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DISPOSABLE PANTS OF TRUNKS-TYPE

This invention relates to disposable pants of trunks-type.

Pants in the form of trunks or briefs have usually been made by cutting respective components such as a front body and a rear body out from common or separate stock material(s) and then stitching them together. Upon completion of stitching, the assemblies are subjected to a step of finishing, for example, by thermal setting and then inspected to obtain finished goods. These pants have been made on the assumption that they should be reusable.

Recently, the demand has rapidly increased for the disposable pants used by surgeons, nurses and patients during operation or inspection and thrown away after used. On the contrary, the reusable pants require unacceptably much labor and high manufacturing cost to be thrown away after a single use since such pants made on the assumption that they should be reusable are obtained by a plurality of steps such as those of cutting, stitching and finishing.

An object of this invention is to provide disposable pants of trunks-type adapted to be easily made at a reasonable cost

and to be thrown away after a single use.

According to this invention, there is provided disposable pants of trunks-type comprising a waist-hole and a pair of leg-holes wherein the waist-hole is provided in vicinity of a peripheral edge thereof with an elastically stretchable member secured under tension thereto so as to extend circumferentially of the pants.

This invention further comprises a pair of symmetric inner sheets each having upper and lower ends extending in a transverse direction, front and rear side portions extending in a longitudinal direction orthogonal to the transverse direction and a cutout extending from the upper end toward the lower end so as to describe a substantially circular arc which is convex toward the lower end and a pair of symmetric outer sheets having upper and lower ends extending in the transverse direction and front and rear side portions extending in the longitudinal direction and lying outside the inner sheets; and the inner sheets are placed upon each other with the upper and lower ends as well as the front and rear side portions of these sheets put in conformity with each other, respectively, and respective sheet surfaces thereof bonded to each other at least along zones of the front and rear side portions extending in vicinity of the upper ends of the sheets and the cutouts with

the upper and lower ends as well as the front and rear portions of these sheets put in conformity with each other, respectively, the inner sheets and the outer sheets are placed upon one another with the upper and lower ends as well as the front and rear side portions put in conformity with each other, respectively, with the sheet surfaces of the inner sheets and respective sheet surfaces opposed to the sheet surfaces of the inner sheets bonded together along the front and rear side portions of these sheets, and the elastic members are attached to the respective the outer sheets along the upper ends thereof, respectively.

According to one preferred embodiment of this invention, the inner sheets and/or the outer sheets are formed by nonwoven fabric.

According to another preferred embodiment of this invention, the nonwoven fabric is composite nonwoven fabric consisting of melt blown nonwoven fabric and two layers of spun bond nonwoven fabric having respective sheet surfaces covering opposite sheet surfaces of the melt blown nonwoven fabric.

Fig. 1 is a perspective view of disposable pants of trunks-type as viewed from the front;

Fig. 2 is an exploded perspective view of the pants shown in Fig. 1; and

Fig. 3 is a sectional view taken along a line A - A in Fig. 1.

Details of disposable pants of trunks-type according to this invention will be more fully understood from the description given hereunder with reference to the accompanying drawings.

Fig. 1 is a perspective view of disposable pants 1 as viewed from the front and Fig. 2 is a exploded perspective showing the pants 1 shown of Fig. 1. The pants 1 comprise a pair of inner sheets 2A, 2B being identical to each other in shape as well as in size and a pair of outer sheets 3A, 3B being identical to each other in shape as well as size are arranged laterally as viewed in Fig. 2. The pants 1 is formed at upper end with a waist-hole 6 and at lower end with a pair of leg-holes 7. The waist-hole 6 is provided in the vicinity of peripheral edge of the waist-hole 6 with an elastically stretchable member 5 in the form of film extending circumferentially of the pants secured under tension to the pants 1. Referring to Fig. 1, gathers are formed along the waist-hole 6 of the pants 1 as the elastic member 5 is relieved of tension.

Referring to Fig. 2, the inner sheets 2A, 2B are placed in plane-symmetrical relationship with each other and the outer

sheets 3A, 3B are placed also in plane-symmetrical relationship with each other outside the respective inner sheets 2A, 2B. Each of the inner sheets 2A, 2B has upper and lower ends 2a, 2b transversely extending in parallel to each other and front and rear side portions 2c, 2d vertically extending in parallel to each other. These inner sheets 2A, 2B are formed between the respective front and rear side portions 2c, 2d with cutouts 4 extending from the respective upper ends 2a to describe substantially circular arcs which are convex toward the respective lower ends 2b. The front side portion 2c of the inner sheet 2A, 2B has its inner side edge extending downward to describe a substantially circular arc gradually approaching a vertical center line Y1 bisecting a dimension defined between the front side portion 2c and the rear side portion 2d. In other words, a transverse dimension of the inner sheet 2A, 2B is larger at its upper end 2a than at its lower end 2b.

Each of the outer sheets 3A, 3B has upper and lower ends 3a, 3b transversely extending in parallel to each other and front and rear side portions 3c, 3d vertically extending in parallel to each other. The front side portion 3c of the outer sheet 3A, 3B has its outer side edge extending downward to describe a substantially circular arc gradually approaching a vertical center line Y2 bisecting a dimension defined between

the front side portion 3c and the rear side portion 3d. In other words, a transverse dimension of the outer sheet 3A, 3B is larger at its upper end 3a than at its lower end 3b. These outer sheets 3A, 3B are provided on their opposed surfaces 3e with elastic members 5 secured under tension thereto so as to extending transversely along the respective upper ends 3a of these outer sheets 3A, 3B.

From the components shown by Fig. 2 in the exploded perspective view, the pants 1 may be obtained in a manner as will be described. First, the respective sheet surfaces 2e of the inner sheets 2A, 2B are placed upon each other so that the respective center lines Y1 of the inner sheets 2A, 2B may coincide with each other and then the sheet surfaces 2e of the inner sheets 2A, 2B are continuously or intermittently bonded to each other along zones 2c1, 2d1 of the front and rear side portions 2c, 2d lying in the vicinity of the respective upper ends 2a as well as along the cutouts 4. Obviously, the inner sheets 2A, 2B placed upon and bonded to each other in this manner should have their upper and lower ends 2a, 2b, front and rear side portions 2c, 2d and cutouts 4 being coincident with each other, respectively.

After the sheet surfaces 2e of the inner sheets 2A, 2B have been bonded to each other, sheet surfaces 3e of the outer

sheets 3A, 3B are placed upon sheet surfaces 2f of the inner sheets 2A, 2B so that the respective center lines Y1, Y2 of these sheets 2A, 2B, 3A, 3B may fall in line. Then, the sheet surface 2f of the one inner sheet 2A and the sheet surface 3e of the one outer sheet 3A opposed to the sheet surface 2f of the one inner sheet 2A are continuously or intermittently bonded to each other along the respective front and rear portions 2c, 2d; 3c, 3d of these inner and outer sheets 2A, 3A with the elastic member 5 being maintained under tension. Similarly, the sheet surface 2f of the other inner sheet 2B and the sheet surface 3e of the other outer sheet 3B are bonded to each other. It will be obviously understood that the inner sheets 2A, 2B, 3A, 3B placed upon and bonded to one another in this manner should have their upper and lower ends 2a, 2b, 3a, 3b, front and rear side portions 2c, 2d, 3c, 3d being coincident with each other, respectively.

By bonding the respective sheet surfaces 2e of the inner sheets 2A, 2B along the zones 2c1, 2d1 of the front and rear side portions 2c, 2d lying in the vicinity of the respective upper ends 2a of the inner sheets 2A, 2B, bonding strength as measured circumferentially of the pants 1 is enhanced with respect to the case in which the surfaces 2e are not bonded along said zones 2c1, 2d1. Therefore, it is not apprehended that the pants 1 might be broken along the cutouts 4 of the inner sheets

2A, 2B even if the waist-hole of the pants 1 is stretched circumferentially outward as the pants are put on a wearer's body.

The respective sheet surfaces 2e of the inner sheets 2A, 2B are bonded together preferably in such a manner that marginal edges of the front and rear side portions 2c, 2d and the cutouts 4 are left not bonded. In this way, the rigidity of the regions in which the inner sheets 2A, 2B have been bonded together is alleviated by the presence of the marginal edges left free from bonding effect and thereby any possible stimulation to a wearer's skin is correspondingly mitigated even when the marginal edges of the front and rear side portions 2c, 2d come in contact with the wearer's arms or even when the marginal edges of the cutouts 4 come in contact with the wearer's crotch.

The respective sheet surfaces 2f, 3e of the inner sheets 2A, 2B and the outer sheets 3A, 3B are bonded one to another preferably the marginal edges of their front and rear side portions left free from the bonding effect. In this way, the rigidity of the regions in which these sheets 2A, 2B, 3A, 3B have been bonded together is alleviated by the presence of the marginal edges left free from bonding effect and thereby any possible stimulation to the wearer's skin is correspondingly mitigated even when the marginal edges of their front and rear

side portions 2c, 2d, 3c, 3d come in contact with the wearer's arms.

Fig. 3 is a sectional view taken along a line A - A in Fig. 1. Of the inner sheets 2A, 2B bonded to each other, the cutouts 4 are placed upon each other with their edges extending inwardly of the pants 1. The inner sheets 2A, 2B and the outer sheets 3A, 3B are placed one upon another with their front and rear side portions 2c, 2d, 3c, 3d extending outward laterally of the pants 1. The pants 1 according to this invention avoids a manner of bonding such that the inner sheets 2A, 2B would be folded outward laterally of the pants 1 in the vicinity of their cutouts 4 to bond the respective sheet surfaces 2f of these inner sheets 2A, 2B to each other or the inner sheets 2A, 2B and the outer sheets 3A, 3B would be folded inward laterally of the pants 1 in the vicinity of their front and rear side portions 2c, 2d, 3c, 3d to bond the respective sheet surfaces 2f, 3e to each other, respectively. As an advantageous result, it is not apprehended that these sheets 2A, 2B, 3A, 3B might become bulky along their cutouts 4 as well as along the front and rear side portions 2c, 2d, 3c, 3d. The absence of the elastic member 5 along the respective upper ends 2a of the inner sheets 2A, 2B makes the pants 1 correspondingly thin and thereby facilitates the pants 1 to be folded in a relatively flat state.

The respective upper ends 2a of the inner sheets 2A, 2B each lying between the cutout 4 and the front and rear side portions 2c, 2d are free from bonding effect and the number of bonded regions is correspondingly reduced. Consequently, even when the regions of the inner sheets 2A, 2B extending in the vicinity of the upper ends 2a are tightly pressed against the wearer's skin under a contractile force of the elastic member 5, the wearer does not suffer from a feeling of stiffness.

It is possible without departing from the scope of this invention to configure the inner sheets 2A, 2B and the outer sheets 3A, 3B so that not only the inner edges of the front side portions 2c, 3c but also the inner edges of the rear side portions 2d, 3d extend from the upper ends 2a, 3a toward the lower ends 2b, 3b so as to describe substantially circular arcs gradually approaching the respective center lines Y1, Y2 or the inner edges define straight lines gradually approaching the center lines Y1, Y2.

Each of the cutouts 4 has its bottom 4a put aside from the center line Y1 toward the rear side portion 2d. The bottom 4a preferably lies between the center line Y1 and the rear side portion 2d at a distance from the center line Y1 approximately corresponding to 1/3 of the dimension defined between the center line Y1 and the rear side portion 2d. By putting the bottom

4a aside from the center line Y1 toward the rear side portion 2d, the cutout 4a of the pants 1 can be conformed to the curves defined by hip and belly of the wearer as closely as possible.

Nonwoven fabric made of thermoplastic fiber may be used as stock material for the inner sheets 2A, 2B and/or the outer sheets 3A, 3B. It is also possible to use nonwoven fabric perforated to improve its moisture-permeability or the nonwoven fabric having its sheet surface embossed to improve its cushioning property. The inner sheets destined to come in contact with the wearer's crotch are preferably formed by the stock material having a high liquid-absorption, a high moisture-permeability and a high flexibility, for example, nonwoven fabric containing rayon fiber, cotton fiber or the like.

It is also possible to use composite nonwoven fabric (SMS nonwoven fabric) consisting of melt blown nonwoven fabric having a high water resistance and two sheets of spun bond nonwoven fabric having a high strength as well as a high flexibility and respectively covering the opposite sheet surfaces of the melt blown nonwoven fabric. Such SMS nonwoven fabric is obtained by sandwiching melt blown nonwoven fabric with spun bond nonwoven fabric and then bonding the melt blown nonwoven fabric and spun bond nonwoven fabric together using

press technique. Use of the SMS nonwoven fabric enables it to make the pants 1 presenting high strength, high water resistance and a comfortable touch.

It is also possible to use nonwoven fabric having a stretchability transversely and/or longitudinally of the sheets 2A, 2B and/or the outer sheets 3A, 3B as stock material for these sheets 2A, 2B, 3A, 3B. In this case, the elastic member 5 which should otherwise be provided along the upper ends 3a of the outer sheets 3A, 3B can be eliminated.

The elastic member 5 may be attached either to the outer sheet surfaces 3f of the outer sheets 3A, 3B or to both the inner and outer sheet surfaces 3e, 3f thereof. The elastic member 5 may be formed, for example, by synthetic rubber, natural rubber, stretchable film containing synthetic rubber, or spun bond or melt blown nonwoven fabric containing synthetic rubber as a principal ingredient. It is also possible to use a composite member consisting of nonwoven fabric and an elastic member secured under tension to the nonwoven fabric or a composite member consisting of nonwoven fabric, an elastic member secured under tension to the nonwoven fabric so that the elastic member may be covered with the nonwoven fabric.

Though not shown, it is also possible to dispose a separately provided absorbent sanitary article between the

liquid-pervious topsheet and the liquid-impervious backsheet. Such absorbent sanitary article is provided on its bottom surface with a fastening sheet such as urethane foam or pressure-sensitive adhesive sheet having a high friction coefficient adapted to be fastened to holder means extending longitudinally on the inner surface of the pants 1.

Bonding of the sheets 2A, 2B, 3A, 3B and the elastic member 5 may be carried out using suitable adhesive such as hot melt adhesive or thermally sealing technique such as heat- or sonic-sealing technique.

The disposable pants of trunks-type according to this invention is of a simplified construction such that the inner sheets placed upon each other with their sheet surfaces bonded together, on one hand, and the inner sheets and the outer sheets are placed one upon another with their sheet surfaces bonded together. This simplified construction enables the pants suitable as the disposable sanitary article to be made more easily than when cloth or woven fabric is stitched to form the pants. In addition, the inner sheets and/or the outer sheets may be formed by nonwoven fabric to make the pants particularly suitable as the disposable sanitary article at a cost lower than a cost which will be necessary when cloth or woven fabric is used as stock material.



WHAT IS CLAIMED IS:

1. Disposable pants of trunks- type comprising a waist-hole and a pair of leg-holes wherein said waist-hole is provided in vicinity of a peripheral thereof edge with an elastically stretchable member secured under tension thereto so as to extend circumferentially of said pants, said disposable pants further comprising:

said pants comprise a pair of symmetric inner sheets each having upper and lower ends extending in a transverse direction, front and rear side portions extending in a longitudinal direction orthogonal to said transverse direction and a cutout extending from said upper end toward said lower end so as to describe a substantially circular arc which is convex toward said lower end and a pair of symmetric outer sheets having upper and lower ends extending in said transverse direction and front and rear side portions extending in said longitudinal direction and lying outside said inner sheets; and

said inner sheets being placed upon each other with said upper and lower ends as well as said front and rear side portions of these sheets put in conformity with each other, respectively, and respective sheet surfaces thereof bonded to each other at least along zones of said front and rear side portions extending



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in vicinity of said upper ends of said sheets and said cutouts with said upper and lower ends as well as said front and rear portions of these sheets put in conformity with each other, respectively, said inner sheets and said outer sheets being placed upon one another with said upper and lower ends as well as said front and rear side portions put in conformity with each other, respectively, with said sheet surfaces of said inner sheets and respective sheet surfaces opposed to said sheet surfaces of said inner sheets bonded together along said front and rear side portions of these sheets, and said elastic members being attached to the respective said outer sheets along said upper ends thereof, respectively.

2. The pants according to Claim 1, wherein said inner sheets and/or said outer sheets are formed by nonwoven fabric.

3. The pants according to Claim 2, wherein said nonwoven fabric is composite nonwoven fabric consisting of melt blown nonwoven fabric and two layers of spun bond nonwoven fabric having respective sheet surfaces covering opposite sheet surfaces of said melt blown nonwoven fabric.