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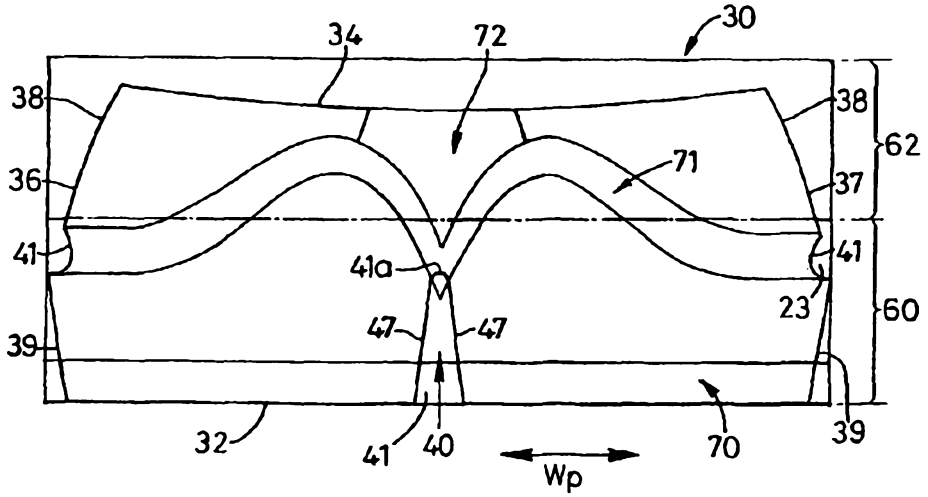
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(54) Title: AN UNDERGARMENT



(57) Abstract: An undergarment having a body portion and a pair of depending leg portions having a crotch region located therebetween, said body and leg portions being integrally formed from a single blank of warp knitted fabric, opposed side edges of the blank being seamed together to define said body and leg portions, the blank being knitted to define compressive regions in the blank having different compressive strengths and being knitted to define stretch regions in the blank which have different stretch characteristics, the positional location, the size and shape of said regions being predetermined to provide desired shaping characteristics of said garment.

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

AN UNDERGARMENT

The present invention relates to an undergarment, in particular an undergarment capable of shaping the buttocks of the wearer.

According to the present invention there is provided an undergarment having a body portion and a pair of depending leg portions having a crotch region located therebetween, said body and leg portions being integrally formed from a single blank of warp knitted fabric, the blank being knitted to define compressive regions in the blank having different compressive strengths and being knitted to define stretch regions in the blank which have different stretch characteristics, the positional location, the size and shape of said regions being predetermined to provide desired shaping characteristics of said garment, characterised in that the blank is formed from warp knitted fabric and has opposed side edges being spaced from one another in the warpwise direction along the blank, said opposed side edges extending generally in the coursewise direction between lower and upper edges of said blank, and being seamed together to define said body and leg portions, said lower edge of the blank defining leg openings for said leg portions in said undergarment.

According to another aspect of the present invention there is provided a blank for forming a garment as defined above.

Various aspects of the present invention are hereinafter described with reference to the accompanying drawings, in which:

Figure 1 is a plan view of a blank for forming a garment according to an embodiment of the present invention.

Figure 2 is a front view of the garment formed from the blank of Figure 1.

Figure 3 is a rear view of the garment formed from the blank of Figure 1.

Figure 4 is a schematic plan view of the blank shown in Figure 1 after cutting from the sheet fabric.

The undergarment 10 shown in Figures 2 & 3 includes a body portion 12 from which depends a pair of leg portions 14. The body portion 12 includes a waist opening which is preferably surrounded by an elasticated waistband 16.

The leg portions 14 are separated by a crotch region 20 formed at the lower region of the body portion 12. Preferably a separately formed crotch insert 23 is located at the crotch region 20 by a seam 25.

The garment 10 is formed from a blank 30 illustrated in Figure 1.

The blank 30 is warp knitted, preferably on a jacquard controlled warp knitting machine for example of the type described in US patent 5628210; the direction of the warp being indicated by arrow W_p. The lower edge 32 of the blank is preferably knit to define a selvedge which in the finished garment forms the leg openings 19 at the lower terminal end of the leg portions 14.

The provision of a selvedge along edge 32 avoids the need to fold and/or seam the fabric and therefore enable the terminal end of the leg portions to lie flat against the skin of the wearer. This is advantageous when wearing garment 10 under a tight fitting overgarment as the lower end of the leg portions will not create a bulge and will not therefore be visible.

The upper edge 34 is preferably cut to shape. A waistband (not shown) is created along edge 34 and in so doing, the edge 34 is secured against untangling. The waistband may be created by folding over a marginal portion of the fabric adjacent edge 34 to create a tube into which an elasticated ribbon is inserted. Alternatively, an elasticated ribbon may be directly seamed along edge 34.

The side edges 36,37 of the blank 30 extend generally in the coursewise direction between upper edge 34 and lower edge 32 and are formed by a cutting operation. Each side edge includes a body forming edge portion 38 and a leg forming edge portion 39. If a crotch insert is to be provided, a cut out 41 is provided inbetween edges 38,39 for forming a crotch opening into which crotch insert 23 may be inserted. At a central location along the blank 30 a slit 40 is formed running inwardly from edge 32. The slit defines a pair of leg forming edges 47 connected by a crotch forming edge portion 41a.

To construct the garment shown in Figure 2, the blank 30 is folded to align body forming edges 38 and these edges are joined by a seam 50. Leg forming edges 39 and a respective one of edges 47 are aligned and seamed together by seams 53 to form the leg portions.

Crotch insert 23 is then inserted into the crotch opening and secured into position by seam 25.

As seen from Figures 2 & 3, the garment formed from blank 30 has a body portion which only has a single seam 50 located on the rear of the garment and a pair of seams 53 which are located on the inside of each leg portion. Accordingly, the front and sides of the body portion are completely free of seams. Also the seam 50 located at the rear of the body portion is positioned centrally and extends inbetween the cheeks of the buttocks in wear. Accordingly the body portion provides a smooth appearance when worn.

Similarly since the seams 53 are located on the inside of the legs of the wearer, the leg portions also provide a smooth appearance when the garment is being worn.

Thus when located under a tightly fitting overgarment, the garment 10 creates no bulges and so is invisible.

The provision of a minimum number of seams and the location of those seams which are provided help to make the garment of the present invention comfortable to wear.

In order to provide a shaping effect, the fabric of the blank 30 is knitted to provide different compressive regions which have different compressive characteristics and also stretch regions which have different stretch characteristics.

The different compressive characteristics are preferably achieved by the incorporation of different strengths of elastomeric yarn, such as LYCRA in different regions of the blank 30.

The different stretch characteristics are preferably achieved by the adoption of different stitch structures in different regions of the blank 30. A particular stretch region may extend solely within a given compressive region or may extend from one compressive region into another compressive region.

The positional location of the compressive and stretch regions and their shape and size within the blank 30 are predetermined in order to provide the desired shaping and smoothing characteristics for the garment.

An example of the position, shape and size of these regions is illustrated in the blank 30 of Figure 1 and the garment shown in Figure 2 & 3.

In blank 30 two different compressive regions 60,62 are provided. Both regions extend throughout the length of the blank 30 from one side edge 36 to the other side edge 37 (ie. direction W_p) and are immediately adjacent to one another in the coursewise direction of the knitted fabric to define a boundary line 64.

During knitting an elastomeric yarn is introduced into each region 60, 62 in order to provide each region with the desired compressive strength. This may be achieved by using elastomeric yarns of different dtex values in each region or by introducing elastomeric yarns of the same dtex value into each region but supply a different number of yarn ends to each needle position. The elastomeric yarn may be incorporated by forming knitted stitches and/or by being laid-in along wales formed in the knitted fabric.

Preferably in the garment of the present invention, region 60 is knitted so as to have a higher warpwise compressive strength than region 62 and the boundary line 64 is located so as to be in the lower region of the body portion in the vicinity of the crotch region. Thus when worn, the boundary line is intended to be located just beneath the cheeks of the buttocks of the wearer. Accordingly due to the higher warpwise compressive strength of region 60, the upper thighs are compressed to give a smooth rounded shape and the lower part of the buttocks is raised. The lower compressive strength of region 62 enables the raising of the lower region of the buttocks to occur and also compresses the cheeks of the buttocks to give a smooth rounded appearance.

The shaping effect of the compressive regions 60,62 is modified by the stretch regions 70, 71 and 72.

Stretch region 71 is in the form of a relatively narrow band which undulates, in a generally sinusoidal manner, along the blank 30 (ie. in direction Wp) from crotch cut out at one side of the blank to the crotch cut out at the other side of the blank. The stitch structure of region 71 is such that it provides less stretch, preferably in both the wale and course directions, than the immediately surrounding fabric.

As seen in Figure 3,the position and shape of region 71 creates a sling 75 which extends from beneath the lower region of the buttocks of the wearer and upwards on both sides toward the waistband.

The lower portion 71a of region 71 extends into compressive region 60 and so portion 71a has less stretch in this portion of region 60. This restriction in stretch helps to compliment the lifting function of compressive region 60.

The upward extent of region 71 preferably terminates at a position just above the hips of the wearer whereat it then is directed downwardly as it extends in the front of the body. Thus the sling 75 is spaced from the waistband and helps to prevent bulging of flesh in the hip region by providing restricted stretch in that region.

Stretch region 72 is preferably formed of a stitch structure which has less stretch, preferably in both the course and wale wise directions, than the surrounding fabric. Preferably the fabric of region 72 has little or no stretch. The region is positioned at the front of the body portion to define a tummy panel and due to its stretch characteristics helps restrict tummy bulge.

Stretch region 70 forms a marginal region around the leg openings. Region 70 is formed of a stitch structure which has less stretch, preferably both in the coursewise and wale wise directions, than the surrounding fabric. In this way, the marginal region about each leg opening tends to grip the leg of the wearer and helps resist the leg portion rising up the leg of the wearer.

It will be appreciated that incorporation of stretch regions 70, 71 and 72 in effect divides the garment into distinct panels 1, 1a, 2, 3 and 4 as schematically illustrated in Figure 4 and that the compressive modulus in these different panels varies depending upon the stretch characteristics of the knitted fabric structure of the stretch region and the compressive strength of the compressive region 60, 61.

By way of example, the compressive region 60 is knit incorporating an elastomeric yarn, LYCRA (RTM) of about 450 to 500 dtex, preferably about 475 dtex and the compressive region 61 is knit incorporating an elastomeric yarn, LYCRA (RTM) of about 260 to 300 dtex, preferably about 285 dtex.

Suitable stitch structures are adopted for the ground fabric for producing the main fabric of the body and leg portions and are adopted for the stretch regions 70, 71 and 72 so as to produce the following preferred values for panels 1, 2, 3 and 4, viz.

	ZONE 1	ZONE 2	ZONE 3	ZONE 4
Warp Modulus	200-400g	330-530g	400-600g	500-700g
Warp Stretch	130-190%	90-130%	125-155%	95-145%

The modulus value is determined by a textile measuring Instron Machine, with 3.5 kg loading at 40% extension.

The embodiment described above is an undergarment in the form of a pair of panties. It will be appreciated that the principles of the invention, viz. the provision of a warp knit blank having at least 2 warpwise extending compressive band regions of differing compressive strengths and stretch regions having predetermined stretch characteristics which co-operate with the compressive band regions to provide panels within the blank having predetermined warpwise compressive moduli may be utilised for the creation of other types of garment.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. An undergarment having a body portion and a pair of depending leg portions having a crotch region located therebetween, said body and leg portions being integrally formed from a single blank of warp knitted fabric, the blank being knitted to define compressive regions in the blank having different compressive strengths and being knitted to define stretch regions in the blank which have different stretch characteristics, the positional location, the size and shape of said regions being predetermined to provide desired shaping characteristics of said garment, characterised in that the blank is formed from warp knitted fabric and has opposed side edges being spaced from one another in the warpwise direction along the blank, said opposed side edges extending generally in the coursewise direction between lower and upper edges of said blank, and being seamed together to define said body and leg portions, said lower edge of the blank defining leg openings for said leg portions in said undergarment.

2. An undergarment according to Claim 1 wherein each of said opposed side edges includes a body forming edge portion, a leg forming edge portion and a crotch region forming edge portion located in between said body forming and leg forming edge portions.

3. An undergarment according to Claim 2 wherein the blank is provided with a pair of opposed leg forming edges located centrally between said opposed side edges said leg forming edges extending from said lower edge of the blank and being interconnected by a central crotch forming edge portion, and wherein in said undergarment, a first of said opposed leg forming edges is connected to one of said leg forming edge portions to form one of said leg portions and a second of said opposed leg forming edges is connected to

the other of said leg forming edge portions to form the other of said leg portions.

4. An undergarment according to Claim 3 wherein the blank is provided with two different compressive regions, each compressive region extending from one of said side edges to the other of said side edges.

5. An undergarment according to Claim 4 wherein a first of said compressive regions extends from said lower edge of the blank to a boundary edge with a second of said compressive regions, said boundary edge being located within the body portion of said undergarment.

6. An undergarment according to Claim 5 wherein said boundary edge is located within a lower region of the body portion in the vicinity of said crotch region of said undergarment.

7. An undergarment according to Claim 6 wherein the first compressive region has a greater compressive strength than the second compressive region.

8. An undergarment according to any one of Claims 4 to 7 including a stretch region in the form of a band which in said blank extends in a generally sinusoidal manner from one of said opposed side edges to the other of said opposed side edges to define, in said undergarment, a buttock supporting sling, said band having less stretch than adjacent fabric of said body and leg portions.

9. An undergarment according to any one of Claims 4 to 8 including a stretch region in the form of a panel located so as to define, in said undergarment a tummy control panel, said panel preferably being non-stretchable.

10. An undergarment according to any one of Claims 4 to 9 including a stretch region in the form of a marginal band which extends along the lower edge of the blank, said marginal band in said undergarment defining marginal regions about said leg openings of said leg portions, said marginal band having less stretch than adjacent fabric of said leg portions.

11. An undergarment, substantially as hereinbefore described with reference to the accompanying drawings.

Dated this 2nd day of April 2004
COURTAULDS TEXTILES (HOLDINGS) LIMITED
By their Patent Attorneys
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Fellows Institute of Patent and
Trade Mark Attorneys of Australia

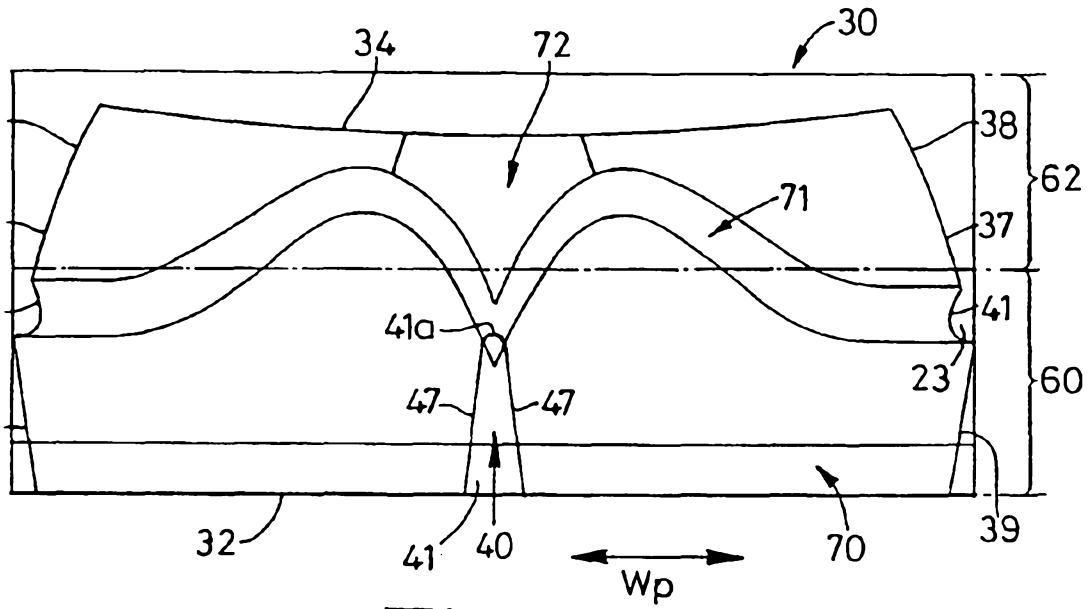

34
72
30
38
62
71
37
41
41a
23
60
47
47
32
41
40
70
39
Wp

Fig. 1

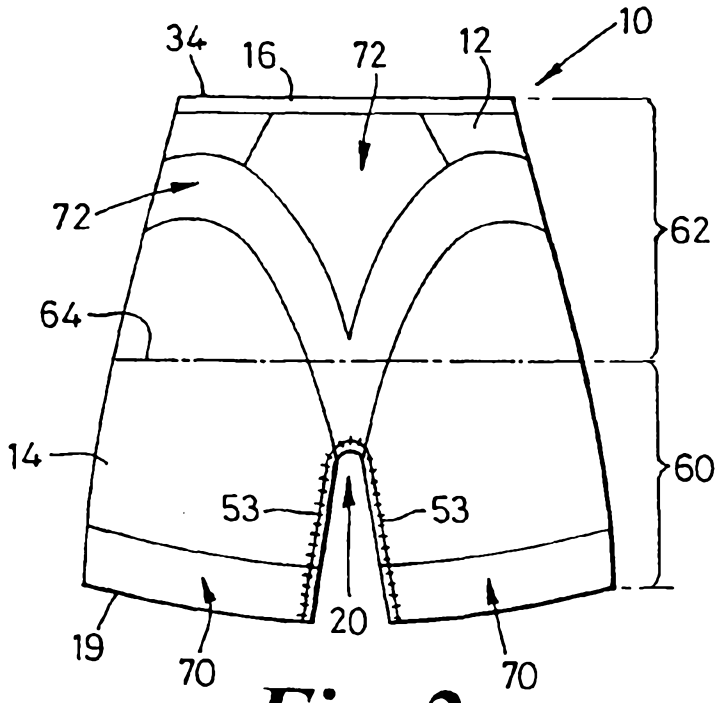

34
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12
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64
14
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70
70

Fig. 2

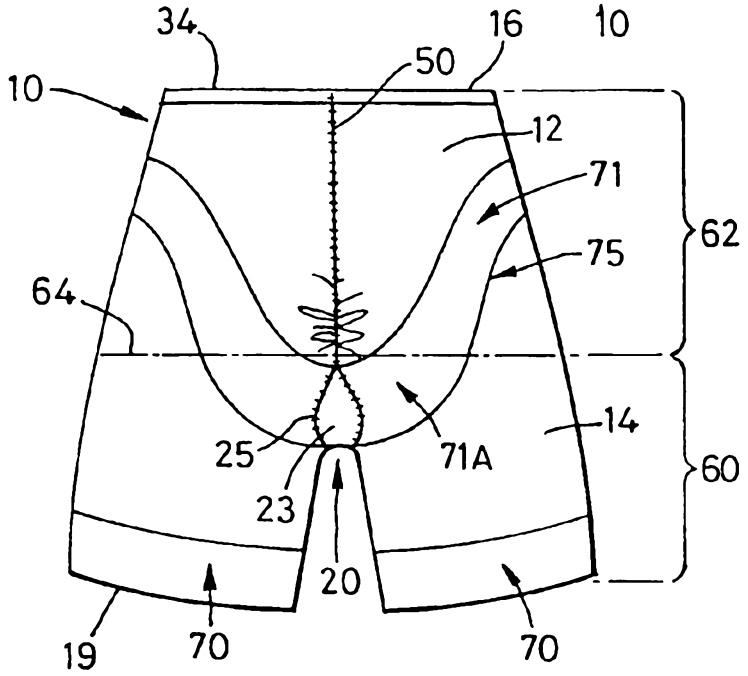

34
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Fig. 3

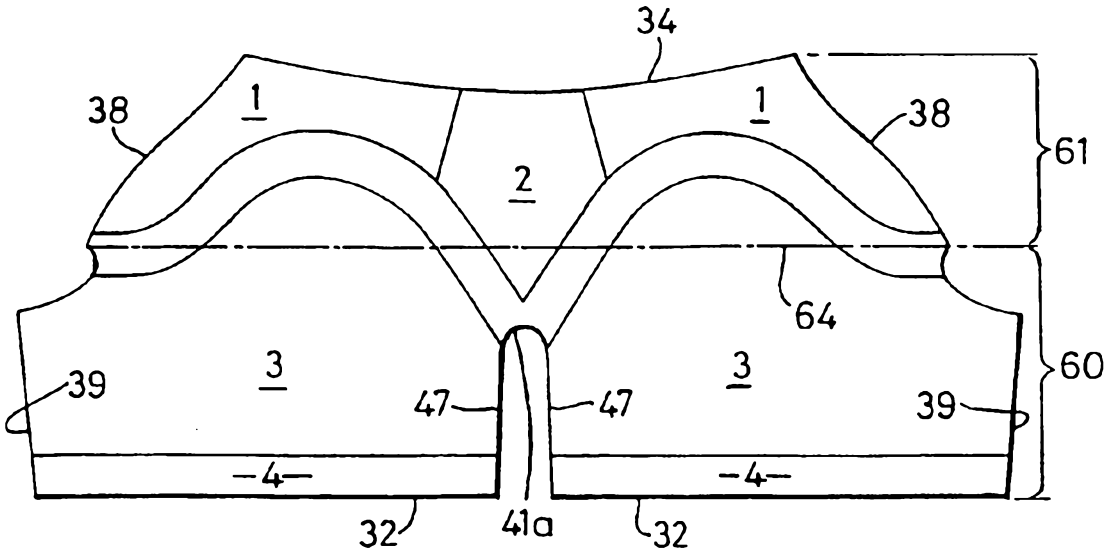

34
38
1
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38
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64
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3
39
60
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47
4
4
32
41a
32

Fig. 4