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(57)

ABSTRACT

A sock comprising a toe section, a heel section, and a mid-section between the toe section and the heel section, wherein the mid-section has a foot bottom portion and a foot upper or instep portion, and wherein at least a part of the foot bottom portion is knit from two or more different yarn types used in an alternating sequence along the longitudinal direction of the mid-section, wherein the different yarn types have different stretch properties. By using the different yarn types in the foot bottom or sole portion between the toe and heel section in an alternating sequence along the longitudinal direction of the mid-section in combination, one can create a sock which has a higher stretch characteristic than other socks.

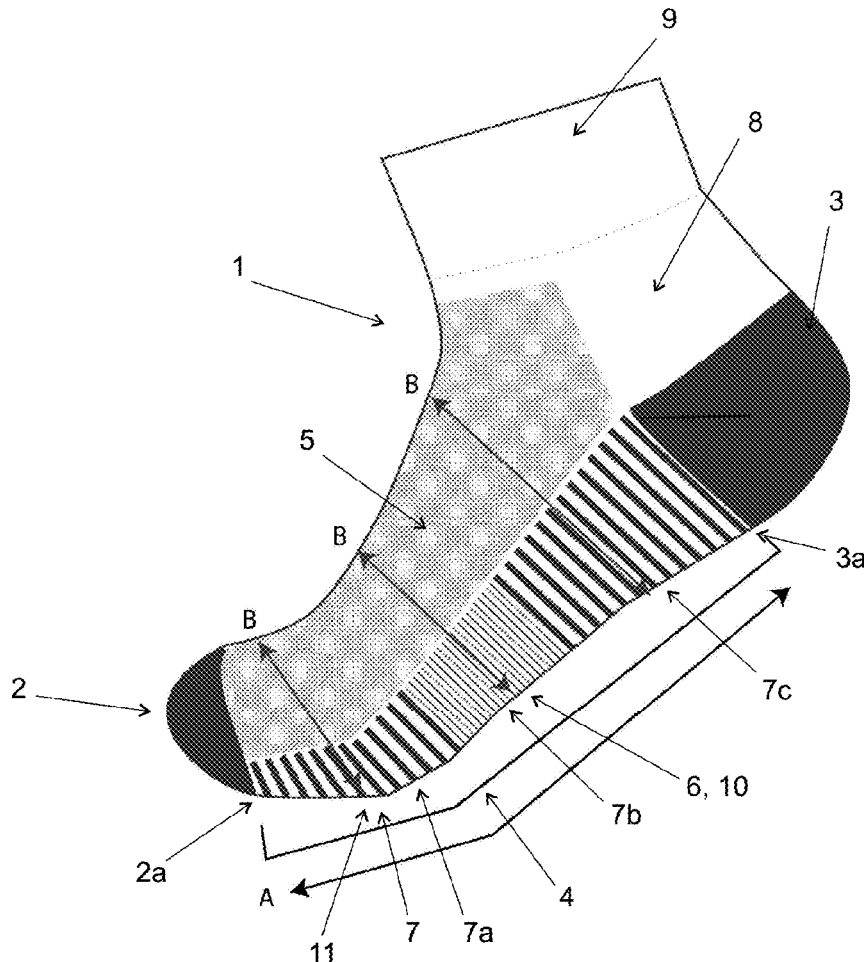


FIG. 1a

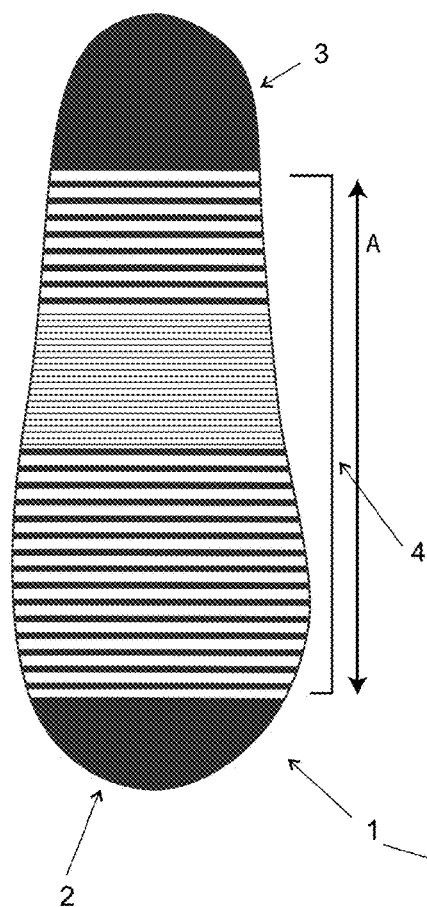


FIG. 1b

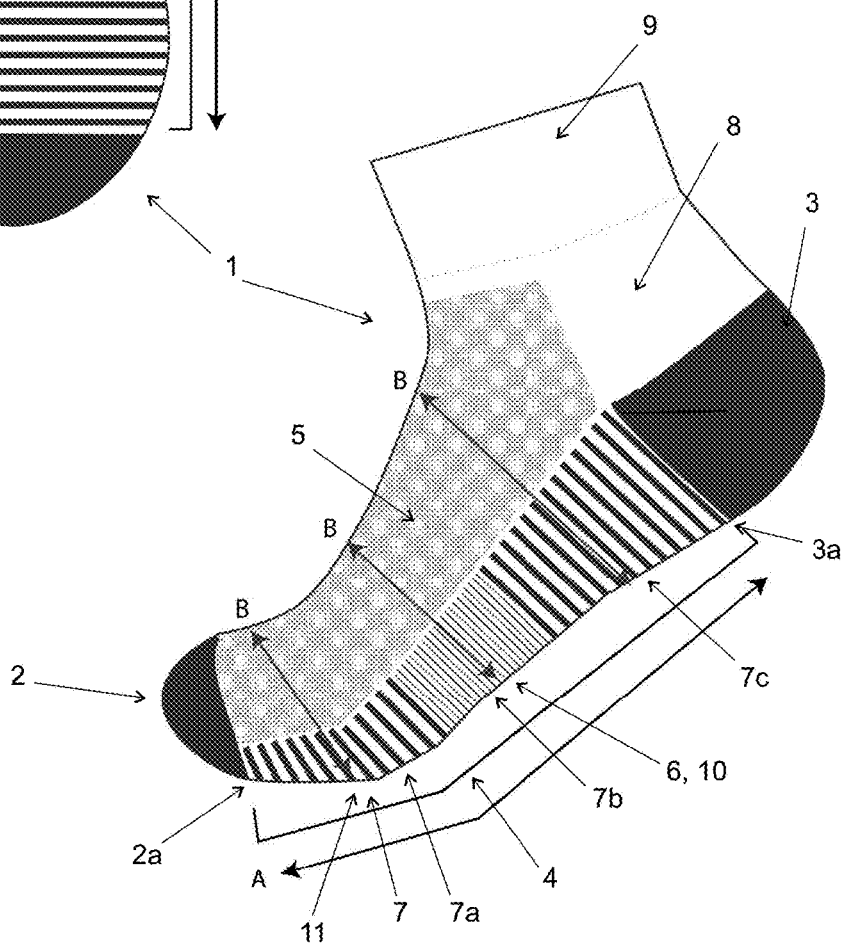


FIG. 2

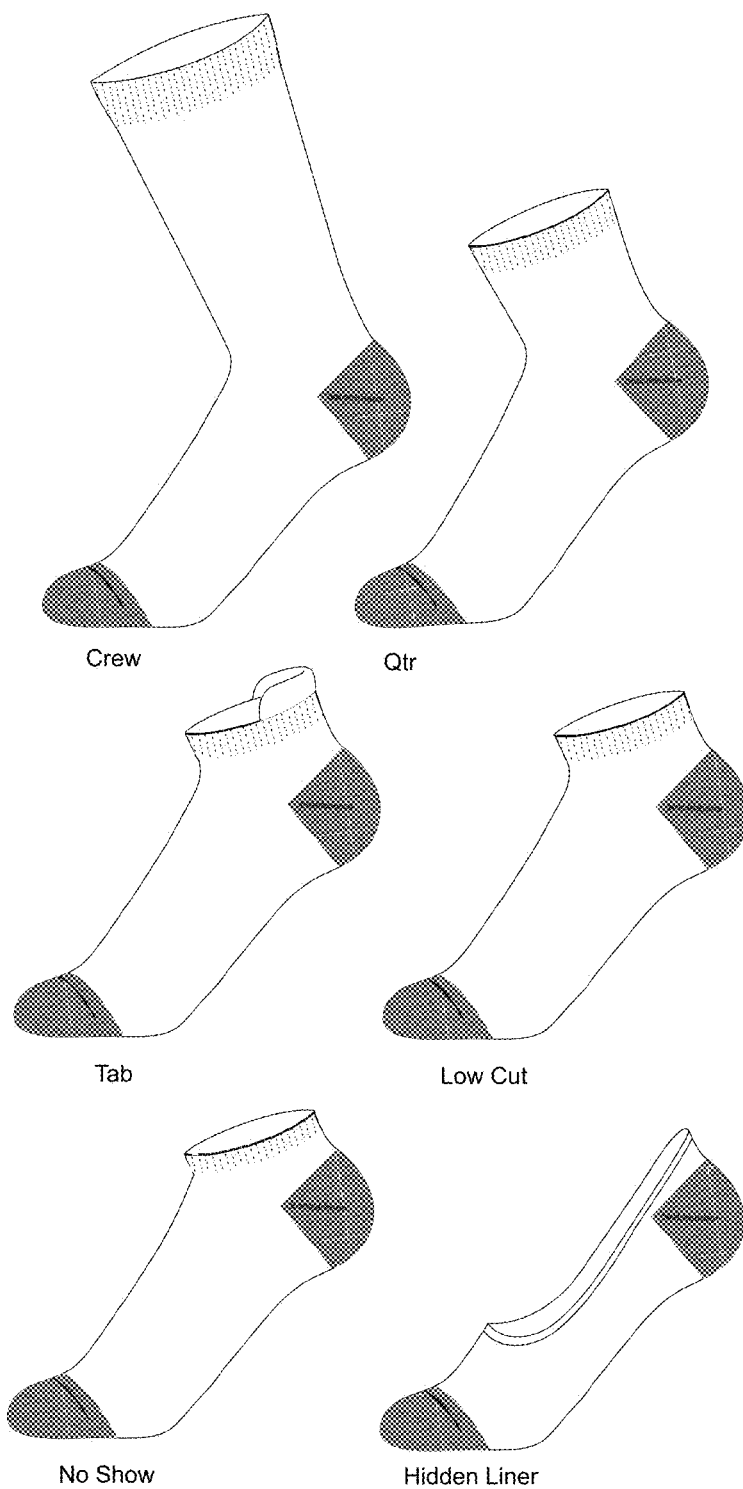
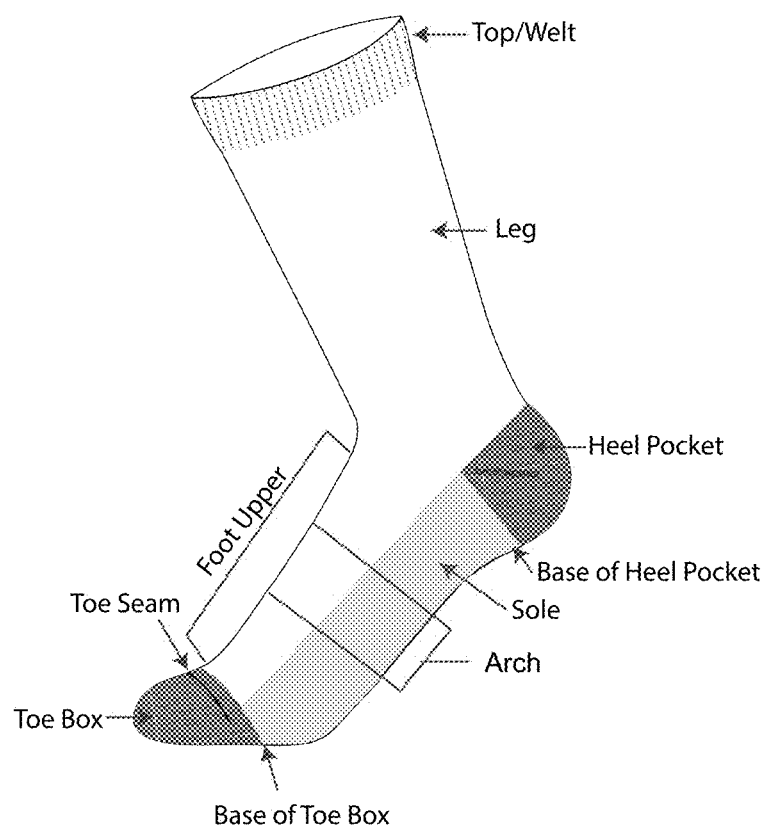


FIG. 3



SOCK

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims benefit of U.S. Provisional Patent Application Ser. No. 62/465,200, filed Mar. 1, 2017, herein incorporated by reference in its entirety.

TECHNICAL FIELD

[0002] The presently disclosed subject matter relates to a sock.

BACKGROUND

[0003] Socks of various types are known. FIG. 2 shows a number of different types of socks including (in the order from top to bottom and left to right) a crew sock, a quarter sock, a tab sock, a low-cut sock, a no-show sock and a hidden liner sock. Another type of sock (not shown) is a knee-high or over-the-calf sock. The presently disclosed subject matter is applicable to all these types of socks.

[0004] FIG. 3 shows, using a crew sock as an example, the typical portions of a sock. These include a toe box that is made to completely cover a wearer's toes, a heel pocket, a mid-section extending between the base of the toe box and the base of the heel pocket to cover the wearer's foot, i.e. at least the sole and a part of the instep portion. The mid-section includes a foot upper or instep portion and a foot bottom or sole portion. Depending on the type of sock it has an ankle section above the heel pocket and a leg section above the ankle section. The hidden liner sock has a shortened foot upper and no ankle section.

[0005] In a typical sock, the ankle section, the mid-section, and the toe-section or toe box are generally made using a consistent body yarn and a plaiting yarn to give the sock shape and stretch properties. Socks are knit to be sized to fit sock industry fit standards, for example as determined by the National Association of Hosiery Manufacturers (NAHM) in the U.S., which correspond with shoe sizes.

[0006] To increase the stretch characteristics of the socks in both a horizontal direction and a vertical direction to accommodate a larger range of shoe sizes, US 2013/0192311 A1 proposes to form a relatively wide stretch panel that extends between the heel section and the toe section about the entire circumference of the mid-section, i.e. which extends as a band in the sole portion and in the instep portion approximately where the arch of the foot is located, and to knit the stretch panel with a different yarn and in a different way than the ankle section, the heel section, and the toe section. Specifically, the yarn used in the stretch panel of the sock has a higher denier of spandex in a range from 1.75 to 4.5 times than the yarn used in the ankle and toe sections. In addition, the knitting machine lengthens the loop of the stitches in the stretch panel in order to loosen the cross stretch within that section.

[0007] While this solution will generate a larger stretch, the concept is not applicable to socks that do not have a cushioning effect because it necessarily involves the use of terry loops in the stretch panel.

SUMMARY

[0008] It is the object of the presently disclosed subject matter to provide a sock that has a large stretch and thus an increased fit range and a wide field of application including

flat-knit structures. This and other objects are achieved in whole or in part by the presently disclosed subject matter.

[0009] In some embodiments, the presently disclosed subject matter provides a sock, comprising a toe section, a heel section, and a mid-section between the toe section and the heel section, wherein the mid-section has a foot bottom portion and a foot upper or instep portion, and wherein at least a part of the foot bottom portion is knit from two or more different yarn types used in an alternating sequence along the longitudinal direction of the mid-section, wherein the different yarn types have different stretch properties.

[0010] By using the different yarn types in the foot bottom or sole portion between the toe and heel section in an alternating sequence along the longitudinal direction of the mid-section in combination, one can create a sock which has a higher stretch characteristic than other socks. The stretch is distributed more evenly over the length of the sole, preferably over substantially the entire length thereof. The enhanced and more evenly distributed stretch properties enable the sock to fit a broader range of wearers with different foot sizes and/or may accommodate those with growing feet, such as children. Thus, the number of different socks produced and stocked can be reduced. Further, the concept of the presently disclosed subject matter is applicable also to socks having a flat-knit sole.

[0011] In some embodiments, the foot upper portion is formed with a mesh panel created by an open stitch maintained by an additional elastomeric yarn. This aspect further enhances the stretch characteristics of the sock.

[0012] In some embodiments, the two or more different yarn types used in the alternating sequence on the foot bottom or sole portion form stripe-like sections extending in the width direction of the mid-section. The stripe-like sections can form a repeatable pattern or zones with one or several different repeatable patterns along the longitudinal direction of the mid-section to suit the stretch requirements at different parts of the foot.

[0013] In some embodiments, the stripe-like sections formed by the alternating sequence of the two or more different yarn types are arranged so as to extend at least over the ball of the foot and the base of the foot of a wearer, preferably, however, over the substantially entire length of the foot bottom portion or sole from a base of the toe section or toe box to a base of the heel section or heel pocket.

[0014] In some embodiments, the two or more different yarn types include a body yarn, optionally spun or filament and not textured, and a texturized filament yarn.

[0015] In some embodiments, the texturized filament yarn is formed in conjunction with spandex and/or rubber material.

[0016] In some embodiments, the body yarn is formed in conjunction with spandex and/or rubber in a lower amount than the texturized filament yarn.

[0017] In some embodiments, the foot bottom portion or sole of the sock has an overall flat knit structure or a cushioned structure with terry loops.

[0018] In some embodiments, the sock has, as a result of the yarn sequential combination, at least 110%, optionally 110%-150% and further optionally 130%-150%, stretch in the longitudinal direction of the mid-section, and at least 120% stretch in the width direction of the mid-section as compared to a standard sock of the same relaxed size.

[0019] In some embodiments, the different yarn types used in the alternating sequence also differ from each other in

color and/or shade. This aspect provides a unique aesthetic appearance and visualizes the different stretch characteristics of the different yarns in the repeated pattern along the sole.

[0020] In some embodiments, depending on the type of sock, the sock has an ankle section and a leg section.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] The presently disclosed subject matter will now be described by reference to the attached drawings on the basis of a representative embodiment. In the drawings:

[0022] FIG. 1a shows a sock according to an embodiment of the presently disclosed subject matter in a foot bottom view;

[0023] FIG. 1b shows the sock of FIG. 1a in a side view as if on a foot of a wearer;

[0024] FIG. 2 shows a number of different types of socks to which the presently disclosed subject matter is applicable; and

[0025] FIG. 3 shows, using a crew sock as an example, the typical portions of a sock.

DETAILED DESCRIPTION

[0026] The sock 1 according to an embodiment of the presently disclosed subject matter shown in FIGS. 1a and 1b has a toe section 2, in some embodiments, in the form of a toe box, a heel section 3, in some embodiments, in the form of a heel pocket, and a mid-section 4 between the toe section 2 and the heel section 3, more precisely between a base 2a of the toe box and a base of the heel pocket. The mid-section 4 has a foot bottom portion or sole portion 6 and a foot upper or instep portion 5 (i.e. the area facing upwards while standing and including the arched part of the foot between the toes and the ankle). The boundaries between these portions are substantially as shown in FIG. 3 in connection with a typical prior art crew sock. As the presently disclosed subject matter is applicable to various types of socks as shown in FIG. 2 including a knee-high or over-the-calf sock, it may further include an ankle section 8 and a leg section 9 although these sections may not be required if the type of sock is a hidden liner type sock, a no-show sock or a low-cut type sock.

[0027] At least a part of the foot bottom portion or sole 6, in some embodiments, the entire sole from the base 2a of the toe box 2 to the base 3a of the heel pocket 3 is knit from two or more different yarn types used in an alternating sequence, for example in one or more regular patterns and/or a randomized structure, along the longitudinal or length direction A of the mid-section and foot, wherein the different yarn types have different stretch properties.

[0028] The two or more different yarn types include a body yarn, in some embodiments spun or filament and not textured, and a texturized filament yarn. The texturized filament yarn is formed in conjunction with spandex and/or rubber material. The body yarn is formed in conjunction with spandex and/or rubber in a lower amount than the texturized filament yarn to create the different stretch properties. The different yarn types may also differ from each other in color and/or shade to produce a unique optical effect that highlights the function of different stretch along the sole of the sock. An example for the body yarn is yarn between one ply 8 cotton count and 32 cotton count. An example for the texturized filament yarn or stripe yarn is 2 plies of 100

denier texturized nylon or a plaiting yarn having 30 denier spandex core with a covering yarn of either texturized nylon or polyester in deniers ranging from 70 to 150 denier.

[0029] The two or more different yarn types used in the alternating sequence on the foot bottom portion 6 form stripe-like sections having a certain width in the longitudinal direction A and extending in the width direction B of the mid-section 4. The extension in the width direction of the entire stripe does not necessarily have to be substantially perpendicular to the longitudinal direction A (as shown in the embodiment of FIG. 1a,1b) but can be inclined in a sense that it includes a component extending in the width direction. The width of the stripe-like sections does not have to be uniform but can be different between the different types of yarns and can be even different between the yarn of the same type depending on the location on the sole.

[0030] The stripe-like sections formed by the alternating sequence of the two or more different yarn types are arranged so as to preferably extend at least over the ball 11 of the foot and the base or center or arch 10 of the foot of a wearer, in some embodiments. In some embodiments and in order to maximize the stretch the stripe-like sections formed by the different yarn types are formed over the substantially entire length of the foot bottom portion 6 from the base 2a of the toe section or toe box 2 to the base 3a of the heel section or heel pocket 3.

[0031] As mentioned above the stripe-like sections formed by the different yarn types may form one or more pattern(s) or pattern zones 7a,7b,7c along the longitudinal direction of the mid-section 4 which can be repeated (in the sock according to the embodiment the patterns 7a and 7c adjacent to the toe box 2 and the heel pocket 3 are identical and the pattern 7b at the arch or base of the foot is different and is formed of stripe-like sections of a more narrow width than those in the other patterns 7a, 7c. This is only an example where different patterns of widths are used but the sock can include the same pattern of widths of the stripe-like sections in the entire sole portion from the base of the toe box to the base of the heel pocket or in one or more sections thereof interrupted with sections of a different yarn and/or a different width.

[0032] The foot bottom portion or sole 6 of the sock 1 may in some embodiments have an overall flat knit structure but may also have a cushioned structure with terry loops if cushioning is desired, i.e. in case of sport socks.

[0033] In order to increase the stretch characteristic, the foot upper portion 5 can be formed with a mesh panel created by an open stitch maintained by an additional elastomeric yarn.

[0034] The presently disclosed subject matter has been described in connection with an embodiment shown in FIGS. 1a,1b. This embodiment is of course only exemplary to explain the concept of the presently disclosed subject matter and modifications can be made within the scope of the presently disclosed subject matter defined by the appended claims. The sock of the presently disclosed subject matter in particular can be of any one of the different types shown in FIG. 2 including the knee-high or over-the-calf type.

[0035] It will be understood that various details of the presently disclosed subject matter may be changed without departing from the scope of the presently disclosed subject

matter. Furthermore, the foregoing description is for the purpose of illustration only, and not for the purpose of limitation.

What is claimed is:

1. A sock comprising

a toe section, a heel section, and a mid-section between the toe section and the heel section,

wherein the mid-section has a foot bottom portion and a foot upper or instep portion, and

wherein at least a part of the foot bottom portion is knit from two or more different yarn types used in an alternating sequence along the longitudinal direction of the mid-section, wherein the different yarn types have different stretch properties.

2. The sock according to claim 1,

wherein the foot upper portion is formed with a mesh panel created by an open stitch maintained by an additional elastomeric yarn.

3. The sock according to claim 1,

wherein the two or more different yarn types used in the alternating sequence on the foot bottom portion form stripe-like sections extending in the width direction of the mid-section.

4. The sock according to claim 2,

wherein the two or more different yarn types used in the alternating sequence on the foot bottom portion form stripe-like sections extending in the width direction of the mid-section.

5. The sock according to claim 3,

wherein the stripe-like sections formed by the alternating sequence of the two or more different yarn types are arranged so as to extend at least over the ball of the foot and the base of the foot of a wearer.

6. The sock according to claim 3,

wherein the stripe-like sections formed by the different yarn types are formed over the substantially entire length of the foot bottom portion from a base of the toe section to a base of the heel section.

7. The sock according to claim 5,

wherein the stripe-like sections formed by the different yarn types are formed over the substantially entire length of the foot bottom portion from a base of the toe section to a base of the heel section.

8. The sock according to claim 3,

wherein the stripe-like sections formed by the different yarn types form one or more pattern(s) repeated along the longitudinal direction of the mid-section.

9. The sock according to claim 1,

wherein the two or more different yarn types include a body yarn, optionally spun or filament and not textured, and a texturized filament yarn.

10. The sock according to claim 9,

wherein the texturized filament yarn is formed in conjunction with spandex and/or rubber material.

11. The sock according to claim 10,

wherein the body yarn is formed in conjunction with spandex and/or rubber in a lower amount than the texturized filament yarn.

12. The sock according to claim 1,

wherein the foot bottom portion of the sock has an overall flat knit structure or a cushioned structure with terry loops.

13. The sock according to claim 1,

wherein the sock has at least 110%, optionally 110%-150% and further optionally 130%-150%, stretch in the longitudinal direction of the mid-section, and at least 120% stretch in the width direction of the mid-section.

14. The sock according to claim 1, wherein the different yarn types used in the alternating sequence also differ from each other in color and/or shade.

15. The sock according to claim 1, wherein the sock has an ankle section.

16. The sock according to claim 15, wherein the sock has a leg section.

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