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DISPOSABLE ABSORBENT UNDERGARMENT

This invention relates to a disposable absorbent undergarment and more particularly to a disposable absorbent undergarment such as a disposable diaper provided with a pocket adapted to hold solid excretion, particularly fluidal excrement within a crotch region so that such excretion may be effectively prevented from spreading along a skin-contactable surface of the undergarment.

Disposable diapers have already been well known in which the topsheet and/or the liquid-absorbent core are formed with an opening and/or recess or annular projection to form a pocket adapted to hold solid excretion such as excrement (e.g., Japanese Laid-Open Utility Model Application Nos. Hei3-29123, Hei4-15921, Hei5-86320, Hei6-5614, Hei6-7725, Hei6-11722, Hei6-21624, Hei6-21626, Hei6-31722, Hei6-31723).

Of these well known arrangements, the arrangement in which the pocket for solid excretion is defined by the opening or the recess formed in the liquid-absorbent core is disadvantageous in that the opening or the recess sometimes can not receive the solid excretion due to insufficient permeability of the topsheet overlying such opening or recess

for such solid excretion. The arrangement in which the opening or recess is formed by the liquid-absorbent core and the topsheet is also disadvantageous in that so-called loose passage or diarrheal excrement once received by the opening or recess may back flow and spread to the upper surface of the topsheet. Finally, the arrangement in which the pocket is formed by the annular projection may deteriorate a desired feeling to wear.

The recently developed technique has enabled a laminated panel as a basic structure of disposable diaper, particularly the liquid-absorbent core to be thinned. However, such thin liquid-absorbent core sometimes makes it difficult to form this core with a recess having a volume sufficient to receive and hold a quantity of excrement.

In view of the problem as has been described above, it is a principal object of the invention to provide a disposable absorbent undergarment having a space sufficient to guide solid excretion from a skin-contactable surface in a crotch region into the interior of the crotch region.

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, and the crotch region being provided with holding means for excrement, the disposable undergarment being characterized in that the holding means comprises an excrement-permeable zone provided so as to occupy at least a given area of the topsheet in the crotch region and a spacer disposed between the topsheet in the crotch region and the liquid-absorbent core; and the spacer comprises a panel-like member having a top wall adapted to be closely in contact with the excrement-permeable zone and formed with an excrement passage opening and transversely opposite side walls symmetrically curved downward from transversely opposite sides of the top wall.

The invention covers further variations as will be described below.

The excrement-permeable zone is formed with a plurality of excrement guiding perforations each having a diameter of at least 2 mm.

The excrement-permeable zone is formed with an excrement guiding opening having a length of at least 50 mm and a width of at least 30 mm.

The excrement passage of the spacer has a length of at least 50 mm and a width of at least 30 mm.

A space defined by the top wall and the side walls of the spacer contains therein a layer of continuous filaments extending longitudinally of the spacer.

The spacer is made of a spongy material of open-cell type or a fibrous material.

The layer of continuous filaments has a void content of 60 - 95 % among the individual filaments.

Finally, the spacer has an appropriate compressive elasticity.

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

Fig. 2 is a perspective view showing an excrement-permeable zone of a topsheet and a spacer;

Fig. 3 is a scale-enlarged perspective view cut along a line A - A in Fig. 1;

Fig. 4 is a view similar to Fig. 3 showing another

embodiment of the invention; and

Fig. 5 is a view similar to Fig. 3 showing still another embodiment of the invention.

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

Referring to Figs. 1 through 3, 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 holding means for excrement 12 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 holding means for excrement 12 comprises an excrement-permeable zone 16 and an elastic spacer 17. The excrement-permeable zone 16 includes a plurality of excrement guiding perforations 18 each having a diameter of 2 - 25 mm formed in a given zone of the crotch region 4. The spacer 17 is disposed between the topsheet 13 and the liquid-absorbent core 15 in the crotch region 4 and comprises a top wall 19 adapted to be closely in contact with the topsheet 13 including the excrement-permeable zone 16 and transversely opposite side walls 20 symmetrically curved downward and inward. The top wall 19 is formed substantially at its central zone with an excrement passage opening 21 practically aligned with the excrement-permeable zone 16 and cooperates with the opposite side walls 20 to define a space 22. The excrement passage opening 21 must be dimensioned to have a

length of at least 50 mm and a width of at least 30 mm in order that almost entire quantity of excrement discharged onto the skin-contactable surface 5 can pass therethrough. While the excrement passage opening 21 is generally arranged so that the passage opening 21 may be positioned to be opposite to the wearer's anus as the diaper is put on the wearer, it may happen, depending on the individual wearer, that the excrement passage opening 21 is out of the intended alignment with the wearer's anus. Even if the diaper has been carefully put on the wearer so that the excrement passage opening 21 may be properly aligned with the wearer's anus, it is inevitable that the diaper will be displaced more or less from the initial position as the time elapses.

According to an alternative embodiment shown by Fig. 4, the space 22 defined by the elastic spacer 17 contains therein a layer 23 of continuous filaments extending longitudinally of the space 22. The layer 23 of continuous filaments is obtained by opening a tow comprising a number of hydrophobic continuous filaments, for example, of polyester having a fineness of 1 ~ 15 deniers. The layer 23 has a void content of 60 ~ 95 % among the individual filaments 23a and functions to hold fluidal excrement flowing thereinto. The individual filaments 23a are preferably crimped to improve a

compressive elastic recovery as well as the void content of the layer 23.

According to a still another embodiment shown by Fig. 5, the excrement-permeable zone 16 of the topsheet 13 is provided in the form of an excrement guiding opening 16a substantially aligned with the excrement passage opening 21 of the elastic spacer 17. Though not shown, the space 22 defined by the elastic spacer 17 may contain therein the layer 23 of continuous filaments as in the case shown by Fig. 4.

The elastic spacer 17 is made of a spongy material of open-cell type or a fibrous material such as a fibrous web of polyolefine and exhibits a appropriate compressive elastic recovery and rigidity.

Referring again to Figs. 1, 2 and 3, 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 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 secured to the portions 14a, 14a and the portions 11a, 11a.

The respective barrier flaps 11, 11 function to confine 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 23 extending in parallel one to another along the fold and secured 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 23 being stretched and, in this state, longitudinally opposite ends 11c of the laminated panel 1 are bonded to the outer side portion 11a by any suitable adhesive means. The inner side portion 11b is bonded at a location 24 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 23 to be risen. 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 that the inner surface is opposed to, instead of being folded outward as has been described above.

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 13b, 13b of the topsheet 13 overlying the backsheet portions 14b, 14b which are bonded together by any suitable adhesive means with elastic members 25 disposed between these backsheet portions 14b, 14b and extensions 13b, 13b. Each of the elastic members 25 comprises a relatively wide strip of spongy tape and fixed between the portions 13b, 14b so as to be longitudinally contractible. The elastic member 25 is preferably made of an open-cell type polyurethane foam, since an air-permeability as well as a softness of this material are ideal to obtain an appropriate fitting of the diaper's waist line to the infant of several month old. The elastic members 25 having such characteristics may be employed in the place of the elastic members 22, 23 for the side flaps and the barrier flaps, respectively. The topsheet 13 is made of

a fibrous nonwoven fabric formed with, in addition to the excrement-permeable zone 16, perforations each having a size similar to or smaller than the size of the excrement guiding opening 18. Useful nonwoven fabric includes various types such as melt blown, spun laced, needle punched, thermally bonded, spun bonded and chemically bonded types. While material fibers for such nonwoven fabric may be hydrophobic and/or hydrophilic, the nonwoven fabric preferably contains hydrophobic fibers of at least 70% by weight to avoid an uncomfortable feeling of wetness for the wearer.

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 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 26, 26 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 an 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.

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.

With the novel undergarment constructed as has been described hereinabove, excrement discharged onto the skin-contactable surface 5 in the crotch region 4, particularly, fluidal excrement is guided through the excrement guiding perforations 18 or the excrement guiding opening 16a in the excrement-permeable zone 16, then through the excrement passage opening 21 into the space 22 defined by the spacer 17 and held therein. According to the embodiment in which the space 22 contains therein the layer 23 of continuous filaments, fluidal excrement settles down and held in the voids among the individual filaments 23a. Particularly with the embodiment in which the excrement-permeable zone 16 is provided in the form of the excrement guiding opening 16a, the layer 23 of continuous filaments can advantageously eliminate any apprehension that the fluidal excrement once having been received by the space 22 might flow back toward the surface of the topsheet 13, depending on the wearer's posture.

With the undergarment according to the invention, excrement, particularly, fluidal excrement discharged onto the skin-contactable surface in the crotch region is guided through the excrement-permeable zone, then through the excrement passage opening of the spacer into the space

defined by the spacer and held therein without spreading along the skin-contactable surface and smearing the wearer's skin. While the spacer may momentarily be flattened under the wearer's own body weight, normally the spacer is maintained so as to be squeezed between the wearer's thighs. Consequently, the spacer is transversely deformed and thereby the spacer is rather enlarged. In this manner, even when the liquid-absorbent core is extremely thin, the space sufficient because no recess must be formed in the liquid-absorbent core over its zone corresponding to the excrement-permeable zone as it has conventionally been the case.

With the embodiment in which the excrement-permeable zone is formed with a plurality of excrement guiding perforations, it can not be expected that most of fluidal excrement is guided through these perforations into the space defined by the spacer at once but the fluidal excrement once having been guided into the space rarely flows back through said perforations toward the skin-contactable surface.

With the embodiment in which the excrement-permeable zone has the relatively large excrement guiding opening, not only the fluidal excrement but also relatively solid excrement can be guided through said opening into the space defined by the spacer.

With the embodiment in which the spacer contains therein the layer of continuous filaments, there is no apprehension that the fluidal excrement once having been held in the space might flow back toward the skin-contactable surface depending on the wearer's posture even when the excrement-permeable zone has the relatively large excrement guiding opening, because the fluidal excrement is held among the individual filaments.

With the embodiment in which the spacer is made of a spongy material of open-cell type or fibrous material, such spacer is air-permeable and therefore placement of such spacer does not affect an air-permeability of the laminated panel.

So far as the spacer has an adequate compressive elasticity, its compressive elastic recovery assures a desired volume of the space even if the spacer is momentarily deformed.



WHAT IS CLAIMED IS:

1. A disposable absorbent undergarment generally comprising a laminated panel structurally composed of 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, and the crotch region being provided with holding means for excrement, the disposable absorbent undergarment being characterized in that:

the holding means comprises an excrement-permeable zone provided so as to occupy at least a given area of the topsheet in the crotch region and a spacer disposed between the topsheet in the crotch region and the liquid-absorbent core; and the spacer comprises a panel-like member having a top wall adapted to be closely in contact with the excrement-permeable zone and formed with an excrement passage opening and transversely opposite side walls symmetrically curved downward from transversely opposite sides of the top wall.





2. The undergarment according to Claim 1, wherein the excrement-permeable zone is formed with a plurality of excrement guiding perforations each having a diameter of at least 2 mm.
3. The undergarment according to Claim 2, wherein the excrement-permeable zone is formed with an excrement guiding opening having a length of at least 50 mm and a width of at least 30 mm.
4. The undergarment according to Claim 1, wherein the excrement passage opening of the spacer has a length of at least 50 mm and a width of at least 30 mm.
5. The undergarment according to Claim 1, wherein a space defined by the top wall and the side walls of the spacer contains therein a layer of continuous filaments extending longitudinally of the spacer.
6. The undergarment according to Claim 1, wherein the spacer is made of a spongy material of open-cell type or a fibrous material.



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REPLACED

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7. The undergarment according to Claim 1, wherein the layer of continuous filaments has a void content of 60 - 95 % among the individual filaments.

8. The undergarment according to Claim 1, wherein the spacer has an appropriate compressive elasticity.



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