

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

ABSORBENT WEARING ARTICLE AND PROCESS OF MAKING THE SAME

5 TECHNICAL FIELD

[0001]

The present invention relates to an absorbent wearing article and particularly to such an article including elastic members circumferentially extending around front and rear
10 waist regions of the wearer (referred to hereinafter sometimes as fit gathers).

RELATED ART

[0002]

There have already been proposed absorbent wearing
15 articles provided with fit gathers circumferentially extending around the front and rear waist regions to improve fit of the article around the wearer's waist.

[0003]

For example, PATENT DOCUMENT 1 discloses an absorbent
20 article comprising a liquid-pervious topsheet, a liquid-impervious backsheet and a liquid-retentive absorbent structure interposed between these two sheets so as to define a front waist region, a rear waist region and a crotch region

wherein the front waist region and/or the rear waist region is or are provided with a plurality of waist elastic members extending in a transverse direction at predetermined intervals. In a region occupied by the absorbent structure, these waist
5 elastic members have elasticity thereof restrained and, outside the opposite side edges of the absorbent structure, these elastic members are fixed to the components of the absorbent wearing article by means of first fastening means so that the elasticity thereof is activated. In the vicinity
10 of borders defined between the regions in which the elasticity is restrained and the regions in which the elasticity is activated, the waist elastic members are fixed to the components of the absorbent article by means of second fastening means.

15 PATENT DOCUMENT 1: JP 2002-95692 A

[0004]

In the absorbent article disclosed in the PATENT DOCUMENT 1, the waist elastic members are interposed between two sheets and a tensile stress as well as a draw ratio at which the waist
20 elastic members are attached to the article can be freely determined so that the absorbent article such as a disposable diaper improved in fit, absorption capacity and leakage barrier performance may be provided.

DISCLOSURE OF THE INVENTION

PROBLEMS TO BE SOLVED BY THE INVENTION

[0005]

However, according to the technique disclosed in the
5 PATENT DOCUMENT 1, the waist elastic members are not bonded
to those two sheets in the region occupied by the absorbent
structure and cut off so that the elasticity of the waist
elastic members is not activated. In the vicinity of borders
defined between the regions in which the elasticity is
10 restrained and the regions in which the elasticity is activated,
the waist elastic members are fixed to the components of the
absorbent article. With such arrangement, the segments of the
waist elastic members having the elasticity restrained are
left to contract and to be shortened. Those two sheets are
15 free from the contraction and left to cover the absorbent
structure.

[0006]

Consequentially, the air permeability of the absorbent
structure to the ambient air may be deteriorated due to two
20 sheets covering the absorbent structure. In addition, a
graphic or logo sometimes printed on the front waist region
or the rear waist region of the absorbent wearing article may
lose a desired visual quality.

[0007]

In view of the problems left by the prior art unsolved behind as have been described above, it is an object of the present invention to provide an absorbent wearing article
5 having fit gathers improved so that an absorbent structure has a high air permeability to ambient air and a graphic or logo printed on the article maintains a high visual quality and a process for making the same.

10 MEASURE TO SOLVE THE PROBLEM

[0008]

There are provided an absorbent wearing article and a process for making the same.

[0009]

15 According to the first aspect of the present invention, an outer sheet having elastic members and an area larger than that of a first backsheet is placed on and bonded to a surface of the first backsheet opposed to its surface bonded to an absorbent structure, the outer sheet has the elastic members
20 intermittently bonded under tension thereto and is formed in a region thereof facing the absorbent structure with an opening, the elastic members extend laterally under tension from a peripheral edge of the opening beyond opposite side edges of

the absorbent structure and the first backsheet is exposed through said opening.

[0010]

According to the second aspect of the present invention
5 comprises the steps of continuously feeding continuous elastic members in a direction parallel to a machine direction to continuous outer sheet continuously fed in the machine direction while the continuous elastic members are intermittently bonded under tension to the continuous outer
10 sheet, making cuts extending orthogonally to the machine direction in the continuous outer sheet having the continuous elastic members bonded thereto so that the continuous elastic members are at least partially chopped off, and bonding the side of the absorbent structure facing the first backsheet to
15 the continuous outer sheet.

EFFECT OF THE INVENTION

[0011]

According to the present invention, the outer sheet including the elastic members (so-called fit gathers) is
20 formed in its region opposed the absorbent structure with the opening through which the first backsheet is exposed so that the first sheet is exposed directly to ambient air. In this way, the absorbent wearing article assuring a high air

permeability of the absorbent structure to ambient air is provided. In addition to such high air permeability of the absorbent structure, a graphic or logo may be printed on the first backsheet assures its visual quality because the first
5 backsheet is exposed through the opening as has previously been described.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012]

[Fig. 1] Fig. 1 is an illustrate a diaper developed and
10 flattened.

[Fig. 2] Fig. 2 is a schematically illustrates the diaper in a sectional view taken in parallel to elastic members.

[Fig. 3] Fig. 3 is a schematically illustrates a process for making the diaper.

15 IDENTIFICATION OF REFERENCE NUMERALS USED IN THE DRAWINGS

[0013]

1	diaper (absorbent wearing article)
2	first backsheet
3	absorbent structure
20 4	elastic member
5	outer sheet
5A	second backsheet
5B	outer covering sheet

7	opening
8	peripheral edge
11	front waist region
12	crotch region
5	13 rear waist region
50	continuous outer sheet
50A	continuous second backsheet
50B	continuous outer covering sheet
HM	hot melt adhesive
10	M center line
MD	machine direction

DESCRIPTION OF THE BEST MODE FOR WORKING OF THE INVENTION

[0014]

15 Taking a diaper 1 as an example, an embodiment of the absorbent wearing article according to the present invention will be described with reference to the accompanying drawings wherein Fig. 1 is a plan view of the diaper 1 developed and flattened as viewed from its outer surface, i.e., its surface
20 opposed to its surface facing the wearer's skin and Fig. 2 is a sectional view taken along the line II-II in Fig. 1.

[0015]

The diaper 1 developed and flattened has a shape which

is symmetric about a center line M and divided by invisible lines extending orthogonally to the center line M to define a front waist region 11, a crotch region 12 and a rear waist region 13 in this order. Referring to Fig. 1, an outer sheet 5 formed with an opening 7 and a first backsheet 2 is exposed in this opening 7.

The first backsheet 2 is smaller than the outer sheet 5 and an absorbent structure 3 having an area smaller than that of the first backsheet 2 is bonded to the backside of the first backsheet 2. In the front waist region 11 and the rear waist region 13, the outer sheet 5 is provided on the backside thereof with elastic members 4 comprising a plurality of rubber strings extending under tension orthogonally to the center line M so that a fit of the diaper 1 around the diaper wearer's waist would be improved.

[0016]

The opening 7 extends in the crotch region 12 and further into the front and rear waist regions 11, 13 symmetrically about the center line M. The absorbent structure 3 bonded to the first backsheet 2 also extends in a manner similar to the opening 7 so as to cover this opening 7. On both sides of the absorbent structure 3, the elastic members 4 laterally extend under tension from a peripheral edge 8 of the opening 7 beyond

the opposite side edges of the absorbent structure 3. In the opening 7, the first backsheet 2 and a graphic printed thereon is exposed. Though not illustrated, it is possible to divide the opening 7 in two or more zones unless the graphic is partially masked.

[0017]

Fig. 2 is a schematic sectional view of the diaper 1 taken along the line II-II, i.e., along the elastic members 4.

The outer sheet 5 of the diaper 1 comprises a second backsheet 5A and an outer covering sheet 5B. The elastic members 4 are sandwiched between these two sheets 5A, 5B and intermittently bonded thereto by hot melt adhesive HM. The absorbent structure 3 is bonded through the intermediary of the first backsheet 2 to the second backsheet 5A constituting the outer sheet 5 by hot melt adhesive HM.

[0018]

Each of the first backsheet 2, the second backsheet 5A and the outer covering sheet 5B is made of a breathable and liquid-resistant or liquid-impervious sheet wherein the outer covering sheet 5B defines the outside of the diaper 1. A liquid-pervious topsheet 14 facing the wearer's skin is placed on and bonded to the second backsheet 5A and the absorbent structure 3. More specifically, the topsheet 14 is

intermittently bonded to the absorbent structure 3 by hot melt adhesive HM. While the topsheet 14 is provided with members of well known art such as leakage barrier cuffs and rubber strings serving to improve a fit of the diaper 1 around the
5 wearer's waist and legs, details of these members will be neither described nor illustrated herein.

[0019]

The first backsheet 2 and the second backsheet 5A are bonded to each other so as to surround the opening 7 and thereby
10 to body waste such as urine would not leak through a gap between these two sheets 2, 5A. Preferably, the peripheral edge 8 of the opening 7 is fully bonded to the first backsheet 2. An area of the opening 7 is dimensioned to be smaller than an area of the absorbent structure 3. Preferably, the opening 7 is
15 formed in a manner that the peripheral edge 8 of the opening 7 is as close as possible to the peripheral edge of the absorbent structure 3 with a margin for bonding left and thereby the opening area is maximized.

[0020]

20 As will be apparent from Fig. 2, the elastic members 4 extend under tension to the peripheral edge 8 of the opening 7. Compared to the case in which the elastic members 4 are cut between the second backsheet 5A and the outer covering sheet

5B and contracted these two sheets, it is possible for the construction illustrated by Fig. 2 to obtain the larger opening 7. Thus the first backsheet 2 having the absorbent structure 3 bonded thereto is exposed through the opening 7 and the area of the first backsheet 2 adapted to come in contact with ambient air without being masked by the outer sheet 5 can be maximized. Consequentially, a high permeability of the absorbent structure 3 to ambient air is ensured and a high visibility of the graphic 15 printed on the first backsheet 2 is also ensured since there is nothing which might mask the graphic 15 (See Fig. 1).

[0021]

The elastic members 4 extend under tension in a direction along which these elastic members 4 bear away from the absorbent structure 3 and, more preferably, extend outward under tension in a direction which is orthogonal to the center line M so as to strain not only the first backsheet 2 itself but also the absorbent structure 3 through the intermediary of this first backsheet 2. Consequentially, it is neither apprehended that the graphic 15 might get wrinkled so as to lose its initial shape as well as its visual quality nor apprehended that the absorbent structure 3 might get wrinkled and body waste such as urine might leak through such wrinkles. In this regard,

it is not essential for the present invention to bond the first
backsheet 2 directly to the absorbent structure 3 so far as
the first backsheet 2 displaying the graphic 15 is free from
getting wrinkled. However, even if the first backsheet 2 is
5 indirectly bonded to the absorbent structure 3, the absorbent
structure 3 is preferably bonded to the topsheet 14 and/or the
second backsheet 5A.

[0022]

Fig. 3 schematically illustrates a process according to
10 the present invention for making the diaper 1.

The process according to the present invention basically
comprises the steps of continuously feeding continuous elastic
members 40 comprising a plurality of rubber strings in a
direction parallel to a machine direction MD to a continuous
15 outer sheet 50 continuously fed in the machine direction MD
while the continuous elastic members 40 are intermittently
bonded under tension to the continuous outer sheet 50, making
cuts extending orthogonally to the machine direction MD in the
continuous outer sheet 50 having the continuous elastic
20 members 40 bonded thereto so that the continuous elastic
members 40 are at least partially chopped off and bonding the
side of the absorbent structure 3 facing the first backsheet
2 to the continuous outer sheet 50.

[0023]

The center line M of the diaper 1 obtained by this process is orthogonal to the machine direction MD. The topsheet 14 (which is continuous in the machine direction MD) and the other
5 members (not illustrated in Fig. 3) are bonded, in subsequent steps, to the continuous outer sheet 50 having the absorbent structure 3 bonded thereto and then the assembly obtained in this manner is cut into the individual diapers 1 as finished products.

10 [0024]

The process according to the invention starts with continuously feeding the continuous elastic members 40 and bonding to the sections of the continuous outer sheet 50 destined to define the front waist regions 11 and the rear waist
15 regions 13. The continuous outer sheet 50 comprises the continuous second backsheet 50A and the continuous outer covering sheet 50B placed on and bonded to the continuous second backsheet 50A wherein the continuous elastic members 40 are fed so as to be interposed between the continuous second
20 backsheet 50a and the continuous outer covering sheet 50B. Bonding of the continuous elastic members 40 to the outer sheet 50 is achieved by intermittently coating the continuous outer covering sheet 50B with hot melt adhesive HM (not shown) using

a first adhesive coater 23 and then placing the continuous elastic members 40 and the continuous second backsheet 50A. Raw fabric for the continuous second backsheet 50A and the continuous outer covering sheet 50B are fed from respective
5 rolls 150A, 150B.

[0025]

In the next step, the cuts 20 each rectilinearly extending in the direction parallel to the center line M from the front waist region 11 to the rear waist region 13 are made
10 by the cutter 24. As a result, the continuous elastic members 40 are at least partially cut off and the continuous elastic members 40 extending between each pair of the adjacent cuts 20 contract together with the continuous outer sheet 50 so as to form the opening 7. At this moment, the continuous outer
15 sheet 50 remains under a tension which is effective in the direction parallel to the machine direction MD and therefore the continuous elastic members 40 extending between each pair of the adjacent cuts 20 can not fully contract, i.e., remain in a stretched state.

20 [0026]

The shape of the opening 7 may be adjusted by appropriately selecting factors such as draw ratio at which the continuous elastic members 40 are feed as well as tension

acting upon the continuous outer sheet 50. Instead of making the cuts 20 in the rectilinear fashion, the cuts 20 may be made so as to cut out partially the continuous outer sheet 50 and thereby the shape of the opening 20 may be adjusted. While
5 the opening area of the opening 7 defined by the peripheral edge 8 thereof should be smaller than that of the absorbent structure 3 as has previously been described, the shape of the opening 7 is preferably adjusted so that the peripheral edge 8 of the opening 7 may be as close as possible to the peripheral
10 edge of the absorbent structure 3 and the opening are may be maximized.

[0027]

Then the first backsheet 2 having the absorbent structure 3 bonded thereto is bonded to the continuous second backsheet
15 50A by hot adhesive HM so that the first backsheet 2 may cover the opening 7.

The absorbent structure 3 and the first backsheet 2 are bonded to each other in the other step and this assembly obtained in this manner is fed in the state of web in preparation
20 for individually cutting. The absorbent structure 3 having the first backsheet 2 bonded thereto is cut into individual assemblies by an absorbent structure cutter 25 and opposite side edges extending orthogonally to the machine direction MD

of the first backsheet 2 cut in this manner are coated with hot melt adhesive HM by a second adhesive coater 26. The first backsheet 2 may be previously printed with the graphic 15 or logo (not shown).

5 [0028]

The absorbent structure 3 is bonded to the first backsheet 2 so as to cover the opening 7 and thereupon the peripheral edge 8 of the opening 7 is fixed in place by hot melt adhesive HM applied on the opposite side edges 27 of the
10 first backsheet 2. In this way, the opening 7 is maintained in an opened state and the continuous elastic members 40 are maintained in a stretched state.

If a clearance is left between the peripheral edge 8 of the opening 7 and the first backsheet 2, there may be provided
15 an additional step of bonding using heat welding technique such as heat sealing technique after the absorbent structure 3 has been bonded to the continuous second backsheet 50A.

[0029]

Alternatively, the process may include the step of
20 coating the continuous outer sheet along the region in which the cuts 20 are to be made inclusive of components extending orthogonally to the machine direction MD with hot melt adhesive. More specifically, on both sides of the region in which the

cut 20 is to be made, i.e., regions destined to become the peripheral edge 8 may be previously coated with hot melt adhesive HM. In this case, a third adhesive coater (not shown) may be provided on upstream (in the direction opposite to the machine direction MD) of the cutter 24. To avoid a problem that hot melt adhesive might interfere with operation of making the cut 20, a quantity of hot melt adhesive to be coated is preferably limited. Proper quantity of hot melt adhesive HM to be coated may be experimentally adjusted, for example, to a range of 1 to 3 g/m².

[0030]

In this way, the first backsheet 2 can be bonded to the absorbent structure 3 with hot melt adhesive HM extending along the peripheral edge 8 of the opening 7 and thereby the peripheral edge 8 can be fixed in place. A quantity of hot melt adhesive HM to be coated on the first backsheet 2 in the subsequent step can be reduced or eliminate the use thereof.

[0031]

As stock materials for various sheets such as the continuous backsheet 50A, the continuous outer covering sheet 50B and the first backsheet 2, the materials conventionally used in this technical field including nonwoven fabrics, films or breathable films each made of thermoplastic resins may be

selectively used. Bonding of these sheets to the continuous elastic members 40 may be carried out by hot melt adhesive HM or heat sealing technique. When hot melt adhesive is used, any particular pattern of coating is not specified and the
5 coating pattern such as stripe-, spiral- or dotted-pattern may be selectively used. To make cuts 20, the cutting means of well known art such as rotary cutter, heat seal cutter supersonic cutter or water jet cutter may be selectively used.
[0032]

10 Instead of using a plurality of rubber strings as the continuous elastic members 40, a single elasticized plastic film or elasticized nonwoven fabric may be used in the place of the continuous elastic members 40. In this case, the peripheral edge 8 of the opening 7 in the continuous outer sheet
15 50 may be bonded together with the single nonwoven fabric or the like used in the place of the continuous elastic members 40 to the first backsheet 2 by heat sealing technique or hot melt adhesive HM. When the elastic members 4 is replaced by the single nonwoven fabric or the like, such nonwoven fabric
20 or the other is more reliably prevented from peeling off from the peripheral edge 8 of the opening 7 than in the case of the elastic members comprising a plurality of rubber strings even when such nonwoven fabric or the like contract.

[0033]

In the diaper 1 obtained by the process as has been described above, the continuous outer sheet 50 having the continuous elastic members 40 bonded thereto is formed in a region facing the absorbent structure 3 with the opening 7 through which the first backsheet 2 of the absorbent structure 3 is exposed. The opening 7 allows the first backsheet 2 bonded to the absorbent structure 3 to be directly exposed to ambient air. In this way, the diaper 1 is provided, in which a high air permeability of the absorbent structure 3 to the ambient air is ensured. Furthermore, the first backsheet 2 exposed in this manner ensures that the graphic 15 or logo printed thereon maintains a high visibility thereof.

[0034]

Furthermore, this process allows the continuous outer sheet 50 under tension to be stretched in the direction parallel to the machine direction MD at the moment of making the cuts in the continuous outer sheet 50. In other words, the continuous outer sheet 50 is stretched out to the width of the diaper 1 as the finished product. Consequentially it is possible to reduce a dimension (as measured in the machine direction) of the raw fabric fed from the roll destined to become a width dimension of the individual diaper 1 with respect

to the width dimension of the individual diaper 1. Compared to the case in which no step of making cuts is included, the production rate can be improved and the production cost can be reduced on the assumption that the rate of feed is maximized.

5 [0035]

It is also possible to make a plurality of cuts 20 extending along the center line M. For example, if two cuts 20 spaced from each other along the center line M to form two openings 7, regions of the continuous outer sheet 50 which are
10 continuous in the machine direction MD of the continuous outer sheet 50 can be increased and running of the continuous outer sheet 50 can be stabilized so that the continuous outer sheet 50 can be easily handled.

C L A I M S

[1] An absorbent wearing article (1) comprising an air permeable and liquid-impervious first backsheet (2) and a liquid-retentive absorbent structure (3) placed on said first backsheet wherein said absorbent wearing article is characterized in that:

said absorbent wearing article comprises an outer sheet (5) having elastic members (4) and an area larger than that of said first backsheet being placed on and bonded to a surface of said first backsheet opposed to its surface bonded to said absorbent structure;

said outer sheet has said elastic members intermittently bonded under tension thereto and being formed in a region thereof facing said absorbent structure with an opening (7);

said elastic members extend laterally under tension from a peripheral edge (8) of said opening beyond opposite side edges of said absorbent structure; and

said first backsheet is exposed through said opening.

20

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

said absorbent wearing article is symmetric about a

center line (M) when said absorbent wearing article is developed in a flattened state;

said absorbent wearing article comprises a front waist region (11), a crotch region (12) and a rear waist region (13) in this order as viewed in a direction orthogonal to said center line;

said opening of said outer sheet is formed so as to extend from said front waist region to said rear waist region;

said absorbent structure extends from said front waist region to said rear waist region so as to cover said opening; and

said elastic members extend under tension in a direction substantially orthogonal to said center line in said front waist region and said rear waist region.

15

[3] The absorbent wearing article according to Claim 1 or 2, wherein said peripheral edge of said opening formed through said outer sheet is bonded to said first backsheet.

20 [4] The absorbent wearing article according to any one of Claims 1-3, wherein:

said outer sheet comprises a second backsheet (5A) bonded to said first backsheet and an outer covering sheet (5B) placed

upon and bonded to said second backsheet; and

said elastic members are sandwiched between said second backsheet and said outer covering sheet.

5 [5] The absorbent wearing article according to any one of Claims 1-4, including a plurality of said openings.

[6] A process for making an absorbent wearing article (1) including an air permeable and liquid-impervious first
10 backsheet (2) and a liquid-retentive absorbent structure (3) placed upon said first backsheet, wherein said process is characterized in comprising the steps of:

continuously feeding continuous elastic members (40) in a direction parallel to a machine direction (MD) to a continuous
15 outer sheet (50) continuously fed in said machine direction while said continuous elastic members are intermittently bonded under tension to the continuous outer sheet;

making cuts extending orthogonally to said machine direction in the continuous outer sheet having said continuous
20 elastic members bonded thereto so that said continuous elastic members are at least partially chopped off; and

bonding the side of said absorbent structure facing said first backsheet to said continuous outer sheet.

[7] The process for making the absorbent wearing article according to Claim 6, wherein:

said absorbent wearing article is symmetric about a center line (M) when said absorbent wearing article is developed in a flattened state;

said absorbent wearing article comprises a front waist region (11), a crotch region (12) and a rear waist region (13) in this order as viewed in a direction orthogonal to said center line;

said center line is orthogonal to said machine direction of said continuous outer sheet;

said continuous elastic members are fed to said front waist region and said rear waist region;

said cuts are made in a direction parallel to said centerline so as to extend from said front waist region to said rear waist region; and

a side of said absorbent structure facing said first backsheet is bonded to said outer sheet from said front waist region to said rear waist region so as to cover said opening.

20

[8] The process for making the absorbent wearing article according to Claim 6 or 7, including a step of coating regions along which said cuts are made with hot melt adhesive (HM) in

the direction orthogonal to said machine direction before said step of making said cuts in said continuous outer sheet.

[9] The process for making the absorbent wearing article
5 according to any one of Claim 6-8, wherein:

said continuous outer sheet comprises a continuous second backsheet (50A) bonded to said first backsheet and a continuous outer covering sheet (50B) bonded placed upon and bonded to said second backsheet;

10 said continuous elastic members are interposed between said continuous second backsheet and said continuous outer covering sheet and bonded thereto; and

said absorbent structure is bonded to said continuous second backsheet on a side of facing said first backsheet.

15

[10] The process for making the absorbent wearing article according to any one of Claim 6-9, including a step of making a plurality of cuts spaced one from another in said machine direction for each of the individual diapers.