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AIR-PERMEABLE AND LIQUID-IMPERMEABLE BACKSHEET FOR USE IN BODY FLUID ABSORBENT ARTICLES, AND ITS MANUFACTURING METHOD
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- (71) Applicant(s)
UNI-CHARM CORPORATION
- (72) Inventor(s)
MICHIKO MATSUSHITA; HIROYUKI SOGA
- (74) Attorney or Agent
PHILLIPS ORMONDE & FITZPATRICK , 367 Collins Street, MELBOURNE VIC 3000
- (56) Prior Art Documents
EP 232060
US 4902553
GB 2235878
- (57) Claim

1. An article for absorbing body fluid including a layer of absorbent material and a backsheet that is liquid-permeable, wherein

said backsheet is composed of a stretched polyolefin plastic containing 30 to 80% by weight of embedded inorganic filler particles based on the weight of the backsheet,

said backsheet having at least one roughened portion that includes a large number of air-permeable fine pores and a large number of fine projections rising upwardly and formed from the rising up of said filler particles when the backsheet is stretched, and

the remainder of said backsheet being composed of a relatively smooth thermo-embossed surface containing air-permeable fine pores that is substantially free of fine projections which rise up and which thermo-embossed surface has a higher transparency than said at least one roughened portion.

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COMPLETE SPECIFICATION
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Name of Applicant:

Uni-Charm Corporation

Actual Inventor(s):

Michiko Matsushita
Hiroyuki Soga

Address for Service:

PHILLIPS ORMONDE & FITZPATRICK
Patent and Trade Mark Attorneys
367 Collins Street
Melbourne 3000 AUSTRALIA

..... : Invention Title:

..... : AIR-PERMEABLE AND LIQUID-IMPERMEABLE BACKSHEET FOR USE IN BODY
..... : FLUID ABSORBENT ARTICLES, AND ITS MANUFACTURING METHOD

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The following statement is a full description of this invention, including the best method of performing it known to applicant(s):

AIR-PERMEABLE AND LIQUID-IMPERMEABLE BACKSHEET
FOR USE IN BODY FLUID ABSORBENT ARTICLES,
AND ITS MANUFACTURING METHOD

BACKGROUND OF THE INVENTION

This invention relates to air-permeable and fluid-impermeable backsheets made of polyolefin plastic sheet for use in body fluid absorbent articles such as disposable diapers, sanitary napkins and the like.

It is well known to use polyolefin plastic sheet such as polyethylene sheet as liquid-impermeable sheet which covers absorbent cores of body fluid absorbent articles. Use of polyethylene sheet, which is made transparent or translucent, allows the absorbent cores stained with body fluid to be identified as they are through observation of the sheet, and such sheet is convenient for judgement of a chance at which the body fluid absorbent articles thus stained with body fluids should be exchanged with fresh ones. However, such sheet of well known art is relatively poor in its air-permeability and therefore the body fluid absorbent articles employing such backsheets tend to become stuffy. It is also well known to stretch polyolefin plastic sheet such as polyethylene sheet containing fine particles of inorganic filler such as calcium carbonate at a desired draw ratio in order to form air-permeable fine

pores and to use such sheet as an air-permeable and liquid-impermeable backsheet as disclosed, for example, in Japanese Patent Application Nos. JP-A-60199037 and JP-A-62167332.

These conventional techniques are certainly convenient in preventing the body fluid absorbent articles from becoming stuffy during use thereof owing to improved air-permeability. However, while such sheet of prior art exhibits a certain transparency before stretching treatment, once it has been stretched, the filler particles are apt to rise to the surface and to form fine projections which, in turn, rough the sheet surface and thereby increase its optical diffusivity. Consequently, the transparency of the sheet is lost, making it difficult for users to identify that an absorbent core has been stained with body fluids.

To solve these problems, it is a principal object of this invention to provide a backsheet having desired transparency as well as desired air-permeability and being suitable to be used as components of body fluid absorbent articles by subjecting air-permeable polyolefin plastic sheet containing inorganic filler particles and having its surface once roughed by stretching to thermo-embossing treatment so as to provide partially transparent and smooth surface.



SUMMARY OF THE INVENTION

According to the present invention there is provided an article for absorbing body fluid including a layer of absorbent material and a backsheet that is liquid-
5 permeable, wherein

said backsheet is composed of a stretched polyolefin plastic containing 30 to 80% by weight of embedded inorganic filler particles based on the weight of the backsheet,

said backsheet having at least one roughened portion that includes a large
10 number of air-permeable fine pores and a large number of fine projections rising upwardly and formed from the rising up of said filler particles when the backsheet is stretched, and

the remainder of said backsheet being composed of a relatively smooth thermo-embossed surface containing air-permeable fine pores that is substantially
15 free of fine projections which rise up and which thermo-embossed surface has a higher transparency than said at least one roughened portion.

In at least one preferred embodiment of this invention, said at least one roughened portion and said relatively smooth thermo-embossed

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surface zones define together a desired surface pattern.

According to this invention, the air-permeable and liquid-impermeable backsheet is made by stretching the polyolefin plastic sheet containing inorganic filler particles so that the sheet surface may be roughed by the filler particles rising up to the surface as air-permeable fine pores are formed. This surface roughed sheet is thermo-embossed, by which part(s) the sheet coming into contact with an embossing roll is softened or molten under a pressure and the rough surface is converted to the smooth surface. The embossing roll may be provided with a desired pattern to obtain a corresponding sheet surface pattern composed of the smooth surface zone and the rough surface zone. Use of this sheet carrying thereon such surface pattern as the backsheet serving to cover the absorbent core of the body fluid absorbent articles facilitates identification of the absorbent core stained with body fluids since the smooth surface zone has an adequate transparency, on one hand, and allows the absorbent core stained with body fluids to be effectively concealed by the rough surface zone since the rough surface zone has a poor transparency due to optical diffusion and thereby said identification is made difficult, on the other hand. Even after thermo-embossed, such sheet maintains the air-permeable fine pores at least over the rough surface zone.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be described more in detail with reference to the attached drawings, in which:

Fig. 1 is a perspective view of a disposable diaper using ~~the~~ ^{a preferred} backsheet of the invention;

Fig. 2 is a fragmentary enlarged view showing ^{preferred} ~~examples~~ (a) and (b) of the surface pattern; and

Fig. 3 is a schematic diagram illustrating a process for making the backsheet.

PREFERRED EMBODIMENTS OF THE INVENTION

Fig. 1 is a perspective view showing, as partially broken away, disposable diaper 2 erected so as to be ready for actual use, said diaper 2 including a surface-patterned air-permeable backsheet 1 of the invention. As in the prior art, the diaper 2 basically comprises a topsheet 3, the backsheet 1 and an absorbent core 4 sandwiched between these sheets 1, 3. The backsheet 1 defines the outer side of the diaper 2 and has sufficient liquid impermeability to prevent body fluid from leaking.

Fig. 2 is a fragmentary perspective view showing, in an enlarged scale, the backsheet 1 of the invention, with (a) and (b) illustrating two examples of the backsheet 1 having different surface patterns. The backsheet 1 is a



polyethylene sheet having a thickness of 50 μm and containing particles of inorganic filler such as calcium carbonate or barium sulfate of 30 to 80% by weight.

At least one surface of the backsheet 1 comprises a rough surface zone 5 and a relatively smooth surface zone 6 so that these two zones represent, for example, a striped pattern as shown by Fig. 2(a) or polka dots as shown by Fig. 2(b). The rough surface zone 5 includes a large number of fine pores 7 each having a diameter of 0.03 to 5 μm and a large number of fine projections 8 formed by rising up of the filler particles. Presence of the fine pores 7 makes the rough surface zone 5 air-permeable but practically maintains liquid-impermeability of this zone 5 while presence of the fine projections 8 causes whitening of this zone 5 due to optical diffusion of transmitted light and reflected light. On the other hand, the smooth surface zone 6 includes thereon practically none of the fine projections 8 or, if any, they will be substantially lower than the fine projections 8 on the rough surface zone 5 so that the optical diffusion of both transmitted light and reflected light may be reduced and thereby it may be assured to obtain a transparency higher than that of the rough surface zone 5. The smooth surface zone 6 may or may not have the fine pores 7.

With the backsheet 1 being in the state for actual use



as shown by Fig. 1, occurrence of excretion can be readily identified and thereby a chance to exchange the diaper 2 can be judged, since the absorbent core stained with body fluids can be seen through the smooth surface zone 6. On the other hand, it is relatively difficult for the stained absorbent core to be seen through the rough surface zone 5 and, therefore, this rough surface zone 5 can be used to conceal the stained absorbent core 4. For this purpose, location as well as size of the rough surface zone 5 may be appropriately selected. Respective configurations of the rough surface zone 5 and the smooth surface zone 6 as well as ratio of their areas may be also appropriately selected to obtain a desired surface pattern on the backsheet 1. It should be understood that Fig. 2 illustrates both the fine pores 7 and the fine projections 8 in exaggerated sizes relative to the thickness of the backsheet 1 to clarify the presence of them.

Fig. 3 is a schematic diagram illustrating a process of making the backsheet 1. Polyethylene sheet 100 having a thickness of approximately ^{20 μ m}~~20mm~~ which contains particles of inorganic filler such as calcium carbonate or barium sulfate of 30 to 80% by weight is fed to a tenter 101 by which the sheet 100 is stretched both in length and width by 100% under heating condition, and then cooled to obtain stretched sheet 102 having the air-permeable fine pores 7



and the opposite surfaces roughed. The stretched sheet 102 is passed between a pair of embossing rolls 103 comprising a combination of a pattern roll having thereon the striped pattern as shown by Fig. 2(a) and a smooth surface roll whereby the roughed surfaces are partially smoothed by heating them under a sufficient pressure so as to obtain air-permeable sheet 104 having the surface pattern defined by the rough surface zone and the smooth surface zone. Then, this sheet 104 is appropriately cut to obtain individual backsheets 1.

When used particularly for disposable diaper, the backsheet 1 preferably has a thickness of 20 to ~~80 μ m~~ ^{80 μ m}. Content of the inorganic filler particles in the backsheet 1 may be selectively adjusted to achieve desired air-permeability and transparency, i.e., see-through characteristic.

The backsheet 1 of this invention is air-permeable through the fine pores provided over the rough surface zone which is also effective to cover up the absorbent core stained with body fluids excreted and absorbed therein and thereby to keep the body fluid absorbent articles in an acceptable appearance. The smooth surface zone allows users to judge a chance to exchange the stained body fluid absorbent articles with fresh ones, since the smooth surface zone has a see-through characteristic which



facilitates identification of the stained absorbent core. The rough and smooth surface zones may be appropriately arranged to represent a desired surface pattern over the backsheet. Such backsheet can be easily made by stretching polyolefin plastic sheet which contains the inorganic filler particles and subsequently thermo-embossing such stretched sheet.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. An article for absorbing body fluid including a layer of absorbent material and a backsheet that is liquid-permeable, wherein

5 said backsheet is composed of a stretched polyolefin plastic containing 30 to 80% by weight of embedded inorganic filler particles based on the weight of the backsheet,

10 said backsheet having at least one roughened portion that includes a large number of air-permeable fine pores and a large number of fine projections rising upwardly and formed from the rising up of said filler particles when the backsheet is stretched, and

the remainder of said backsheet being composed of a relatively smooth thermo-embossed surface containing air-permeable fine pores that is substantially free of fine projections which rise up and which thermo-embossed surface has a higher transparency than said at least one roughened portion.

15 2. An article as claimed in Claim 1, wherein said at least one roughened portion and said relatively smooth thermo-embossed surface define together a desired surface pattern over the backsheet.

20 3. An article for absorbing body fluid substantially as herein described with reference to any one of the embodiments illustrated in the accompanying drawings.

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PHILLIPS ORMONDE & FITZPATRICK

Attorneys for:

25 UNI-CHARM CORPORATION

David Fitzpatrick



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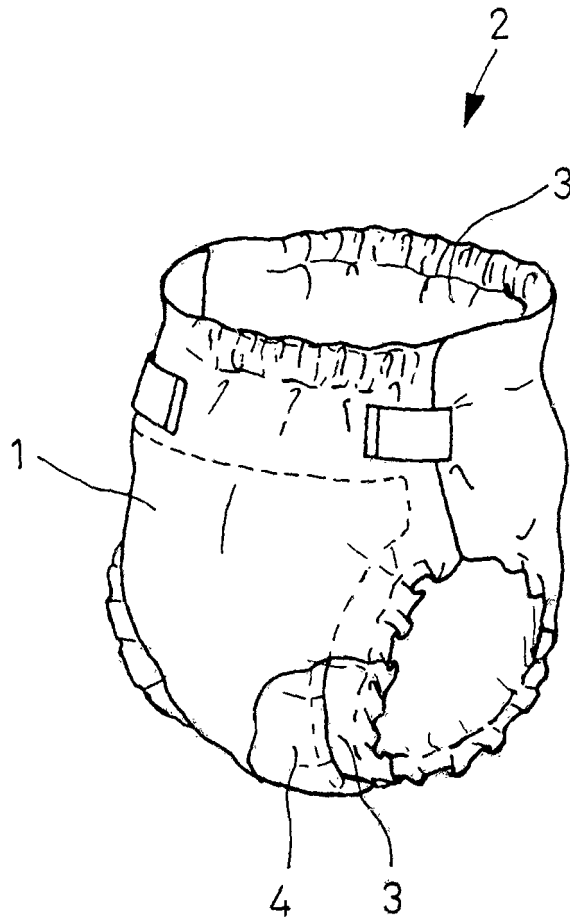
Here is disclosed air-permeable and liquid-impermeable backsheet for use in body fluid absorbent articles.

Polyolefin plastic sheet containing inorganic filler particles is stretched and then thermo-embossed to obtain the backsheet 1. At least one surface of this backsheet 1 is composed of a rough surface zone 5 and a smooth surface zone 6 so that these two kinds of zones define together a desired surface pattern over the backsheet. The rough surface zone 5 has fine pores 7 for air-permeability and the smooth surface zone 6 facilitates an absorbent core of the body fluid absorbent article to be seen through this smooth surface zone 6.

(Fig. 2)

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FIG.1



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FIG.2A

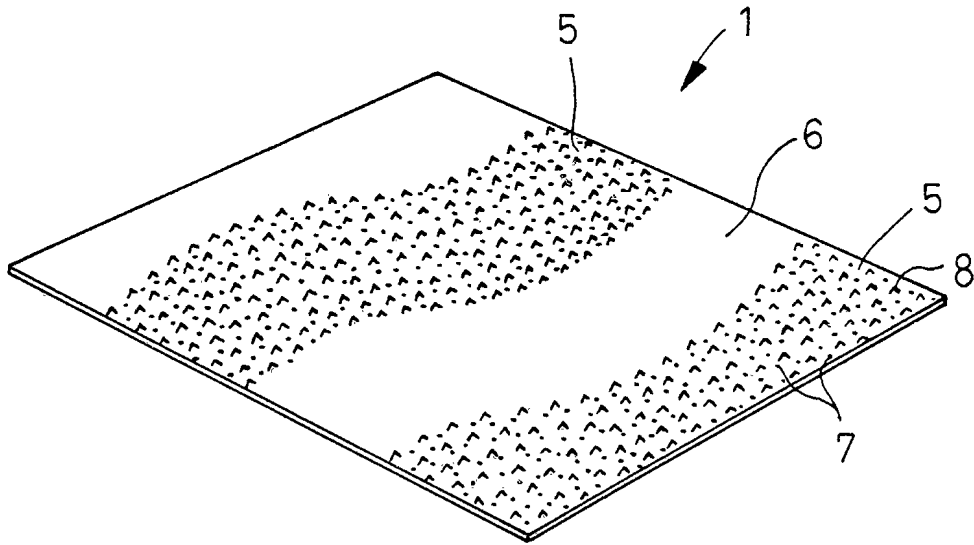


FIG.2B

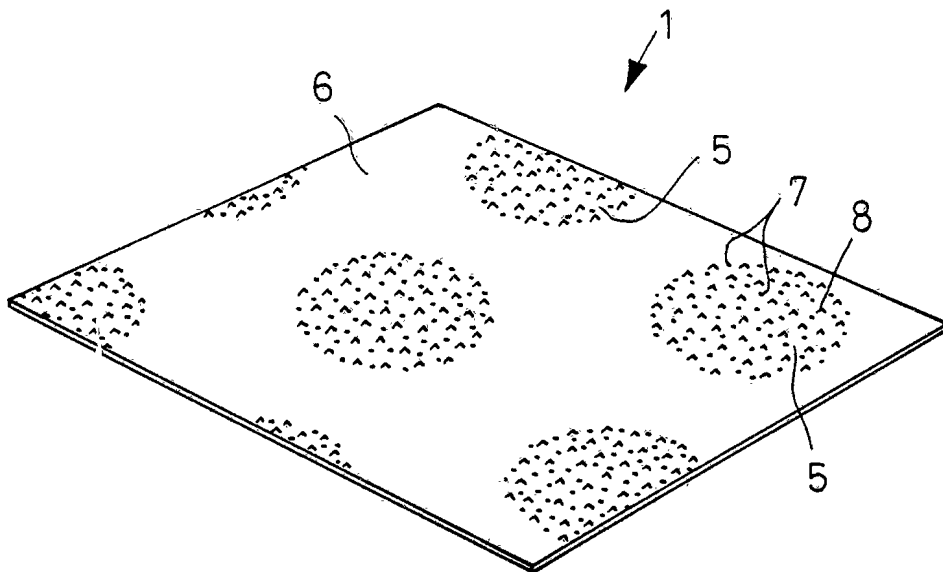


FIG.3

