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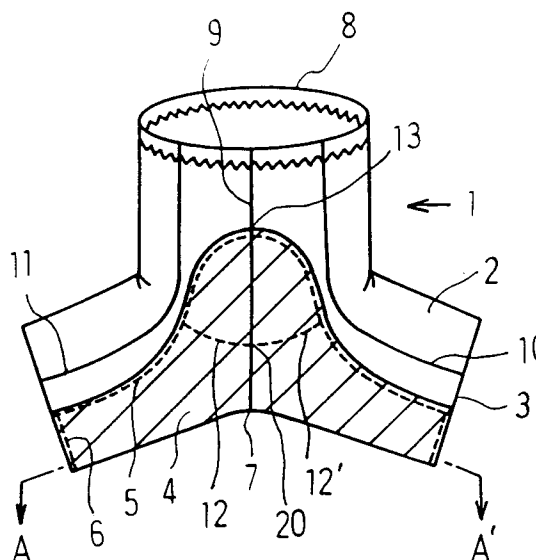
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(54) **Crotch and hip joint protection garment.**

(57) This invention relates to a crotch and hip joint protection garment of a breeches-shape or a pants-shape having hem portions of the leg parts below the wearer's hip joint regions and a protection pad in the vicinity of the wearer's crotch region. The protection pad (4) comprises a base pad made of non-woven fabric or an open-cell flexible polyurethane foam and a pad cover made of a knit or a non-woven fabric covering the base pad. The protection pad (4) extends and covers from the crotch region to at least the region below the wearer's hip joint regions toward the hem portions, to provide a garment to protect the wearer's crotch and hip joint regions which is not liable to cause pain or abrasion by the friction between the garment and the skin of the wearer. The garment can provide improved wearing comfort with its good ventilation and less stuffiness, and therefore, is appropriate for the sports application including bicycling, motorcycling and horseriding.

**Fig. 1****EP 0 643 929 A1**

The present invention relates to crotch and hip joint protection garments, and more specifically to a crotch and hip joint protection garment which is applicable for various sports activities such as bicycling, motorcycling and horseback riding.

Protection garments comprising breeches (short pants) or pants (longer ones) with protection pads sewn to the inside covering over the crotch region in the vicinity of the pubis in the front to the coccyx in the back, for alleviating impact to the crotch region, have been used for bicycle sports, such as triathlon, various bicycle races, or bicycling.

There has not been any garment capable of alleviating impact given during motor-cycling activities such as moto-cross or motor-cycle races, and therefore garments for bicycle sports have often been used in motor-cycling as well. For equestrian sports such as horseback riding, an inner garment designed to ease impact has not been on the market but only such riding pants having leather patches to prevent abrasion of fabric have been available. Thus inner garments for everyday use or protection garments for bicycling have often been used.

Moreover, for sports such as car rally in which people do not have to ride astride saddles but possibly have their crotch parts come in contact with the vehicle, or the vicinity of right and left upper regio femoris medialis regions chafe each other by pedaling actions, protection garments with protection pads capable of alleviating impact during the sports practice have not been available so far.

Prior products can be explained with an example of a spats-type breeches for bicycling. In general, a protection pad which covers in the vicinity of the pubis region in the front and to the vicinity of the coccyx region in the back and approximately over the crotch part widthwise is attached to the garment body by seaming at its circumference with the thread exposed to the skin side.

FIGs. 24-27 illustrate a concrete example of a typical breeches-type (short-pants type) protection garment available on the market.

FIG. 24 is a schematic plan view from the front side (a schematic plan view provided that the garment is folded in two along the side lines almost evenly), FIG. 25 is a schematic plan view from the back side (folded in the same way as Fig. 24), FIG. 26 is a schematic plan view seen from a side (a schematic plan view seen from a side provided that the garment is folded in such a way as when the pants are pressed by a pants-presser) and FIG. 27 is a schematic plan view of a garment inside out and spread with the leg parts spread widely to the right and left so as to make a protection pad attached to the crotch part observed well and seen from the above.

In FIGs. 24-27, numeral 201 describes the main body, 202 a leg part, 203 a protection pad sewn to the inner side of the main body, 204 a crotch part, 205 and 207 circumference seam lines of the protection pad, 212 a fold-back part at the hem edge of a leg part at which the hem edge is folded back to the inside and stitched along the leg part at the seaming line 213. The hem fold-back parts can be folded inwardly or outwardly or a tape can be further attached to the part by stitching. The numeral 210 in FIG. 26 is the front end of the protection pad 203 extending to the vicinity of the pubis region, which is obvious from FIG. 24. And the numeral 211 is the back end of the protection pad 203 extending to the vicinity of the coccyx region, which is obvious from FIG. 25.

With respect to the direction of FIG. 27, the upper margin direction corresponds to the front side (front region), the lower margin direction to the back side (back region). The protection pad 203 comprises a lower pad part 203a and an upper pad part 203b. The upper pad part 203b covers over the crotch part extending from the vicinity of the pubic region in the front side and to the vicinity of the coccyx region in the back side. Numeral 206 illustrates the central seam line of the upper pad part 203b extending along the crotch center line to the front and back directions. The lower pad part 203a extends further to the front side than the upper pad part 203b, reaching the vicinity of the pubis region. To the back side, the lower pad part 203a extends to the vicinity of the coccyx region overlapped by the upper pad part 203b and sewn to the main body together. The lower pad part 203a has right and left stitch lines 208 so as to prevent the front part of the lower pad part 203a from puckering when the part is attached to the main body. The protection pads 203 only cover the crotch part widthwise, not reaching ahead of the hip joints toward the hem of the leg parts.

The lower pad part 203a is of double-layer structure comprising polyurethane foam sheet at the main body side and thick pile knit or pile woven fabric at the skin side. And the upper pad part 203b is further sewn to the main body overlapping the lower pad part. For the material of the upper pad part 203b, chamois leather or synthetic leather of the similar feeling to the chamois leather slightly thicker than the ordinary woven fabric or knit fabric is used.

Most of the above-mentioned sports require a rather long time to practice. For example, in a triathlon competition, participants need to pedal a bicycle for about 6 hours, some bicycling takes a whole day or a few days, and some motorcycle endurance races or car rallies take long time. Moreover, even when a sport competition does not take a long time, total time of the daily practice

mayd take a rather long time.

Therefore when a wearer of the above-mentioned conventional garment with protection pads drives or rides a car, a motorbike, or a horse astride a seat or a saddle, the edge stitching line 205 and the edge of the lower pad part 203a having different levels described in FIG. 27 will continuously come in contact with a seat or a saddle and be weighted by the wearer so that such portions of the garment are rubbed strongly against the right and left hip joint regions of the wearer. The portions of the edge stitching line of the upper pad part 203b and the edge of the lower pad part 203a having different levels are rubbed strongly against the pubic region of the wearer. Moreover, because the width of the protection pads is rather narrow, portions not lined with a pad would be rubbed against the side portions of the saddle. Or the region in the vicinity of a hip joint of the wearer would be rubbed strongly against the saddle or the seat while the wearer corners leaning sideways (with the one's crotch off the center of the saddle). Then when the wearer corners to the opposite direction, because the rider has to shift the weight to the other side by sliding the one's body, the vicinity of the other hip joint would be rubbed strongly to cause abrasion and this may result in not only preventing the person from wearing the garment for the pain, but also preventing continued participation in the competition.

If the conventional daily inner garments not designed to alleviate impacts are worn in such sports, such garments would not only fail to alleviate impacts but may cause abrasion in the skin against the portions having different levels at the fold-back part or the part thickened by a hem tape, or the stitching.

Even in the sports like car rallies which do not require the participants to ride astride but in which their crotch part comes in contact with the seat, the above mentioned conventional protection garments for bicycling are often used for alleviating the impacts. However, in such competitions as car rallies, the participants should transfer their feet from pedal to pedal of the accelerator, the clutch and the brake frequently, so that the crotch part is rubbed against the seat inevitably as well as the vicinity of the right and left hip joints of the wearer are rubbed against the edge stitching line 205 to cause pain or abrasion in the skin of the hip joint regions to provide discomfort.

Besides, as mentioned before, chamois leather or a synthetic leather of the similar feeling which do not provide good ventilation are used as the pad cover, the conventional garments have such shortcomings of wearing discomfort as easily becoming stuffy when the wearer perspires, which is not good for sanitation of the pubic region, causing itch.

It is an object of the present invention to provide garments to protect the crotch and the vicinity of the hip joints, which can solve the conventional problems for not causing pain nor abrasion in the skin of the crotch or hip joints by the friction against the garment, providing good ventilation with less stuffiness and better wearing comfort.

The present invention relates to a crotch and hip joint protection garment comprising a main body with leg parts, each of the leg parts terminating in a hem which in use is below the wearer's hip joint region, and a protection pad which in use extends from the wearer's crotch region at least to an area below the wearer's hip joints, in the direction of the hems of the leg parts, said protection pad comprising a base pad which comprises a non-woven fabric or an open-cell flexible polyurethane foam, and a pad cover for said base pad which comprises a knit or woven fabric.

It is preferable that in the crotch and hip joint protection garment of the present invention, the protection pad is sewn to the inside of the main body.

It is preferable that the protection pad of the crotch and hip joint protection garment of the present invention in use extends to the vicinity of the pubis in the front and to the vicinity of the coccyx in the back of the wearer.

It is preferable that in the crotch and hip joint protection garment of the present invention, the bulk density of the non-woven fabric comprising the base pad is  $0.05\text{--}0.09\text{g/cm}^3$ .

It is preferable that in the crotch and hip joint protection garment of the present invention, the bulk density of the open-cell flexible polyurethane foam comprising the base pad is  $0.02\text{--}0.09\text{g/cm}^3$ .

It is preferable that in the crotch and hip joint protection garment of the present invention, the base pad comprises a non-woven fabric or an open-cell flexible polyurethane foam with at least the one side thereof is laminated with a knit or a woven fabric.

It is preferable that the crotch and hip joint protection garment of the present invention, the pad cover is formed without seam part.

It is preferable that in the crotch and hip joint protection garment of the present invention, the pad cover has seam parts, wherein the outlet seam or stitch of the seam parts is arranged at the rear side of the pad cover so as not to appear to the surface.

It is preferable that in the crotch and hip joint protection garment of the present invention, the protection pad comprises a base pad and a pad cover which are laminated by adhesion or heat-adhesion.

It is preferable that in the crotch and hip joint protection garment of the present invention, the

base pad is formed as an integral sheet and is molded three-dimensionally so as to conform to the shape of the vicinity of the crotch and hip joint regions of a wearer's body.

It is preferable that in the crotch and hip joint protection garment of the present invention, the base pad comprises plural parts to be seamed so as to conform to the shape of the vicinity of the crotch and hip joint region of a wearer's body.

It is preferable that in the crotch and hip joint protection garment of the present invention, the base pad has a central seam which in use extends along the crotch center to the front and the back directions of the wearer's body and front seams which in use slant from the lower center of the pubis region toward upper outside directions at right and left, wherein at said center seam and front seams the base pads are butted and attached to each other by sewing zigzag or by heat-adhesion.

It is preferable that the crotch and hip joint protection garment of the present invention has the hems of the leg parts of the main body without a fold-back part or lower hem edge reinforcing tape, or stitch parts along the hem circumferences to sew said fold-back part or lower hem edge reinforcing tape.

It is preferable that in the crotch and hip joint protection garment of the present invention, the fabric for the main body is made of a stretchable fabric.

It is preferable that the crotch and hip joint protection garment of the present invention is for a riding application in bicycling, motorcycling, or horseriding.

It is preferable that the crotch and hip joint protection garment of the present invention comprises a main body having leg parts, each of the leg parts terminating in a hem which in use is below the wearer's hip joint region, and a protection pad which in use extends from the wearer's crotch region at least to an area below the wearer's crotch region at least to an area below the wearer's hip joints, in the direction of the hems of the leg parts. The protection pad comprises a base pad which comprises a non-woven fabric or an open-cell flexible polyurethane foam, and a pad cover for said base pad which comprises a knit or woven fabric. A pad cover is made of a knit or a woven fabric covering the surface of the base pad so that the protection pad has good ventilation. This makes it less liable to get stuffy even in the long-time use and therefore good for sanitation, and provides less degradation in wearing comfort compared to a protection pad using a synthetic leather or a genuine leather as the pad cover. Moreover, because the base pad is made of a non-woven fabric or an open-cell flexible polyurethane foam, it will provide

ventilation. In particular, a non-woven fabric can provide an excellent ventilation, and therefore, it is preferable.

In addition, said protection pad in use covers at least to the area below the wearer's hip joint region toward the hem portion of the leg parts, namely, to the part where attention has not been paid sufficiently in the conventional products. For such reasons, the present crotch and hip joint protection garment has no stitch or level difference at the circumference rim of a thick protection pad in the vicinity of the hip joints of the wearer in use. Therefore a stitch or the edge of a thick protection pad does not rub against the wearer's skin nor cut into flesh, and does not cause rubbing or abrasion even during long-time use.

In a preferable embodiment of the crotch and hip joint protection garment of the present invention, the protection pad is attached to the inside of the main body not revealing to the surface, and a garment having a neat appearance can be provided.

In a preferable embodiment of the crotch and hip joint protection garment of the present invention, the protection pad in use extends to the vicinity of the pubis region in the front side and to the vicinity of the coccyx region in the back side, and a garment which can prevent abrasion caused by the impact of the friction of the wearer's forward and backward movement or of the friction caused by the contact of sports vehicles and the wearer's body, and which subsequently can provide wearing comfort, can be provided.

In a preferable embodiment of the crotch and hip joint protection garment of the present invention, the base pad comprises a non-woven fabric having a bulk density of 0.05-0.09g/cm<sup>3</sup>, and a garment having well-balanced appropriate shock-absorbing effect and good ventilation can be provided.

In a preferable embodiment of the crotch and hip joint protection garment in the present invention, the base pad comprises an open-cell flexible polyurethane foam having a bulk density of 0.02-0.09g/cm<sup>3</sup> and therefore can be easily molded to the shape of the vicinity of the crotch of a wearer three dimensionally, and can be produced at a reasonable cost. By using the open-cell flexible polyurethane foam with a bulk density of 0.02-0.09g/cm<sup>3</sup>, a garment with relatively good ventilation and sufficient shock-absorbing effect can be provided, and thus is preferable.

In a preferable embodiment, the crotch and hip joint protection garment of the present invention has a base pad comprising a non-woven fabric or an open-cell flexible polyurethane foam with at least one side thereof is laminated with a knit or a woven fabric. The base pad made of a non-woven

fabric laminated with a knit or a woven fabric will be strengthened to prevent shape deterioration, and will be able to be sewn or cut easily compared with a pad without such fabric lamination, and will avoid fuzzing or pilling. The base pad made of an open-cell flexible polyurethane foam laminated with a knit or a woven fabric also will be strengthened surfacewise.

Besides, by using a fabric treated with anti-bacterial processing or deodorization processing, or a fabric with a good water-absorbability as the knit or the woven fabric to laminate on the base pad, better sanitation is provided with respect to the wearer's perspiration or stuffiness. Thus, a crotch and hip joint protection garment which is comfortable to wear without causing problems such as itch can be provided, and thus is preferable.

A preferable embodiment of the crotch and hip joint protection garment of the present invention has the pad cover without a seam part, and provides a crotch and hip joint protection garment with less influence of stitch parts or unevenness of the base pad to the wearer's skin. There is also less liability of having the wearer's skin rubbed by thread at a seam part on the pad cover, and less degradation of wearing comfort even in a long-time use, thus providing better wearing comfort. Also by employing a base pad without a seam part molded three-dimensionally when a pad cover has no seam part, a crotch and hip joint protection garment with better wearing comfort can be provided, and thus is preferable.

In a preferable embodiment in the present invention, the protection pad cover has seam parts of which outlet seams or stitches are applied at the rear side of the seam parts so as not to appear to the surface, a crotch and hip joint protection garment without degradation of wearing comfort caused by friction between the thread of the stitch portions and the wearer's skin, with better wearing comfort, or without liability that the thread of seam parts will be worn out or cut by friction can be provided, and thus preferable.

In a preferable embodiment of the present invention, the protection pad comprises a pad cover and a base pad laminated by adhesion or heat-adhesion. The production will be facilitated by the less complicated method than stitching, thus to reducing the production cost.

In particular, when said protection pad is molded three-dimensionally to conform to the shape of the vicinity of the crotch region, the production cost can be further reduced by molding the base pad three-dimensionally with a pad cover thereon so that both the base pad and the pad cover can be molded three-dimensionally together by applying adhesion or heat-adhesion simultaneously.

In a preferable embodiment of the crotch and hip joint protection garment in the present invention, the base pad is molded three-dimensionally and includes an integral single piece to conform to the shape of the crotch region. By molding the piece three-dimensionally, a base pad with desirable shape can be produced, thereby cutting the production cost sharply by not requiring the sewing labor. A garment with good wearing comfort for the structure not having a seam part on the base pad can be provided, and thus preferable.

In a preferable embodiment of the crotch and hip joint protection garment of the present invention, the base pad comprises plural pieces stitched to conform to the shape of the crotch or hip joint region three-dimensionally. Thus, a crotch and hip joint protection garment which fits well to a wearer's body, and enables the wearer to move thighs smoothly in sports can be provided.

In a preferable embodiment of the crotch and hip joint protection garment in the present invention, the base pad has a central seam which in use extends from the crotch center to the front and the back directions of the wearer's body and front seams which in use slant from the lower center of the pubis region toward the upper outside directions at right and left. At the center seam and front seams the base pads are butted and attached to each other by sewing zigzag or by heat-adhesion, and a crotch and hip joint protection garment with a reduced difference in levels at the seam parts of the base pad and better wearing comfort can be provided.

Moreover, such seam parts enable the base pad stitched to the main body to fit closely to the shape of the wearer's body so that a crotch and hip joint protection garment which allows smooth movement of thighs in sports activities with good wearing comfort can be provided.

A preferable embodiment of the crotch and hip joint protection garment of the present invention has the hems of the leg parts of the main body without fold-back part or lower hem edge reinforcing tape, or stitch parts along the hem circumferences to sew said fold-back part or lower hem edge reinforcing tape. Thus, a crotch and hip joint protection garment is provided with thinner hem portions to prevent the degradation of wearing comfort caused by the friction against the different levels of the fabrics or thread in the portions.

In a preferable embodiment of the crotch and hip joint protection garment in the present invention, because a fabric for the main body is made of a stretchable fabric, a garment with less resistance for the wearer's actions to allow the wearer to move smoothly and provide good wearing comfort with less exhaustion can be provided.

A preferable embodiment of the crotch and hip joint protection garment in the present invention is for use in a riding purpose in bicycling, motorcycling, or horseriding. The garment is highly effective as riding garment for said sports, providing an impact alleviating function, preventing pain caused by friction or abrasion, and providing good ventilation, even though the wearer rides astride a bicycle, motorbike, or horse so that the crotch region of the wearer will be in contact with a saddle or a seat to receive the impact conveyed from the saddle or the seat rather directly and hip joint parts will be liable to suffer friction by contacting strongly with the saddle or the seat.

#### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic plan view of the breeches-type (short-pants type) garment of one embodiment of this invention seen from the front side.

FIG. 2 is a schematic plan view of the crotch and hip joint protection garment of the same embodiment seen from the back side.

FIG. 3 is a schematic plan view of the crotch and hip joint protection garment of the same embodiment described in FIGs. 1-2 seen from the side.

FIG. 4 is a schematic plan view of the crotch and hip joint protection garment of the same embodiment, turned inside out and spread with the leg portions spread flat so that the protection pad can be observed well, seen from above.

FIG. 5 is a schematic sectional view of the base pad of one embodiment of the present invention.

FIG. 6 is a schematic partially sectional view of the vicinity of a seam part to illustrate the structure of seaming of the base pad of the protection pad of this invention.

FIG. 7 is a schematic partially plan view in the vicinity of a seam part to illustrate the structure of seaming of the base pad of the protection pad of this invention.

FIG. 8 is a schematic fragmentary end view of FIG. 1 taken on line A-A'.

FIG. 9 is a development of parts of a base pad of one embodiment of this invention.

FIG. 10 is a development of parts of a base pad of another embodiment of this invention.

FIG. 11 is a plan view of a three-dimensionally molded base pad of one embodiment of this invention seen from above.

FIG. 12 is a sectional view of the three-dimensionally molded base pad described in FIG. 11 taken on line B-B'.

FIG. 13 is a perspective view of the three-dimensionally molded base pad of one embodi-

ment of this invention.

FIG. 14 is a side view of the three dimensionally molded base pad described in FIG. 11 seen from the right side.

FIG. 15 is a sectional view of the three-dimensionally molded base pad described in FIG. 13 taken on line C-C'.

FIG. 16 is a sectional view of the three-dimensionally molded base pad described in FIG. 13 taken on line D-D'.

FIG. 17 is a sectional view of a three-dimensionally molded base pad of another embodiment taken on line D-D'.

FIG. 18 is a plan view of a three-dimensionally molded base pad of another embodiment seen from the above.

FIG. 19 is a sectional view of the three-dimensionally molded base pad described in FIG. 18 taken on line F-F'.

FIG. 20 is a perspective view of the three-dimensionally molded base pad.

FIG. 21 is a side view of the three-dimensionally molded base pad described in FIG. 18 seen from the right side.

FIG. 22 is a schematic plan view of a breeches-type protection garment in the present invention seen from the front side.

FIG. 23 is a schematic plan view of the breeches-type protection garment described in FIG. 22 seen from the back side.

FIG. 24 is a schematic plan view of a conventional crotch protection garment seen from the front side.

FIG. 25 is a schematic plan view of a conventional crotch protection garment seen from the back side.

FIG. 26 is a schematic plan view of the conventional crotch protection garment seen from the side.

FIG. 27 is a schematic plan view of a conventional crotch protection garment turned inside out and spread with the leg parts spread widely to the right and left so as to make a protection pad attached to the crotch part observed well, seen from the above.

A crotch and hip joint protection garment in the present invention includes a breeches-type or a pants-type garment having hem lines for leg parts below the wearer's hip joint regions and a protection pad in the vicinity of the crotch part comprehensively. This includes not only a breeches-type or a pants-type garment with a crotch portion which covers from the wearer's waist region to below at least the hip joint region, but any garment covering at least from the wearer's waist region to at least the region below the hip joint and possessing a crotch part, for example, a garment with the upper body part above waist portion with chest part

and back part can be included as well. That is, a "breeches-type or pants-type garment" in this invention represents any garment having at least a breeches or a pants portion, and therefore even if the garment has such an additional portion as the upper body part, it should be included as well.

A crotch and hip joint protection garment in the present invention is not so limited, but is suitable for sports application in the bicycle-related-sports, motorcycling or horseriding in which a person should ride astride on a saddle or a seat, or in the sports like car rallies in which a participant does not have to ride astride on a saddle or a seat but the buttocks or hip joint region will be in contact with the vehicle. Because the garment protects the crotch and hip joint region by alleviating the impact in the vicinity of the crotch and hip joint region or relieves the friction on the skin in the region, the wearer can enjoy such sports comfortably.

In order to facilitate the understanding about this invention, a breeches type (a short-pants type) protection garment of one embodiment in the present invention will be explained referring to drawings. Though the present invention is not limited to this embodiment as mentioned before, it can be easily understood that the garments in the present invention include such garments as a pants type garment having longer leg parts extending below the knee, or a garment having further an upper body part portion attached to a breeches-type or a pants-type garment.

FIG. 1 is a schematic plan view of a breeches type (a short-pants type) protection garment of one embodiment of the present invention seen from the front side (with the both hem portions spread out to the right and left to show the vicinity of the crotch portion well), FIG. 2 is a schematic plan view of the embodiment described in FIG. 1 seen from the back side (with the both hem portions spread out to the right and left similarly to FIG. 1), FIG. 3 is a schematic plan view of the embodiment described in FIGs. 1-2 seen from a side (a schematic plan view seen from a side provided that the garment is folded in such a way that the pants are pressed by a pants-presser). FIG. 4 is a schematic plan view of the protection garment described in FIGs. 1-3 turned inside out and spread with the leg parts spread flat so that the protection pad can be observed well, seen from above.

In FIGs. 1-4, numeral 1 illustrates the main body, 2 a leg part, and 3 a hem portion of the leg part which extends in this embodiment below the hip joint to about the middle of the thigh region, i.e. about midway between the knee and the hip joint. The hem portion 3 does not have a fold-back portion which generally is provided to be hemmed, nor a stitch to sew the fold-back portion along the hem edge. In other words, a fabric woven or knitted

in such a way that the hem edge portion would not fray (a fabric which does not require stitch to be hemmed) is used. Use of such fabric allows the hem portion to be thinner, to lessen the difference in levels of the fabric in the portion. This avoids the degradation of wearing comfort caused by the friction between the portion having different levels and the wearer's skin, and therefore it is preferable. However, stitching the protection pad 4 and the main body 1 at the stitch line 6 at the hem portion does not matter. Garments with longer leg parts do not suffer such inconveniences even if the edge portion is folded-back to form double structure.

For a fabric for the main body 1, various stretchable fabrics (knit or woven) such as spandex power net, all ways stretch tricot, stretch satin fabric or other fabrics containing spandex fiber can be used. Numeral 4 illustrates the protection pad attached to the inside of the main body 1 by stitching. 5 is the edge stitching line of the protection pad, and 6 is the hem edge stitching line which is a part of the edge stitching line 5 arranged in the vicinity of the hem portion 3 in this embodiment. That is, in this embodiment, the protection pad 4 extends below the wearer's hip joint regions to about the middle of the thigh region, namely almost to the hem portion 3 which extends to about midway between the knee and the hip joint. Numeral 7 illustrates the crotch center, 8 the waist portion, and 9, 10, 11 seam portions of the main body. 12, 12' are front seams of the base pad, which extend from its center point 20 located slightly below the pubis region and slant to upwards to both right and left. The base pad is covered with the main body 1 and a pad cover later described and therefore the front seams cannot be seen from the outside. Numeral 13 illustrates the front edge of the protection pad which extends, in this embodiment, ahead of and across the pubis region. Numeral 14 is the back edge of the protection pad which extends, in this embodiment, to the vicinity of coccyx. Numeral 15, 16, 17 describe the back seams of the main body 1. Numeral 18 described in FIG. 4 illustrates the pad cover seam which extends along the crotch center in front and back directions with the base pad thereunder having a similar seam. It is preferable that the base pad seam which extends along the crotch center in front and back directions, has different shapes for male and female applications. For male wearers, the garment should conform to the shape of the bulged shape of a male pubic region and for the purpose the base pad seam extends from the back edge of the protection pad 14 to the intersecting point 20 (slightly below the pubis region) of front seams of base pad 12, 12' and further to the front edge of the protection pad 13. For female wearers, the garment should not

have an unnecessary bulged shape to conform to the shape of the female pubic region and for the purpose the base pad seam extends from the back edge 14 only to the intersecting point 20 and does not have a seam from the intersecting point 20 to the front edge of the protection pad 13 thereby having an integrated piece of the right and left portion. The "base pad seam which extends along the crotch center in front and back directions" includes both embodiments of the male and female base pad seam.

It is preferable to use a non-woven fabric for the material of the base pad in the above mentioned embodiments, in particular, a non-woven fabric with a bulk density of 0.05-0.09 g/cm<sup>3</sup>, more preferably a non-woven fabric with a bulk density of 0.06-0.07 g/cm<sup>3</sup> which can provide a protection garment with well-balanced proper shock-absorbing effect and good ventilation. For a material of the base pad in the above mentioned embodiments, an open-cell flexible polyurethane foam can be used. It is preferable to use an open-cell flexible polyurethane foam with a bulk density of 0.02-0.09 g/cm<sup>3</sup> which can provide comparatively good ventilation and sufficient shock-absorbing effect.

For the base pad material, a non-woven fabric or an open-cell flexible polyurethane foam alone can be used but it is preferable that, as illustrated in FIG. 5, at least one side (the example shown in FIG. 5 described has lamination on both sides) of a non-woven fabric or a polyurethane foam 51 is laminated with a knit or a woven fabric 61, 61'. By use of such lamination, the base pad made of a non-woven fabric will be strengthened to prevent shape deterioration, will be able to be sewn or cut easily compared with a pad comprising only a non-woven fabric, will avoid fuzzing or pilling; the base pad made of a polyurethane foam also will be strengthened surfacewise, and therefore it is preferable. In either case, it is also preferable to use a fabric treated with antibacterial processing or deodorization processing or a fabric with good water-absorbability for a knit or a woven fabric to laminate because in such an embodiment, better sanitation with respect to the wearer's perspiration or stuffiness in long time use provides a garment which is comfortable to wear without causing problems such as itch.

FIG. 6 and 7 illustrates the stitch structure at the seam parts of the base pad of the protection pad. FIG. 6 describes a schematic partially sectional view of the vicinity of a seam part, and FIG. 7 describes a schematic partially plan view seen from the above of the FIG. 6. In FIGs 6 and 7, the base pads 52a, 52b are butted against each other with an ordinary reinforcing fabric 62 onto the portion and stitched together at the zigzag stitch line 63. The reinforcing fabric 62 is not a prerequisite

but it is preferable to use the reinforcing fabric to strengthen the stitch portions. It is preferable to have such a stitch structure to lessen the difference in level at the base pad seam. Also though not described in the drawings, the base pads 52a and 52b can be butted against each other and joined by heat-adhesion instead of the zigzag stitch. When the pads are joined by heat-adhesion, such methods can be employed as including a heat-adherent fiber as a part of the material of the non-woven fabric of the base pad 52a and 52b, or arranging a heat-adherent tape (including a tape made from a heat-adherent fiber sheet) both over and under the butted portion of 52a and 52b to be heat-adhered, or a combination thereof.

FIG. 8 illustrates a sectional view of the portion on which

the protection pad is attached to and cut from the crotch center 7 to the both right and left ends to describe the general idea of an example of the end view structure, which corresponds to a part of a schematic fragmentary sectional view of the FIG. 1 taken on line A-A'. Because the seam structure of the base pads 52a, 52b shown in FIG. 8 is the same as the structure shown in FIG. 6, the same numerals are maintained and further explanation is omitted. In this example, the pad cover 81 has the seam part 82 in its center portion with the outlet seam 84 of the pad cover 81 folded back to the direction of base pads 52a, 52b (hereinafter called "rear side") and sewn at the stitch line 83 in the rear side. It is preferable to have such a structure because it prevents the stitching thread or outlet seam of the seam portions of the pad cover from appearing at the skin side and does not deteriorate the wearing comfort and therefore provides a crotch and hip joint protection garment with better wearing comfort. Numeral 85 illustrates a part of the main body 1 having the seam 86 in the center (which corresponds to the crotch center 7 in FIG. 1) with the outlet seam 87 of the main body 85 folded back to the direction of base pads 52a, 52b (hereinafter called "rear side") and sewn at the stitch line 88 in the rear side. It is preferable to have such a structure because it prevents the outlet seam 87 from appearing at the outside and thus provides a protection garment with good appearance. In the case the protection pad is attached to the outside of the main body 1, it is preferable to have a structure in which the numeral 85 illustrated in FIG. 8 is the pad cover and 81 is a part of the main body.

Though not indicated in FIG. 8, a knit or a woven fabric can be inserted further to the portion between the pad cover 81 and base pads 52a, 52b if needed, and it is preferable to use a fabric treated with antibacterial processing or deodorization processing or a fabric with good water-absor-



bability for said knit or woven fabric to have better sanitation with respect to the wearer's perspiration or stuffiness during extended use. This provides a crotch and hip joint protection garment which is comfortable to wear without causing problems such as itch.

FIG. 9 and 10 illustrate an embodiment of a development of parts of base pads divided in element pieces. The pad described in FIG. 9 is for male wearers and FIG. 10 is for female wearers. Both drawings show only the right side part of the element pieces and the left side part is omitted because the parts are bilaterally symmetrical. Referring to the explanation about the seam parts of base pad in FIG. 4 would facilitate understanding.

The male base pad illustrated in FIG. 9 comprises a front element piece 91 and a main element piece 92 located backward. With the left side element which is not described in the figure, the number of element pieces becomes four. The pieces are stitched along the lines B-C, E-F respectively to their left side counterparts to form a base pad explained in FIG. 4, which extends along the crotch center in the front and back directions. In the embodiment for male wearers, both lines C-D and E-J have a further convex shape and are stitched to each other. It is preferable to have such technique because it enables the pad to have the structure to conform to the bulged shape of the pubic region of male wearers. The same can be said of the left side element. In the portion encompassed by GHIJ, the base pad extends toward the hem portion of the leg part. The embodiments are not limited to the embodiment described in FIG. 9 with a slightly shorter leg part toward the hem portion or the embodiment illustrated in FIG. 10, but any one with the leg portion extending at least to the region below the hip joint, preferably to the region between the hip joint and knee slightly closer to the hip joint, namely to the upper regio femoris medialis can be included. It is difficult to indicate the length of the base pad concretely because it varies depending on the wearer's body size, but for a male or female adult person, about 12 cm of the length from crotch center 7 toward the hem portion of leg part 3 would be enough to extend below the hip joint. It is more preferable to have the portion 13 cm or longer.

The female base pad illustrated in FIG. 10 also comprises a front element piece 91 and a main element piece 92 located backward thereof. The reason why the line B-C is indicated by a chain line is that the left side portion not indicated is not separated at the line B-C, but an element piece which is bilaterally symmetrical about the line B-C is formed integrally. Therefore the female base pad comprises the front element piece and with the bilaterally symmetrical right and left main element

pieces 92, the number of elements becomes three, which is different from the embodiment for male wearers. The main element piece 92 is stitched to the left side counterpart along the line E-F and the line E-K is stitched to the front element piece 91 along the line C-D. Because the both lines E-K and C-D have a slightly concave shape and are stitched to each other to have the shape to conform to the shape of the vicinity of the female groin.

The left side counterpart of the line E-K is also stitched to the left side counterpart of the line C-D. Because the garments for female wearers do not need a bulged shape around the pubic region, front element piece 91 comprises a single piece extending in both the right and left portions integrally as mentioned before. In the portion encompassed by GHIJ, the base pad extends toward the hem portion of the leg part. As mentioned before, the embodiments are not so limited to the embodiment described in FIG. 10 with a slightly longer leg part toward the hem portion or the embodiment illustrated in FIG. 9. The embodiments of the base pads described in FIGs. 4, 9, 10 include examples of the base pads comprising plural element pieces seamed to each other to conform to the shape of the vicinity of the wearer's crotch and hip joint region three-dimensionally. With such three-dimensionally shaped structure, the base pad can be neatly stitched to the main body, conforming to the shape thereof, and have a shape which can easily fit to the shape of a wearer's body. Therefore, the crotch and hip joint protection garment provides good wearing comfort and allows the thigh parts to be moved smoothly during sports activities.

An embodiment of a base pad made of an integral sheet of polyurethane foam or a non-woven fabric molded three-dimensionally so that it can conform to the shape of the vicinity of the crotch and hip joint region is illustrated in FIG. 11 by a plan view seen from above, in FIG. 12 by a sectional view taken on the line B-B' of FIG. 11, in FIG. 13 by a perspective view of the molded base pad, in FIG. 14 by a side view of FIG. 11 seen from the right side, in FIG. 15 by a sectional view taken on the line C-C' of FIG. 13, in FIG. 16 by a sectional view taken on the line D-D' of FIG. 13, and in FIG. 17 by a sectional view of another embodiment taken on the line D-D' respectively. Numeral 111 in FIGs. 11-14 describes the front portion of the base pad which extends toward the front side of the wearer's body, to the pubis region, and ahead of the wearer's pubic region. The back portion of the base pad 112 extends toward the back side of the wearer's body and in this embodiment to the vicinity of the wearer's coccyx region. Numeral 113 describes the portion extending below the right hip joint portion toward the hem portion of the leg part. Numeral 114 describes the portion extending below

the left hip joint portion toward the hem portion of the leg part. As is apparent from FIG. 12 and 13, the portions extending below the hip joint portions toward the hem portions of the leg parts 113 and 114 are molded in a shape bent downward from the vicinity of the wearer's hip joints. As is apparent from FIG. 13 and 14, the front portion of the base pad 111 and the back portion of the base pad 112 are molded to be bent upward to conform to the shape of the wearer's body. As is apparent from FIG. 15 which is a sectional view taken on the line C-C' of FIG. 13, the back portion of the base pad 112 is molded to have a curved surface to conform to the round shape of the wearer's hips. As is apparent from FIG. 16 of one embodiment or FIG. 17 of another embodiment which are the sectional views taken on the line D-D' of FIG. 13, the front portion of the base pad 111 has a slightly curved or comparatively flat shape. In the examples, FIG. 16 illustrates the shape preferable for male wearers and FIG. 17 illustrates the shape preferable for female wearers. It is also preferable to change the thickness of the each portion of the base pad to conform to the shape of the wearer's body further. It is also preferable to have base pads of different thicknesses for male and female applications because the outline of the male pubic region and female pubic region are different from each other.

The three-dimensionally molded base pad described above contributes to reducing the production cost drastically because it is not made up from plural pieces to be seamed together as explained in the above-mentioned embodiment. Moreover, the molded base pad secures better wearing comfort due to the structure not having seam parts in itself. Since a flat base pad of a sheet-like shape attached to the garment main body would not sufficiently conform to the shape of the vicinity of a human crotch region, it is preferable to use a base pad three-dimensionally molded so as to fit to the shape of the vicinity of a human crotch and hip joint region as described above.

Commonly the three-dimensional molding is conducted by heating with a metal mold. For a material of the base pad to be three-dimensionally molded, the polyurethane foam is preferable for its forming property. However, the non-woven fabric can also be molded three-dimensionally.

Conditions of the three-dimensional molding for a flexible polyurethane foam may vary depending upon such factors as the kind of the polyurethane, the bulk density of the foam, or the thickness of the foam, but generally, it may be molded for about 20 to 60 seconds at 200-230 °C. Conditions of the three-dimensional molding for a non-woven fabric may vary depending upon such factors as the kind of fibers comprising the non-woven fabric, or the

bulk density of the non-woven fabric, but generally, a non-woven fabric made from a polyester fiber or a polyamide fiber may be molded for about 20 to 50 seconds at 200-250 °C.

It is preferable to use a pad cover comprising one integral sheet without a seam part when a base pad is molded three-dimensionally. A three-dimensionally molded protection pad can be obtained by molding a pad cover comprising one integral sheet and a base pad together with a proper amount of a heat-adherable agent or any adherable agent between the base pad and the pad cover. If a heat-adherable ingredient like a heat-adherable fiber is included in the material of the pad cover and/or the base pad, they can be adhered each other at the time of the three-dimensional molding without any additional adhesive agent. Such three-dimensionally molded protection pads will be attached to main bodies by stitching along the pads' circumferences.

A schematic plan view of a breeches-type protection garment in the present invention obtained by the above mentioned methods seen from the front side is illustrated in FIG. 22. A schematic plan view seen from the back side of the breeches-type protection garment is illustrated in FIG. 23. Numeral 120 in FIGs. 22 and 23 is the protection pad which is attached to the inside of the main body 1 by stitching similarly to the above-mentioned embodiment.

Another embodiment of three-dimensionally molded base pads made of integrated sheet of a polyurethane foam or a non-woven fabric will be explained referring to FIGs. 18-21.

FIG. 18 is a plan view of a three-dimensionally molded base pad seen from the above, FIG. 19 is a sectional view of the three-dimensionally molded base pad of FIG. 18 taken on the line F-F'. FIG. 20 is a perspective view of the base pad. FIG. 21 is a side view of the base pad seen from the right side of FIG. 18.

As is apparent from FIGs. 18-21, the three-dimensional shape of this embodiment is almost the same as the above mentioned embodiment. The point different from the embodiment of the base pad illustrated in FIGs. 11-17 is that the base pad in this embodiment possesses optional holes 115 in the vicinity of the hip joints of the wearer in use. The holes 115 enable the base pad to have further bendability in the vicinity of the hip joint regions of the wearer. It is preferable to have such holes because the garment provides better wearing comfort, smoother physical movements in lifting up thighs in sports, and better ventilation. In particular it is preferable to have such holes 115 on the base pad made of a polyurethane foam. Because the embodiment is virtually the same as the embodiment shown in FIGs. 11 and 12 except for the

holes, the same numerals are applied to the same portions and a detailed explanation is omitted. Because a sectional view of the embodiment in FIG. 20 taken on the line C-C' is the same as FIG. 15 and a sectional view of the embodiment in FIG. 20 taken on the line D-D' is the same as FIG. 16 or FIG. 17, the illustrations are omitted. And because the same pad covers previously mentioned can preferably be used and a schematic plan view of a breeches-type protection garment with this base pad seen from the front side is almost the same as FIG. 22, and a schematic plan view of the breeches-type protection garment seen from the back side is almost the same as FIG. 23, the illustrations are omitted.

Although not described in a drawing, when a protection garment of the present invention has main body's longer leg parts to form a pants-shape, its protection pad in principle should extend and cover from the crotch region to below the hip joint regions toward the hem portions of the leg parts, but the pad can extend further as previously mentioned or further protection pads can be added to such portions as the areas between knees and ankles.

The pad cover may be made of a knit or a woven fabric and can be attached to the base pad and/or the main body by stitching or can be laminated to the base pad by adhesion or heat-adhesion. Examples of a knit or a woven fabric for the pad cover include tricot, a non-stretchable knit or woven fabric such as plain woven fabric, or a stretchable knit or woven fabric such as all ways stretch tricot, stretch satin fabric, and various stretchable fabric containing spandex fiber, but the invention is not limited to these examples.

Although not described in a drawing, the protection pad can be located outside of the main body if necessary and further the protection pad can substitute for a part of the main body. Namely, in the portion from the crotch at least to below the hip joint region of the wearer, the protection pad can replace the main body in that region.

#### EFFECT OF THE INVENTION

(1) The crotch and hip joint protection garment in the present invention provides a crotch and hip joint protection garment with excellent wearing comfort which has good ventilation, good sanitation without stuffiness even in extended use, less degradation of wearing comfort even when the wearer perspires, impact alleviating effect with the protection pad in the crotch and hip joint region, and less liability of pain caused by the friction between the garment and the wearer's skin or abrasion. In particular, it is preferable to use a non-woven fabric as the

base pad of the protection pad because it provides excellent ventilation.

(2) In a preferable embodiment of the present invention having the protection pad attached to the inside of the main body and not appearing at the surface, a crotch and hip joint protection garment having a neat appearance can be provided.

(3) In a preferable embodiment of the crotch and hip joint protection garment of the present invention in which the protection pad in use extends to the vicinity of the pubis region in the front side and to the vicinity of the coccyx region in the back side, a garment is provided which can prevent abrasion caused by the friction of the wearer's forward and backward movement or of the friction caused by the contact between sports vehicles and the wearer's body and providing wearing comfort.

(4) In a preferable embodiment of the crotch and hip joint protection garment in the present invention, the base pad comprises a non-woven fabric having a bulk density of 0.05-0.09g/cm<sup>3</sup>, and a garment having well-balanced appropriate shock-absorbing effect and good ventilation can be provided.

(5) In a preferable embodiment of the crotch and hip joint protection garment in the present invention, the base pad comprises an open-cell flexible polyurethane foam having a bulk density of 0.02-0.09g/cm<sup>3</sup> and therefore can be easily molded to the shape of the vicinity of the crotch of a wearer three dimensionally, and can be produced at a reasonable cost. By using an open-cell flexible polyurethane foam with a bulk density of 0.02-0.09g/cm<sup>3</sup>, a garment with relatively good ventilation and sufficient shock-absorbing effect can be provided.

(6) A preferable embodiment of the crotch and hip joint protection garment of the present invention has a base pad made of a non-woven fabric or an open-cell flexible polyurethane foam laminated with a knit or a woven fabric on at least one side of the base pad. The base pad made of a non-woven fabric laminated with a knit or a woven fabric will be strengthened to prevent shape deterioration, will be able to be sewn or cut easily compared with a pad without such fabric lamination, and will avoid fuzzing or pilling. The base pad made of an open-cell flexible polyurethane foam laminated with a knit or a woven fabric will be strengthened surface-wise.

Besides, by using a fabric treated with anti-bacterial processing or deodorization processing, or a fabric with good water-absorbability as the knit or woven fabric to laminate on the base pad, better sanitation with respect to the wear-

er's perspiration or stuffiness is provided, and a crotch and hip joint protection garment which is comfortable to wear without causing problems such as itch can be provided.

(7) A preferable embodiment of the crotch and hip joint protection garment of the present invention has the pad cover without a seam part. The crotch and hip joint protection garment exerts less influence of stitch parts or unevenness of the base pad to the wearer's skin, or further has less liability of hurting the wearer's skin by rubbing with thread at a seam part on the pad cover, and has improved wearing comfort even in a extended use. Also by employing a base pad without a seam part molded three-dimensionally when a pad cover has no seam part, a crotch and hip joint protection garment with better wearing comfort can be provided.

(8) In a preferable embodiment of the present invention wherein the pad cover has seam parts of which outlet seams or stitches are applied at the rear side of the seam parts so as not to appear at the surface, a crotch and hip joint protection garment is provided without degradation of wearing comfort caused by friction between the thread of the stitch portions and the wearer's skin, with better wearing comfort, and without liability that the thread of seam parts will be worn out or cut by friction.

(9) In a preferable embodiment of the present invention wherein the protection pad comprises a pad cover and a base pad laminated with adhesion or heat-adhesion, the production will be facilitated by the use of a less complicated method than stitching, to reduce the production cost.

In particular, when the protection pad molded three-dimensionally to conform to the shape of the vicinity of the crotch region is employed, the production cost can be further reduced by molding the base pad three-dimensionally with a pad cover thereon so that both the base pad and the pad cover are molded three-dimensionally together by applying adhesion or heat-adhesion simultaneously.

(10) In a preferable embodiment of the crotch and hip joint protection garment of the present invention, the base pad is molded three-dimensionally, and is formed as an integrated single piece to conform to the shape of the crotch region. Thus, a base pad with desirable shape can be produced, thereby cutting the production cost sharply by not requiring seaming labor. A garment with good wearing comfort due to the structure not having a seam part on the base pad can be provided.

(11) In a preferable embodiment of the crotch and hip joint protection garment of the present

invention, the base pad comprises plural pieces stitched to conform to the shape of the crotch or hip joint region three-dimensionally. The crotch and hip joint protection garment fits well to a wearer's body and enables the wearer's thighs to move smoothly in sports.

(12) In a preferable embodiment of the crotch and hip joint protection garment of the present invention, the base pad has a central seam which in use extends from the crotch center in the front and the back directions of the wearer's body and front seams which in use slant from the lower center of the pubis region toward the upper outside directions at the right and left. At the center seam and front seams the base pads are butted and attached to each other by sewing zigzag or by heat-adhesion, and a crotch and hip joint protection garment with a less difference in level at the seam parts of the base pad and better wearing comfort can be provided.

(13) In a preferable embodiment of the crotch and hip joint protection garment of the present invention having the hems of the leg parts of the main body without a fold-back part or lower hem edge reinforcing tape, or stitch parts along the hem circumferences to sew said fold-back part or lower hem edge reinforcing tape, a crotch and hip joint protection garment can be provided with thinner hem portions to prevent the degradation of wearing comfort caused by the friction between the difference in level of the fabrics or thread and the wearer's skin.

(14) In a preferable embodiment of the crotch and hip joint protection garment of the present invention, a fabric for the main body is made of a stretchable fabric. A garment with less resistance for the wearer's actions to allow the wearer to move smoothly and provide good wearing comfort with less exhaustion can be provided.

(15) In a preferable embodiment, the crotch and hip joint protection garment of the present invention is for a riding application in bicycling, motorcycling or horseriding. A garment is provided which is highly effective as a riding garment for these sports, with an impact alleviating function, preventing pain caused by friction or abrasion as well as good ventilation, even though the wearer should ride astride a bicycle, motorbike, or horse so that the crotch region of the wearer will be in contact with a saddle or a seat to receive the impact conveyed from the saddle or the seat rather directly, and the hip joint parts will be liable to suffer friction by contacting strongly with the saddle or the seat.

## Claims

1. A crotch and hip joint protection garment, comprising: a main body having leg parts, each of the leg parts terminating in a hem which in use is below the wearer's hip jointing region; and a protection pad which in use extends from the wearer's crotch region at least to an area below the wearer's hip joints, in the direction of the hems of the leg parts; said protection pad comprising a base pad which comprises a non-woven fabric or an open-cell flexible polyurethane foam, and a pad cover for said base pad which comprises a knit or woven fabric. 5
2. The crotch and hip joint protection garment of claim 1, wherein the protection pad is sewn to the inside of the main body. 10
3. The crotch and hip joint protection garment of any one of claims 1 to 2, wherein in use the protection pad extends to the vicinity of the pubis in the front and to the vicinity of the coccyx in the back of the wearer. 15
4. The crotch and hip joint protection garment of any one of claims 1 to 3, wherein the base pad comprises non-woven fabric having a bulk density of 0.05-0.09g/cm<sup>3</sup>. 20
5. The crotch and hip joint protection garment of any one of claims 1 to 3, wherein the base pad comprises an open-cell flexible polyurethane foam having a bulk density of 0.02-0.09g/cm<sup>3</sup>. 25
6. The crotch and hip joint protection garment of any one of claims 1 to 5, wherein the base pad comprises a non-woven fabric or an open-cell flexible polyurethane foam with at least the one side thereof is laminated with a knit or a woven fabric. 30
7. The crotch and hip joint protection garment of any one of claims 1 to 6, wherein the pad cover is formed without a seam part. 35
8. The crotch and hip joint protection garment of any one of claims 1 to 6, comprising seam parts in the pad cover, wherein the outlet seam or stitch of the seam parts is arranged at the rear side of the pad cover without appearing at the surface. 40
9. The crotch and hip joint protection garment of any one of claims 1 to 5, 7, 8, wherein the protection pad comprises a base pad and a pad cover laminated by adhesion or heat-adhesion. 45
10. The crotch and hip joint protection garment of any one of claims 1 to 9, wherein the base pad is formed as an integral single piece and is molded three-dimensionally to conform to the shape of the vicinity of crotch and hip joint region of a wearer's body. 50
11. The crotch and hip joint protection garment of any one of claims 1 to 9, wherein the base pad comprises plural pieces to be seamed so as to conform to the shape of the vicinity of crotch and hip joint region of a wearer's body. 55
12. The crotch and hip joint protection garment of any one of claims 3 to 9, wherein the base pad has a central seam which in use extends along the crotch center in the front and the back directions of the wearer's body and front seams which in use slant from the lower center of the pubis region in upper outside directions to the right and left, wherein at said center seam and front seams the base pads are butted attached to each other by sewing zigzag or by heat-adhesion.
13. The crotch and hip joint protection garment of any one of claims 1 to 12, wherein the hems of the leg parts of the main body are formed without a fold-back part or lower hem edge reinforcing tape, or stitch parts along the hem circumferences to sew said fold-back part or lower hem edge reinforcing tape.
14. The crotch and hip joint protection garment of any one of claims 1 to 13, wherein a fabric for the main body is made of a stretchable fabric.
15. The crotch and hip joint protection garment of any one of claims 1 to 14, said garment is for a riding application in bicycling, motorcycling, horseriding.

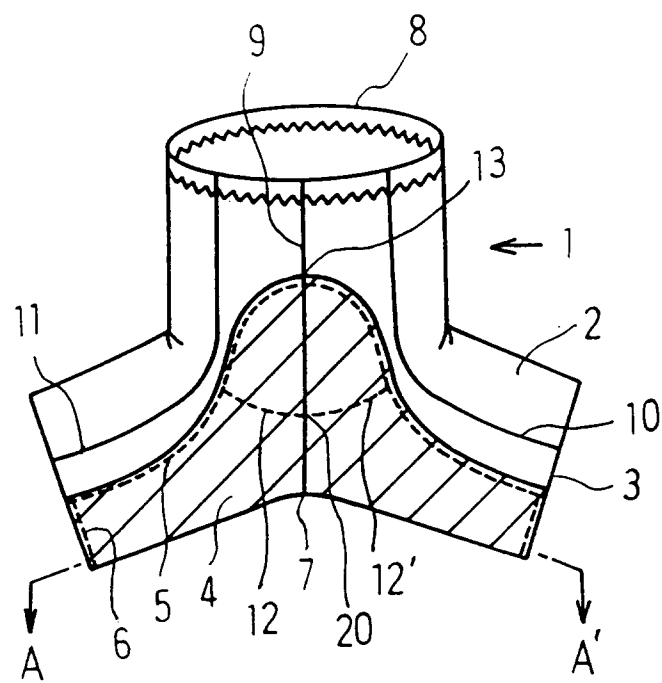


Fig. 1

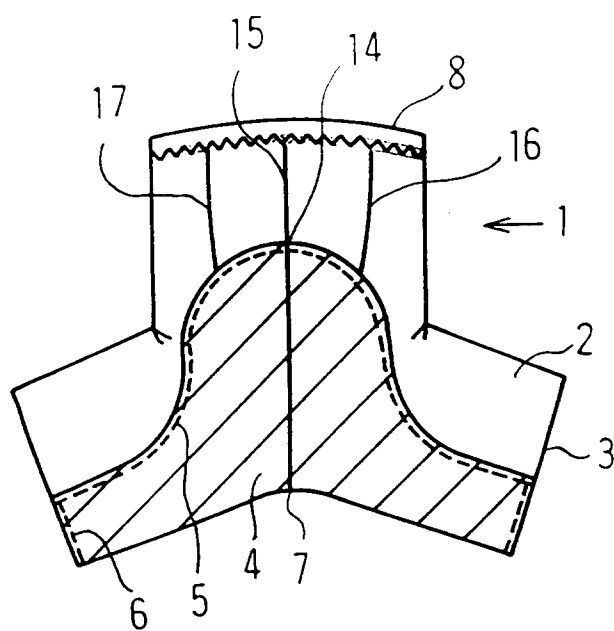


Fig.2

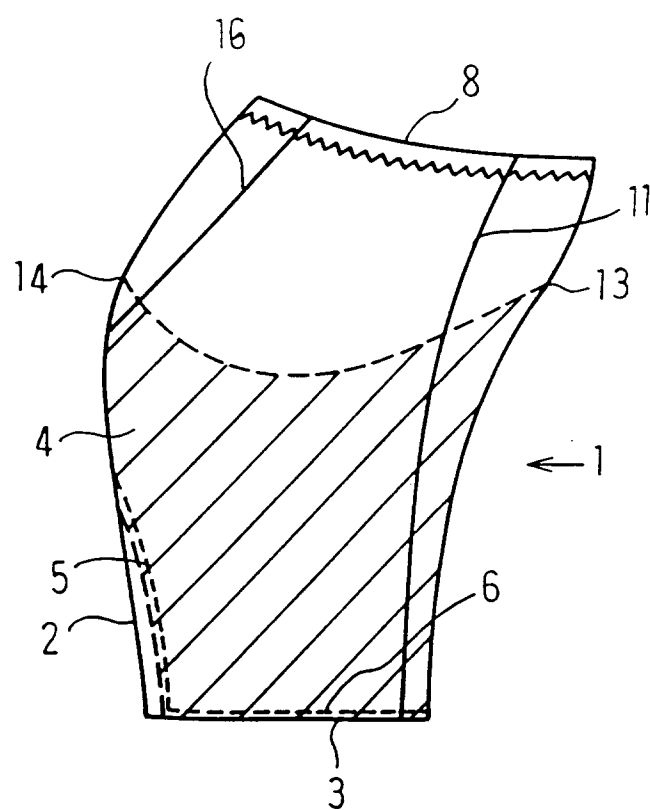


Fig. 3



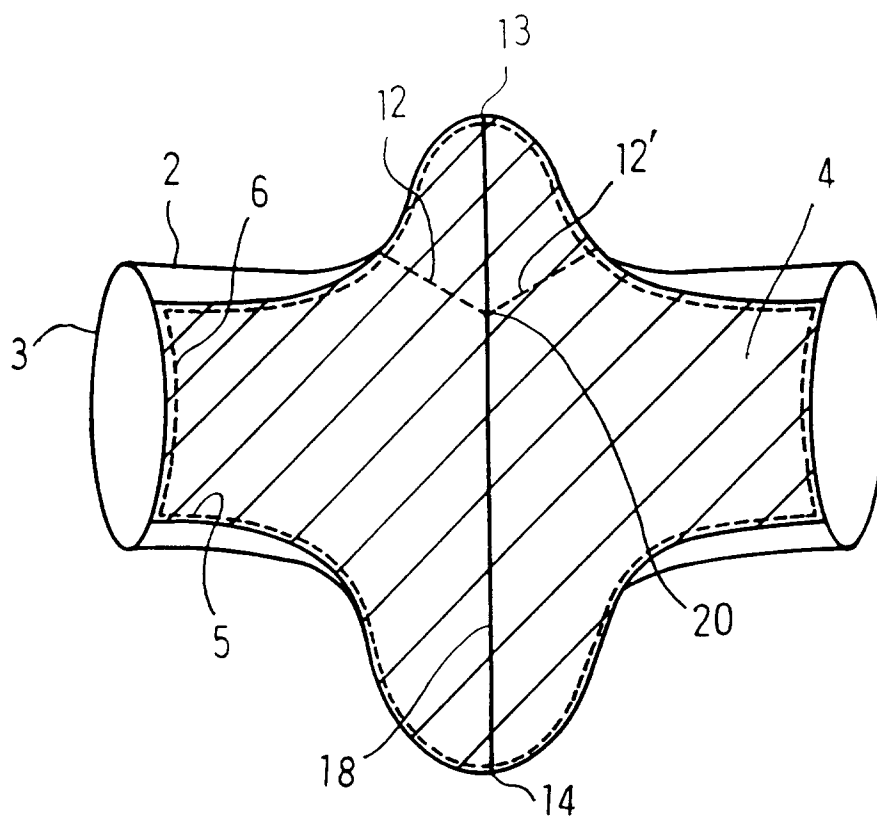


Fig.4

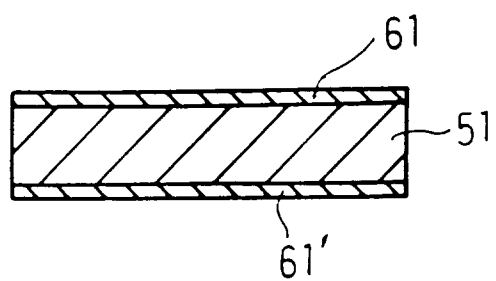


Fig. 5

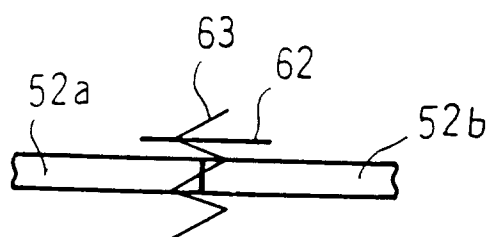


Fig. 6

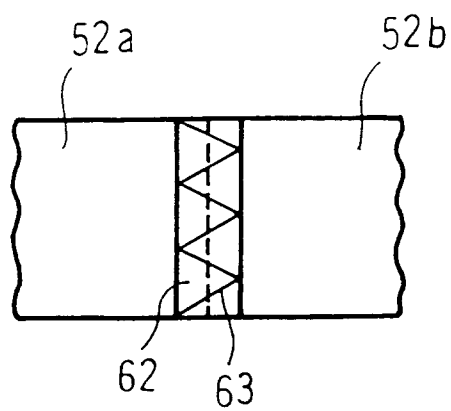


Fig. 7

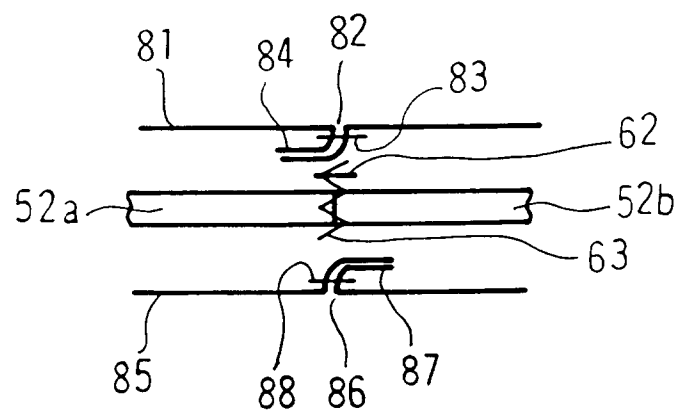


Fig. 8

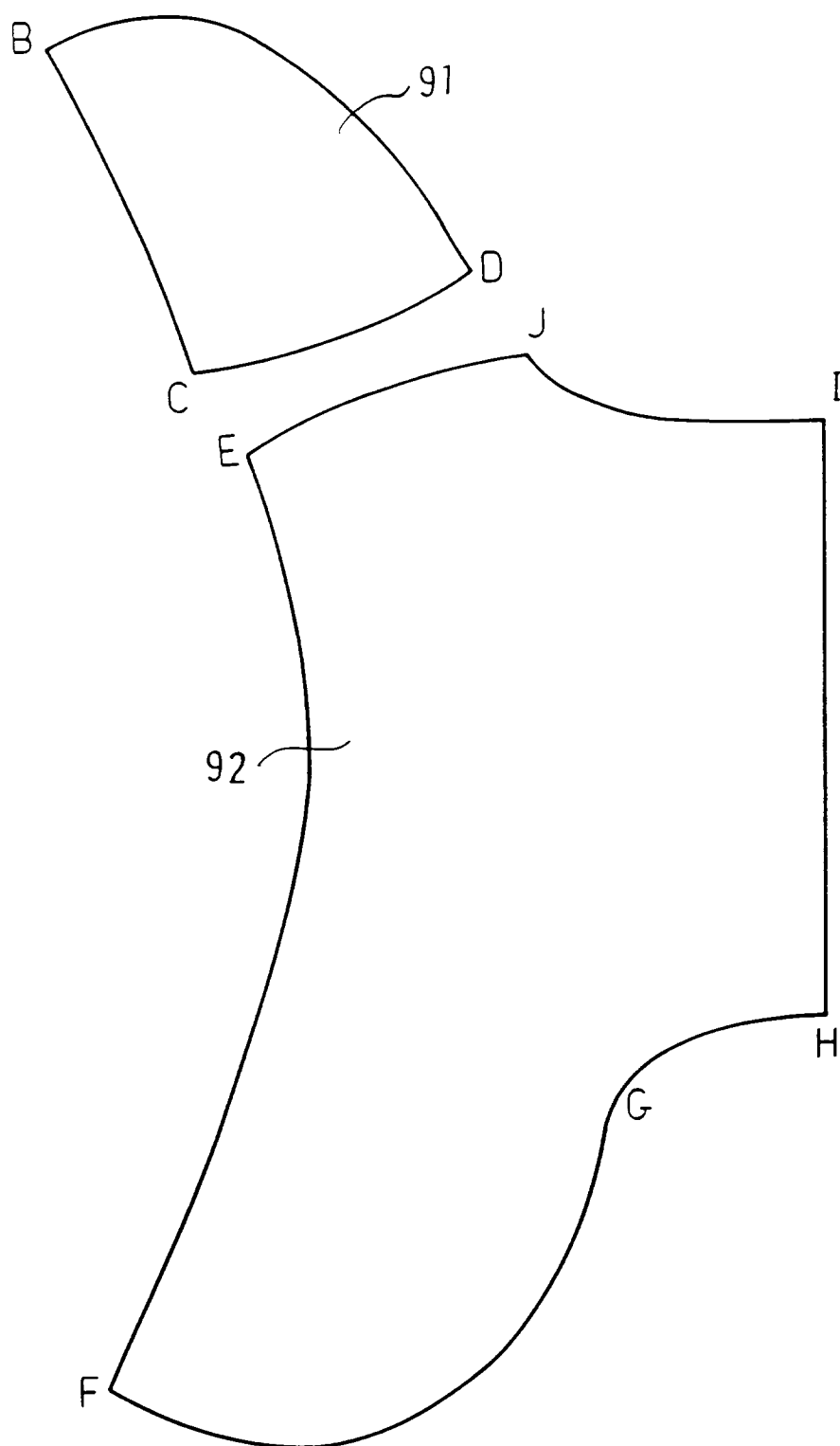


Fig.9

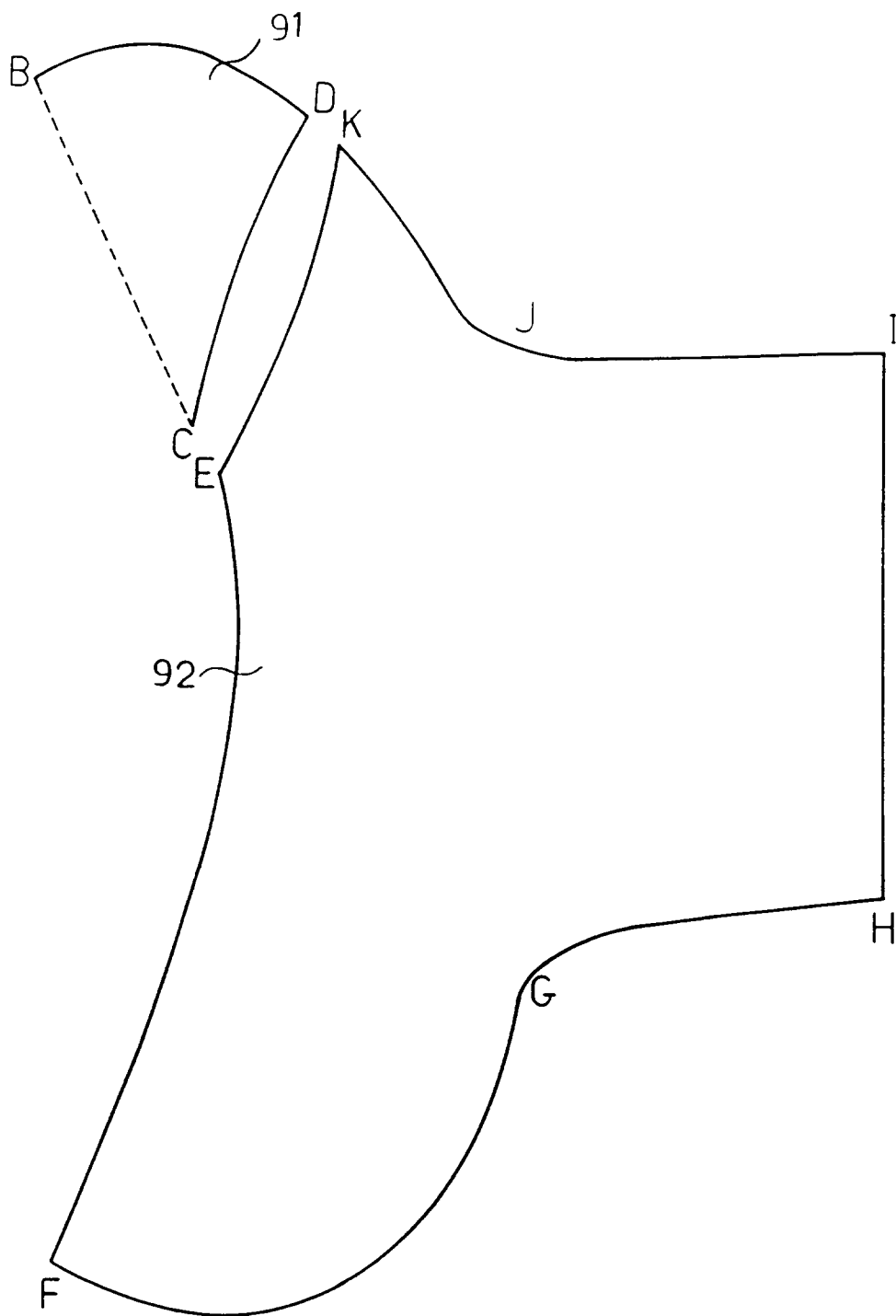


Fig. 10

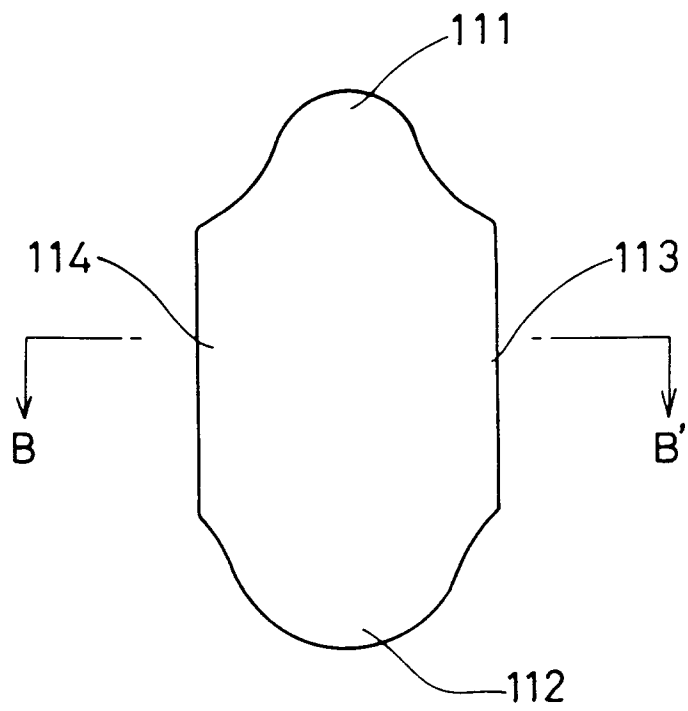


Fig. 11

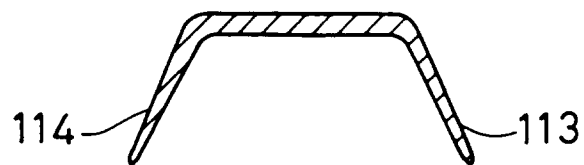


Fig. 12

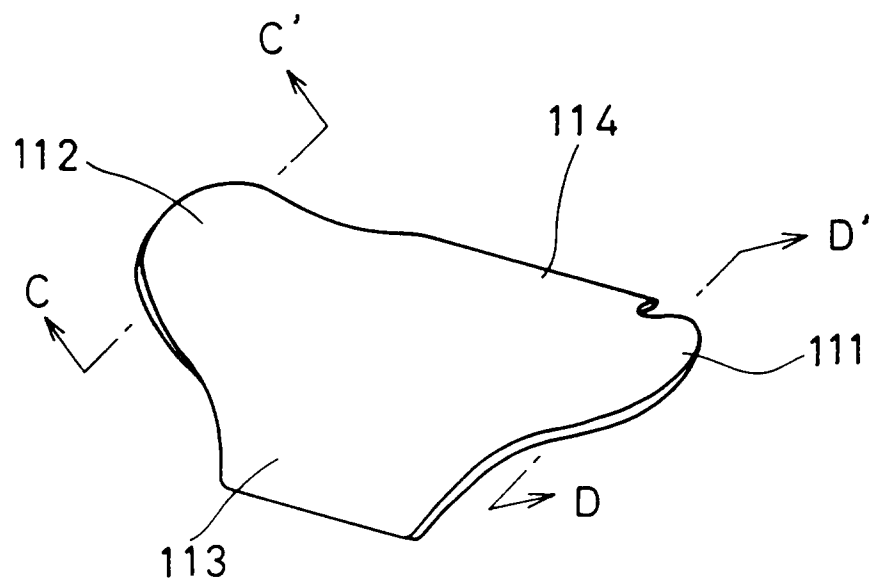


Fig.13

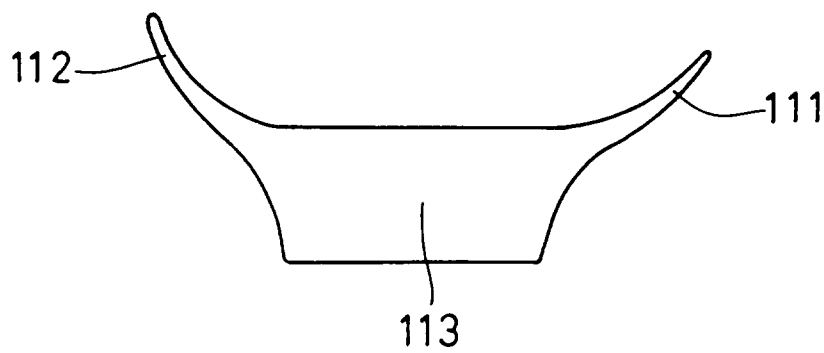


Fig.14



Fig.15



Fig.16



Fig.17



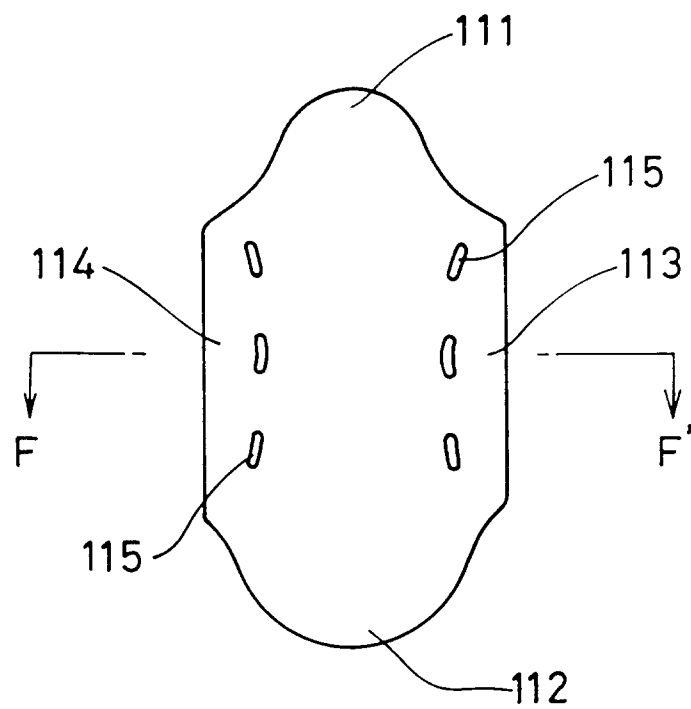


Fig. 18

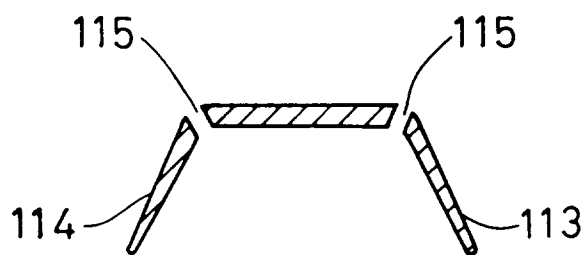


Fig. 19

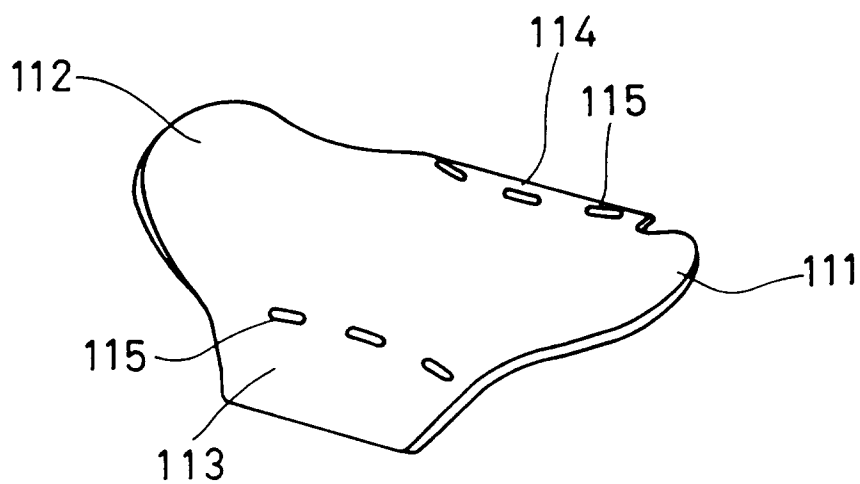


Fig. 20

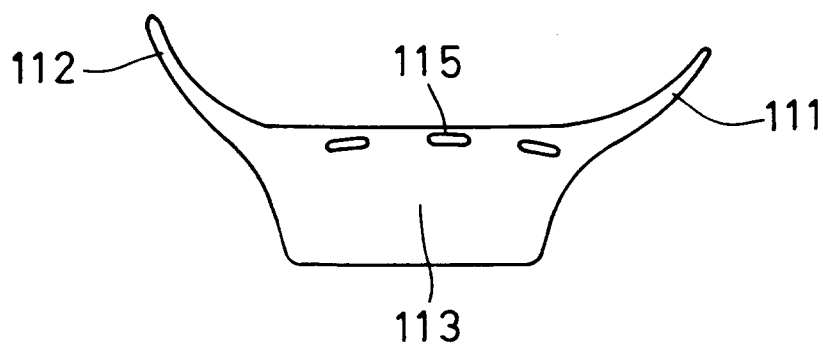


Fig. 21

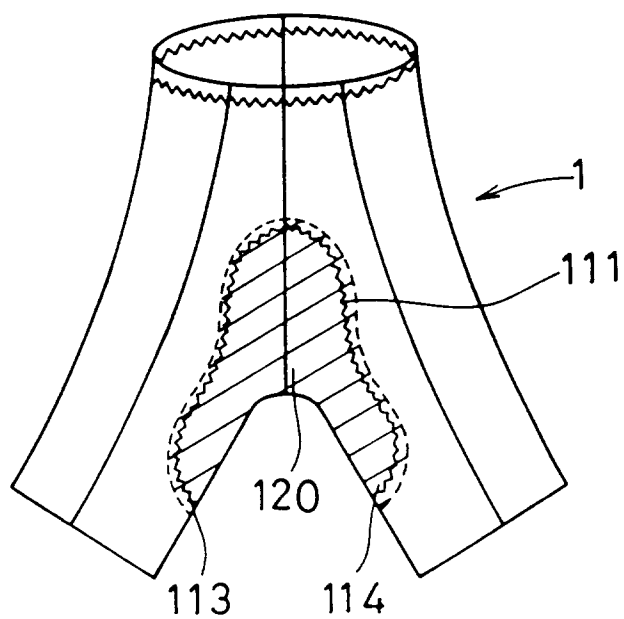


Fig. 22

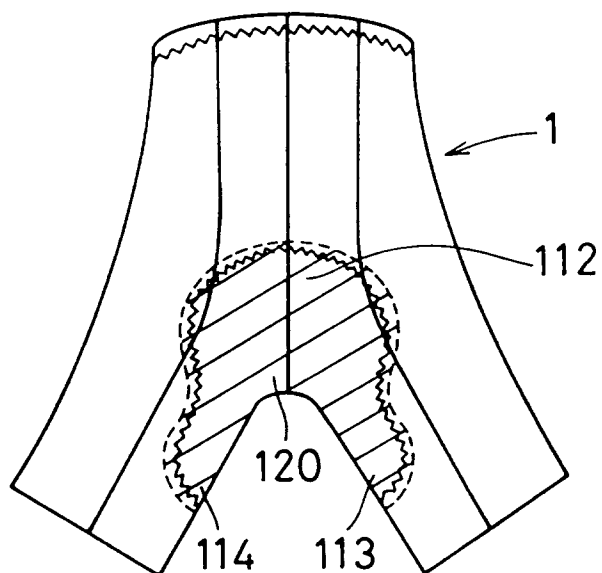


Fig. 23

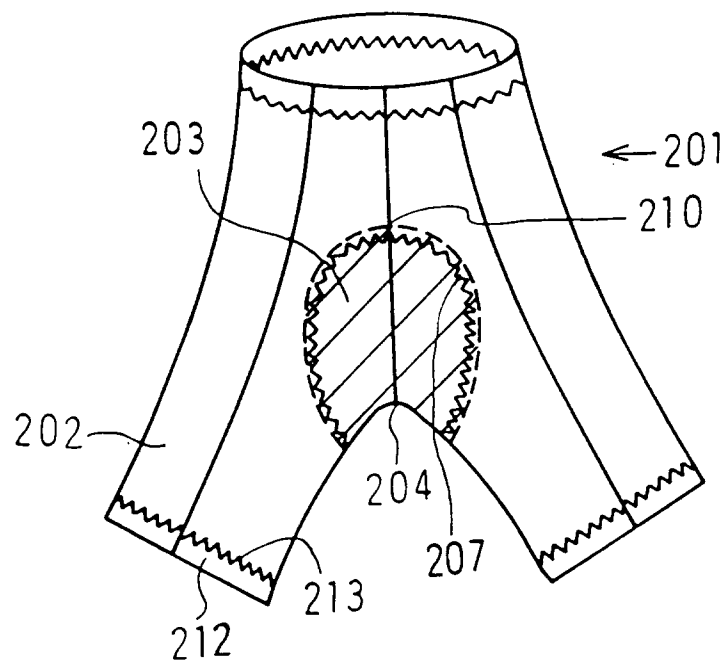


Fig. 24

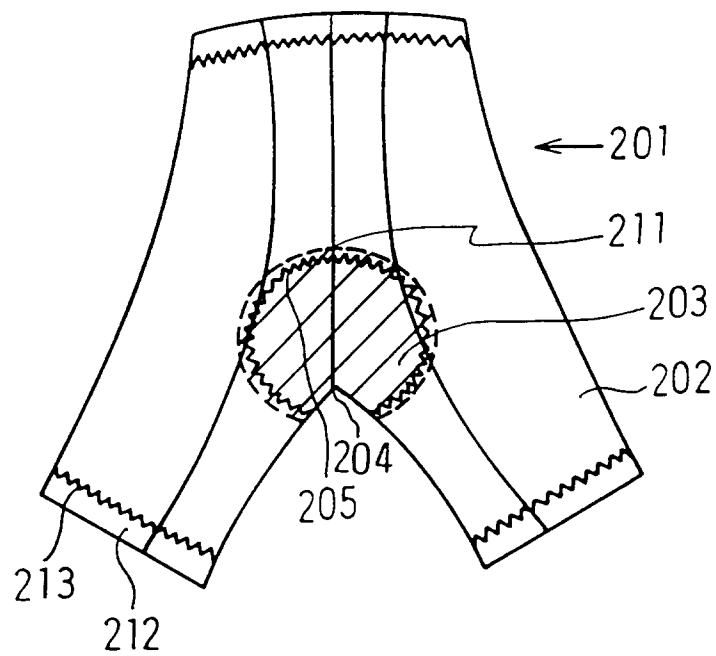


Fig.25

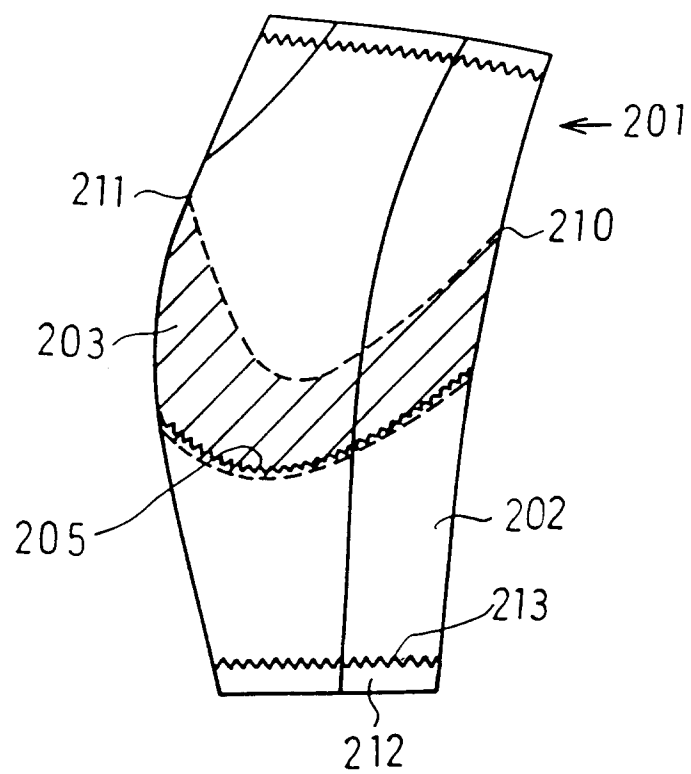


Fig. 26

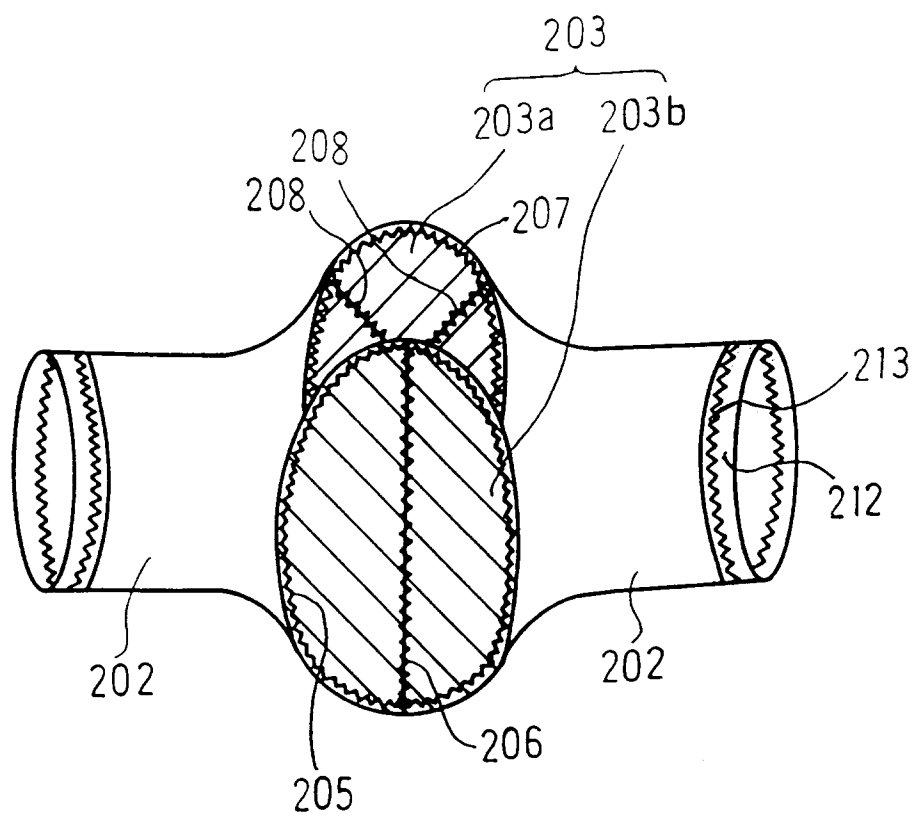


Fig.27



European Patent  
Office

## EUROPEAN SEARCH REPORT

Application Number  
EP 94 11 4557

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
Y A	US-A-4 961 233 (CANNONDALE CORPORATION) * the whole document *	1 2,3,6,7, 9,10,14, 15	A41D1/08
Y A	US-A-5 068 920 (O. S. SYSTEMS INCORPORATED) * column 2, line 56 - column 3, line 42; claims 1,2; figures 1-4 *	1 6,7,9	
A,P	US-A-5 271 101 (NIKE INC.)  * column 3, line 4 - column 4, line 39; claims 1-13; figures 1-5 *	1-3,5,7, 9,10, 13-15	
A	FR-A-2 476 987 (J. BELMAS) * the whole document *	1-3,9,15	
A	DE-U-89 05 746 (K. W. HOCHSCHORNER GMBH)  * the whole document *	1-3,11, 15	TECHNICAL FIELDS SEARCHED (Int.Cl.6)
A	DE-U-77 23 764 (W. GEISSLER)  * page 5, paragraph 3 - page 7, paragraph 2; claims 1-4; figures 1-6 *	1-3,11, 15	A41D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 12 December 1994	Examiner Garnier, F
<b>CATEGORY OF CITED DOCUMENTS</b> X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			