

FAR-INFRARED (FIR) EMITTING PARTICLES EMBEDDED COMPRESSION GARMENT FOR THE LIMBS

5 FIELD OF TECHNOLOGY

The present invention relates generally to a compression garment derived from a combination of weaving technique and further embedded with FIR emitting particles. Such garment is designed for improving body fluid circulation at the limbs and provide foot arch
10 support thereto.

BACKGROUND OF THE INVENTION

Compression garments provide support for wearer who have poor circulation. For example,
15 compression garments worn on the legs can help prevent deep vein thrombosis and reduce swelling. In order to support the body, many compression garments are required to be worn for a long period of time. However, compression garments are usually made of thick and rough fabrics. This may cause discomfort or skin allergies upon prolonged usage. Further, in order to achieve compression effect on targeted area, some compression garments may
20 require extra help in wearing. This may be inconvenient to some wearer. The present invention provides an improved garment which is derived from a combination of weaving techniques so as to achieve the desired compression effect when worn. Advantageously, the present invention incorporates FIR emitting particles into the garment to enhance circulation of wearer.

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SUMMARY OF THE INVENTION

One object of the present invention is to provide a compression garment having pressurized zones for improving body fluid circulation at the limbs, more particularly the lower leg and

foot area, but not limited thereto. In the preferred embodiment, a combination of weaving patterns on a single garment provides features including elasticity, anti-slip, breathability, and comfort.

- 5 At least one of the preceding objects is met, in whole or in part, by the present invention, in which one of the embodiments of the present invention is a garment having a compressive effect when worn by a user, the garment being derived from fabric embedded with far-infrared (FIR) emitting particles and wherein said garment comprises at least two distinct zones each of which is adapted to surround a limb of the user and achieve said
- 10 compressive effect, one of the distinct zones comprises a lower leg section which is elasticated so as to provide a first compressive effect, when worn, and another zone of the distinct zones comprising a foot section which is elasticated between toe and heel portions of the foot section so as to provide a second compressive effect, when worn.
- 15 Preferably, the first and the second compression effects are different from one another. For instance, the first compression effect ranges from 15 to 24 hpa whereas the second compression effect ranges from 16 to 28 hpa.

Preferably, the garment is adapted with a combination of plain and ribbed weaving.

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In the preferred embodiment, the garment is further adapted with mesh weaving.

Preferably, the garment is adapted with anti-slip weaving, such as a tuck knitting.

- 25 Another object of the present invention is to provide a compression garment incorporated with FIR emitting particles for enhancing body fluid circulation of a wearer. More particularly, fabric used for the garment is derived from yarns spun with fibers selected from polyester, cotton, rayon, polyurethane, nylon, or a combination of any two of more thereof.

Preferably, the yarns are spun with fibers derived from 38% to 42 % of polyester, 38% to 42 % of cotton, 8% to 11 % of rayon, 3% to 6% of polyurethane, and 1% to 2 % of nylon. Particularly, the far-infrared (FIR) emitting particles are compounded into fibres, preferably into rayon or nylon.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention is illustrated, although not limited, by the following description of embodiments made with reference to the accompanying drawings in which:

Figure 1 is a drawing of a side view of the compression garment in the first embodiment of the present invention.

Figure 2 is a drawing of a perspective view of the compression garment as shown in Figure 1.

Figure 3 shows knittings which are combined to provide weaving patterns of 103, 104 and 109 from the first embodiment of the present invention.

Figure 4 shows knittings which are combined to provide weaving pattern of 105 from the first embodiment of the present invention.

Figure 5 shows knittings which provides to weaving pattern of 106 from the first embodiment of the present invention.

Figure 6 shows knittings which are combined to provide weaving pattern of 107 from the first embodiment of the present invention.

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Figure 7 shows knittings which are combined to provide weaving pattern of 108 from the first embodiment of the present invention.

Figure 8 shows knittings which are combined to provide weaving pattern of 110 from the first embodiment of the present invention.

Figure 9 is a drawing of the compression garment in the second embodiment of the present invention.

Figure 10 shows a ribbed weaving pattern of 203 and 204 from the second embodiment of the present invention.

Figure 11 shows a mesh weaving pattern of 206 from the second embodiment of the present invention.

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Figure 12 shows another ribbed weaving pattern of 205 from the second embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

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Exemplary, non-limiting embodiments of the invention will be disclosed. However, it is to be understood that limiting the description to the preferred embodiments of the invention is merely to facilitate discussion of the present invention and it is envisioned that those skilled in the art may devise various modifications without departing from the scope of the appended claim.

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The present invention provides a slip-on compression sock (100 or 200) as shown in Figure 1 to 12. The sock is mainly made up of a combination of weaving methods at different sections. Different weaving methods offer a different level of elasticity (hence,

compression effect) and breathability. Meanwhile, the sock is derived from fabric incorporated with FIR emitting particles. In view of this, the weaving combination and fabric used herein works in association with each other to offer comfort and support to the leg of a wearer while reducing the symptoms due to venous insufficiency, lack of fluid
5 circulation, or the like.

A first embodiment of the present invention provides male version of compression socks male 100 whereas a second embodiment of the present invention provides a female version of compression socks 200.

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Figure 1 and 2 shows the first embodiment of the present invention. According to Figure 1 and 2, the sock 100 comprises a foot section 101 and a lower leg section 102. The sock 100 are designed such that it exerts substantial compression effect on a wearer. More particularly, the sock 100 comprises at least two distinct zones configured with elasticated
15 feature. One of the distinct zone (denoted by 'D' in Figure 1) is at the lower leg section 102 which is elasticated so as to provide a first compressive effect. Another distinct zone (denoted by 'B' in Figure 1) is at the foot section 101 which is elasticated between toe and heel portions of the foot section so as to provide a second compressive effect, especially at the foot arch, when worn.

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Accordingly, the first and the second compression effects can be different from one another. Preferably, the second compression effect are often higher than the first compression effect so as to provide additional support for foot arch. For instance, the first compression effect ranges from 15 to 24 hpa whereas the second compression effect ranges from 16 to 28 hpa.

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As aforementioned, the elasticity of the sock is derived from weaving combination and fabric used. In the present invention, each section of the sock may comprised of one or a combination of knittings which intertwine into weaving patterns. In some circumstances, more than one type of knittings can be overlapped or made complementary to each other.

If necessary, an extra thread can be inserted thereinto (known as 'insert thread' hereinafter) so as to achieve the weaving pattern. In the present invention, a front thread and a back thread can be intertwined close to each other in a plain knitting. Alternatively, a front thread and a back thread can be knitted spaced apart in an arranged manner to achieve a certain pattern. Preferably, an insert thread can be used in between the front and back threads so as to create ribbed or spiral features.

In the first embodiment, also referring to Figure 1, the lower leg section 102 is derived from weaving patterns denoted by 103, 104, 105, 106 and 107. Weaving patterns denoted by 103 and 104 are derived from a combination of plain knitting and a '3 by 1' transverse knitting (as shown in Figure 3) hence providing a ribbed feature. More particularly, weaving pattern denoted by 103 has a double welt feature at edges. Weaving pattern denoted by 105 is derived from a combination of plain knitting and '1 by 1 transverse' '2 by 2 vertical' spiral knitted mesh (as shown in Figure 4). Therefore, weaving pattern denoted by 105 offers breathability when worn. The combination of weaving patterns denoted by 104 and 105 across the sock offers extra elasticity so as to obtain the first compression effect when worn. Weaving pattern denoted by 106 is derived from plain knitting (as shown in Figure 5). It shall be understood that weaving pattern denoted by 106 extends partially to the foot section 101. Further, weaving pattern denoted by 107 is derived from tuck knitting (as shown in Figure 6) to obtain an anti-slip feature on the sock. It shall be understood that weaving pattern denoted by 107 extends to the foot section 101 so as to substantially surrounds the ankle of a wearer when worn.

Further, the foot section 101 is derived from weaving patterns denoted by 106, 107, 108, 109, and 110. As aforementioned, weaving pattern denoted by 106 is derived from plain knitting (as shown in Figure 5) extended from the lower leg portion 102. Weaving pattern denoted by 108 is derived from mesh knitting which comprises a combination of '1 by 1 transverse' '2 by 2 vertical' spiral knitted mesh on plain knitted mesh (see Figure 7). Therefore, weaving pattern denoted by 108 also offers breathability when worn. Further,

- weaving pattern denoted by 109 is derived from a combination of plain knitting and a '3 by 1' transverse knitting (as shown in Figure 3) hence providing a ribbed feature. A combination of weaving patterns denoted by 108 and 109 across the sock offers extra elasticity so as to obtain the second compression effect, especially at foot arch, when worn.
- 5 Further, weaving pattern denoted by 110 derived from plain knitting and 1 x 1 seed knitting (see Figure 8) provides a ribbed feature which offers breathability and flexibility at upper foot area when worn. Further, weaving pattern denoted by 107 is also derived from tuck knitting (as shown in Figure 6) to obtain an anti-slip feature at toes part of the sock.
- 10 Figure 9 shows the second embodiment of the present invention. According to Figure 9, the sock 200 comprises a foot section 201 and a lower leg section 202. The sock 200 are designed such that it exerts substantial compression effect on a wearer. More particularly, the sock 200 comprises at least two distinct zones configured with elasticated feature. One of the distinct zone is at the lower leg section 202 which is elasticated so as to provide a
- 15 first compressive effect. Another distinct zone is at the foot section 201 which is elasticated between toe and heel portions of the foot section so as to provide a second compressive effect, especially at the foot arch, when worn.

In the second embodiment, also referring to Figure 9, the lower leg section 202 is derived

20 from weaving patterns denoted by 203, 204 and partially 205. It shall be noted that weaving pattern denoted by 205 extends to the foot section 201. Weaving patterns denoted by 203 and 204 are derived from a combination of plain knitting and a '3 by 1' transverse knitting (combined and shown in Figure 10) hence providing a ribbed feature (refer Figure 9). More particularly, weaving pattern denoted by 203 has a double welt feature at edges. The

25 weaving patterns denoted by 204 across the lower leg section 202 offers extra elasticity so as to obtain the first compression effect when worn. Further, weaving pattern denoted by 205 is derived from a combination of plain knitting and '1 by 1 transverse' '2 by 2 vertical' spiral knitted mesh (as shown in Figure 12). Therefore, weaving pattern denoted by 205 offers breathability when worn.

Further, the foot section 201 is derived from weaving patterns denoted by 204, 205 and 206. It shall be noted that the weaving pattern denoted by 205 extends from the lower leg section 202 and offers breathability when worn. The weaving patterns denoted by 204
5 across the foot section 201 offers extra elasticity so as to obtain the second compression effect when worn. On the other hand, weaving pattern denoted by 206 is preferably derived from plain stitches (as shown in Figure 11).

In both embodiments, the first and the second compression effects can be different from
10 one another. Preferably, the second compression effect are often higher than the first compression effect so as to provide additional support for foot arch. For instance, the first compression effect ranges from 15 to 24 hpa whereas the second compression effect ranges from 16 to 28 hpa. Furthermore, the compression effects for male and female wearer may be different. Preferably, the compression effects of a sock for female has relatively higher
15 compression effects than those for the male.

The fabric used to produce the sock 100, 200 are mainly derived from yarns spun with fibers selected from polyester, cotton, rayon, polyurethane, nylon, or a combination of any two of more thereof. Further in particular, the yarns are spun with fibers derived from 38%
20 to 42 % of polyester, 38% to 42 % of cotton, 8% to 11 % of rayon, 3% to 6% of polyurethane, and 1% to 2 % of nylon. The far-infrared (FIR) emitting particles are compounded into fibres, preferably rayon or nylon, before being spun into yarns. Hence, the FIR emitting particles are substantially spreaded throughout the sock.

25 The present invention may be embodied in other specific forms without departing from its essential characteristics. The described embodiments are to be considered in all aspects only as illustrative and not restrictive. The scope of the invention is, therefore indicated by the appended claims rather than by the foregoing description. All changes, which come

within the meaning and range of equivalency of the claims, are to be embraced within their scope.

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CLAIMS

1. A garment having a compressive effect when worn by a user, the garment being knitted from fabric embedded with far-infrared (FIR) emitting particles and wherein said garment comprises at least two distinct zones each of which is adapted to surround a limb of the user and achieve said compressive effect, one of the distinct zones comprises a lower leg section which is elasticated so as to provide a first compressive effect, when worn, and another zone of the distinct zones comprising a foot section which is elasticated between toe and heel portions of the foot section so as to provide a second compressive effect, when worn, in which the garment is made up of a combination of plain and ribbed weaving derived from knitting which intertwine into overlapping or complementary weaving patterns in order to provide compression, comfort and flexibility when worn, whereby the weaving at lower leg section comprises weaving patterns at cuff, back of leg, body and gusset of the section, in which the weaving pattern at cuff is a combination of plain knitting and '3 by 1' transverse knitting which provides a ribbed feature; the weaving pattern at back of leg is a combination of plain knitting and '1 by 1 transverse' '2 by 2 vertical' spiral knitted mesh; the weaving pattern at body of the sock is plain knitting while the weaving pattern at gusset of the sock is tuck knitting whereas the weaving at foot section comprises weaving patterns at body, gusset, instep, sole arch and mid-instep of the section, in which the weaving pattern at the body of the foot section is plain knitting; the weaving pattern at the gusset of the sock is tuck knitting; the weaving pattern at the instep of the sock is mesh knitting which comprises a combination of '1 by 1 transverse' '2 by 2 vertical' spiral knitted mesh on plain knitted mesh; the weaving pattern at the sole arch of the sock is a combination of plain knitting and a '3 by 1' transverse knitting while the weaving pattern at the mid-instep of the sock is plain knitting and 1 x 1 seed knitting.

2. The garment according to claim 1, wherein the first and the second compression effects are different from one another.
- 5 3. The garment according to claim 1 or 2, wherein the first compression effect ranges from 15 to 24 hpa.
4. The garment according to any one of claims 1 to 3, wherein the second compression effect ranges from 16 to 28 hpa.
- 10 5. The garment according to any one of claims 1 to 4 is adapted with mesh weaving.
6. The garment according to any one of claims 1 to 5 is adapted with anti-slip weaving.
- 15 7. The garment according to any one of claims 1 to 6, wherein the yarns are spun with fibers derived from 38% to 42 % of polyester, 38% to 42 % of cotton, 8% to 11 % of rayon, 3% to 6% of polyurethane, and 1% to 2 % of nylon.
- 20 8. The garment according to any one of claims 1 to 7, wherein the far-infrared (FIR) emitting particles are compounded into the rayon or nylon fibres.