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DISPOSABLE BODY FLUIDS ABSORBENT GARMENT /

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This invention relates generally to disposable body fluids absorbent garments and more particularly to such garments which is relative thin and adapted to absorb a relatively small quantity of body fluids such as menstruation pads.

U.S. Patent No. 4,950,264 discloses a relatively thin menstruation pad or napkin. The menstruation pad disclosed therein comprises a liquid-permeable topsheet, a liquid-impermeable barrier sheet and a liquid-absorbent core disposed between these two sheets. It is described that the barrier sheet may be formed by breathable but liquid-impermeable polyethylene film. The absorbent core may be formed by woody pulp or a laminate comprising a pair of tissue paper sheets and hydrogel producing material disposed between the pair of tissue paper sheets.

Japanese Patent Publication No. Hei6-38815 discloses a menstruation pad or napkin having its upper surface covered with a fluid-permeable cover sheet and its lower surface covered with a breathable but fluid-impermeable baffle. With the menstruation pad disclosed therein, a desired breathability in the direction of its thickness will be

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assured by its absorbent core comprising fluff pulp which has been well known and usually employed in the related field of industry.

In the case of the relatively thin napkin described in the foregoing U.S. Patent No. 4,950,264, a rigidity of the menstruation pad increases and a fitting of the pad to the wearer's skin is correspondingly deteriorated as a content of the hydrogel producing material in the absorbent core increases. This is for the reason that the hydrogel producing material is generally composed of hard and fine particles it is difficult for the absorbent core with a high content of this material to hold its shape unless it is pressed, preferably wet-pressed into a wad. Polyethylene film employed as the barrier sheet often sounds offensive when the wearer handles the menstruation pad.

Both the fluid-permeable cover and the absorbent core employed by the menstruation pad disclosed in the foregoing Japanese Patent Publication No. Hei6-38815 have their breathable through-holes filled up with body fluids absorbed by them and the breathability in the direction of its thickness will be seriously affected.

In view of the problem as has been described above, it

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is a principal object of the invention to provide a relatively thin disposable body fluids absorbent garment improved so as to maintain a desired breathability even after a quantity of body fluids discharged thereon has been absorbed by the garment.

The object set forth above is achieved, according to the invention, by a disposable body fluids absorbent garment comprising a breathable topsheet, a breathable backsheet and a breathable intermediate sheet layer disposed between said topsheet and said backsheet, said disposable body fluids absorbent garment being characterized in that: said topsheet is formed by a body fluids absorbent nonwoven fabric made of hydrophilic fibers, said topsheet being formed with a plurality of through-holes each having a diameter of 0.3 - 3 mm; said backsheet is formed by a nonwoven fabric made of thermoplastic synthetic fibers, said backsheet having a fineness of 1 - 8 deniers; and said intermediate sheet layer comprises a plurality of nonwoven fabric sheets each made of thermoplastic synthetic fibers and at least includes a liquid permeation resistant and breathable melt blown nonwoven fabric sheet.

Preferably, said hydrophilic nonwoven fabric is cellulose fiber nonwoven fabric in the form of a spun laced

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nonwoven fabric made of any one selected from a group consisting of cotton, pulp, rayon and acetate and the cellulose fiber nonwoven fabric has a basis weight of 15 ~ 70 g/m².

Preferably, said plurality of through-holes are distributed so that each pair of adjacent through-holes are spaced from each other by a center-to-center distance of 1 ~ 10 mm.

Preferably, said melt blown nonwoven fabric has a basis weight of 10 ~ 30 g/m².

Fig. 1 is a perspective view showing panty - liner as a specific embodiment of the invention; and

Fig. 2 is a sectional view showing an important part along a line II - II in Fig. 1.

Details of a disposable body fluids absorbent garment according to invention will be more fully understood from the description of pantie-liner as the specific embodiment thereof given hereunder with reference to the accompanying drawings.

Figs. 1 and 2 are respectively a perspective view of a pantie-liner 1 and a sectional view showing the important



part along a line II - II in Fig. 1. The pantie-liner 1 has a upper surface 2 intended to come in contact with the wearer's skin, a lower surface 3 intended to come in contact with shorts worn by the wearer and a thickness t extending between these upper and lower surfaces 2, 3. The pantie-liner 1 comprises a topsheet 6, a backsheet 7 and an intermediate sheet layer 8 which are laminated one on another in this order as viewed in the direction of the thickness t .

The topsheet 6 is made of a liquid-absorbent fibrous web having a basis weight of $15 \sim 70 \text{ g/m}^2$ and comprising intertwined hydrophilic fibers, preferably cellulose fibers. This fibrous web is formed with a plurality of through-holes 11 each having a diameter D of $0.3 \sim 3 \text{ mm}$ and arranged so that each pair of adjacent through-holes 11 may have their centers spaced from each other by $1 \sim 10 \text{ mm}$. The topsheet 6 is initially breathable through fibers interstices of the fibrous web and its breathability is enhanced by the through-holes 11. There are various types of the hydrophilic fibers, for example, cotton, pulp, rayon, acetate and so-called sweat-absorbent fibers of well known art comprising hydrophobic fibers surface-treated so as to become hydrophilic. Any one or a mixture thereof may be formed into web. While such web may have various configurations such as

a nonwoven fabric, a random web, a parallel web, it is preferred to form the cotton fibers into a nonwoven fabric, particularly into a spun laced nonwoven fabric with a machine operating longitudinally of the pantie-liner. In view of a fact that the cotton fibers generally has a fiber length of about 10 ~ 50 mm, the spun laced nonwoven fabric obtained by subjecting such web of cotton fibers to high pressure water jets can provide a relatively high tensile strength. The spun laced nonwoven fabric provides also a relatively high resistibility against falling off of fibers because individual fibers are complicatedly intertwined under the high pressure water jets. Additionally, this nonwoven fabric provides a comfortable touch and high liquid-absorptivity peculiar to the cotton fibers. The through-holes 11 of the topsheet 6 may be formed using the conventional means, for example, the web may be squeezed between a pair of embossing rolls, or the web may be laid on a support having a plurality of projections and then subjected to high pressure water jets so that the individual fibers may be reoriented along the peripheral walls of the respective projections.

The backsheet 7 is formed by a point bonded nonwoven fabric of thermoplastic synthetic fibers having a fineness of 1 ~ 8 deniers and a basis weight of 10 ~ 50 g/m². Such

nonwoven fabric has individual fibers intermittently heat-sealed together under an appropriate pressure so as to form heat-sealed pints (not shown) each having an area of about $0.5 \sim 5 \text{ mm}^2$ with a breathability and a high tensile strength. At the heat-sealed points, the individual fibers are heat-sealed together in a film-like state and such heat-sealed points occupy 10 ~ 70 % of the entire surface area of the backsheet 7. While it is preferred to evenly distribute the heat-sealed points over the entire backsheet 7, the heat-sealed points may be locally concentrated unless they seriously affect the desired breathability of the backsheet 7.

The intermediate sheet layer 8 comprises, from the backsheet 7 toward the topsheet 7, a leak-proof sheet 2, a reinforcing sheet 13 serving to improve a tensile strength of the leak-proof sheet 12 and a cushion sheet 14 serving to make the pantie-liner 1 soft and bulky, which are successively laminated in this order one upon another. The leak-proof sheet 12 prevents or retards a quantity of body fluids from reaching the backsheet 7 even if the quantity of body fluids permeates through the intermediate sheet layer 8 after having been absorbed by the topsheet 6. Such leak-proof sheet 12 is formed by a melt blown nonwoven fabric

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having a basis weight of 10 ~ 30 g/m² and made of thermoplastic synthetic resin such as polypropylene resin. This nonwoven fabric has a breathability and a liquid permeation resistance sufficient for prevention or at least retarding of liquid permeation, both being practically effective to meet the requirements imposed by the body fluids absorbent garment. Specifically, this nonwoven fabric is made of melt blown fibers having a fineness less than 1 denier and presents a cloth-like soft touch so that it does not sound offensive when it is folded as a plastic film is the case. It should be understood that this nonwoven fabric generally has not tensile and friction strengths sufficiently to be effectively used as a surface covering material for the body fluids absorbent garment. For this reason, the reinforcing sheet 13 is bonded to the melt blown nonwoven fabric and thereby to improve the strength of the nonwoven fabric. The reinforcing sheet 13 is formed by a spun bonded nonwoven fabric made of thermoplastic synthetic fibers having a fineness of 1 ~ 8 deniers such as polypropylene fibers and has a basis weight of 10 ~ 40 g/m². The cushion sheet 14 is formed by a bulky nonwoven fabric made of crimped conjugated fibers having a fineness of 1 ~ 8 deniers and has a basis weight of 10 ~ 50 g/m². Useful conjugated fibers includes

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polyester/polyethylene conjugated fiber of sheath-and-core type or side-by-side type. Such conjugated fibers has its component fibers which are mechanically intertwined and/or intertwined by heat-sealing. In the latter case, such nonwoven fabric advantageously makes the pantie-liner 1 remarkably cushiony.

In the laminate shown by Fig. 2, the backsheet 7, the leak-proof sheet 12, the reinforcing sheet 13, the cushion sheet 14 and the topsheet 6 are face-to-face but intermittently bonded together so that such bonding might not significantly affect the respective sheets breathability. Such bonding may be achieved by use of an appropriate adhesive agent such as hot melt adhesive or by intermittently heat-sealing these sheets. Of the laminate, the backsheet 7 is applied on its lower surface with adhesive 21 and lower surface of this adhesive 21 is protectively covered with release paper 22. The adhesive 21 serves to separably fix the pantie-liner 1 to shorts worn by the wearer and intermittently applied on the lower surface of the backsheet 7 so as to maintain a desired breathability of the backsheet 7.

With the unique arrangement as has been described above, the pantie-liner 1 comprises a plurality of breathable

sheets laminated one upon another so that the respective sheets breathability might not be affected and therefore is breathable in the direction of its thickness. With the liner 1 put on the wearer's body, body fluids discharged thereon is absorbed and held by the topsheet 6. The quantity of body fluids once absorbed by the topsheet 6 substantially does not transfer from the topsheet 7 to the intermediate sheet layer 8 since the respective sheets underlying the topsheet 6 are made of hydrophobic thermoplastic synthetic fibers. It should be understood here that the topsheet 6 can no longer hold the quantity of body fluids discharged thereon when the quantity of body fluids exceeds a liquid-absorbing capacity of the liner 1 or the wearer's body weight is exerted on the liner 1.

In the topsheet 6, the diameter D of each through-hole 11 is substantially larger than each interstice of the cotton fiber. Therefore, a quantity of body fluids flowing into the through-holes 11 is absorbed by the cotton fibers along the peripheral walls of these through-holes 11 and disappears therefrom so far as a liquid-absorbing capacity of the sheet 6 in the proximity of these through-holes is not saturated. The quantity of body fluids flowing into the through-holes 11 transfers into the liner 1 without any apprehension that the

quantity of body fluids might fill up the fibers interstices in the sheets underlying the through-holes 11 such as the cushion sheet 14 and the leak-proof sheet 12. As a result, the breathability of these sheets underlying the through-holes 11 is not affected. In this manner, upon disappearance of body fluids from the through-holes 11, the liner 1 can restore the breathability in the direction of its thickness through said through-holes 11.

The body fluids absorbent garment according to the invention can be implemented, in addition to the pantie-liner 1 as described and illustrated, in the form of a menstruation pad or napkin, a urine-absorbent pad for incontinent patient and a sanitary pad.

In the disposable body fluids absorbent garment according to the invention, a liquid-absorbent and breathable sheet is employed as the topsheet, on one hand, and the nonwoven fabric of thermoplastic synthetic fibers placed upon the sheet is liquid permeation resistant and breathable, on the other hand. This unique arrangement allows the garment to be as thin as possible and to be excellent in its breathability.

By employing a spun laced nonwoven fabric of cellulose fiber having no heat-sealed or binder-bonded spots as the



topsheet, it is possible to provide the garment of a soft touch and high absorptivity.

Even after a quantity of body fluids has been discharged, the topsheet can maintain its high breathability through the through-holes each having a diameter of 0.3 ~ 3 mm.

By employing a melt blown nonwoven fabric as the liquid permeation resistant sheet, it is possible to avoid offensive sound often occurring when a breathable and liquid-impermeable plastic film is employed as this sheet.

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WHAT IS CLAIMED IS:

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1. A disposable body fluids absorbent garment comprising a breathable topsheet, a breathable backsheet and a breathable intermediate sheet layer disposed between said topsheet and said backsheet, said disposable body fluids absorbent garment being characterized in that:

said topsheet is formed by a body fluids absorbent nonwoven fabric made of hydrophilic fibers, said topsheet being formed with a plurality of through-holes each having a diameter of 0.3 ~ 3 mm; said backsheet is formed by a nonwoven fabric made of thermoplastic synthetic fibers, said backsheet having a fineness of 1 ~ 8 deniers; and said intermediate sheet layer comprises a plurality of nonwoven fabric sheets each made of thermoplastic synthetic fibers and at least includes a liquid permeation resistant and breathable melt blown nonwoven fabric sheet.

2. The garment according to Claim 1, wherein said hydrophilic nonwoven fabric is a cellulose fiber nonwoven fabric in the form of a spun laced nonwoven fabric made of any one selected from a group consisting of cotton, pulp, rayon and acetate.

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3. The garment according to Claim 1 or 2, wherein said cellulose fiber nonwoven fabric has a basis weight of 15 ~ 70 g/m².

4. The garment according to any one of Claims 1 ~ 3, wherein said plurality of through-holes are distributed so that each pair of adjacent through-holes are spaced from each other by a center-to-center distance of 1 ~ 10 mm.

5. The garment according to any one of Claims 1 ~ 4, wherein said melt blown nonwoven fabric has a basis weight of 10 ~ 30 g/m².

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