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(54) **GRIP-ENHANCING SPORTSWEAR AND METHODS OF MANUFACTURING THE SAME**

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(57) **ABSTRACT**

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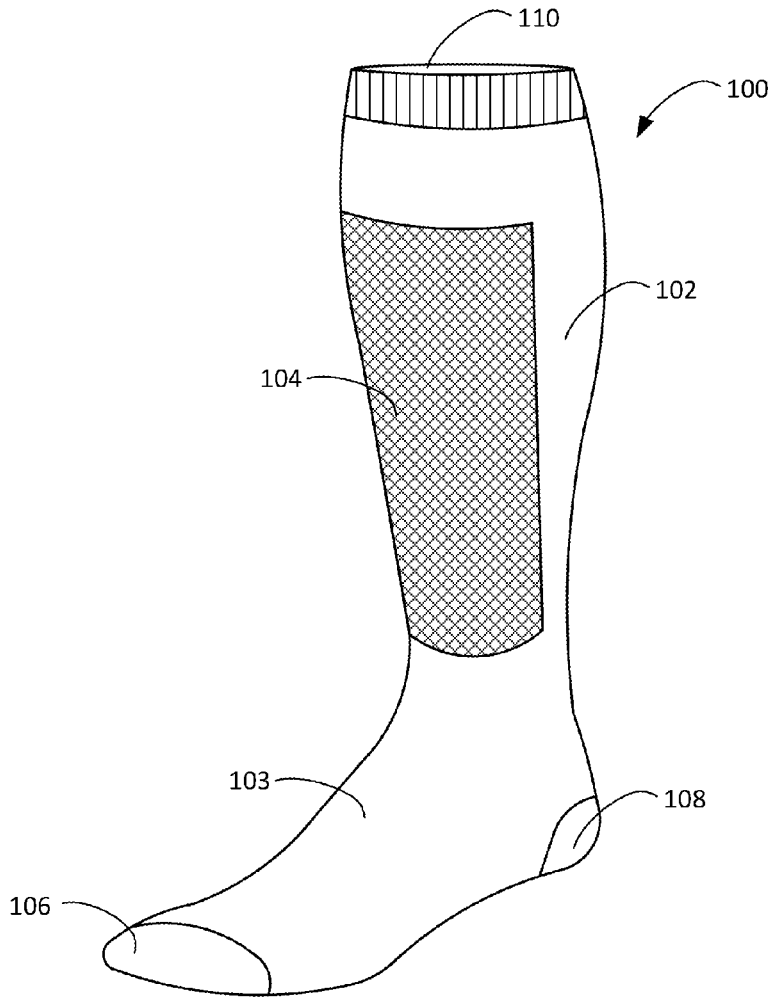
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Socks and other articles of sportswear for increasing grip on a contacted ball, as well as methods for manufacturing the same, are provided. A sock includes one or more coating material portions disposed on at least a portion of a sock base material of the sock leg. The one or more coating material portions include a coating base material or a coating base material and an aggregate material, such that a coefficient of friction between the coating material portions and the contacted ball is higher than a coefficient of friction between the sock base material and the contacted ball.



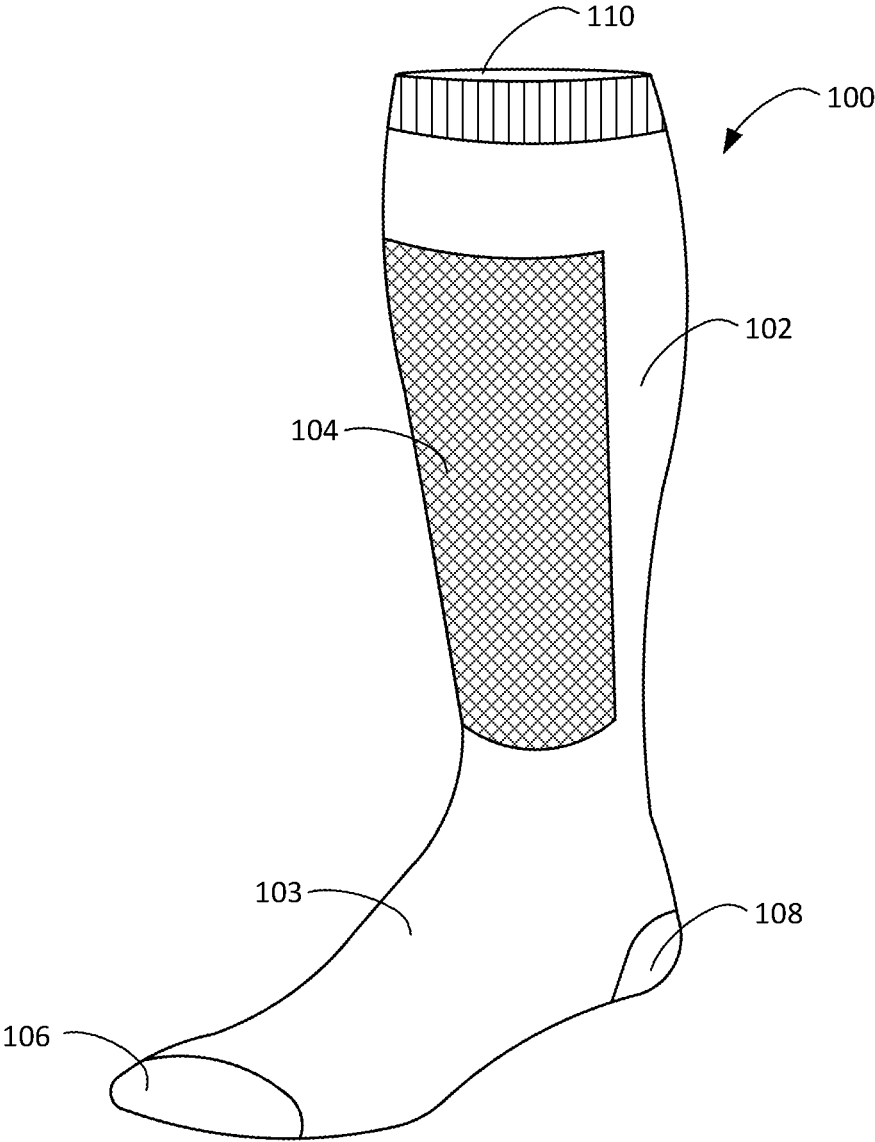


FIG. 1

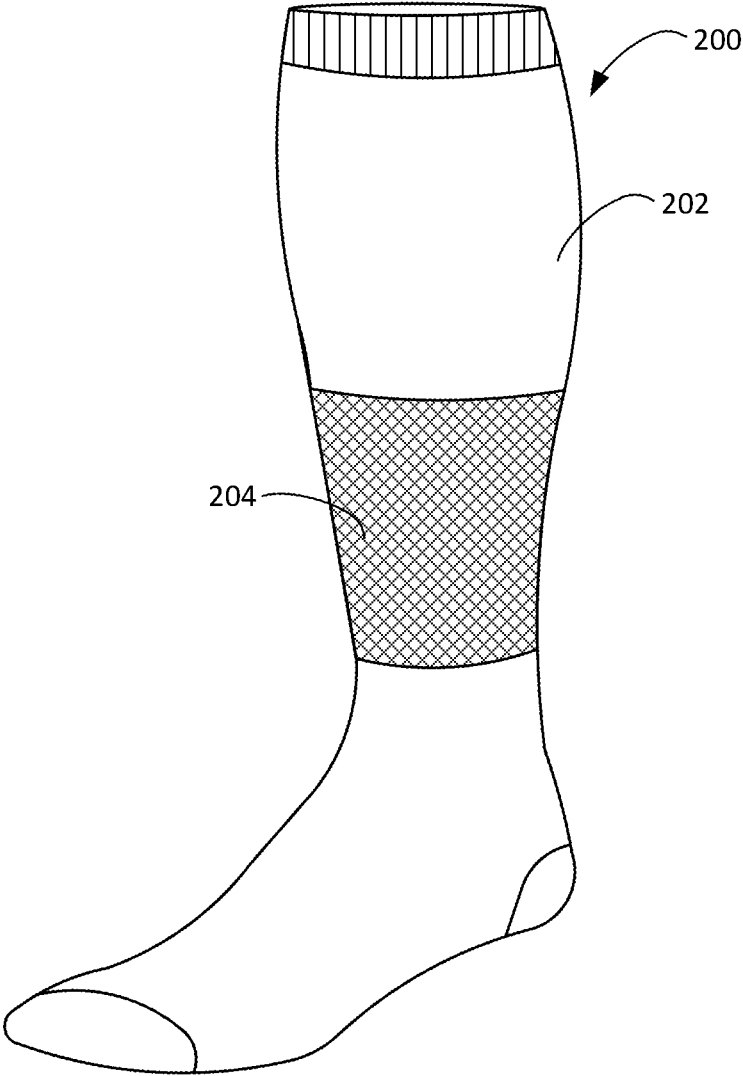


FIG. 2

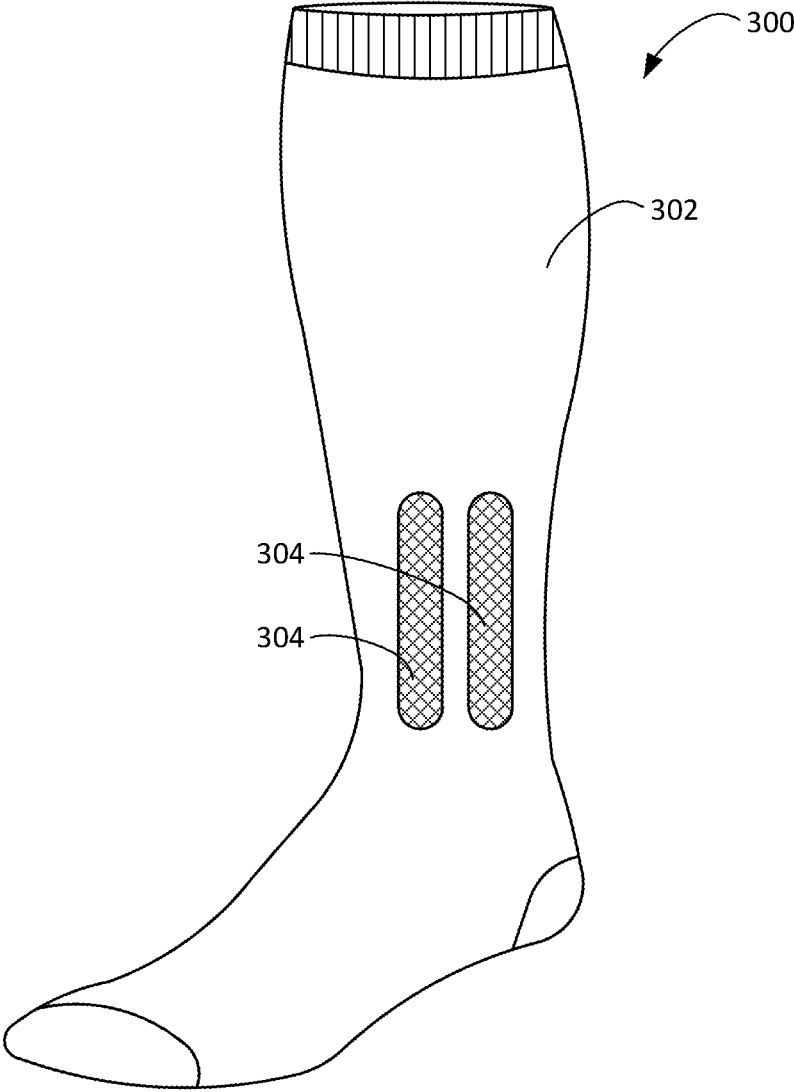


FIG. 3

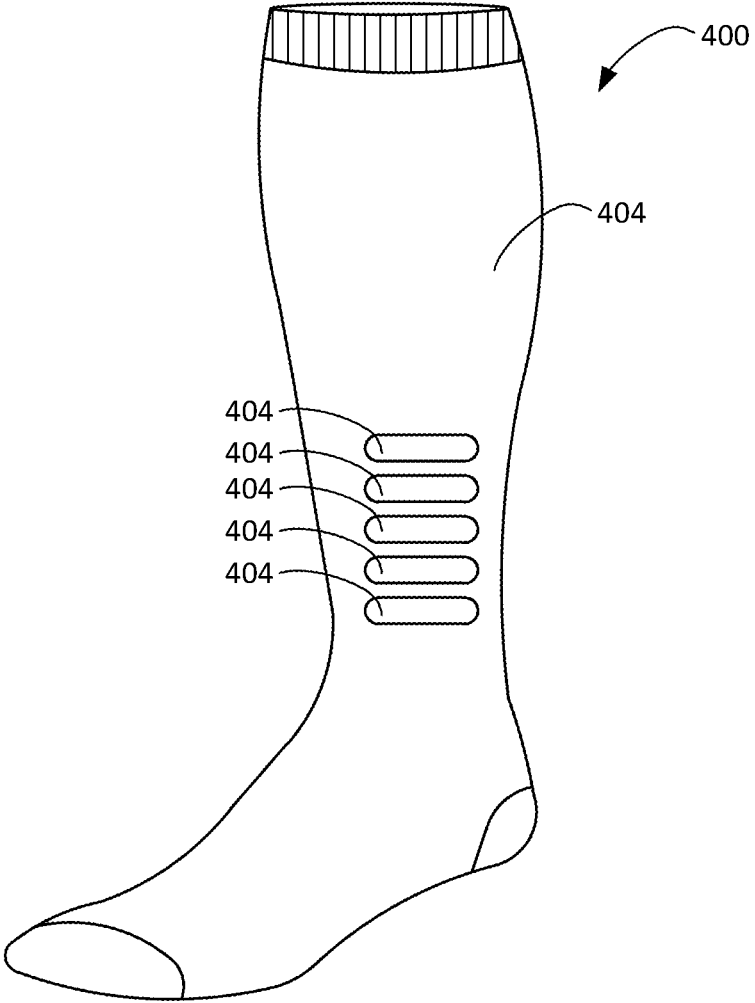


FIG. 4

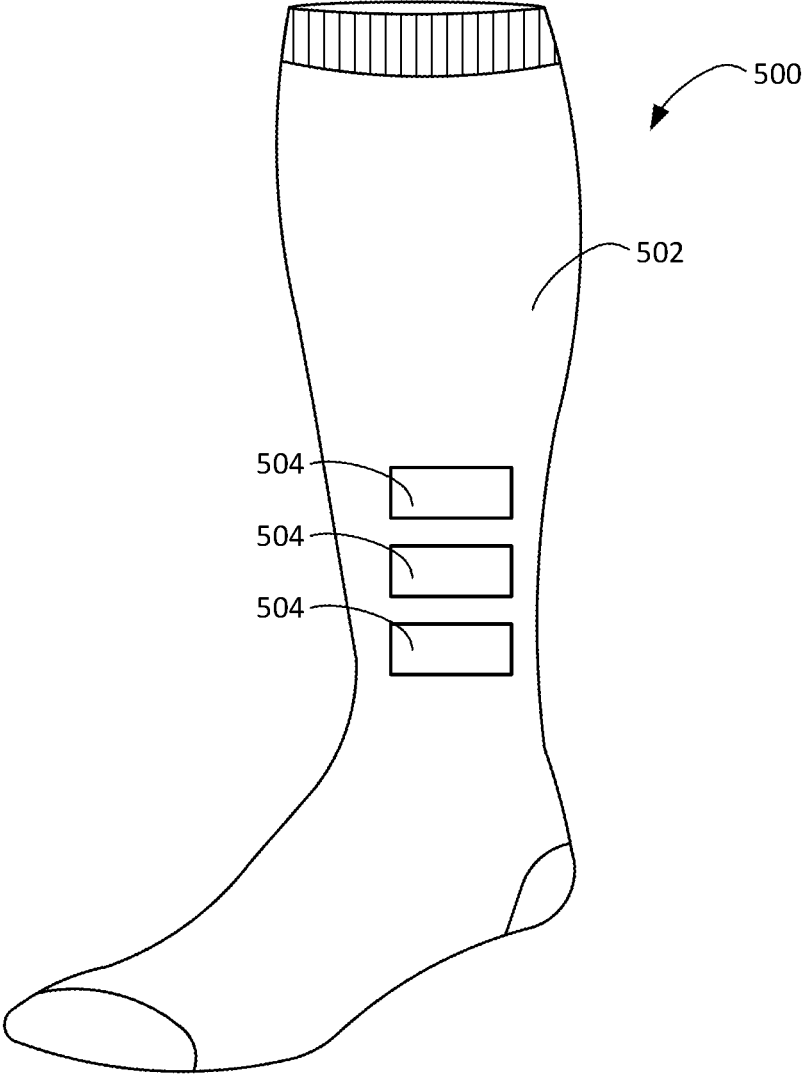


FIG. 5

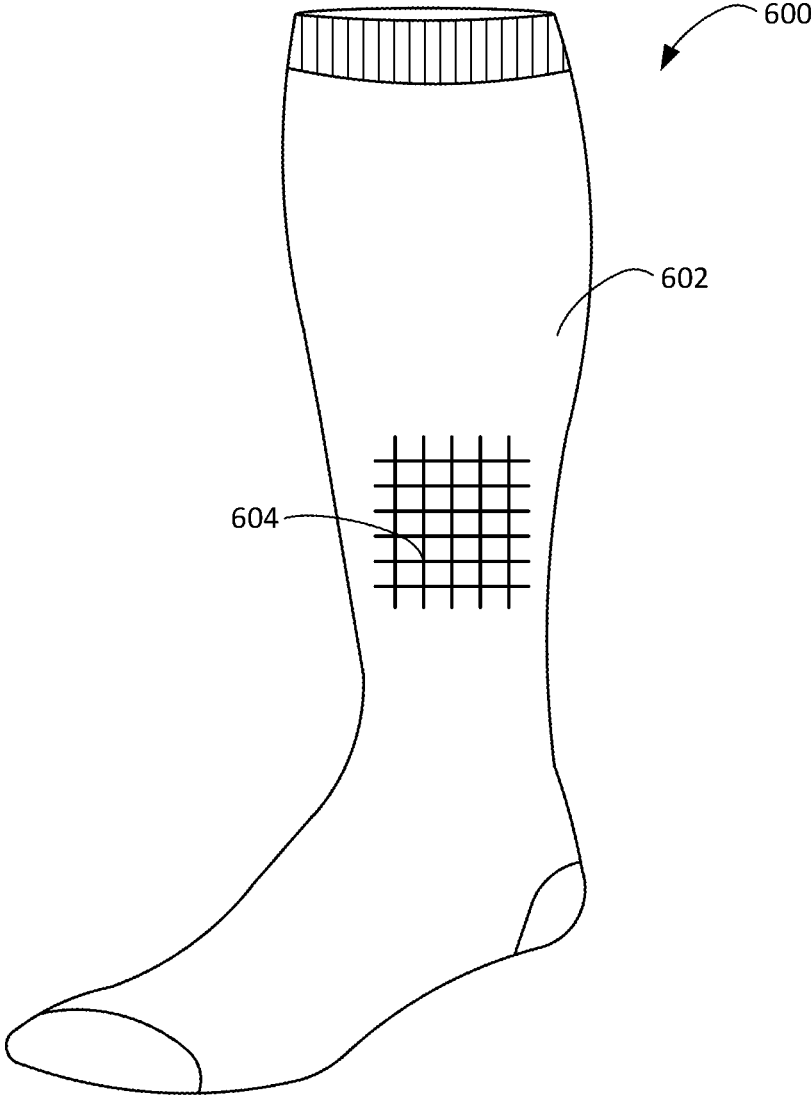


FIG. 6

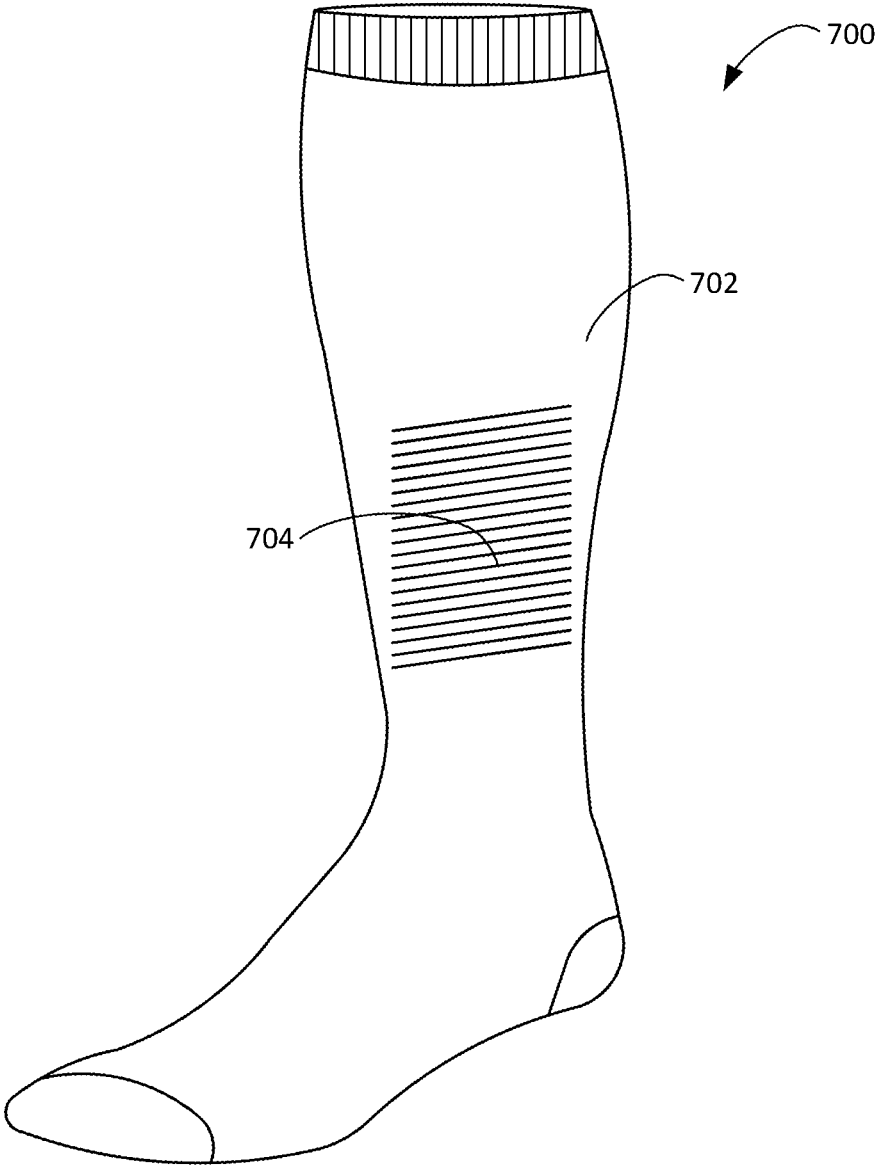


FIG. 7

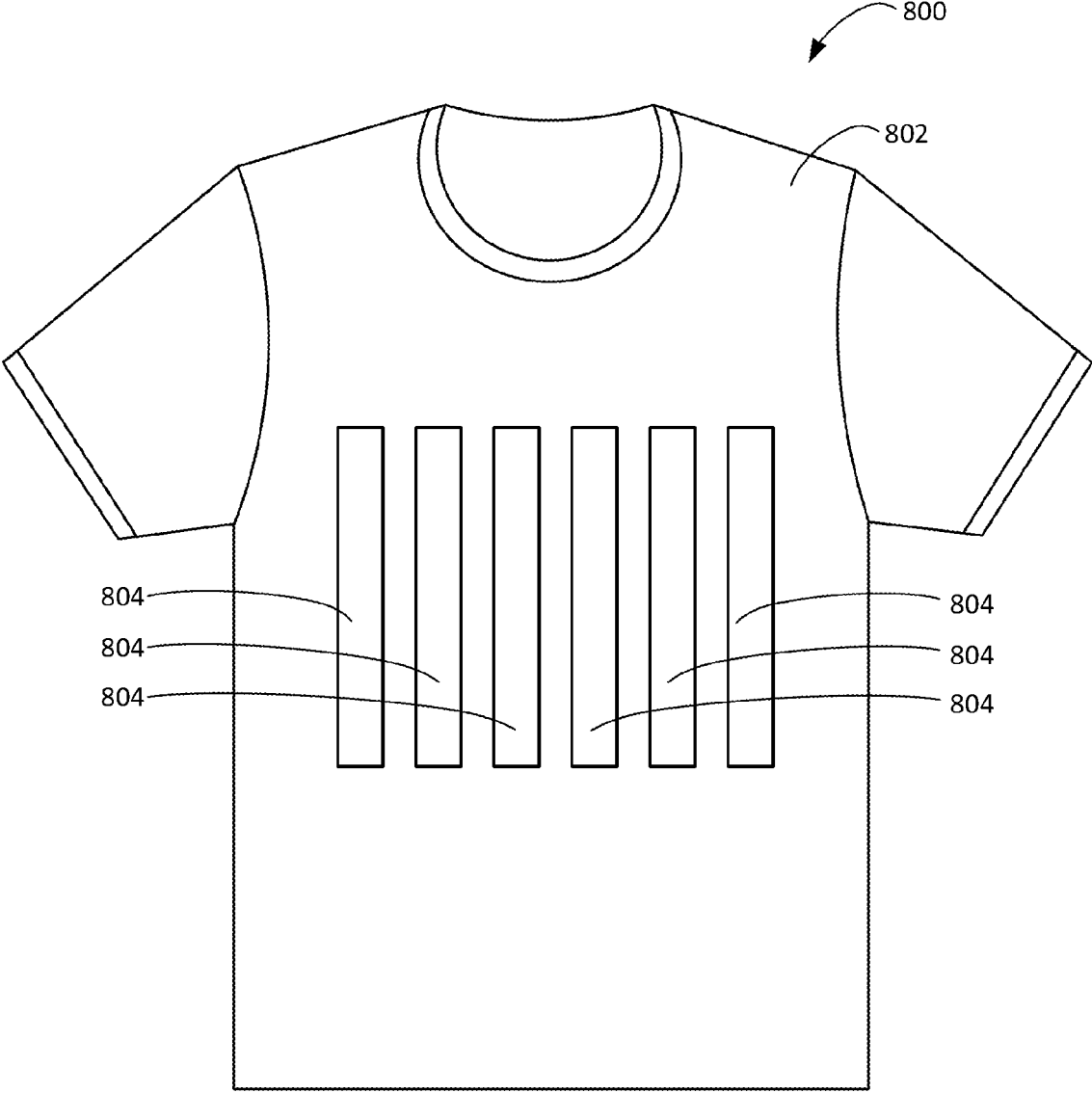


FIG. 8

**GRIP-ENHANCING SPORTSWEAR AND
METHODS OF MANUFACTURING THE
SAME**

CROSS-REFERENCE TO RELATED
APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Application No. 61/969,375, filed on Mar. 24, 2014, which is incorporated by reference in its entirety.

BACKGROUND

[0002] Various sports and activities, such as soccer, American football, rugby, Australian Rules football, and kickball, involve an athlete kicking, dribbling, or otherwise handling or controlling a ball with his or her legs, feet, head, and/or chest. However, sportswear and equipment worn while playing such sports may impede an athlete's ability to control the ball. For example, current sportswear may provide an uneven and/or slippery surface at the point of impact, resulting in ball slippage and loss of ball control.

[0003] Accordingly, there is a need for socks and other sportswear to provide improved ball gripping, control, and handling.

SUMMARY

[0004] In one aspect, a sock for increasing grip on a contacted ball is provided, including a sock leg extending from a sock foot, the sock leg including a sock base material, and one or more coating material portions disposed on at least a portion of the sock base material of the sock leg. The one or more coating material portions include a coating base material or a coating base material and an aggregate material, such that a coefficient of friction between the one or more coating material portions and the contacted ball is higher than a coefficient of friction between the sock base material and the contacted ball.

[0005] In another aspect, a method of manufacturing a sock for increasing grip on a contacted ball is provided, including providing a sock having a sock leg extending from a sock foot, the sock leg including a sock base material, and coating at least a portion of the sock base material of the sock leg with one or more coating material portions. The one or more coating material portions include a coating base material or a coating base material and an aggregate material, such that a coefficient of friction between the one or more coating material portions and the contacted ball is higher than a coefficient of friction between the sock base material and the contacted ball.

[0006] In yet another aspect, an article of sportswear for increasing grip on a contacted ball is provided, including at least one external surface region positioned to contact a ball during ball handling, dribbling, or controlling performed by a wearer, and one or more coating material portions disposed on the at least one external surface region. The one or more coating material portions include a coating base material or a coating base material and an aggregate material, such that a coefficient of friction between the one or more coating material portions and the contacted ball is higher than a coefficient of friction between the external surface region and the contacted ball.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] FIG. 1 is a plan view showing one embodiment of a grip-enhancing sock.

[0008] FIG. 2 is a plan view showing one embodiment of a grip-enhancing sock.

[0009] FIG. 3 is a plan view showing one embodiment of a grip-enhancing sock.

[0010] FIG. 4 is a plan view showing one embodiment of a grip-enhancing sock.

[0011] FIG. 5 is a plan view showing one embodiment of a grip-enhancing sock.

[0012] FIG. 6 is a plan view showing one embodiment of a grip-enhancing sock.

[0013] FIG. 7 is a plan view showing one embodiment of a grip-enhancing sock.

[0014] FIG. 8 is a plan view showing one embodiment of a grip-enhancing jersey.

DETAILED DESCRIPTION

[0015] The present invention addresses one or more of the above-described needs by providing grip-enhancing socks and other sportswear, and methods of manufacturing the same. Several embodiments of socks, sportswear, and methods of making these articles are described herein. Parameters of different components, features, and steps of the embodiments are described separately, but may be combined consistently with this description to enable still other embodiments as will be understood by those skilled in the art.

[0016] The socks and other sportswear described herein provide improved ball gripping and handling, so as to allow an athlete to remove or impart spin and control on the ball. Existing socks and sportswear are generally not designed to aid the wearer in handling or controlling a ball. The presently disclosed socks and sportswear advantageously locate grip-enhancing coating material portion(s) to maximize the contact area of the coating material portions and a ball. In certain embodiments, the coating material portion(s) are strategically disposed on one or more external surface regions of the sportswear to contact a ball during ball handling, dribbling, or controlling performed by a wearer. For example, the coating material portion(s) may be disposed on the sportswear such that they are located at the shin, inner lower leg, outer lower leg, chest, head, stomach, thigh, or any other locations on a wearer's body that may be used to handle or control a ball. For example, the coating portion(s) may advantageously increase the coefficient of friction between the coated external surface regions of the sportswear and the contacted ball.

[0017] Moreover, methods of manufacturing the presently disclosed socks and sportswear are advantageously simple, do not require specialty sportswear articles, and may be incorporated into known sportswear manufacturing processes.

[0018] Grip-enhancing socks and other sportswear, as well as methods of manufacturing the same are described in more detail below.

[0019] Grip-Enhancing Socks and Other Sportswear

[0020] In certain embodiments, a sock for increasing grip on a contacted ball is provided. As shown in FIG. 1, a sock **100** may include a sock leg **102** extending from a sock foot **103**, and one or more coating material portions **104** disposed on at least a portion of the sock base material of the sock leg **102**. The coating material portions **104** may include a coating base material or a coating base material and an aggregate material, such that the coefficient of friction between the one or more

coating material portions **104** and the contacted ball is higher than a coefficient of friction between the sock base material and the contacted ball.

[0021] Generally, the socks described herein may be of any suitable sizes, shapes, and designs known to those of ordinary skill in the art. For example, the socks may be any type of athletic, sports, or other socks that would benefit from enhanced grip. While certain embodiments of knee or shin-length socks and jerseys are illustrated herein, it is to be understood that the grip-enhancing coatings described herein could be incorporated into a variety of socks and sportswear, including but not limited to ankle socks, tennis socks, mid-calf or shin-length socks, knee socks, over-the-knee socks, leg warmers or similar articles of varying lengths, short sleeve shirts, long sleeve shirts, athletic jerseys of varying styles, pants, shorts, pads, guards, helmets, hats, shoes, and socks.

[0022] For example, the socks described herein may include any sock construction known to those of ordinary skill in the art. In certain embodiments, the socks described herein may include a sock foot, for example including toe, heel, sole, top, and gusset or instep regions, a sock leg extending from the sock foot, for example including a cuff region. The socks described herein may have any suitable textural or aesthetic features known to those of ordinary skill in the art, including but not limited to ribs, textures, patterns, or designs.

[0023] In certain embodiments, the sock includes a base material from which at least a portion of the sock is made. The sock leg and/or foot regions may be made from the same or different base materials. For example, the sock base material may include any suitable material, or combination of materials, known to those of ordinary skill in the art. In one embodiment, the sock leg includes a sock base material selected from the group consisting of cotton, wool, nylon, acrylic, polyester, olefins, spandex, and combinations thereof.

[0024] In certain embodiments, the sock has one or more coating material portions disposed on at least a portion of the sock base material of the sock leg. For example, the one or more coating material portions may be strategically located to maximize the contact area of the coating material and a contacted ball to increase the coefficient of friction between the coated regions and the ball. In certain embodiments, the coating material includes one or both of a coating base material and an aggregate material. The coating base material may include any suitable composition known to those of ordinary skill in the art. In one embodiment, the coating base material includes a natural or synthetic material selected from the group consisting of silicone, latex, and combinations thereof. For example, the coating base material may include a tacky or non-slip material. Suitable coating base materials may include roughened leathers, rubbers, silastics, or any elastomeric material such as styrene-butadiene, or polyurethane.

[0025] As used herein, the term "aggregate material" refers to particulate or granular material that can be combined with the coating material to impart additional coarseness or abrasiveness thereto. The aggregate material may include any suitable aggregate known to those of ordinary skill in the art. In one embodiment, the aggregate material includes a natural or synthetic material selected from the group consisting of garnet, emery, aluminum oxide, silicon dioxide, silicon carbide, and combinations thereof. In certain embodiments, suitable additives, dyes, and/or pigments are included in the coating material to achieve the desired aesthetic and performance properties, such as to achieve a desired coating color.

[0026] The amounts of base material and aggregate material used to form the coating material may vary based on the desired levels of tackiness and/or abrasiveness. In one embodiment, the coating material includes amounts of base material and aggregate material that are selected so as to increase the coefficient of friction between the sock or sportswear to which it is applied and a moving ball. For example, the coating material may include from about 10 to about 90 percent by weight of the coating base material and from about 10 to about 90 percent by weight of the aggregate material. In one embodiment, a coating material includes from about 40 to about 60 percent by weight of the coating base material and from about 40 to about 60 percent by weight of the aggregate material.

[0027] In one embodiment, the coating material includes a latex base material and an aluminum oxide aggregate material. In another embodiment, the coating material includes a silicone base material and an aluminum oxide aggregate material. In another embodiment, the coating material includes a latex base material and a silicon carbide aggregate material. In another embodiment, the coating material includes a silicone base material and a silicon carbide aggregate material. The coating material may be formulated to provide the desired abrasive, tacky, or non-slip properties, which may vary based on the sport, playing condition, and/or athlete position or technique. In certain embodiments, the coating materials may be designed to enhance gripping in the presence of moisture.

[0028] As shown in FIGS. 1-7, the one or more coating material portions may be disposed on at least a portion of the sock base material of the sock leg in a variety of configurations and patterns. It is to be understood that the coating material embodiments disclosed herein are meant to be exemplary, and that additional coating material configurations are envisioned. In one embodiment, as shown in FIG. 1, the one or more coating material portions include a single coating material portion **104** disposed at least on a shin area of the sock leg. For example, the shin area includes an area between an ankle and a cuff **110** of the sock leg **102** on a section of the sock leg **102** that faces the toe **106** of the sock foot **103**. For example, the single coating material portion may include a substantially rectangular geometry. Alternatively, the coating material portion may have a substantially circular, oval, elliptical, linear, or other geometry. In certain embodiments, the single coating material portion is disposed such that it substantially covers a wearer's shin or shin guard when worn.

[0029] In one embodiment, as shown in FIG. 2, the one or more coating material portions include a continuous coating material strip **204** extending around at least a portion of a circumference of the sock leg **202** in an area between an ankle and a cuff of the sock leg **202**. For example, the continuous material strip may extend around a portion of or the entire circumference of the sock leg. In one embodiment, the continuous material strip is a latitudinal strip having a width from about 5 to about 80 percent of a length of the sock leg. As used herein, the terms "latitudinal" and "longitudinal" refer to directions relative to the sock leg.

[0030] In certain embodiments, as shown in FIGS. 3-5, the one or more coating material portions include a plurality of discrete coating material portions **304**, **404**, **504**. For example, the discrete coating material portions may have a geometry selected from the group consisting of rectangles, rounded-edge rectangles, ovals, ellipses, circles, lines, and crosses. The discrete coating material portions may have any

suitable geometry, or combination of geometries, to provide the desired surface coverage and contact area. For example, the discrete coating material portions could be configured to form a logo, word, symbol, or picture. In one embodiment, the plurality of discrete coating material portions include a number of parallel elongated coating material portions disposed in an area between an ankle and a cuff of the sock leg. For example, the parallel elongated coating material portions may include substantially longitudinal or latitudinal strips. In certain embodiments, the parallel elongated coating material portions are disposed on an instep and/or toe-facing section of the sock leg.

[0031] In certain embodiments, as shown in FIGS. 6-7, the one or more coating material portions include a plurality of coating material lines. As shown in FIG. 6, the plurality of coating material lines **604** may be disposed in a grid pattern. As shown in FIG. 7, the coating material lines **704** may be parallel and extend substantially latitudinally or longitudinally in an area between an ankle and a cuff of the sock leg.

[0032] Generally, the one or more coating material portions may be disposed on the sock or sportswear such that the coating material portions are positioned to maximize a contact area of the coating material portions and a ball when dribbled or controlled by a wearer. For example, the one or more coating material portions are disposed on the sock leg such that the coating material portions are substantially located at the shin, inner lower leg, outer lower leg or a combination thereof, of the wearer.

[0033] In certain embodiments, sportswear for increasing grip on a contacted ball is provided. In one embodiment, as shown in FIG. 8, an article of sportswear **800** for increasing grip on a contacted ball includes at least one external surface region **802** positioned to contact a ball during ball handling, dribbling, or controlling performed by a wearer, and one or more coating material portions **804** disposed on the at least one external surface region. As described above, the one or more coating material portions may include a coating base material or a coating base material and an aggregate material, such that the coefficient of friction between the one or more coating material portions and the contacted ball is higher than a coefficient of friction between the external surface region and the contacted ball. The one or more coating material portions may be provided on any sportswear for which increased grip or friction with a ball or other object is desirable. For example, the article of sportswear may be selected from the group consisting of leg warmers, short sleeve shirts, long sleeve shirts, athletic jerseys, pants, shorts, pads, guards, gloves, helmets, hats, shoes, and socks.

[0034] Overall, the coating material portion may provide an increased coefficient of friction between the sportswear and a contacted ball or object that aids the athlete in imparting more spin or control on the ball. That is, the coating material may have a higher kinetic friction coefficient than the base material of the article alone. For example, the grip-enhancing coating portions may be disposed over a region of the sportswear or socks where the force transfer between the athlete and a contacted ball is optimal, and where most athletes or wearers tend to trap or contact a ball, such as the central chest, shin, or thigh. Using this configuration, the sportswear may provide enhanced gripping, allowing the user to easily apply spin or control in any direction. In certain embodiments, the coating material portion(s) are disposed on the sportswear in a manner that maximizes the contact area between the grip-enhancing coating material and a contacted ball. This large

contact area may facilitate friction between the sportswear and a ball, allowing for improved ball handling and control.

[0035] In certain embodiments, the coating material portion(s) are configured to provide an even, symmetric, and/or level contact area between the ball and the sportswear. Even distribution of the contact area may provide the wearer of the sportswear with the ability to firmly and positively contact a ball. The socks and other sportswear described herein may provide an athlete with a firm and predictable contact area and grip, as compared to known equipment that may cause unpredictable deflection of a ball during contact.

[0036] Methods of Manufacture

[0037] In certain embodiments, methods of manufacturing a sock or other sportswear for increasing grip on a contacted ball are provided. These methods may be designed to manufacture any embodiments of the socks and sportswear described herein.

[0038] In certain embodiments, methods of manufacturing a sock for increasing grip on a contacted ball include: (i) providing a sock including a sock leg extending from a sock foot, the sock leg including a sock base material, and (ii) coating at least a portion of the sock base material of the sock leg with one or more coating material portions. The one or more coating material portions may include a coating base material or a coating base material and an aggregate material, such that the coefficient of friction between the one or more coating material portions and the contacted ball is higher than a coefficient of friction between the sock base material and the contacted ball. For example, the sock may have any suitable size and shape, such as those described above.

[0039] Any suitable coating methods known to those of ordinary skill in the art may be used to coat the base material with the coating material. The coating material may be applied to the base material by one application process or by a combination of application methods. For example, the coating material may be applied by (i) direct spray and cure, (ii) dip and cure, (iii) roll and cure, (iv) brush and cure, (v) meter and cure, (vi) screen print and cure, and/or (vii) heat press methods.

[0040] In certain embodiments, coating at least a portion of the sock base material of the sock leg with one or more coating material portions includes applying the one or more coating portions via a coating method selected from the group consisting of: spraying, dipping, rolling, brushing, metering, screen printing, heat pressing, and combinations thereof. In certain embodiments, the coating material is applied in a single step (i.e., the coating base material and the aggregate are premixed and are applied in a single application). In other embodiments, the coating base material and the aggregate material are applied in sequential steps. In certain embodiments, the coating material is applied as a continuous strip. In other embodiments, at least a portion of the coating material is applied as a plurality of patterned or randomly located dots, stripes, or other coating geometries. In one embodiment, the methods include combining the coating base material and the aggregate material prior to coating the sock leg.

[0041] In certain embodiments, the methods further include curing the coating material portions. For example, the curing step may include heating, drying, chemical reaction or exposure to UV light.

[0042] In certain embodiments, the coating base material is selected from the group consisting of silicone, latex, and combinations thereof, and the aggregate material is a natural or synthetic material selected from the group consisting of

garnet, emery, aluminum oxide, silicon dioxide, silicon carbide, and combinations thereof. In one embodiment, the method includes combining a pigment or dye with the coating base material prior to coating the sock leg.

[0043] In certain embodiments, coating at least a portion of the sock base material of the sock leg with one or more coating material portions includes applying a single coating material portion to a shin area of the sock leg, and the shin area includes an area between an ankle and a cuff of the sock leg on a toe-facing section of the sock leg. For example, the single coating material portion may include a substantially rectangular geometry. In one embodiment, the single coating material portion is applied such that it substantially covers a wearer's shin or shin guard when worn.

[0044] In one embodiment, coating at least a portion of the sock base material of the sock leg with one or more coating material portions includes applying a continuous coating material strip extending around at least a portion of a circumference of the sock leg in an area between an ankle and a cuff of the sock leg. For example, the continuous material strip may extend around an entire circumference of the sock leg. In one embodiment, the continuous material strip includes a latitudinal strip having a width from about 5 to about 80 percent of a length of the sock leg.

[0045] In certain embodiments, coating at least a portion of the sock base material of the sock leg with one or more coating material portions includes applying a plurality of discrete coating material portions to the sock base material of the sock leg. For example, the discrete coating material portions may have a geometry selected from the group consisting of rectangles, rounded-edge rectangles, ovals, ellipses, circles, lines, and crosses. The discrete coating material portions may have any suitable geometry, or combination of geometries, to provide the desired surface coverage and contact area. For example, the discrete coating material portions could be configured to form a logo, word, symbol, or picture. In one embodiment, the plurality of discrete coating material portions include a number of parallel elongated coating material portions disposed in an area between an ankle and a cuff of the sock leg. In one embodiment, the parallel elongated coating material portions include substantially longitudinal or latitudinal strips. In one embodiment, the parallel elongated coating material portions are disposed on an instep or toe-facing section of the sock leg.

[0046] In certain embodiments, coating at least a portion of the sock base material of the sock leg with one or more coating material portions includes applying a plurality of coating material lines to the sock base material of the sock leg. For example, the plurality of coating material lines may be disposed in a grid pattern. In one embodiment, the coating material lines are parallel and extend substantially latitudinally or longitudinally in an area between an ankle and a cuff of the sock leg.

[0047] In certain embodiments, coating at least a portion of the sock base material of the sock leg with one or more coating material portions includes applying the one or more coating material portions to a region of the sock leg such that the coating material portions are positioned to maximize a contact area of the coating material portions and a ball when dribbled or controlled by a wearer. For example, the one or more coating material portions may be applied to a sock leg such that the coating material portions are substantially located at the shin, inner lower leg, outer lower leg, or a combination thereof, of the wearer.

[0048] These methods advantageously provide for the manufacture of grip-enhancing socks and other sportswear without requiring complex braiding or weaving operations. Moreover, these methods may utilize premade sock and sportswear base materials, thereby minimizing manufacturing costs and complexity.

[0049] It will be appreciated that various above-disclosed and other features and functions, or alternatives thereof, may be desirably combined into many other different products or applications. Various presently unforeseen or unanticipated alternatives, modifications, variations, or improvements therein may be subsequently made by those skilled in the art which are also intended to be encompassed by the following claims.

What is claimed is:

1. A sock for increasing grip on a contacted ball, comprising:

a sock leg extending from a sock foot, the sock leg comprising a sock base material; and

one or more coating material portions disposed on at least a portion of the sock base material of the sock leg,

wherein the one or more coating material portions comprise a coating base material or a coating base material and an aggregate material, such that a coefficient of friction between the one or more coating material portions and the contacted ball is higher than a coefficient of friction between the sock base material and the contacted ball.

2. The sock of claim 1, wherein the sock base material is selected from the group consisting of cotton, wool, nylon, acrylic, polyester, olefins, spandex, and combinations thereof.

3. The sock of claim 1, wherein the coating base material is selected from the group consisting of silicone, latex, and combinations thereof.

4. The sock of claim 1, wherein the aggregate material comprises a natural or synthetic material selected from the group consisting of garnet, emery, aluminum oxide, silicon dioxide, silicon carbide, and combinations thereof.

5. The sock of claim 1, wherein:

the one or more coating material portions comprise a single coating material portion disposed at least on a shin area of the sock leg, and

the shin area comprises an area between an ankle and a cuff of the sock leg on a toe-facing section of the sock leg.

6. The sock of claim 1, wherein the one or more coating material portions comprise a continuous coating material strip extending around at least a portion of a circumference of the sock leg in an area between an ankle and a cuff of the sock leg.

7. The sock of claim 1, wherein the one or more coating material portions comprise a plurality of discrete coating material portions.

8. The sock of claim 1, wherein the one or more coating material portions comprise a plurality of coating material lines.

9. The sock of claim 1, wherein the one or more coating material portions are disposed on the sock leg such that the coating material portions are positioned to maximize a contact area of the coating material portions and a ball when dribbled or controlled by a wearer.

10. A method of manufacturing a sock for increasing grip on a contacted ball, comprising:

providing a sock comprising a sock leg extending from a sock foot, the sock leg comprising a sock base material; and coating at least a portion of the sock base material of the sock leg with one or more coating material portions, wherein the one or more coating material portions comprise a coating base material or a coating base material and an aggregate material, such that a coefficient of friction between the one or more coating material portions and the contacted ball is higher than a coefficient of friction between the sock base material and the contacted ball.

11. The method of claim 10, wherein coating at least a portion of the sock base material of the sock leg with one or more coating material portions comprises applying the one or more coating portions via a coating method selected from the group consisting of spraying, dipping, rolling, brushing, metering, screen printing, heat pressing, and combinations thereof.

12. The method of claim 10, further comprising curing the one or more coating material portions.

13. The method of claim 10, further comprising combining the coating base material and the aggregate material prior to coating the sock leg.

14. The method of claim 10, wherein: coating at least a portion of the sock base material of the sock leg with one or more coating material portions comprises applying a single coating material portion to a shin area of the sock leg, and the shin area comprises an area between an ankle and a cuff of the sock leg on a toe-facing section of the sock leg.

15. The method of claim 10, wherein coating at least a portion of the sock base material of the sock leg with one or more coating material portions comprises applying a continuous coating material strip extending around at least a portion of a circumference of the sock leg in an area between an ankle and a cuff of the sock leg.

16. The method of claim 10, wherein coating at least a portion of the sock base material of the sock leg with one or more coating material portions comprises applying a plurality of discrete coating material portions to the sock base material of the sock leg.

17. The method of claim 10, wherein coating at least a portion of the sock base material of the sock leg with one or more coating material portions comprises applying a plurality of coating material lines to the sock base material of the sock leg.

18. The method of claim 10, wherein coating at least a portion of the sock base material of the sock leg with one or more coating material portions comprises applying the one or more coating material portions to a region of the sock leg such that the coating material portions are positioned to maximize a contact area of the coating material portions and a ball when dribbled or controlled by a wearer.

19. An article of sportswear for increasing grip on a contacted ball, comprising:

at least one external surface region positioned to contact a ball during ball handling, dribbling, or controlling performed by a wearer; and

one or more coating material portions disposed on the at least one external surface region,

wherein the one or more coating material portions comprise a coating base material or a coating base material and an aggregate material, such that a coefficient of friction between the one or more coating material portions and the contacted ball is higher than a coefficient of friction between the external surface region and the contacted ball.

20. The article of claim 19, wherein the article of sportswear is selected from the group consisting of leg warmers, short sleeve shirts, long sleeve shirts, athletic jerseys, pants, shorts, pads, guards, helmets, hats, shoes, and socks.

* * * * *