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TRAINING PANTS FOR INFANT

This invention relates to training pants for infants and more particularly to disposable training pants to be worn by infants for a training period lasting until it becomes unnecessary for the infants to wear any diaper.

It is well known to provide disposable diapers between a light-transmissive backsheet and a liquid-absorbent core thereof with means for visually indicating urination comprising, for example, a substance commonly referred to as an indicator which is responsive to urination to exhibit color development or color change so that the nursing person such as the mother can be visually indicated by the color development or color change of urination.

It is also well known to provide training pants on a skin-contactable surface thereof with means for awaking an infant to a sense of wetness due to urination comprising a sheet of high water-absorptivity.

Incorporation of the means for visually indicating urination into the training pants having also the means for awaking the infant to a sense of wetness due to urination may result in double convenience that not only the infant wearing the training pants can be awaked of his or her own urination

but also the nursing person such as the mother can be visually indicated of the infant's urination. However, it is not practical for the nursing person such as the mother to attend the infant and to check urination unceasingly, on one hand, and the sensitivity to be awaked of his or her own urination depends on the individual infant, on the other hand. In other words, some of infants may be unaware of their own urination. In addition, incorporation of the urination indicating means and/or the means for awaking the infant of his or her own urination in the training pants should correspondingly increase the number of the steps as well as the cost for manufacturing the training pants.

In view of the problem as has been described above, it is a principal object of the invention to provide novel training pants utilizing extremely simple means to change a state of the training pants being worn upon occurrence of urination so that the state changed due to urination can be visually known both by the nursing person such as the mother and the infant him- or herself can be distinctly aware of his or her own urination.

The object set forth above is achieved, according to the invention, by improved training pants having a front

waist region, a rear waist region, a crotch region extending therebetween, a waist-opening, a pair of leg-openings and a skin-contactable surface wherein the leg-openings are respectively provided with elastic members bonded with appropriate tension by room temperature setting adhesive agent, the training pants being characterized in that at least a portion of the adhesive agent serving to adhesively retain the elastic members in the crotch region is water-absorptive adhesive agent selected so as to absorb a water content of urine for gelation or dissolution and at least portions of the elastic members laid in the crotch region are separated from their initial bonded zones lose their initial stretch stress once the water-absorptive adhesive agent has been gelatinized by or dissolved in the water content of urine.

More specifically to define the invention, the elastic members comprise first and second groups of elastic elements symmetrically curved substantially in U-shapes respectively opened toward the waist-opening, respective middle sections of said first and second groups of elastic elements as viewed in the U-shapes extending across the crotch region, and the first and second groups of elastic elements are arranged so that side sections lying on one side of respective said U-

shapes defined by the first and second groups of elastic elements extend along substantially front halves of said leg-openings and the side sections lying on the other side of respective the U-shapes extend along substantially rear halves of said leg-openings; said middle sections of the first and second groups of elastic members curved substantially in U-shapes extend in parallel to each other and spaced from each other longitudinally of the crotch region and sections extending between the middle sections and the side sections in the respective U-shapes intersect each other; and the training pants according to the invention may further comprise a pair of elastically contractible barrier flaps provided on transversely opposite sides of the skin-contactable surface.

Fig. 1 is a perspective view showing an embodiment of training pants according to the invention;

Fig. 2 is an opened perspective view illustrating a laminated panel as a basic constituent of the training pants;

Fig. 3 is a perspective view exemplarily illustrating a situation in which elastic members provided around respective leg-openings partially contract and are displaced due to partial dissolution of adhesive used for bonding of

the elastic members; and

Fig. 4 is a perspective view showing an alternative embodiment of the invention in which there are provided a pair of barrier flaps on transversely opposite sides of a skin-contactable surface as cut transversely of these barrier flaps.

Details of training pants according to the invention will be more fully understood from the description given hereunder in reference with the accompanying drawings.

Referring to Figs. 1 and 2, the training pants comprise a laminated panel 1 which is formed with a waist-opening 2 and a pair of leg-openings 3. The laminated panel 1 is longitudinally extensive and flat, comprising a liquid-permeable topsheet 6, a liquid-impermeable backsheet 7 and a liquid-absorbent core 8. The laminated panel 1 is composed of front and rear waist regions 9, 11 and a crotch region 10 extending between the front and rear waist regions 9, 11. The crotch region 10 is formed along transversely opposite sides with cut-out edges 10a, respectively, intended to define the respective leg-openings 3. Longitudinally opposite ends of the laminated panel 1, i.e., of the front and rear waist regions 9, 11 are respectively provided with

a plurality of elastic members 4 extending in parallel one to another and bonded with appropriate tension to the respective ends by any suitable adhesive means such as hot melt resinous adhesive. The crotch region 10 is provided with two groups of elastic members 5, each comprising a plurality of elastic elements extending in parallel one to another, and cooperatively extending along the respective cut-out edges 10a. These elastic members 5 are bonded with appropriate tension to the crotch region 10 by adhesive agent as will be described later. More specifically, the elastic members 5 comprise a first group 5A of elastic elements and a second group 5B of elastic elements symmetrically curved with appropriate tension in two substantially U-shapes respectively opening toward the waist-opening 2. The middle sections 5A₂, 5B₂ of the respective U-shapes intersect each other in the proximity of the respective cut-out edges 10a, leaving their linear sections defined between these intersecting points which are spaced longitudinally of the crotch region 10 and extend on the lower surface of the liquid-absorbent core in parallel to each other. Side sections 5A₁, 5B₁ of the respective U-shapes cooperatively extend along the respective cut-out edges 10a. The middle sections 5A₂, 5B₂ and the portions lying adjacent them

extending in adhesive applied zones 12a represented by spiral lines, respectively, are bonded by means of water-absorptive adhesive agent as will be described, and the side sections 5A₁, 5B₁ extending in adhesive applied zones 12b represented by zigzag lines are bonded by means of water-non-absorptive adhesive agent such as hot melt adhesive based on EVA or rubber, to the backsheet 7 and/or the topsheet 6, respectively. It should be understood that, referring to Fig. 2, the reference numerals 12a, 12b do not intend to represent actual patterns in which the adhesive agent is coated but merely to identify respective ranges in which the water-absorptive adhesive agent and the water-non-absorptive adhesive are coated. Such actual patterns may be selected from the commonly used patterns in which adhesive agent is usually coated in order to bond the elastic members to the sheet members in the disposable diaper of well known art, for example, the patterns defined by spiral line, zigzag line, netty line and dots.

The water-absorptive adhesive agent as herein referred to should be understood to be normal temperature setting adhesive agent which absorbs water and is gelatinized or dissolved when it comes in contact with weakly alkaline urine and consequently loses its adhesively holding force for the

portions of the elastic members 5A, 5B corresponding to the adhesive coated zones 12a, respectively. Material for such water-absorptive adhesive agent may be selected from resin of various types such as poval, sodium polyacrylate, polyethylene glycol, polyethylene oxide and polyvinyl pyrrolidone. In this manner, when the zones 12a coated with the water-absorptive adhesive agent comes in contact with urine discharged by the infant wearing the training pants, the water-absorptive adhesive agent coated on the zones 12a absorbs water from the urine and is gelatinized or dissolved and loses its initial adhesively holding force for the portions of the elastic members 5A, 5B corresponding to the zones 12a. As a result, the portions of the elastic members 5A, 5B which have been adhesively held the adhesive coated zones 12a are now separated from the backsheet 7 and/or the topsheet 6 and contract. Thus, these portions of the elastic members 5A, 5B lose their initial stretch stress. As another result, the portions of the elastic members 5A, 5B which have been arranged closely adjacent each other and intersected each other are now displaced away from each other as seen in Fig. 3 and consequently the crotch region 10 hangs down under a tightening effect of the portions of the elastic members 5A, 5B. It is also possible to coating the zones 12b also

with the water-absorptive adhesive agent instead of with the water-non-absorptive adhesive agent.

Suitable adhesive means such as hot melt resinous adhesive agent may be used to bond the topsheet 6 and the backsheet 7 together at their portions extending outward from a peripheral edge of the core 8, on one hand, and to bond the topsheet 6 and/or the backsheet 7 to the core 8, on the other hand. The laminated panel 1 formed in this manner may be longitudinally folded back in the crotch region 10 with the topsheet 6 lying inside and then ultrasonic sealing technique may be used to bond the front and rear waist regions 9, 11 together along their transversely opposite sides intermittently in their longitudinal direction to configure the laminated panel 1 into pants or shorts.

Fig. 4 shows an alternative embodiment of the invention further comprising, on transversely opposite sides of the skin-contacting surface, a pair of moisture-permeable but liquid-impermeable barrier flaps 14 adapted to be longitudinally contractible. Each of these barrier flaps 14 comprises an outer portion 14a bonded to the corresponding portion 7a of the backsheet 7 extending outward beyond the peripheral edge of the core 8 by any suitable adhesive means such as hot melt resinous adhesive agent and an inner portion

14b folded back inward so as to form a sleeve. An elastic member 15 extends within this sleeve longitudinally of the sleeve and bonded thereto with appropriate tension by any suitable adhesive means such as hot melt resinous adhesive agent. Longitudinally opposite ends 14c of the inner portion 14b are bonded to the topsheet 6 by any suitable adhesive means such as hot melt resinous adhesive agent. The barrier flaps 14 configured as has been described above are normally biased by elastically contractile force of the respective elastic members 15 to rise.

The topsheet 6 may be made of fibrous nonwoven fabric such as spun laced, melt blown, needle punched, thermally bonded, spun bonded or chemically bonded nonwoven fabric and preferably of fibrous nonwoven fabric which is elastically stretchable and contractible. The backsheet 7 may be made of plastic film, preferably of moisture-permeable and elastically stretchable/contractible plastic film laminated with the fibrous nonwoven fabric so that the fibrous nonwoven fabric may define the outer surface of the laminated panel 1. The liquid-absorbent core 8 may be substantially made from a mixture of fluff pulp obtained by pulverizing wood pulp sheet and hydrocolloid materials. A panel of appropriate thickness may be obtained by compression-molding this mixture. With

such configuration, the core 8 is semi-rigid and well retains its initial shape so far as the diaper is worn in a normal manner. The hydrocolloid materials include 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 materials for sanitary napkins and disposable diapers.

With the novel training pants as has been described hereinabove, the portions of the elastic members serving to elastically tighten the leg-openings of the training pants being worn are adhesively held by water-absorptive adhesive agent. Upon coming in contact with urine discharged by the infant, the water-absorptive adhesive agent absorbs water content of urine and becomes gelatinized by or dissolved in the water content. Consequently, the portions of the elastic members are separated and displaced from their initial bonded zones and lose their initial stretch stress. As a result, the crotch region of the training pants hangs down under a tightening effect by the portions of the elastic members. Such state necessarily gives the infant uncomfortable feeling and at the same time prevents the infant from smoothly walking. Accordingly, the infant him- or herself not only

becomes distinctly aware of urination but also visually knows his or her own urination. The nursing person such as the mother also can visually know the occurrence of urination. In this manner, the purpose for which the training pants are used is satisfactorily achieved. Such indicator means can be obtained merely by using the water-absorptive adhesive agent on the portions of the elastic members and therefore the cost for manufacturing the training pants can be correspondingly alleviated.

Even after the portions of the elastic members have been separated from the corresponding zones of the training pants, the barrier flaps arranged on the transversely opposite sides of the training pants on the skin-contactable surface adequately serve as the barriers against leakage of urine and therefore there is no apprehension that the leakage preventing effect might be affected by the partial separation of the portions from their bonded zones.

WHAT IS CLAIMED IS:

1. Training pants having a front waist region and a rear waist region, a crotch region extending therebetween, a waist-opening, a pair of leg-openings and a skin contactable surface wherein the leg-openings are respectively provided with elastic members bonded with appropriate tension by room temperature setting adhesive, the training pants being characterized in that:

at least a portion of the adhesive agent serving to adhesively retain the elastic members in the crotch region is water-absorptive adhesive agent selected so as to absorb a water content of urine for gelation or dissolution and at least the portions of the elastic members laid in the crotch region are separated from their initial bonded zones lose their initial stretch stress once the water-absorptive adhesive agent has been gelatinized by or dissolved in the water content of urine.

2. Training pants according to Claim 1, wherein the elastic members comprise first and second groups of elastic elements symmetrically curved substantially in U-shapes respectively opened toward the waist-opening, respective



middle sections of the first and second groups of elastic elements as viewed in the U-shapes extending across the crotch region, and the first and second groups of elastic elements are arranged so that side sections lying on one side of respective the U-shapes defined by the first and second groups of elastic elements extend along substantially front halves of the leg-openings and the side sections lying on the other side of the U-shapes extend along substantially rear halves of the leg-openings.

3. Training pants according to Claim 2, wherein the middle sections of the first and second groups of elastic members curved substantially in U-shapes extend in parallel to each other and spaced from each other longitudinally of the crotch region and sections extending between the middle sections and the side sections in the respective U-shapes intersect each other.

4. Training pants according to Claim 1, further comprising a pair of elastically contractible barrier flaps provided on transversely opposite sides of the skin-contactable surface.

