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DISPOSABLE ABSORBENT UNDERGARMENT

This invention relates to disposable absorbent undergarments and more particularly to disposable absorbent undergarments such as disposable diapers effectively preventing spread and leakage of fluidal excretion for infants, the aged or the sick.

Disposable diapers have already been well known in which a longitudinal end, i.e., a waist end of the diaper are folded back onto a skin-contactable surface thereof to form an end flap or a pocket serving as a barrier to prevent excretion from leaking out beyond the waist end (e.g., Japanese Laid-Open Utility Model Application No. Hei3-122823).

Generally in the diaper of this type, a free end of the end flap or a peripheral edge of the pocket is provided with a contractible elastic member so that the free end or the peripheral edge may be biased to rise on the skin-contactable surface and thereby to receive and hold excretion which otherwise would reach an edge of the waist end.

However, in view of the fact that when the wearer is a several-month-old infant, an aged person restrained on his or her bed or a sick person, such wearer often continues to lie

on his or her back for a long time, there is a possibility that the free end of the end flap or the peripheral edge of the pocket may be pressed by the wearer's own body weight against the skin-contactable surface and thereby collapsed. In such state, the flap or the pocket can not function in the desired manner and consequently fluidal excretion such as so-called loose passage or diarrheal excrement may leak out beyond the waist opening without being effectively held by the end flap or the pocket.

Additionally, most of the conventional diapers have no function to absorb and hold the quantity of fluidal excretion flowing toward the waist end and such fluidal excretion often spreads along the skin-contactable surface. As a result, the wearer's skin is smeared with such excretion around the waist end, giving the wearer an unpleasant feeling and even causing a skin disease.

In view of the problem of the conventional diaper as has been described above, it is a principal object of the invention to provide an improvement in the waist-opening of the disposable absorbent undergarment such as a disposable diaper, particularly in a rear waist region of such undergarment such that, even when the wearer is lying on his

or her back, the quantity of fluidal excretion flowing toward the waist-opening can be effectively prevented from leaking out beyond the waist-opening.

The object set forth above is achieved, according to the invention, by a disposable absorbent undergarment comprising a laminated panel having front and rear waist regions, a crotch region longitudinally extending therebetween, and skin-contactable and skin-noncontactable surfaces, the laminated panel comprising a liquid-permeable topsheet extending along the skin-contactable surface, a liquid-impermeable backsheet extending along the skin-noncontactable surface and a liquid-absorbent core disposed therebetween, wherein at least the rear waist region is provided on its skin-contactable surface with barrier means extending circumferentially of the rear waist region to prevent excretion from further flowing toward a waist end of the laminated panel, the improvement being characterized in that the barrier means comprises a pad member protruding from the skin-contactable surface immediately overlying said liquid-absorbent core at least by 2 mm, extending circumferentially of the rear waist region and having a compressive elastic recovery higher than those of the topsheet and the liquid-absorbent core.

The invention covers further variations as will be described below.

The pad member comprises a liquid-absorbent elastic member and a liquid-permeable sheet.

The liquid-absorbent elastic member comprises a fibrous assembly and the liquid-permeable sheet comprises a fibrous nonwoven fabric.

The fibrous assembly comprises a number of continuous filaments and extends transversely of the liquid-absorbent core.

The fibrous nonwoven fabric has a plurality of perforations each defined by a diameter of 2 - 15 mm.

The pad member protrudes from the skin-contactable surface immediately overlying the liquid-absorbent core by 2 - 50 mm.

A pair of flexible barrier flaps adapted to be elastically contractible longitudinally of the liquid-absorbent core extend along the skin-contactable surface of the laminated panel longitudinally of the liquid-absorbent core wherein longitudinally opposite ends of each of the barrier flaps are pressed against and bonded to opposite sides of the pad member as viewed transversely of the liquid-absorbent core so that the opposite sides gradually go down

toward the respective side edges of the liquid-absorbent core.

Fig. 1 is an exploded perspective view showing an embodiment of a disposable diaper according to the invention as partially broken away;

Fig. 2 is a scale-enlarged perspective view cut along a line A - A in Fig. 1;

Fig. 3 is a scale-enlarged sectional view taken along a line B - B in Fig. 1; and

Fig. 4 is a scale-enlarged perspective view cut along a line C - C in Fig. 1; and

Fig. 5 is a fragmentary perspective view showing an alternative embodiment of the pad member.

Details of a disposable absorbent undergarment according to the invention will be more fully understood from the description given hereunder in reference with the accompanying drawings which illustrate a disposable diaper for infants as a specific example of the inventive undergarment.

Referring to Figs. 1 through 4, the diaper comprises a laminated panel 1 having a longitudinally narrow and flat

configuration. The laminated panel 1 longitudinally comprises, in turn, front and rear waist regions 2, 3 and a crotch region 4 extending between these two waist regions 2, 3, on one hand, and comprises, as seen in a direction of thickness, a skin-contactable surface 5 and a skin-noncontactable surface 6, on the other hand. Thus, the laminated panel 1 is defined by the two surfaces 5, 6, transversely opposite side edges 7, 7 and longitudinally opposite ends 8, 8. The laminated panel 1 further comprises a transversely opposite pair of elastically contractible side flaps 9, 9, a longitudinally opposite pair of elastically contractible end flaps 10, 10, a pair of elastically contractible barrier flaps 11, 11 provided on the respective side flaps 9, 9, and a layer 12 of a number of filaments longitudinally extending on the crotch region 4.

The laminated panel 1 comprises a liquid-permeable topsheet 13 defining the skin-contactable surface 5, a liquid-impermeable backsheet 14 defining the skin-noncontactable surface 6 and a liquid-absorbent core 15 disposed between these two sheets 13, 14.

The pad member 12 is provided as barrier means adapted to receive fluidal excretion, particularly fluidal excrement such as so-called loose passage discharged by infants or

diarrheal excrement discharged by the aged or the sick without spreading at the level of the skin-contactable surface 5 and thereby to hold the fluidal excrement without leaking out beyond the longitudinally end 8. The pad member 12 comprises, as illustrated by Figs. 2 and 3 in an enlarged scale, a liquid-absorbent elastic member 16 and a liquid-permeable sheet 17 covering the elastic member 16. Specifically, the liquid-absorbent elastic member 16 is obtained by opening a tow comprising a number of filaments and then loosely bundling them again substantially in a shape of cylinder extending transversely of the liquid-absorbent core 15. The liquid-absorbent elastic member 16 with a void content of 60 - 85 % among the individual filaments is effective to receive fluidal excrement among the individual filaments and thereby hold it. The liquid-permeable sheet 17 is made of a fibrous nonwoven fabric having a surface sufficiently soft and smooth to protect the skin of a infant with a navel string still not dried from an undesirable irritation. The liquid-permeable sheet 17 wraps the elastic member 16, leaving a portion 12a extending to the longitudinal end 8 of the rear waist region 3. The pad member 12 has its portion 12a bonded with interposition of an elastic member 18 as will be described later to a portion 14b

of the backsheet and its portion 19 bonded to the topsheet 13 respectively by suitable adhesive so that the pad member 12 can be held at its position. While the portion of the pad member 12 which wraps the elastic member 16 may have any cross-section such as circular, oval or rectangular cross-section, the bulging portion of the pad member 12 should have a height of at least 2 mm, preferably 5 ~ 50 mm, more preferably 10 ~ 30 mm as measured from the upper surface of the topsheet 13 immediately overlying the liquid-absorbent core 15 in order to achieve the desired effect. At the same time, the pad member 12 should have a compressive elastic recovery of at least 30 %, preferably 50 % or higher in order to achieve the desired effect.

The liquid-absorbent elastic member 16 is preferably made of the previously described filaments, particularly crimped hydrophobic filaments because such filaments provide the pad member 12 with a high compressive elastic recovery under the wetted condition. However, the member 16 may be also made of an assembly of hydrophobic or hydrophilic crimped fibers, a spun laced nonwoven fabric in which these fibers are loosely intertwined, or a spongy material of open-cell type. In view of the infant's delicate skin, the liquid-permeable sheet 17 is preferably made of a nonwoven

fabric other than that obtained by chemical bonding, for example, a nonwoven fabric obtained by melt blowing, spun lacing, needle punching, thermally bonding or spun bonding, particularly a nonwoven fabric obtained from extremely fine fibers by melt blowing. Such nonwoven fabric preferably has a plurality of perforations 20 allowing fluidal excrement to pass therethrough, as seen in Fig. 5 and these perforations 20 are preferably arranged so that each of them is defined by a diameter of 2 ~ 15 mm distributed with a perforation rate of 40 ~ 80 %. While such nonwoven fabric may be hydrophobic and/or hydrophilic, it is preferable that the nonwoven fabric contains hydrophobic fibers of at least 70 % by weight to avoid an uncomfortable feeling of wetness for the wearer.

The respective side flaps 9, 9 function to prevent leakage of excretion from occurring around the wearer's legs. These side flaps 9, 9 comprise backsheet portions 14a, 14a extending outward beyond transversely opposite side edges of the liquid-absorbent core 15 and the outer side portions 11a, 11a of the respective barrier flaps 11, 11 overlying the backsheet portions 14a, 14a, which are bonded together, respectively, by any suitable adhesive means. A plurality of thread-like elastically contractible members extending in parallel one to another longitudinally of the laminated panel

1 are disposed between and bonded to the portions 14a, 14a and the portions 11a, 11a.

The respective barrier flaps 11, 11 function to confine fluidal excrement within a space defined between these barrier flaps 11, 11. Each of these barrier flaps 11, 11 has the outer side portion 11a and an inner side portion 11b extending from the outer side portion 11a toward the liquid-absorbent core 15 and folded inward. The inner side portion 11b contains therein a plurality of thread-like elastically contractible members 22 extending in parallel one to another along the fold and bonded to the inner side portion 11b. The barrier flap 11 is then folded outward along a transversely middle line of the inner side portion 11b with the elastic members 22 being stretched and, in this state, longitudinally opposite ends 11c of the laminated panel 1 are bonded to the outer surface of the outer side portion 11a by any suitable adhesive means. The inner side portion 11b is bonded at a location 23 to an extension 13a of the topsheet 13 by any suitable adhesive means. With such an arrangement, the inner side portion 11b is biased under a contractile force of the elastic members 22 to be erected. It should be understood that the inner side portion 11b may have its inner surface fixed to the skin-contactable surface 5 of the laminated

panel 1 the inner surface is opposed to, instead of being folded outward as has been described above. As has previously been described, the opposite ends 11c, 11c of the inner side portion 11b are fixed and consequently the opposite sides 12b, 12b of the pad member 12 as viewed transversely of the liquid-absorbent core 15 gradually go down toward the transversely opposite side edges of the liquid-absorbent core 15 under a pressure exerted by the opposite sides 12b, 12b. Accordingly, no significant difference in level is formed between the opposite sides 12b, 12b and the skin-contactable surface 5, i.e., the opposite sides 12b, 12b and the wearer's skin leave not therebetween a gap through which the excretion might flow.

The respective end flaps 10, 10 function to hold the diaper around the wearer's waist and to prevent leakage of excretion from occurring around the wearer's waist. These end flaps 10, 10 comprise backsheet portions 14b, 14b extending outward beyond longitudinally opposite ends of the liquid-absorbent core 15 and extensions 12a, 12a of the pad member 12 overlying the backsheet portions 14b, 14b, which are bonded together by any suitable adhesive means with elastic members 18 disposed between these backsheet portions 14b, 14b and extensions 12a, 12a. Each of the elastic

members 18 comprises a relatively wide strip of spongy tape and fixed between the portions 12a, 14b so as to be longitudinally contractible. The elastic member 18 is preferably made of a open-cell type polyurethane foam, since an air-permeability as well as a softness of this material are ideal to obtain an appropriate fitness of the diaper's waist line to the infant of several month old. The elastic members 18 having such characteristics may be employed in the place of the elastic members 21, 22 for the side flaps and the barrier flaps, respectively.

Material for the topsheet 13 is not limited to the nonwoven fabric and the perforated plastic film well known as typical surface material for articles such as the disposable diaper may be also employed. The backsheet 14 may be made of a moisture-permeable plastic film or laminated sheet of the plastic film and the fibrous nonwoven fabric. It will be obviously understood that the side and end flaps 9, 10 have high flexibilities because they are made of the plastic film and/or nonwoven fabric. The liquid-absorbent core 15 is substantially made from a mixture of fluff pulp fibers obtained by pulverizing a wood pulp sheet and a hydrocolloid material. A panel of appropriate thickness is obtained by compression-molding this mixture and covered with a liquid-

diffusible tissue paper. With such a configuration, the core 15 is semi-rigid and well retains its shape so far as the diaper is worn in a normal manner. The hydrocolloid material includes graft polymer of starch, modified cellulose, water-soluble crosslinked polymer, self-crosslinked acrylic acid/alkali metal salt polymer and the other materials which have conventionally been well known as the absorbent material for sanitary napkins and disposable diapers.

The diaper comprising the laminated panel 1 having the construction as has been described above may be put on the wearer's body by releasably adhering respective free ends of strips of well known pressure-sensitive adhesive tapes 24 provided on transversely opposite sides of the rear waist region 3 to the outer surface of the backsheet 14 in the front waist region 2. Such diaper is commonly referred to as open type diaper. The diaper according to the invention is applicable not only to this open type diaper but also to so-called shorts type (pull-on type) diaper having its front and rear waist regions previously connected along its transversely opposite side edges.

Though not illustrated, the pad member 12 may be provided also in the front waist region and/or inside the barrier flaps 11, 11 extending along the transversely

opposite side edges of the liquid-absorbent core 15 or replace these barrier flaps 11, 11, if desired. It is also possible to dispose the liquid-absorbent elastic member 16 comprising the continuous filaments between the topsheet 13 and the liquid-absorbent core 15 at least in the crotch region 4.

While no detailed description has been make about the manner as well as the method of bonding, these manner and method are well known to those skilled in the art. For example, the adhesive means includes hot melt adhesive, heat- or ultrasonic sealing.

While the undergarment according to the invention may be designed so that the pad member lies in a recessed region of the wearer's back, the pad member will give the wearer no feeling of physical disorder even if the pad member protrudes from the skin-contactable surface because of its high cushioning effect. On the other hand, the pad member is elastically maintained in close contact with the back of the wearer lying on his or her back and thereby effectively prevents the fluidal excrement from leaking out beyond the pad member. Particularly for a several-month-old infant with navel string still not dried, the diaper is usually put on the infant in a manner as loosely as possible. Even when the

diaper is put on the infant in this manner, the pad member satisfactorily functions to block the fluidal excrement. Owing to such a feature, the invention is suitable not only for a several-month-old infant but also for an aged person restrained on his or her bed or a sick person particularly when the wearer discharges the fluidal excrement.

The pad member not only function to block the fluidal excrement but also functions to absorb such fluidal excrement together with liquid excretion and thereby improves its preventive effect against the excretion leakage.

The pad member protrudes from the skin-contactable surface but no significant difference in level is formed between its lateral sides and the skin-contactable surface, i.e., there is no gap left therebetween through which the fluidal excrement flows.

The topsheet also is permeable for the fluidal excrement and cooperates with the pad member to prevent leakage of the fluidal excrement.

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WHAT IS CLAIMED IS:

1. A disposable absorbent undergarment comprising a laminated panel having front and rear waist regions, a crotch region longitudinally extending therebetween, and skin-contactable and skin-noncontactable surfaces, the laminated panel comprising a liquid-permeable topsheet extending along the skin-contactable surface, a liquid-impermeable backsheet extending along the skin-noncontactable surface and a liquid-absorbent core disposed therebetween, wherein at least the rear waist region is provided on its skin-contactable surface with barrier means extending circumferentially of the region to prevent excretion from further flowing toward a waist end of the laminated panel, the disposable undergarment being characterized in that:

the barrier means comprises a pad member protruding from the skin-contactable of the laminated panel surface of said topsheet immediately overlying the liquid-absorbent core at least by 2 mm, extending circumferentially of the rear waist region and having a compressive elastic recovery higher than those of the topsheet and the liquid-absorbent core.

2. The undergarment according to Claim 1, wherein the pad



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member comprises a liquid-absorbent elastic member and a liquid-permeable sheet.

3. The undergarment according to Claim 2, wherein the liquid-absorbent elastic member comprises a fibrous assembly and the liquid-permeable sheet comprises a fibrous nonwoven fabric.

4. The undergarment according to Claim 3, wherein the fibrous assembly comprises a number of continuous filaments and extends transversely of the liquid-absorbent core.

5. The undergarment according to Claim 3, wherein the fibrous nonwoven fabric has a plurality of perforations each defined by a diameter of 2 - 15 mm.

6. The undergarment according to Claim 1, wherein the pad member protrudes from the skin-contactable surface immediately overlying the liquid-absorbent core by 2 - 50 mm.

7. The undergarment according to Claim 1, wherein a pair of flexible barrier flaps adapted to be elastically contractible longitudinally of the liquid-absorbent core



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extend along the skin-contactable surface of the laminated panel longitudinally of the liquid-absorbent core and wherein longitudinally opposite ends of each of the barrier flaps are pressed against and bonded to opposite sides of the pad member as viewed transversely of the liquid-absorbent core so that the opposite sides gradually go down toward the respective side edges of the liquid-absorbent core.

8. The undergarment according to Claim 1, wherein the topsheet comprises a fibrous nonwoven fabric having a plurality of perforations each defined by a diameter of 2 ~ 15 mm.



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