tape section 231 constituting the tape fastener 230 extend outwardly in the transverse direction of the diaper 201 beyond the lateral edge 213 defined by the laminated portion 240 of the front and rear waist regions 206, 207. This feature facilitates the outer end portion 237

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of the tape fastener 240 to be taken between the fingers and thereby enables the outer end portion 237 taken between the fingers to be pulled as indicated by imaginary lines in the direction P to the front waist region 206 (See Fig. 13).

5 Fig. 13 is a perspective view of the pants-type disposable diaper to illustrate a manner in which the tape fasteners 230 in the diaper 201 are used. In the diaper 201 shown in Fig. 13, overabundance possibly present in the waist-surrounding direction by tucking such overabundance utilizing the tape
10 fasteners 230 extending from the rear waist region 207 so that the front waist region 206 may be pulled toward the rear waist region 207. Like the tape fasteners 30 shown in Fig. 4, these tape fasteners 230 also can be used to roll up the used diaper for disposal.

15 While this invention has been described on the basis of the disposable diaper in reference to the accompanying drawings, it should be understood that this invention is applicable also to the other disposable wearing articles such as diaper for incontinence patient and training pants.

20 The disposable wearing article according to this invention has advantageous effects that the outer end portions of the respective tape fasteners adapted to be taken between the fingers extend outwardly beyond the lateral edges of the

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article. This feature facilitates the tape fasteners to be taken between the fingers. The process according to this invention for making such a disposable wearing article includes the step of elastically contracting the backsheet to which the
5 tape fasteners are attached and thereby enables the outer end portions of the respective tape fasteners for taking them between the fingers to extend outwardly beyond the lateral edges of the wearing article.

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C L A I M S

1. A disposable wearing article(1) having a surface destined to face a wearer's body and a surface destined to face wearer's clothes, said article(1) being contoured by front and rear ends(11,12) extending in parallel to each other in a transverse direction and a pair of lateral edges(13) extending in parallel to each other in a longitudinal direction orthogonal to said transverse direction,

said article (1) comprising:

a front waist region(6);

a rear waist region(7);

a crotch region(8) extending between said front and rear waist regions(6,7);

tape fasteners(30) provided on said surface destined to face said wearer's clothes in a vicinity of said lateral edges (13) in said front waist region(6) or said rear waist region (7);

each of said tape fasteners(30) comprises, in such a folded state, a first tape section(31)having a lower surface thereof destined to face said wearer's clothes at least partially coated with an adhesive agent (39) and defining a top layer of said tape fastener(30) and having a free end portion (37)adapted to be taken between the fingers to unfold the folded

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tape fasteners(30) and a first end portion(36) longitudinally opposed to said free end portion(37) and a second tape section(32) underlying said first tape section(31) so as to face said surface destined to face said wearer's clothes and having a fixed end portion(41) firmly bonded to said surface destined to face said wearer's clothes and a second end portion(42) longitudinally opposed to said fixed end portion(41) and connected to said first end portion(36) of said first tape section(31); said article being characterized in that:

each of said tape fasteners(30) further comprises third tape section(33) and said third tape fastener (30) is interposed between said first tape section(31) and said second tape section(32) to connect said first and second tape sections(31,32) to each other, said third tape section(33) having one end portion(46) upwardly folded back and connected to said first end portion(36) of said first tape section(31), the other end portion(47) opposed to said one end portion(46) and connected to said second end portion(42) upwardly folded back of said second tape section(32), and an intermediate portion(48) defined between said one end portion(46) and said other end portion(47) and temporarily bonded to said first tape section(31) and/or said second tape section(32) so that these first - third tape sections (31,32,33) may present a Z- or inverted Z-shape as said tape fastener (30) is folded; and

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at least a part of said free end portion (37) extends outwardly beyond said lateral edge (13) and a lower surface of said part are of non-adhesive nature..

2. The disposable wearing article (1) according to Claim 1, wherein said first end portion (36) of said first tape section (31) extends beyond said one end portion (46) of said third tape section (33) in said transverse direction and is temporarily bonded to said fixed end portion (41) said second tape section (32) extending beyond said one end portion (46) of said third tape section (33) in said transverse direction.

3. The disposable wearing article(1) according to Claim 1 , wherein said article(1) is a pants-type disposable diaper(201) composed of a front waist region(206), a rear waist region(207) and a crotch region (208) extending between said waist regions(206,207), said front and rear waist regions(206,207) being connected to each other in a vicinity of lateral edges(213) thereof so as to define a waist-hole(271) and a pair of leg-holes(272), said tape fasteners(230) being attached to said surface destined to face said wearer's clothes of said front waist region (206) or said rear waist region(207) in a vicinity of respective said lateral edges(213) so that said longitudinal direction of said tape fasteners(230) may coincide

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with a waist-surrounding direction of said diaper(201) and said free end portions(237) of respective said tape fasteners(230) may at least partially extend outwardly in said waist-surrounding direction beyond said lateral edges(213) of said front waist region (206) or said rear waist region(207).

4. The diaper(201) according to Claim 3, in said front and rear waist regions(206,207)and said crotch region(208), a liquid-absorbent core(204) having a surface destined to face said wearer's body and flaps formed by sheet members extending outwardly from a peripheral edge of said core(204) wherein said tape fasteners(230)are attached to said surface destined to face said wearer's clothes in said flaps.

5. The diaper(201) according Claim 3, wherein elastic members (219)are attached in a stretched state to said front waist region (206)or said rear waist region (207) provided with said tape fasteners (230)so as to extend in said transverse direction between said lateral edges(213) of said waist region (206 or 207)and said tape fasteners (230)are attached to said surface destined to face said wearer's clothes in said front waist region (206) or said rear waist region (207)so as to cover said elastic members(219) from outside.

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6. The diaper (201) according Claim 3, wherein said surface destined to face said wearer's clothes to which said tape fasteners (230) are attached is made of a sheet being elastically stretchable in said transverse direction.

7. The diaper (201) according to Claim 3, wherein said free end portions (237) at least partially extend outwardly beyond said lateral edges (213) by 0.7 mm or more.

8. A process for making a disposable wearing article (1), having a surface destined to face a wearer's body and a surface destined to face wearer's clothes, said article (1) being contoured by front and rear ends (11,12) extending in parallel to each other in a transverse direction and a pair of lateral edges (13) extending in parallel to each other in a longitudinal direction orthogonal to said transverse direction, said article (1) comprising a front waist region (6), a rear waist region (7) and a crotch region (8) extending between said front and rear waist regions (6,7), a front waist region (11) put aside from said crotch region (8) toward said front end (6) and a rear waist region put aside from said crotch region (8) toward said rear end (12), said front waist region (6) or said rear waist region (7) being provided on said surface destined to face said wearer's clothes in a vicinity of said lateral edges (13) with

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tape fasteners (30) adapted to be unfolded outwardly from said front waist region (6) or said rear waist region (7) in said transverse direction beyond said lateral edges (13), said process comprising the steps of:

feeding a sheet (63) forming said surface destined to face said wearer's clothes to which said tape fasteners (30) are attached, including zones destined to define said lateral edges of said wearing article (1) so that a plurality of said sheets (63) are connected one to another along said zones destined to define said lateral edges (13) and thereby to form a continuum of said sheets (63) which is elastically stretchable in said transverse direction in a vicinity of said zones destined to define said lateral edges (13) in said transverse direction;

applying a first adhesive agent (44) to a single tape member having upper and lower surfaces on said lower surface at longitudinally opposite end portions except for a longitudinally middle portion to bond firmly said end portions to said surface destined to face said wearer's clothes; applying a second adhesive agent (137) to zones defined between said middle portion and respective said end portions to bond temporarily said zones to said surface destined to face said wearer's clothes so as to form an adhesive tape unit (67); feeding said tape unit (67) onto one side of said continuum of

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said sheet (63) so that a longitudinal direction of said tape unit (67) may coincide with said transverse direction and said middle portion may extend across said zone destined to define said lateral edge (13); bonding said tape unit (67) to said one side by means of said first adhesive agent (44); then cutting said continuum of said sheet (63) together with said tape unit (67) along said zone destined to define said lateral edge (13) to obtain individual sheets (63) each forming said surface destined to face said wearer's clothes which has contracted in said transverse direction more remarkably than said tape unit (67) in a vicinity of said lateral edges (13); and bonding said tape fasteners (30) to said sheet (63) in a vicinity of said lateral edges (13) to obtain said tape fasteners at least partially extending outwardly beyond said lateral edges (13).

9. The process according to Claim 8, wherein said sheet (63) is elastically stretchable in said transverse direction and fed in said transverse direction in an elastically stretched state.

10. The process according to Claim 8, wherein said sheet (63) comprises a non-stretchable sheet and thread-like elastic members (119) bonded to said sheet while said thread-like elastic members (119) are being stretched in said transverse

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direction.

11. The process according to Claim 8, wherein said tape fasteners(30) at least partially extend outwardly beyond said lateral edges (13) by 0.7 mm or more.