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FASTENING SYSTEM FOR GARMENT

The present invention relates to a fastening system for a garment and more particularly to a improved mechanical fastening system for a garment such as a disposable diaper, a diaper cover or incontinence pants.

As a fastening system for a garment of this type, what is called a tape or surface fastener has conventionally been used, which comprises a combination of a hook panel and a loop panel respectively having a plurality of hook and loop elements and commonly known under the trade mark "Velcro Tape" or "Magic Tape". With this fastening system hooks and loops of both panels extending substantially in vertical directions relative to the panels are brought into a mechanical engagement as the hook panel and the loop panel are put one upon another.

Figs. 5 and 6 of the accompanying drawings are side views illustrating a manner in which a plurality of hook elements 17 on a hook panel 13 are engaged with a plurality of loop elements 25 on a loop panel 14. Referring to Fig. 5, the hook panel 13 is engaged with the loop panel 14 as the hook panel 13 is put on the loop panel 14 in a direction as indicated by an arrow A and released therefrom as the hook

panel 13 is pulled vertically as indicated by an arrow B. Referring now to Fig. 6, these two panels 13, 14 are tensioned, when they are pulled in horizontally opposite directions as indicated by arrows C, D from their mutually engaged states as illustrated by Fig. 5. Fig. 6 reveals that many of the hook elements 17 are positively brought into engagement with the corresponding loop elements 25. In the state illustrated by Fig. 5 on the other hand, the hook elements 17 are merely inserted into spaces defined among the loop elements 25 and only a few of the hook elements 17 are in engagement with the corresponding loop elements 25. As a consequence, the hook panel 13 can be easily released from the loop panel 14 as the hook panel 13 are pulled upward from the loop panel 14.

With respect to such a fastening system, Japanese Laid-Open Patent Application No. Hei4-276251 discloses that a loop panel may be intermittently bonded to a garment to facilitate many of hook elements to be caught by corresponding loop elements as a hook panel is horizontally pulled.

With a garment put on a wearer and fastened by engaging a hook panel with a loop panel of a fastening system, the hook panel is sometimes released from the loop panel due to a vertically oriented force tending to release the hook panel

from the loop panel carelessly exerted on the fastening system. To avoid such a situation, there is always a demand for a fastening system so improved that, with a garment put on a wearer, a mutual engagement of these two panels can not be easily released simply by an unintentional movement of the hook panel in the direction vertical to the loop panel but released only by positively pulling the hook panel in the vertical direction when it is desired to take off the garment from the wearer. While the previously mentioned Laid-Open Patent Application No. Hei4-276251 discloses a means ensuring a hook panel and a loop panel to be engaged with each other as the hook panel is moved in a horizontal direction relatively to the loop panel, none of means is disclosed, by which an engagement of these two panels can be ensured as the hook panel is moved in the vertical direction relative to the loop panel.

In view of the problems as described above, it is a principal object of the invention to provide a fastening system for a garment improved so as to ensure that a hook panel should not be easily released from a loop panel even if the hook panel is moved in a vertical direction away with respect to the loop panel.

The object set forth above is achieved, according to the invention, by a fastening system for a garment comprising a hook panel and a loop panel respectively having a plurality of hook and loop elements and releasably engageable with each other so that the hook panel is progressively released from one end thereof held by fingers of a person looking after a wearer toward the other opposite end, wherein:

the hook panel comprises a base sheet having a top surface and a back surface and the hook elements extending vertically from the top surface of the base panel;

and the back surface of the base panel has a secured region and a non-secured region with respect to the garment, the non-secured region being defined aside toward the one end of the hook panel and extending over the full width of the base panel transversely of a direction in which the hook panel is progressively released from the loop panel, and some of the hook elements vertically extend from the top surface corresponding to the non-secured region.

Fig. 1 is a perspective view showing a disposable diaper provided with a fastening system of the invention;

Fig. 2 is a fragmentary perspective view showing the fastening system as partially broken away as viewed in a

direction as indicated by arrows from a section taken along line II-II in Fig. 1.

Fig. 3 is a side view showing a hook panel and a loop panel comprising the fastening system as they have been engaged with each other;

Fig. 4 is a side view showing the hook panel as it is being released from the loop panel;

Fig. 5 is a fragmentary side view showing the hook panel and the loop panel as they have been engaged with each other; and

Fig. 6 is a fragmentary side view showing the hook panel and the loop panel as they are being pulled from their positions in Fig. 5 in horizontally opposite directions.

A fastening system of the present invention used with a garment will be described in more detail with reference to the accompanying drawings for a specific embodiment in which the fastening system is used with a disposable diaper, a typical example of the garment.

A disposable diaper 1 shown by Fig. 1 in a perspective view comprises a liquid-permeable topsheet 2, a liquid-impermeable backsheet 3 and a liquid-absorbent core (not shown) disposed therebetween and has a front area 6, a rear

area 7 and a crotch area 8 extending therebetween. The fastening system of the present invention comprises a fastening tape 10 and a receiving tape 11. A pair of the fastening tapes 10 respectively extends from transversely opposite side edges of the rear waist region 7, and the receiving tape 11 is attached to an outer surface of the backsheet 3 and circumferentially extends. Each of the fastening tapes 10 comprises a supporting tape 12 and a hook panel 13 secured to a top surface of the supporting tape 12. The receiving tape 11 comprises a loop panel 14. A combination of these hook panel 13 and loop panel 14 is commonly known under the trade mark "Velcro Tape" or "Magic Tape" and both panels 13, 14 cooperate with each other so that they are detachably fastened together and thereby reliably hold a diaper 1 on a wearer as the hook panel 13 is forced against the loop panel 14. To take off the diaper 1 from the wearer, an outer end 12B of the supporting tape 12 is held by fingers of a person looking after the wearer and the hook panel 13 is progressively released from the loop panel 14 from the outer end 12B toward an inner end 12A opposed to the outer end 12B.

Fig. 2 is a fragmentary perspective view showing the fastener 10 as partially broken away as viewed in the

direction as indicated by arrows from a section taken along line II-II in Fig. 1. The inner end 12A of the supporting tape 12 is secured to a back surface, i.e., an outer surface, of the backsheet 3 by means of hot melt type adhesive 15 and the outer end 12B serves as a grip zone used to release the fastening tape 10. The hook panel 13 secured to a top surface, i.e., an inner surface, of the supporting tape 12 between the inner and outer ends 12A, 12B comprises a base panel 16 and a plurality of hook elements 17 extending from the base panel 16 in a vertical direction relative to the base panel 16, and the base panel 16 is secured to the supporting tape 12 over a region 20 thereof except an outer end region 18 defined by a length W and fully extending over a width of the base panel 16 (refer also to Fig. 1) by means of hot melt type adhesive 21. The outer end region 18 defines a non-secured zone with respect to the supporting tape 12. 2 - 20 elements of the hook elements 17, preferably 5 - 15 elements of the hook elements 17 per 5mm length are arranged on the base panel 16 longitudinally as well as transversely thereof and the outer end region 18 is provided with the hook elements 17 arranged in 2 - 20 rows each extending transversely thereof. It should be understood that the topsheet 2 and the backsheet 3 are bonded together by

means of hot melt adhesive 22 along transversely opposite side edges of the diaper 1.

Fig. 3 is a side view similar to Fig. 5, illustrating a state in which the hook panel 13 is pressed in the vertical direction against the loop panel 14 having a plurality of loop elements 25 and brought into engagement with the loop panel 14. In this state, a plurality of the vertically oriented hook elements 17 are merely inserted into spaces defined among a plurality of the loop elements 25 which are also oriented in the substantially vertical direction and therefore a relatively small number of the hook elements 17 are effectively engaged with the correspondingly small number of the loop elements 25.

Fig. 4 is a schematic diagram illustrating a state after the fastening tape 10 has moved upward in vertical direction from its position shown by Fig. 3 relatively to the loop panel 14. As illustrated, the hook elements 17 follow such a movement of the tape fastener 10 and rather smoothly leave the spaces defined among the loop elements 25 so far as the region 20 of the hook panel 13 bonded to the supporting tape 12 is concerned. In the outer end region 18 (non-secured region), on the other hand, the movement of the fastening tape 10 causes the hook elements 17 to be tilted so

as to be laterally brought into engagement with the corresponding loop elements 25 and thereby the hook panel 13 is prevented from being released away from the loop panel 14. Obviously, the number of the rows of the hook elements 17 associated with the outer end region 18 of the base panel 16 is selected from a range of 2 - 20 and accordingly the fastening tape 10 can be positively released from the receiving zone 11 without any difficulty.

Garments with which the fastening system of the present invention can be used include, in addition to the disposable diaper 1 illustrated as a typical example of the garments, diaper covers, incontinence pants, sanitary napkins, bandages and other various garments. In the hook panel 13 used with these garments, the base panel 16 preferably has a bending resistance less than 0.1g as measured by a Gurley Stiffness Tester. While the hook panel 13 has been described and illustrated as being attached to the diaper 1 with interposition of the supporting tape 12, it is also possible to attach the hook panel 13 directly to the diaper 1 at a desired location. Bonding or jointing of the diaper's various components such as the hook panel 13 and the loop panel 14 may be achieved by utilizing, in addition to adhesive such as hot melt adhesive having appropriate

softness, heat-sealing so far as components to be bonded are heat-sealable.

With the fastening system of the invention, there is no apprehension that the hook panel might be readily and unintentionally released off from the loop panel even when the hook panel moves in the vertical direction away with respect to the loop panel with which the hook panel has been engaged, because the outer end region of the hook panel is left as the non-secured region with respect to the base panel to which the remaining region of the hook panel is secured and the outer end region is provided with 2 - 20 rows of the hook elements.

WHAT IS CLAIMED IS:



1. A fastening system for a garment comprising a hook panel and a loop panel respectively having a plurality of hook and loop elements and releasably engageable with each other so that the hook panel is progressively released with one end thereof held by fingers of a person looking after a wearer toward the other opposite end, wherein:

the hook panel comprises a base panel having a top surface and a back surface and the hook elements extending vertically from the top surface of the base panel;

the back surface of the base panel comprises a secured region and a non-secured region with respect to the garment, the non-secured region being defined aside toward the one end of the hook panel and extending over the full width of the base panel transversely of a direction in which the hook panel is progressively released from the loop panel, and some of the hook elements vertically extend from the top surface corresponding to the non-secured region.

2. The fastening system according to Claim 1, wherein the top surface of the base panel corresponding to the non-secured region is provided with at least two rows of the hook



elements each extending transversely of the direction in which the hook panel is progressively released.

3. The fastening system according to Claim 1, wherein the base panel has a bending resistance less than 0.1g as measured by a Gurley Stiffness Tester.

4. The fastening system according to Claim 1, wherein the garment is any one of a disposable diaper, a diaper cover and incontinence pants.

5. The fastening system to Claim 4, wherein a pair of the hook panel are respectively provided at opposite side edges of the waist region and the loop panel is provided on an outer surface of the backsheet in the front waist region.

6. The fastening system Claim 5, wherein each of the hook panels is attached onto a top surface of a supporting tape extending from the side edge of the waist region, and one end extending outward beyond an outer end of the hook panel defines the one end held by fingers of a person looking after a wearer.