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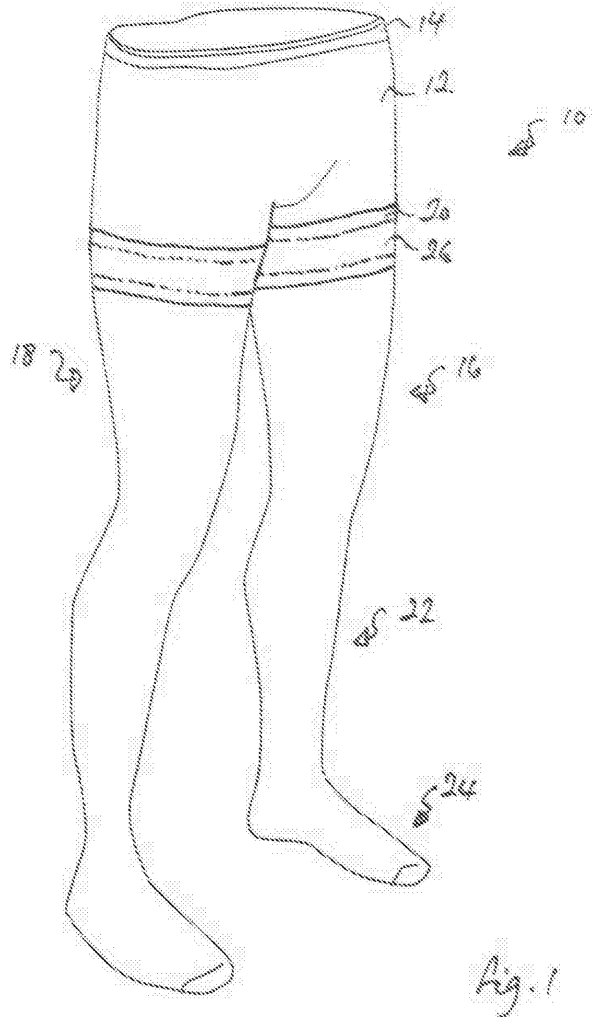
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(56) Documents Cited:  
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GB 1215408 A GB 1214549 A  
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(58) Field of Search:  
INT CL A41B, A41F  
Other: Online: EPODOC, WPI

(54) Title of the Invention: **Stretchable legwear**  
Abstract Title: **Stretchable leg wear with frictional engagement portion**

(57) Stretchable leg wear 10, in the form of tights, comprise a panty part 12, leg parts 16, 18 and a foot part 24. A proximal portion 20 of each leg part is provided with at least one enhanced friction member, in the form of a band 26. The band 26 is attached to the internal surface of the band 20 by the application of silicone elastomer in liquid form, which is then cured. The band 26 has a thickness of about 1 mm, a width of about 30 mm, and translucent so as not to be visible through the leg portion 20. In use, the band 26 encircles the upper thigh of the wearer and grips the skin as a result of the elasticity of the band 26.



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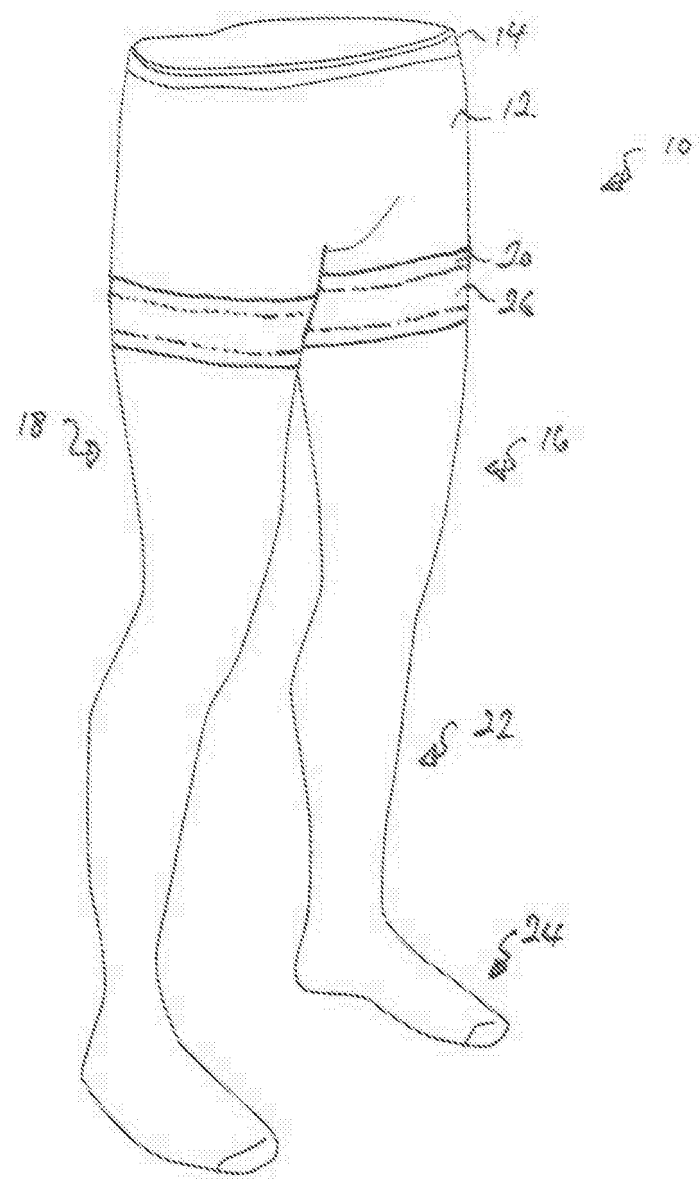


Fig. 1

Fig. 1

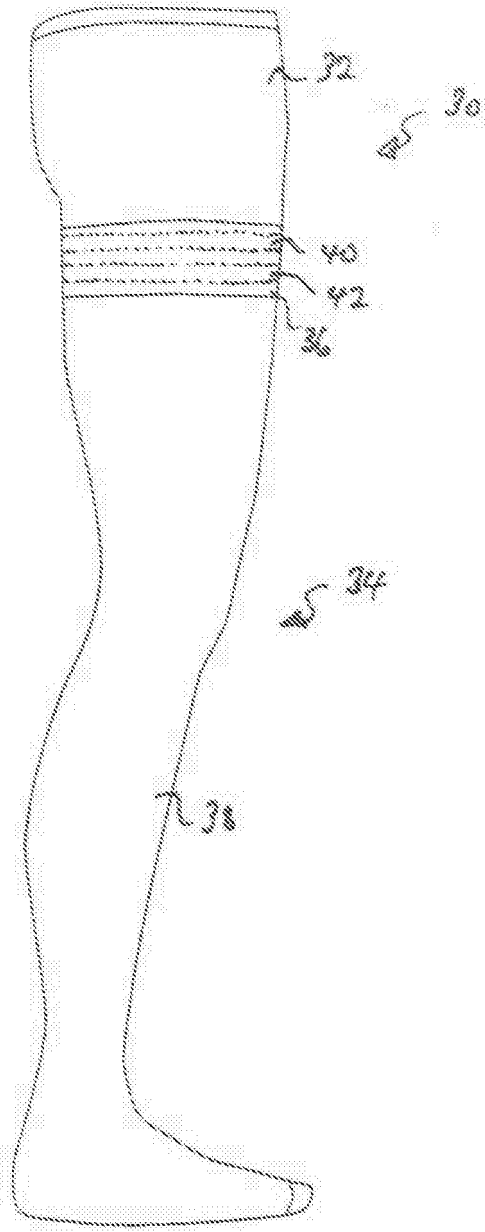


Fig. 2

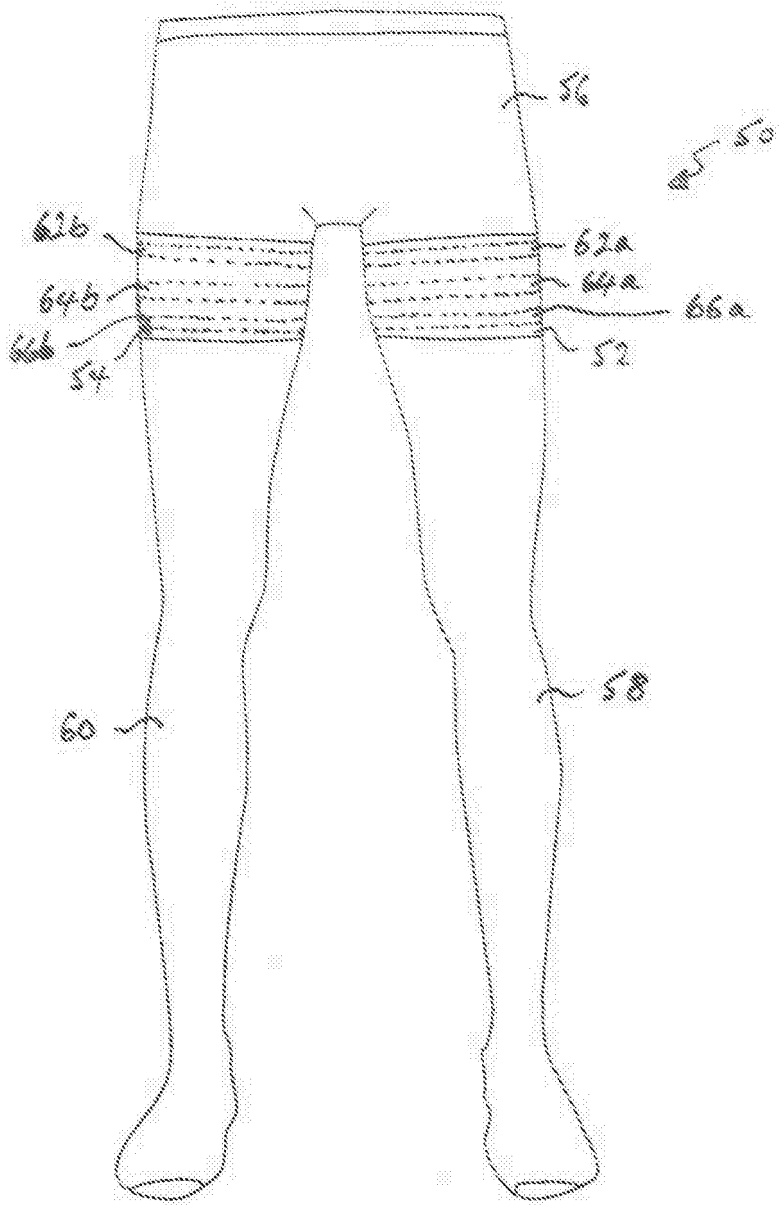


Fig. 3

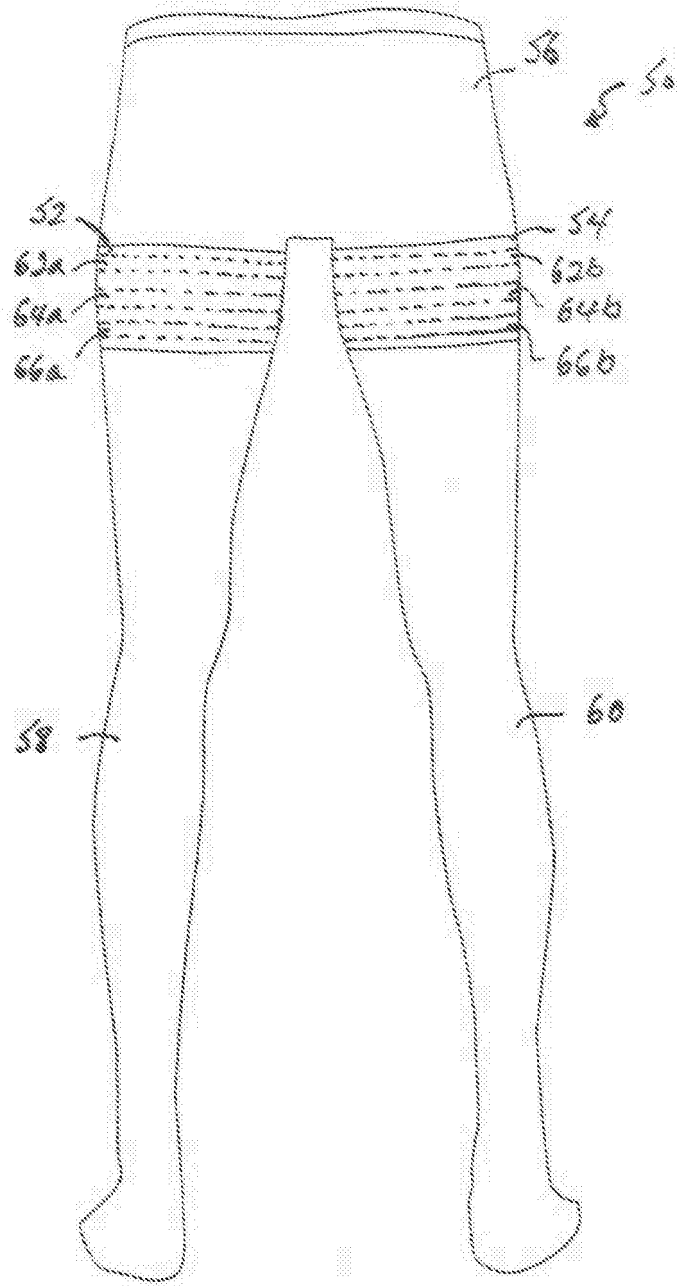


Fig. 4

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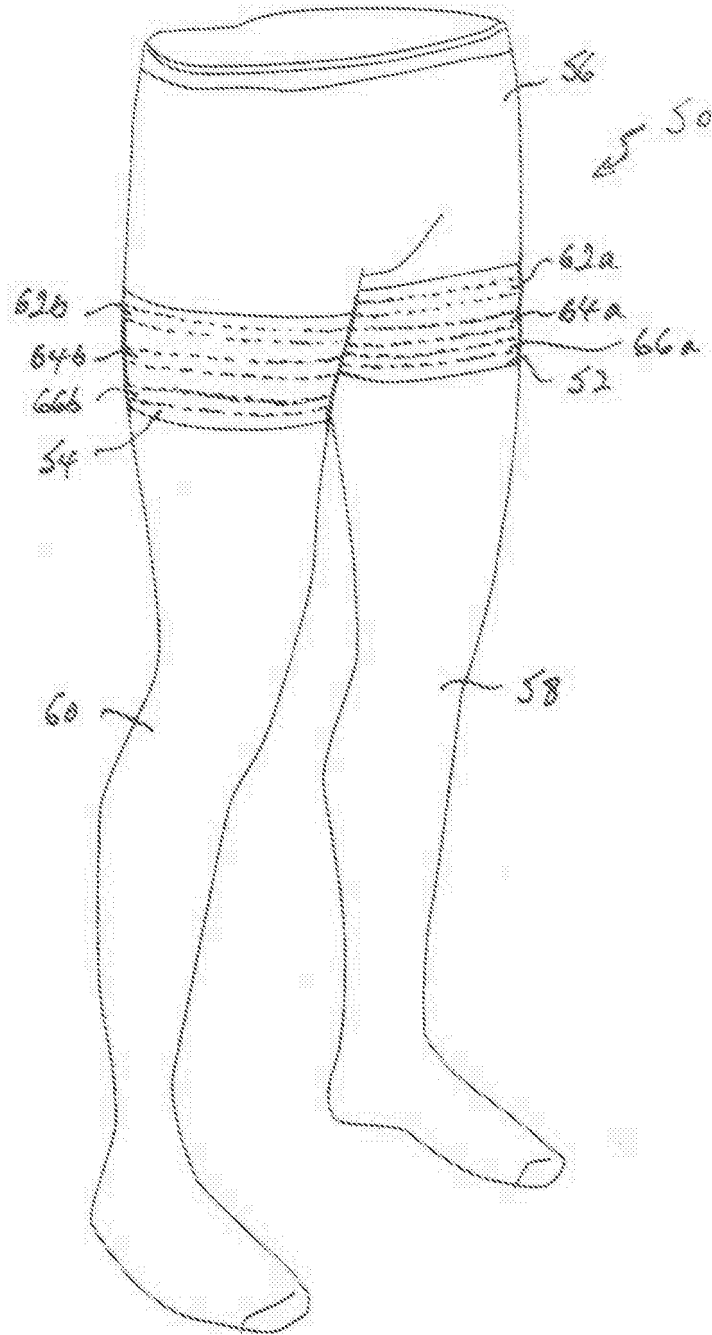


Fig. 5

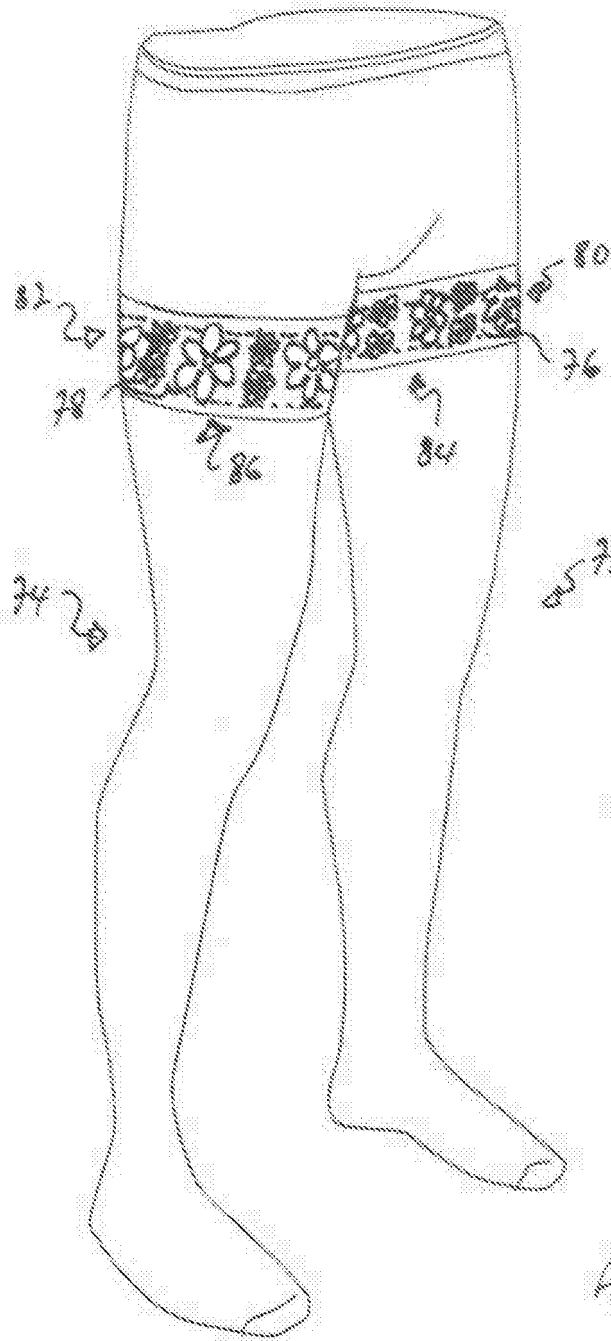


Fig. 6

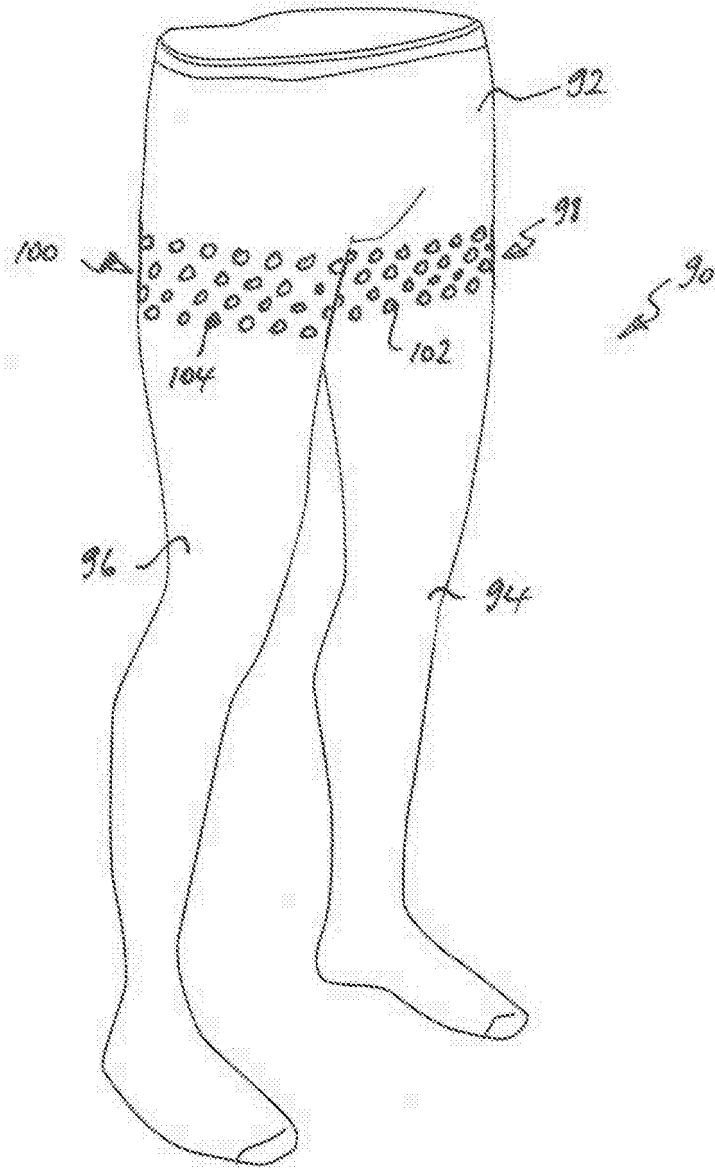


Fig. 7



**TITLE:**        STRETCHABLE LEGWEAR

### **Field of the Invention**

This invention relates to stretchable legwear that has a panty part and leg parts attached to the panty part, such as long johns, leggings and tights, and in particular to such stretchable legwear that has means for resisting a tendency of the legwear to slip down a wearer's body in use.

### **Background to the Invention**

Stretchable legwear is available in various forms, from thin nylon or silk tights (sometimes known as "pantyhose") worn as underwear, through woollen tights and long johns worn for warmth, to the leggings and thick tights worn for various sporting and recreational activities, such as running, cycling and horse riding.

It has been found that, in use, the leg parts of such stretchable legwear tend to slip down the legs of a wearer, pulling the panty part down the lower torso of the wearer and causing unsightly and uncomfortable sagging of the stretchable legwear around the wearer's crotch and upper thighs, and requiring the stretchable legwear to be hitched up from time to time.

Tights and stockings have been well known for a long time, as has their tendency to slip down the legs of the wearer in use.

For stockings, this tendency has been addressed in various ways, including by suspending the stockings from a girdle worn around the waist of the wearer, and by providing the tops of the stockings with an internal enhanced friction member to provide a greater frictional engagement between the tops of the stockings and the legs of the wearer than would be provided by the fabric of the stockings.

International Patent Applications Publication Nos. WO 2006/011168 and WO 2010/063581, for example, are concerned with applying elastomeric enhanced friction members to the internal surfaces of the tops of stockings.

These documents suggest that such elastomeric enhanced friction members may also be applied inside the waistbands of tights.

Two better known approaches to address the tendency of underwear tights to slip down the body of the wearer are either to wear panties over the tights, or to cut the leg parts from an old pair of tights, leaving the panty part, and to wear the panty part of the old pair of tights over the panty part of a new pair of tights, so as to tighten the engagement of the panty part of the new pair of tights with the lower torso of the wearer.

It is also known to provide so-called “control tights”, which have a reinforced panty portion that extends, in use, to upper portions of the wearer’s thighs. The reinforced panty portion of such control tights is designed to provide a more attractive shape to the lower torso and upper thighs of the wearer, but may also provide some resistance to the tendency of the tights to slip down the wearer’s body in use.

### **Summary of the Invention**

According to a first aspect of the invention there is provided stretchable legwear made from a stretchable material and comprising a panty part and leg parts attached to the panty part, wherein a proximal portion of each leg part is provided with at least one enhanced friction member that, in use of the stretchable legwear, provides a greater frictional engagement between the proximal portion of each leg part and an upper portion of a thigh of a wearer than the frictional engagement that would be obtained in the absence of the at least one enhanced friction member between the stretchable material of the proximal portion of each leg part and the upper portion of the thigh of the wearer.

The invention therefore provides stretchable legwear, such as tights, the leg parts of which have enhanced friction members that, in use, increase a frictional engagement of the legwear with the upper portions of the wearer’s thighs and thereby resist a tendency of the legwear to slip down the wearer’s legs.

The at least one enhanced friction member may advantageously comprise a band of elastic material, for example in the form of a garter, that, in use, is drawn over a leg part of the stretchable legwear after the stretchable legwear has been pulled on by the wearer.

Preferably, however, the at least one enhanced friction member is attached to the leg part. In this way, the stretchable legwear and the at least one enhanced friction member can easily be pulled on by the wearer in a single operation.

Where the at least one enhanced friction member is attached to the leg part, it is preferably attached to an internal surface of the leg part.

Attachment of the at least one enhanced friction member to an internal surface of the leg part enables the stretchable legwear to better resist a tendency of the stretchable legwear to slip down the wearer's legs, while avoiding an excessive compressive force being exerted on the upper portion of the wearer's thigh, because the material of the at least one enhanced friction member is chosen to have a greater coefficient of friction with the upper portion of the wearer's thigh than the coefficient of friction of the stretchable material of the proximal portion of the leg part with the upper portion of the wearer's thigh.

In preferred embodiments of the invention, the stretchable legwear is tights.

The at least one enhanced friction member may advantageously be formed at least in part from an elastomer, and preferably is formed at least in part from a silicone elastomer.

In one embodiment of the invention, the at least one enhanced friction member is attached to an internal surface of the leg part, and comprises a plurality of pads.

In other embodiments of the invention, the at least one enhanced friction member is attached to the leg part, preferably to an internal surface of the leg part, and comprises at least one band of elastic material, which in use of the tights encircles an upper portion of a wearer's thigh.

In some embodiments of the invention, the leg parts of the stretchable legwear are each of single piece construction and the at least one enhanced friction member is applied directly to the stretchable material of each leg part.

Suitable methods of applying the at least one enhanced friction member directly to the stretchable material of each leg part include bonding with an adhesive or stitching, or embedding a portion of the stretchable material in the enhanced friction member, for example by applying the enhanced friction member in a softened or liquid form to the stretchable material, as in a moulding or serigraphic printing operation, followed by cooling and/or curing.

Where the leg parts are of single piece construction and the at least one enhanced friction member comprises a plurality of pads applied directly to the stretchable material of the leg parts, the pads are drawn into engagement with the thigh of the wearer by the compressive force exerted by the stretchable material. In the case of thin tights, the compressive force exerted by the stretchable material may be insufficient to maintain the pads in engagement with

the wearer's thigh (because such thin tights would otherwise be uncomfortably tight for the wearer on other parts of the wearer's legs or lower torso).

In one such embodiment, therefore, the proximal portion of the leg part is configured to exert, in use, a greater compressive force on the upper portion of the wearer's thigh than the compressive force exerted by a distal portion of the leg part on the other portions of the wearer's leg.

To this end the proximal portion of the leg part may be made from thicker material, e.g. a more dense knit, and/or may be provided with a greater proportion of elastic material, than the distal portion of the leg part.

Alternatively, where the leg parts are of single piece construction, the at least one enhanced friction member may advantageously be applied to a stretchable substrate, which substrate is applied to the proximal portion of the leg part, preferably to an internal surface of the proximal portion of the leg part.

The stretchable substrate is preferably in the form of a band, which in use of the stretchable legwear encircles an upper portion of a wearer's thigh.

The stretchable substrate is chosen to exert a greater compressive force on the wearer's thigh than would be exerted by the stretchable material of the leg parts and therefore, where the substrate is applied to an internal surface of the proximal portion of the leg part, maintains the at least one enhanced friction member in engagement with the wearer's thigh, whilst avoiding the stretchable legwear causing discomfort to the wearer through excessive pressure on other parts of the wearer's legs or lower torso.

In other embodiments of the invention, the leg parts of the stretchable legwear are each of multiple piece construction, with the at least one enhanced friction member being applied to a stretchable substrate that has the form of a band, each leg part being constituted by such a band joined along one edge to the panty part to form the proximal portion of the leg part, and joined along the other edge to a distal portion of the leg part.

The band is preferably joined to the panty part and the distal portion of the leg part by stitching.

The stretchable substrate may advantageously be provided with a pattern. For example, the stretchable substrate may be lace.

In this way, the stretchable substrate may serve to conceal the at least one enhanced friction member.

Alternatively, or in addition, an external decorative band may be applied to the proximal portion of each leg part to conceal the at least one enhanced friction member.

According to a second aspect of the invention, there is provided a kit for producing enhanced stretchable legwear, the kit comprising stretchable legwear made from a stretchable material and comprising a panty part and leg parts attached to the panty part, and at least one enhanced friction member comprising a band of elastic material for wearing with the stretchable legwear around an upper portion of a wearer's thigh to increase a frictional engagement of a proximal portion of a leg part of the stretchable legwear with the upper portion of the wearer's thigh.

The at least one enhanced friction member may advantageously be configured for wearing over the stretchable legwear around an upper portion of a wearer's thigh.

Preferably, however, the at least one enhanced friction member is provided with fastening means, e.g. adhesive tape, for fastening the at least one enhanced friction member to an internal surface of a proximal portion of a leg part of the stretchable legwear.

### **Brief Description of the Drawings**

The invention will now be described, by way of example, with reference to the attached drawing figures, in which:

Figure 1 is a perspective view of a first embodiment of stretchable legwear in accordance with the invention in the form of tights in use;

Figure 2 is a side view of a second embodiment of stretchable legwear in accordance with the invention in the form of tights in use;

Figures 3 and 4 are front and rear views, respectively, of a third embodiment of stretchable legwear in accordance with the invention in the form of tights in use;

Figure 5 is a perspective view of the tights of Figures 3 and 4 in use;

Figure 6 is a perspective view of a fourth embodiment of stretchable legwear in accordance with the invention in the form of tights in use; and

Figure 7 is a perspective view of a fifth embodiment of stretchable legwear in accordance with the invention in the form of tights for toddlers or young children in use.

### **Detailed Description of Embodiments**

Figures 1 to 7 show stretchable legwear in the form of tights. The tights 10 of Figure 1 comprise a panty part 12 with an elasticated waistband 14 and first and second leg parts 16 and 18, respectively. The panty part 12 is made from a stretchable material in the form of a nylon fabric containing Lycra (RTM). The construction and materials of the panty part 12 are conventional and will therefore not be described in detail.

The first leg part 16 has a proximal portion in the form of a band 20 and a distal portion in the form of a tube 22, one end of which is stitched closed to form a foot 24 of the first leg part 16. The band 20 and tube 22 are formed of the same stretchable material as the panty part 12. A first edge of the band 20 is stitched to a leg opening of the panty part 12. The other edge of the band 20 is stitched to the open end of the tube 22. The construction and materials of the tube 22 are conventional and will therefore not be described in detail.

The construction of the second leg part 18 is identical to that of the first leg part 16.

A band 26 of silicone elastomer is attached to the internal surface of the band 20 mid-way between the edges of the band by applying the silicone elastomer in liquid form to the band 20, followed by curing. The band 26 has a thickness of about 1 mm and a width of about 30 mm in its relaxed state and the silicone elastomer is chosen to be translucent, so that the band 26 is not readily visible through the band 20. For illustrative purposes, however, the band 26 has been shown as visible (using dotted lines) in Figure 1.

In use of the tights 10 the band 26 encircles the upper thigh of the wearer and is drawn into engagement with the wearer's upper thigh as a result of the elasticity of the band 26. The tights 10 and their bands 26 would be made available in a range of sizes, a wearer choosing a size of the tights to ensure a firm, but not uncomfortable, engagement of the band 26 with the wearer's upper thigh.

The tights 30 of Figure 2 are of similar construction to the tights 10 of Figure 1, having a panty part 32 and first and second leg parts, of which only the second leg part 34 is visible in Figure 2. The second leg part, which is of identical construction to the first leg part, has a proximal portion in the form of a band 36 joining the panty part 32 to a tube 38. First and second bands 40 and 42 of silicone elastomer are attached to the internal surface of the band 36 in a spaced

apart and parallel relationship. The bands 40 and 42 are about 1 mm thick and have a width of about 15 mm in their relaxed states.

The arrangement of the second embodiment of two bands 40 and 42 of the tights 30 of Figure 2 that are more narrow than the band 26 of the tights 10 of Figure 1 has a first advantage over the first embodiment that the two bands are less likely to trap perspiration between the bands and the wearer's skin. A second advantage over the first embodiment is that in use of the tights, the portion of the skin of the wearer's thigh between the bands 40 and 42 can project slightly between the bands, which projection improves the engagement of the bands with the wearer's upper thigh and increases the resistance of the tights 30 to slipping down the wearer's legs.

The tights 50 of Figures 3 to 5 are of similar construction to those of Figures 1 and 2, but differ in that the bands 52 and 54 joining the panty part 56 to the tubes 58 and 60 have first, second and third bands 62a, 62b, 64a, 64b and 66a, 66b of silicone elastomer attached to their internal surfaces in a spaced apart and parallel relationship. The bands 62a, 62b, 64a, 64b and 66a, 66b are about 1 mm thick and have a width of about 10 mm in their relaxed states.

The arrangement of the third embodiment of three bands 62a, 62b, 64a, 64b and 66a, 66b of the tights 50 of Figures 3 to 5 that are more narrow than the bands 26 of the tights 10 of Figure 1 and the bands 40 and 42 of the tights 30 of Figure 2 has the same advantages over the first and second embodiments, i.e. further reduced likelihood of trapping perspiration and improved engagement of the proximal portions of the leg parts with the wearer's upper thighs.

Turning to Figure 6, a fourth embodiment of tights 70 in accordance with the invention is similar to the tights 10 of Figure 1, each leg part 72 and 74 having a single band 76 and 78, respectively, of silicone elastomer, but the bands 80 and 82, respectively, to which the bands 76 and 78 of silicone elastomer are attached being formed with decorative patterns 84 and 86, which serve to conceal the bands 76 and 78 (shown as visible using dotted lines in Figure 6 for illustrative purposes).

Figure 7 shows a fifth embodiment of tights 90 in accordance with the invention. The tights 90 are made from a stretchable material in the form of a wool, cotton and Lycra (RTM) fabric and comprise a panty part 92 attached to first and second leg parts 94 and 96, respectively.

The first and second leg parts 94 and 96 have respective first and second proximal portions 98 and 100 defined by patterns of pads of silicone elastomer applied to the internal surfaces of the fabric of the leg parts. The pads have been shown as visible for illustrative purposes in Figure

7 but would of course not be readily discernible in use of the tights because they would be inside the tights. One such pad on the first proximal portion 98 is denoted by reference numeral 102, and another such pad on the second proximal portion 100 by reference numeral 104.

The pads of silicone elastomer are circular with a diameter of 10 mm and are arranged in lines around the proximal portions 98 and 100 of the leg parts 94 and 96, which lines are approximately horizontal when the tights are worn and the wearer is standing. The separation of the pads in each line is 20 mm. There are four such lines of pads arranged parallel to one another but with the even numbered lines being displaced relative to the odd numbered lines, such that the pads in adjacent rows form diagonal lines in the manner of the pieces on a draughts board.

The pads are applied as liquid silicone elastomer to the internal surfaces of the leg parts 94 and 96 of the tights by a serigraphic printing process (with the tights turned inside out), followed by curing.

The tights 90 of Figure 7 are intended for use by toddlers and young children, and are sized accordingly.

A prototype of the stretchable legwear of the invention was made by cutting the leg parts from the panty part of a pair of 60 denier tights (composition 92% polyamide, 8% Lycra (RTM), available in the UK from branches of Primark (RTM)). Each of a pair of 80 denier hold up stockings (composition 92% polyamide, 8% Lycra (RTM), available in the UK from branches of Matalan (RTM)), the top portions of which are formed with an internal band of silicone elastomer of around 25 mm in width, was stitched around its open end to one of the leg openings of the panty part of the tights. The resulting tights therefore had, for each leg part, an enhanced friction member in the form of a band of silicone elastomer attached to the internal surface of a proximal portion of the leg part. The prototype tights were worn for a day by the inventor with no discernible slipping of the tights down the inventor's legs.

It will be apparent that the above description relates only to six embodiments of the invention, and that the invention encompasses other embodiments as defined by the claims set out hereafter.



## CLAIMS

1. Stretchable legwear made from a stretchable material and comprising a panty part and leg parts attached to the panty part, wherein a proximal portion of each leg part is provided with at least one enhanced friction member that, in use of the stretchable legwear provides a greater frictional engagement between the proximal portion of each leg part and an upper portion of a thigh of a wearer than the frictional engagement that would be obtained in the absence of the at least one enhanced friction member between the stretchable material of the proximal portion of each leg part and the upper portion of the thigh of the wearer.
2. Stretchable legwear according to claim 1, wherein the at least one enhanced friction member comprises a band of elastic material, that, in use, is drawn over a leg part of the stretchable legwear after the stretchable legwear has been pulled on by the wearer.
3. Stretchable legwear according to claim 1, wherein the at least one enhanced friction member is attached to the leg part.
4. Stretchable legwear according to claim 3, wherein the at least one enhanced friction member is attached to an internal surface of the leg part.
5. Stretchable legwear according to any preceding claim, wherein the stretchable legwear is tights.
6. Stretchable legwear according to any preceding claim, wherein the at least one enhanced friction member is formed at least in part from an elastomer.
7. Stretchable legwear according to any preceding claim, wherein the at least one enhanced friction member is formed at least in part from a silicone elastomer.
8. Stretchable legwear according to claim 4 or any claim dependent therefrom, wherein the at least one enhanced friction member comprises a plurality of pads.

9. Stretchable legwear according to claim 3 or any claim dependent therefrom, wherein the at least one enhanced friction member comprises at least one band of elastic material, which in use of the tights encircles an upper portion of a wearer's thigh.
10. Stretchable legwear according to claim 3 or any claim dependent therefrom, wherein the leg parts are each of single piece construction and the at least one enhanced friction member is applied directly to the stretchable material of each leg part.
11. Stretchable legwear according to claim 4 or any claim dependent therefrom, wherein the leg parts are each of single piece construction and the proximal portion of the leg part is configured to exert, in use, a greater compressive force on the upper portion of the wearer's thigh than the compressive force exerted by a distal portion of the leg part on the other portions of the wearer's leg.
12. Stretchable legwear according to claim 3 or any claim dependent therefrom, wherein the leg parts are each of single piece construction and the at least one enhanced friction member is applied to a stretchable substrate, which substrate is applied to the proximal portion of the leg part.
13. Stretchable legwear according to claim 12, wherein the stretchable substrate is in the form of a band, which in use of the stretchable legwear encircles an upper portion of a wearer's thigh.
14. Stretchable legwear according to claim 3 or any of claims 4 to 9 when dependent from claim 3, wherein the leg parts are each of multiple piece construction, with the at least one enhanced friction member being applied to a stretchable substrate that has the form of a band, each leg part being constituted by such a band joined along one edge to the panty part to form the proximal portion of the leg part, and joined along the other edge to a distal portion of the leg part.
15. Stretchable legwear according to claim 14, wherein the band is joined to the panty part and the distal portion of the leg part by stitching.

16. Stretchable legwear according to any of claims 10 to 15, wherein the stretchable substrate is provided with a pattern.
17. Stretchable legwear according to any preceding claim, wherein an external decorative band for concealing the at least one enhanced friction member is applied to the proximal portion of each leg part.
18. A kit for producing enhanced stretchable legwear, the kit comprising stretchable legwear made from a stretchable material and comprising a panty part and leg parts attached to the panty part, and at least one enhanced friction member comprising a band of elastic material for wearing with the stretchable legwear around an upper portion of a wearer's thigh to increase a frictional engagement of a proximal portion of a leg part of the stretchable legwear with the upper portion of the wearer's thigh.
19. A kit according to claim 18, wherein the at least one enhanced friction member is configured for wearing over the stretchable legwear around an upper portion of a wearer's thigh.
20. A kit according to claim 18, wherein the at least one enhanced friction member is provided with fastening means for fastening the at least one enhanced friction member to an internal surface of a proximal portion of a leg part of the stretchable legwear.
21. Stretchable legwear substantially as hereinbefore described and with reference to the accompanying drawings.
22. An enhanced friction member substantially as hereinbefore described and with reference to the accompanying drawings.



**Application No:** GB1507285.3

**Examiner:** Mr Philip J. Roe

**Claims searched:** 1-20

**Date of search:** 4 September 2015

**Patents Act 1977: Search Report under Section 17**

**Documents considered to be relevant:**

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1 - 20	JP H10226903 A (OAI KOGYO KK) see WPI Abstract Accession No. 1998/51527, and all figures.
X	1 - 20	DE 20117427 U (FU CHU KNITTING CO) see WPI Abstract Accession No. 2002/149159, and all figures.
X	1 - 20	GB 1215408 A (GLOBOTEX) see whole document, especially col 3 lines 46-55.
X	1 - 20	GB 1214549 A (GLOBOTEX) see whole document, especially col 3 lines 85-92.
X	1 - 20	US 4390999 A (LAWSON et al) see whole document
X	1 - 20	US 2013/0192311 A (ALFORD et al) see whole document, especially figure 4.
A	-	GB 0441397 A (MYERS) see whole document, especially page 1 lines 34-40
A	-	GB 2418594 A (KO) see whole document.
A	-	GB 2246281 A (BREVET HOSPITAL PRODUCTS) see whole document.

**Categories:**

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.



**Field of Search:**

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC<sup>X</sup> :

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Worldwide search of patent documents classified in the following areas of the IPC

A41B; A41F
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The following online and other databases have been used in the preparation of this search report

EPODOC, WPI
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**International Classification:**

Subclass	Subgroup	Valid From
A41B	0011/14	01/01/2006
A41F	0011/16	01/01/2006