

BODY FLUIDS ABSORBENT ARTICLE

This invention relates generally to a body fluids absorbent article such as a sanitary napkin or pad serving for absorbing and containing menstrual discharge or a ladies' incontinence pad.

Sanitary napkins provided along transversely opposite sides thereof with flaps having a liquid-resistance (or barrier property) is well known and actually used to absorb and contain menstrual discharge.

However, the flap of well known art has been made of a water vapor impermeable plastic sheet allowing body fluids to flow on a surface thereof, or made of a nonwoven fibrous sheet being water vapor permeable but poorly liquid-impermeable and/or being apt to be napped or damaged due to frictional contact with a wearer's crotch region, or made of a composite sheet of a relatively rigid plastic film making a soft fitting to the wearer's crotch region and a nonwoven fibrous sheet.

To meet the properties required for the flap, the surface of the flap should be effectively resistant to body fluids flowing thereon resulting in sideways leakage thereof; permeation of body fluids should be effectively retarded by

the flap; the flap should be well resistant to napping or damage due to frictional contact with the wearer's crotch region; and the flap should be in soft and close contact with the wearer's skin in her crotch region.

In view of the problem as has been described above, it is a principal object of the invention to provide a body fluids absorbent article improved to satisfy the desired properties as have been mentioned above and thereby to overcome the disadvantages as have been discussed above.

The object set forth above is achieved, according to the invention, by a body fluids absorbent article including a laminate panel having a skin-contactable side and a skin-noncontactable side, the laminate panel comprising a liquid-permeable topsheet defining the skin-contactable side, a liquid-impermeable backsheet defining the skin-noncontactable side, a liquid-absorbent core disposed between these two sheets, a pair of first flaps formed at least by an extension of the backsheet laterally extending beyond transversely opposite side edges of the absorbent core and having a liquid-resistance and a pair of second flaps connected to the first flaps, respectively, and having a liquid-resistance, the absorbent article being characterized in that: each of

the second flaps is made of thermoplastic synthetic fibers each having a fineness of 1 or larger deniers and comprises first and second breathable fibrous layers and a third breathable fibrous layer integrally disposed between the first and second fibrous layers wherein the third fibrous layer is formed by superfine thermoplastic synthetic fibers each having a relatively small fineness and has a water-pressure resistance higher than those of the first and second fibrous layer.

The first and second fibrous layers may be formed by a spun bonded nonwoven fabric.

The first and second fibrous layers may be formed also by a spun laced nonwoven fabric.

The third fibrous layer may be formed by a melt blown nonwoven fabric.

The pair of second flaps may have a basis weight of 10 ~ 30 g/m².

The third fibrous layer may have a water-pressure resistance of at least 30 mm.

The first and second fibrous layer may contain 20 ~ 45 % by weight, respectively, and the third fibrous layer may contain 10 ~ 60 % by weight of a total amount of fibers in the pair of second flaps.

A fiber fineness in the first and second fibrous layers may be 1 ~ 3 deniers and a fiber fineness in the third fibrous layer may be less than 1 denier.

The pair of second flaps may generate a longitudinal stress of 400 ~ 1000 g/25 mm and a transversal stress of 50 ~ 300 g/25 mm as they are stretched by 5 %.

The first, second and third fibrous layers may be held in the laminated state at intermittently distributed dot-like heat-sealing spots formed by an embossing treatment.

The heat-sealing spots are provided at an area ratio of 5 ~ 30 % with respect to a total area of the second flaps.

The first, second and third fibrous layers may be held in the laminated state by fiber intertwining.

With the absorbent article according to the invention, there is no apprehension that an amount of body fluids might flow along the surfaces of the respective second flaps so as to penetrate the second flaps and to leak sideways beyond the transversely opposite side edges of the absorbent article. In addition, an appropriate breathability of the article is effective to avoid an undesirable stuffiness which otherwise would be generated between the absorbent article and a wearer's skin. An appropriate flexibility of the absorbent article assures a good fitting to the wearer's crotch region

while the absorbent article is free from being napped or damaged due to frictional contact with the wearer's crotch region.

The above-mentioned advantages of the absorbent article according to the invention are based on the unique construction as will be specifically described. The first and second fibrous layers respectively defining top and bottom layers of the second flap are formed by hydrophobic fibers each having a fineness of at least 1 denier and therefore their surfaces have no smoothness of slippery or slick feeling. The third fibrous layer defining the intermediate layer of the second flap is formed by so-called superfine fibers each having a fineness less than 1 denier with fiber interstices fewer than those present in the first and second fibrous layers and therefore this fibrous layer has a sufficient water-pressure resistance to prevent body fluids from easily permeating therethrough. Not only the first and second fibrous layers but also the third fibrous layer have an adequate breathability to avoid an uncomfortable stuffiness which otherwise would be generated between the absorbent article and the wearer's skin. The second flap comprises the first, second and third fibrous layers, in other words, the second flap are substantially

fibrous as a whole and can be brought into close contact with the wearer's skin with a desired flexibility. Different from the third fibrous layer formed by superfine fibers, the first and second fibrous layers are formed by fibers each having a fineness of at least 1 denier, so that these two fibrous layers have an adequate surface friction strength to eliminate any apprehension that these two fibrous layers might suffer from fiber breakage, napping and/or damage due to frictional contact with the wearer's crotch region.

Fig. 1 is a plan view showing a sanitary napkin as a specific embodiment of a body fluid absorbent article according to the invention;

Fig. 2 is a scale-enlarged perspective view showing the sanitary napkin as partially in a sectional view taken along a line 2 - 2 in Fig. 1;

Fig. 3 is a scale-enlarged sectional view of a nonwoven fabric forming a second flap;

Fig. 4 is a view similar to Fig. 2 showing another embodiment of the invention; and

Fig. 5 is a view similar to Fig. 2 showing still another embodiment of the invention.

Details of a body fluid absorbent article according to the invention will be more fully understood from the description of a sanitary napkin or pad for absorbing and containing menstrual discharge given hereunder with reference to the accompanying drawings.

Referring to Figs. 1 and 2, a sanitary napkin includes a laminate panel 1 having a skin-contactable side 3 and a skin-noncontactable side 4. The laminate panel 1 comprises a liquid-permeable topsheet 5 defining the skin-contactable side 3, a liquid-impermeable backsheet 6 defining the skin-noncontactable side 4 and a liquid-absorbent core 7 disposed between these two sheets 5, 6. The topsheet 5 and the backsheet 6 are dimensioned so that they extend outward beyond a peripheral edge of the absorbent core 7 and bonded together along their extensions so as to form longitudinally opposite flaps 8 and transversely opposite flaps 9. It should be understood here that the topsheet 5 has its width smaller than the width of the backsheet 6 and transversal margins of the backsheet 6 extend outward beyond transversal margins of the topsheet 5, respectively. The extensions of the topsheet 5 and the backsheet 6 defining the respective flaps 8, 9 are bonded together by the well known bonding means such as heat-sealing technique or adhesive agent.

The topsheet 5 and the backsheet 6 as well as the absorbent core 7 may be made of well known materials in the art of manufacturing the absorbent article for care of body fluids. More specifically, the topsheet 5 may be made, for example, of a liquid-permeable nonwoven fibrous sheet or nonwoven fabric with or without a plurality of openings or capillaries or a plastic film having a plurality of openings or capillaries. The backsheet 6 may be made, for example, of a water vapor permeable plastic film or, nonwoven fibrous sheet or nonwoven fabric laminated with such a plastic film. The core 7 may be made, for example, from a mixture of woody fluff pulp and hydrogel of super water absorptivity. The nonwoven fabric may be selected, for example, from a group consisting of melt blown, spun laced, needle punched, thermally bonded, spun bonded and chemically bonded nonwoven fabrics made of polyolefine, polyester or polyamide resin. Such nonwoven fabric preferably has a basis weight of 10 ~ 45 g/m² and a fineness of 0.1 ~ 10 deniers. An example of the plastic film is a low density polyethylene film containing inorganic particles and subjected to drawing treatment so as to be provided with a plurality of fine openings. The hydrogel may be selected from a group consisting of self-crosslinked polymer of alkali metal acrylate, graft polymer

of starch, modified cellulose and crosslinked water-soluble polymer.

A flap 10 overlies each of the transversely opposite side flaps 9. The flap 10 is formed by a nonwoven fabric having a structure as illustrated by Fig. 3. A nonwoven fabric 11 is formed by thermoplastic synthetic resin fibers having a fineness of 1 or higher deniers. More specifically, this nonwoven fabric 11 comprises first and second fibrous layers 11a, 11b both having a breathability and a third fibrous layer 11c integrally disposed between the first and second fibrous layers 11a, 11b. The third fibrous layer 11c has, in addition to a breathability, a water pressure resistance higher than those of the first and second fibrous layers 11a, 11b.

These three fibrous layers 11a, 11b, 11c may be formed, for example, by a nonwoven fabric of polyolefine, polyester or polyamide. Preferably, the first and second fibrous layers 11a, 11b are formed by a spun bonded or spun laced nonwoven fabric and the third fibrous layer 11c is formed by a melt blown nonwoven fabric. The nonwoven fabric 11 as a whole may have a basis weight of 10 ~ 30 g/m². To obtain a desired strength and touch of the nonwoven fabric 11, the first and second fibrous layers 11a, 11b preferably occupy 20

~ 45 % by weight, respectively, and the third fibrous layer 11c preferably occupies 10 ~ 60 % by weight of the nonwoven fabric 11. The third fibrous layer 11c has a fiber density higher than those of the first and second fibrous layers 11a, 11b, i.e., contains a relatively poor fiber interstice and its breathability is correspondingly poor. However, a desired breathability of the sanitary napkin is not affected by such poor breathability of the third fibrous layer 11c. If the basis weight of the nonwoven fabric as a whole and the % by weight of each fibrous layer are less than the critical values, the desired strength can not be obtained. If the basis weight and the % by weight exceed the critical values, the desired touch can not be obtained. In addition, if the third fibrous layer 11c is less than 10 % by weight, the desired water pressure resistance can not be obtained. This water pressure resistance is preferably 30 mm or higher as measured according to the prescription by JIS (Japanese Industrial Standard). If the water pressure resistance is lower than this critical value, a liquid-resistance will be insufficient to assure smooth permeation of body fluids. The first and second fibrous layers 11a, 11b are preferably of 1 ~ 3 deniers while the third fibrous layer 11c preferably comprises so-called superfine fibers of 1 ~ 3 deniers and of

a fiber density higher than the first and second fibrous layers 11a, 11b in order to achieve the desired qualities of the nonwoven fabric 11 such as water pressure resistance, strength and touch.

So far as the touch of the nonwoven fabric 11 is concerned, the nonwoven fabric 11 preferably generates a longitudinal stress of 400 ~ 1000 g/25 mm and a transversal stress of 50 ~ 300 g/25 mm under a stretching of 5 %. Such requirement is well met by the three-layered nonwoven fabric 11.

The first, second and third fibrous layers 11a, 11b, 11c are intermittently heat-sealed by heat-embossing treatment or fiber intertwined by water-jet treatment so as to hold them together in a laminated condition. Such manner of holding these three fibrous layers is also preferable to obtain the desired strength and touch of the nonwoven fabric 11. In the case of heat-sealing by heat-embossing treatment, the heat-sealed spots are preferably formed at an area ratio of 5 ~ 30 %. The area ratio less than the critical value will make it impossible to obtain the desired strength and the area ratio exceeding the critical value will make it impossible to obtain the desired touch as well as the desired breathability.

Referring to Fig. 2, the flap 10 has a proximal end region 12 and a free end region 13. With the free end region 13 being collapsed inward, the proximal end region 12 and longitudinally opposite ends 14 of the free end region 13 are integrally bonded to an upper surface of the associated flap 9 by well known bonding means such as heat-sealing or suitable adhesive agent. The free end region 13 is partially folded inward so as to form a sleeve 15 which contains an elastic member 16 being contractile along the sleeve 15. The elastic member 16 is bonded to the sleeve 15 by means of well known hot melt adhesive so that the free end region 13 is normally biased under contraction of the elastic member 16 to rise on the proximal end region 12.

An alternative embodiment of the flap 10 shown by Fig. 4 is similar to the embodiment of the flap 10 shown by Fig. 2 except that, with the free end region 13 being collapsed outward, the proximal end region 12 and longitudinally opposite ends of the free end region 13 are integrally bonded to an upper surface of the associated flap 9 by well known bonding means such as heat-sealing or suitable adhesive agent. Except this, the flap in this embodiment is substantially same as the flap in the previous embodiment shown by Fig. 2. Specifically, the free end region 13 is

partially folded inward so as to form a sleeve 15 which contains an elastic member 16 adapted to be contractile along the sleeve 15 and bonded to the sleeve 15 by means of well known hot melt adhesive so that the free end region 13 may be normally biased under contraction of the elastic member to rise on the proximal end region 12.

Still another embodiment of the flap 10 shown by Fig. 5 is similar to the embodiments shown by Figs. 2 and 4 in that the flap 10 has a proximal end region 12 and a free end region 13. This embodiment is distinguished from the embodiments previously described in reference with Figs. 2 and 4 in that the flap 10 has a pair of transversely opposite proximal end regions 12 bonded by well known bonding means such as heat-sealing or suitable adhesive agent to upper and lower surfaces of the associated flap 9 to sandwich the flap 9 between the pair of proximal end regions 12. In this manner, a transversely intermediate region is curved so as to form a sleeve presenting a substantially in U-shaped cross-section. This sleeve forming region defines the free end region 13 within which there is provided an elastic member 16 being contractile longitudinally along the curved edge of the sleeve. This elastic member 16 is bonded to the curved edge by well known bonding means such as heat-sealing or hot melt

adhesive so that the free end region 13 is normally biased under contraction of the elastic element 16 to rise on the proximal ends 12. This embodiment shown by Fig. 5 is characterized in that the elastic element 16 has a relatively large width, presenting a substantially U-shaped cross-section contributing to a high resiliency (cushioning property) of the free end region 13. Such high cushioning property of the free end region 13 allows the elastic member 16 to be bonded to the flap 10 without any tension.

The elastic member 16 may be of natural or synthetic rubber, elastomer or the like. Open cell polyurethane is suitable particular for the elastic member 16 used in the specific embodiment shown by Fig. 5. This polyurethane has, in addition to a desired cushioning property, sufficient breathability and liquid-absorptivity.



WHAT IS CLAIMED IS:

1. A body fluids absorbent article including a laminate panel having a skin-contactable side and a skin-noncontactable side, said laminate panel comprising a liquid-permeable topsheet defining the skin-contactable side, a liquid-impermeable backsheet defining the skin-noncontactable side, a liquid-absorbent core disposed between these two sheets, a pair of first flaps formed at least by an extension of the backsheet laterally extending beyond transversely opposite side edges of the absorbent core and having a liquid-resistance and a pair of second flaps connected to the first flaps, respectively, and having a liquid-resistance, the absorbent article being characterized in that:

each of the second flaps is made of thermoplastic synthetic fibers each having a fineness of 1 or larger deniers and comprises first and second breathable fibrous layers and a third breathable fibrous layer integrally disposed between the first and second fibrous layers wherein the third fibrous layer is formed by superfine thermoplastic synthetic fibers each having a relatively small fineness and has a water-pressure resistance higher than those of the first and second fibrous layers.



2. The absorbent article according to Claim 1, wherein the first and second fibrous layers are formed by a spun bonded nonwoven fabric.
3. The absorbent article according to Claim 1, wherein the first and second fibrous layers are formed by a spun laced nonwoven fabric.
4. The absorbent article according to Claim 1, wherein the third fibrous layer is formed by a melt blown nonwoven fabric.
5. The absorbent article according to Claim 1, wherein the pair of second flaps have a basis weight of 10 ~ 30 g/m².
6. The absorbent article according to Claim 1, wherein the third fibrous layer has a water-pressure resistance of at least 30 mm.
7. The absorbent article according to Claim 1, wherein the first and second fibrous layers respectively contain 20 ~ 45 % by weight and the third fibrous layer contains 10 ~ 60 % by weight of a total amount of fibers in the pair of second flaps.



8. The absorbent article according to Claim 1, wherein a fiber fineness in the first and second fibrous layers is 1 - 3 deniers and a fiber fineness in said third fibrous layer is less than 1 denier.

9. The absorbent article according to Claim 1, wherein the pair of second flaps generate a longitudinal stress of 400 - 1000 g/25 mm and a transversal stress of 50 - 300 g/25 mm as they are stretched by 5 %.

10. The absorbent article according to Claim 1, wherein the first, second and third fibrous layers are held in the laminated state at intermittently distributed dot-like heat-sealing spots formed by an embossing treatment.

11. The absorbent article according to Claim 10, wherein the heat-sealing spots are provided at an area ratio of 5 - 30 % with respect to a total area of the second flaps.

12. The absorbent article according to Claim 1, wherein the first, second and third fibrous layers are held in the laminated state by fiber intertwining.