Title: OUTER SOLE FOR SPIKELESS FOOTWEAR

Abstract: An outer sole for a footwear including a base extending from a heel portion, through a midfoot portion, to a ball portion of the footwear, a plurality of cleats disposed on the base throughout the heel, midfoot, and ball portions of the footwear, and a plurality of interconnecting portions extending from each of the cleats and extending across a portion of the base, at least one of the interconnecting portions being connected to an adjacent cleat, where the cleats and the interconnecting portions include soft curves configured to avoid debris from accumulating on the sole.
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OUTER SOLE FOR SPIKELESS FOOTWEAR

Cross Reference to Related Application

[0001] This application is related to and claims the benefit of U.S. Provisional Patent Application Number 62/292,089 filed on February 05, 2016, the contents of which are incorporated by reference in their entirety.

Technical Field

[0002] The present invention relates generally to footwear and more particularly the present invention relates to an outer sole construction for a spikeless footwear particularly for soccer, football, golf and similar sports to provide better traction.

Background of the Invention

[0003] Conventional sports shoes often have removable metal cleats or integrated non-metal cleats extending from a sole surface of the shoes. While such conventional constructions may provide reasonably satisfactory amount of traction, it is believed that the degree of traction could be improved. Further, spikes on shoe soles have long been used to provide traction in dirt and grass, but they can damage the surface.

[0004] In golf, for example, a player needs to walk not just over greens (i.e., the putting surfaces), but also over smooth and hard surfaces peripheral to the playing area. Conventional golf shoes have hard spikes or cleats with sharp edges. Although providing some amount of traction, these conventional golf shoes do not address additional problems, such as damage imparted upon the surfaces that are walked on, both in the area of play and peripherally.

[0005] A golf player needs a strong grip or traction between his shoe and the grassy areas of the golf course. The traction is particularly important during a golf swing when the lower body, and the feet in particular, are subject to large torque and significant lateral forces. A major problem with golf shoes having spikes is that the spikes can leave spike marks or holes on a grass surface of a golf course, therefore, damaging the grass surfaces and particularly the greens. Some golf establishments even ban golf shoes with metal spikes from the golf course. In order to
avoid such damage but still have a firm grip, a special type of "soft cleats" or "soft spikes" have been developed in recent years. These cleats dig into the green and create sufficient grip while reducing surface damage. However, these types of golf shoes tend to accumulate dirt and debris, especially during wet conditions and the accumulation of such dirt and debris requires frequent and tedious cleaning in order to provide the desired grip during the golf swing. Further, these types of shoes are subject to an aquaplaning effect because of dirt accumulation and/or due to the sole design. Additionally, golf shoes of this type and the soles and cleats thereof are immediately exposed to wear and tear when used outside the golf course on hard road surfaces.

Clearly there is a need for a sports shoe and associated outsole that provides sufficient grip and traction on a variety of surfaces and in a variety of conditions but yet minimizes damage to the surfaces while at the same time being durable and resistant to wearing when contacting non-sport surfaces.

**Summary of the Invention**

[0006] An outer sole for footwear is disclosed herein as including a base extending from a heel portion, through a midfoot portion, to a ball portion of the footwear, a plurality of cleats disposed on the base throughout the heel, midfoot, and ball portions of the footwear, and a plurality of interconnecting portions extending from each of the cleats and extending across a portion of the base, at least one of the interconnecting portions being connected to an adjacent cleat, where the cleats and the interconnecting portions include soft curves configured to avoid debris from accumulating on the sole.

[0007] In accordance with the invention, there is provided an outer sole for a footwear comprising: a base extending from a heel portion, through a midfoot portion, to a ball portion of the footwear; cleats disposed on the base throughout the heel, midfoot, and ball portions of the footwear; and a plurality of interconnecting portions extending from each of the cleats and extending across a portion of the base, at least one of the interconnecting portions being connected to an adjacent cleat; wherein the cleats and the interconnecting portions include soft curves configured to avoid debris from accumulating on the sole.

[0008] The combination of the cleats and the interconnecting portions means that it may be
possible to increase the distance between cleats, compared to traditional spikeless golf shoes, similar to the ECCO golf street hybrid shoes, while still maintaining a solid and firm traction with the ground, especially with grass. The increased distance between cleats means that means that there is an increased space between two cleats in the volume between the cleats, so that there is a decreased risk that dirt, grass, gravel or other types of debris will become lodged in the space between the cleats. In traditional spikeless golf shoes the distance between the cleats, in some areas, may be less than 5-10 mm which means that a small rock that has a similar size, may easily be lodged between the cleats. By introducing cleats and interconnecting portions, which extends from each cleat to another cleat, there is provided an element that may come into contact with the surface area, such as grass, and may provide traction in a direction that is different from the direction of the interconnecting portion.

[0009] Furthermore, by providing interconnecting portions between the cleats, it is possible to raise the surface of the outsole between the cleats, which means that any debris that extends between the two cleats, will come into contact with the interconnecting portion, and will reduce the risk that the debris comes into close contact with the outer surface of the outsole (the area with no cleats or interconnecting portions).

[0010] In one embodiment the number of cleats on the outer sole may be less than 65. By providing a reduced number of cleats on the outer sole of the shoe, it may be seen that the reduced number of cleats provides fewer areas where debris can become lodged on the outer sole. I.e. the reduced number of cleats creates increased space between the cleats, and reduces the risk of trapping debris.

[0011] In one embodiment the outer sole may be constructed from a material comprising plastic, polyurethane, or rubber or any combination thereof.

[0012] In one embodiment a distance between the cleats may be at least about 15 millimeters. By providing a distance between the cleats in such a manner, it is ensured that rocks or pebbles that have a diameter that is less than the defined distance have a significantly less risk to lodged between two cleats. Furthermore, a pebble or a cleat that has a diameter that is more than 15 mm will most likely be of such a size that it would be too large to be lodged between the cleats.
without the user being aware of this.

[0013] In one embodiment the at least 15 millimeters may delimit areas absent of cleats configured to increase traction and to said avoid debris from accumulating on the sole.

[0014] In one embodiment each of the plurality of cleats and the interconnecting portions may have a base portion and a top portion and wherein the cleats and the interconnecting portions taper from the base portions towards the top portions. Thus, the distance between the cleats may be larger at the terminal ends (tops) of the cleats than the base of the cleats, while the same may be said with the top of the interconnecting portions and the base of the interconnecting portions, thereby reducing the risk that debris gets stuck between the interconnecting portions and/or the cleats. It may be envisioned that only the cleats or only the interconnecting portions are provided with a taper.

[0015] In one embodiment the cleats and the interconnecting portions may further have smooth surfaces to said avoid debris from accumulating on the sole.

[0016] In one embodiment the space between the cleats may be sufficient to improve grip and thereby to avoid an aquaplaning effect.

[0017] In one embodiment, the height of the interconnecting portion from the outer surface of the sole to the highest point of the interconnecting portion, may be less than the terminal height of the cleat from the outer surface of the sole. The outer surface of the sole, may be seen as an area of the outer sole where there are no cleats or interconnecting portion, and the interconnecting portion or the cleat extend outwards from the outer surface.

[0018] The interconnecting portion may be of a height that is between 10 - 90 % of the height of the cleat, where it preferably is between 20% and 80 % of the height of the cleat, where it is more preferably between 30 and 70 % of the height of the cleat, where it is more preferably between 40 and 60 % of the height of the cleat. Thus, when the shoe is positioned on a hard plane surface, the terminal ends of the cleats will be in contact with the ground surface, while the interconnecting portions will not come into contact with the plane ground surface. However, when the shoe is positioned on a soft surface, such as grass, the cleats will extend into the grassy
surface, and the interconnecting portions will come into contact with the soft ground surface in between the cleats.

[0019] In one embodiment the outer sole pattern may have no sharp edges. When using the term sharp, it may be meant that the transition between two surfaces is smooth and where there is no abrupt transition between surfaces of the sole pattern. When using the terminology sharp, it may also be understood that the transition angle may be more than 90 degrees.

[0020] In one embodiment the soft curves may comprise curved surface areas without straight edges and without planar surfaces, and wherein the curved surface areas are smooth and uninterrupted.

[0021] In one embodiment the soft curves may comprise curved surface areas without acute, right, or obtuse angles, wherein the curved surface areas are smooth and uninterrupted.

[0022] In one embodiment the soft curves may comprise a radius of curvature of about two to three millimeters.

[0023] In one embodiment the cleats and the interconnecting portions may form a pattern that resembles an organic structure of a tree leaf or animal membrane.

[0024] In one embodiment two to seven of the interconnecting portions may extend generally radially from each of the cleats and wherein the two to seven interconnecting portions are generally evenly spaced about the respective cleat.

[0025] In one embodiment at least one cleat may be interconnected to a plurality of cleats using the interconnecting portions. Thus, one cleat that is centrally placed on the outer sole of the shoe, may be connected to between two and ten cleats, where there is provided an interconnecting portion between each of the cleats. In other areas of the outer sole, one cleat may only be connected to one other cleat, especially in areas that are close to the outer radial periphery of the sole, i.e. close to the outer edge of the outsole.

[0026] In accordance with the invention there is also provided a cleat for an outer sole of a
footwear, comprising: a base portion configured to be disposed on the outer sole; a top portion disposed opposite from the base portion and configured to extend from the outer sole and to contact a surface during use of the footwear; and a plurality of elongated interconnecting portions each having a first end affixed to the base portion and a second end extending away from the base portion; wherein the base portion has a width larger than a width of the top portion such that the cleat generally tapers in a direction toward the top portion: wherein the second end of at least one of the interconnecting portions is affixed to an adjacent cleat; and wherein the cleats and the interconnecting portions include soft curves configured to avoid debris from accumulating on the sole.

[0027] In one embodiment the base portion of the cleat may have a diameter of about five to seven millimeters and wherein the interconnecting portion affixed to the adjacent cleat may be at least fifteen millimeters long.

[0028] In accordance with the invention there is also provided a method of increasing traction and wear resistance of an outer sole of a footwear, comprising: providing a plurality of cleats on the outer sole; spacing each cleat at least fifteen millimeters from an adjacent cleat; connecting each cleat to a plurality of adjacent cleats with interconnecting portions; forming the cleats and interconnecting portions with soft curves comprising smooth and uninterrupted curved surface areas without acute, right, or obtuse angles.

[0029] A cleat for an outer sole of a footwear including a base portion configured to be disposed on the outer sole, a top portion disposed opposite from the base portion and configured to extend from the outer sole and to contact a surface during use of the footwear, and a plurality of elongated interconnecting portions each having a first end affixed to the base portion and a second end extending away from the base portion, where the base portion has a width larger than a width of the top portion such that the cleat generally tapers in a direction toward the top portion, where the second end of at least one of the interconnecting portions is affixed to an adjacent cleat, and where the cleats and the interconnecting portions include soft curves configured to avoid debris from accumulating on the sole.

[0030] Also, a method of increasing traction and wear resistance of an outer sole of a
footwear is disclosed herein. The method involves providing a plurality of cleats on the outer sole, spacing each cleat at least fifteen millimeters from an adjacent cleat, connecting each cleat to a plurality of adjacent cleats with interconnecting portions, and forming the cleats and interconnecting portions with soft curves comprising smooth and uninterrupted curved surface areas without acute, right, or obtuse angles.

[0031] Other features and aspects of the invention will become apparent from the following detailed description, taken in conjunction with the accompanying drawings, which illustrate, by way of example, the features in accordance with embodiments of the invention. The summary is not intended to limit the scope of the invention, which is defined by the claims attached hereto.

**Brief Description of the Drawings**

[0032] The invention will now be described, by way of example, with reference to the accompanying drawings, in which:

[0033] Figure 1 illustrates a bottom perspective view of a spikeless footwear showing an outer sole pattern and arrangement of cleats, in accordance with an embodiment of the present invention;

[0034] Figure 2 illustrates a bottom plan view thereof;

[0035] Figure 3 illustrates a side view thereof;

[0036] Figure 4 illustrates a side view thereof, opposite to that shown in Figure 3;

[0037] Figure 5 illustrates a front view thereof;

[0038] Figure 6 illustrates a rear view thereof;

[0039] Figure 7 illustrates an enlarged perspective view of the outer sole of Figure 1;

[0040] Figure 8 illustrates an enlarged perspective view thereof;

[0041] Figure 9 illustrates a plan view of Figure 7;
[0042] Figure 10 illustrates a plan view of Figure 8; and

[0043] Figure 11 shows another enlarged perspective view of the outer sole of Figure 1.

[0044] Like reference numerals refer to like parts throughout the various views of the drawings.

**Detailed Description of the Invention**

[0045] The following detailed description is merely exemplary in nature and is not intended to limit the described embodiments or the application and uses of the described embodiments. As used herein, the word "exemplary" or "illustrative" means "serving as an example, instance, or illustration." Any implementation described herein as "exemplary" or "illustrative" is not necessarily to be construed as preferred or advantageous over other implementations. All of the implementations described below are exemplary implementations provided to enable persons skilled in the art to make or use the embodiments of the disclosure and are not intended to limit the scope of the disclosure, which is defined by the claims. For purposes of description herein, the terms "upper," "lower," "left," "rear," "right," "front," "vertical," "horizontal," and derivatives thereof shall relate to the invention as oriented in FIG. 1. Furthermore, there is no intention to be bound by any expressed or implied theory presented in the preceding technical field, background, brief summary or the following detailed description. It is also to be understood that the specific devices and processes illustrated in the attached drawings, and described in the following specification, are simply exemplary embodiments of the inventive concepts defined in the appended claims. Specific dimensions and other physical characteristics relating to the embodiments disclosed herein are therefore not to be considered as limiting, unless the claims expressly state otherwise.

[0046] The outer sole 100 construction for a spikeless footwear 102 is referenced in Figures 1-11. The outer sole 100 construction of the footwear 102 uses a pattern which has integrated cleats 104 with soft curves 106 and the cleats 104 are interconnected to each other by interconnecting portions 108 throughout the length of the outer sole 100 resembling an organic structure such as tree leaf or animal membrane. As used herein, soft curve is intended to mean an area of the cleats 104 and arms 108 where the surface includes curvature. That is, soft curves are
areas without straight edges, without planar surfaces, and/or without acute or obtuse angles and without vertices therebetween. Further there is a relatively larger space between the cleats 104 that facilitates in minimizing dirt accumulation and improving the grip and traction, thereby reducing an aquaplaning effect during a golf swing or similar activities. Additionally the shoe 102 can be used not just on, for example, golf course putting green, but also on smooth and hard surfaces peripheral to the playing area. The spikeless footwear 102 with the organic structure sole 100 pattern also provides sufficient grip and traction during playing soccer, football, golf, running, jogging and other similar sports.

[0047] As mentioned, the integrated cleats 104 are interconnected to each other by interconnecting portions 108 throughout the length of the outer sole 100 resembling an organic structure like a tree leaf or an animal membrane. This unique structure is configured to facilitate detachment of dirt, soil, and other debris from a corresponding shoe during normal use. With less debris affixed to the outsole 100, the corresponding shoe gains traction and is less likely to experience aquaplaning. The outer sole 100 has a relatively large space between the cleats 104, in other words, there are less cleats 104 on the sole 100 thus creating more gaps in order to further avoid an aquaplaning effect. There are less than 65 cleats 104 on the outer sole 100 and the distance between the cleats 104 is at least about 15 mm. More particularly, there are about 40 to 65 cleats on the outer sole 100. Further, the larger space between the cleats 104 contributes to the minimization of dirt accumulation and thus improves the grip and traction, thereby reducing a slipping effect during a golf swing or similar activities.

[0048] The cleats 104 extend vertically from a base of the outsole about five to six millimeters. This dimension is shown by way of example at A in Figure 3. The interconnecting portions 108 extend about two to three millimeters from the outsole base. This dimension can be seen at B in Figure 3. The base itself is about three to four millimeters in thickness and it is affixed to the upper and/or a midsole or other interlayer. This dimension can be seen at P in Figure 3. Thus, the total thickness of the outsole is about eight to ten millimeters. The cleats 104 include a diameter D of about five to seven millimeters. See Figure 2. The soft curves used to form the cleats 104 arms 108 and other aspects of the outsole 100 have a radius of curvature of about two to three millimeters. Of course, these dimensions and measurements are merely
exemplary and may be varied as desired to attain the desire degree of traction and wear resistance.

[0049] Figure 7 illustrates an enlarged perspective view of the cleats 104, in accordance with an exemplary embodiment of the present invention. The plurality of cleats 104 is located on and extends from a surface 110 of the sole 100 facing away from the footwear 102 and each of the plurality of cleats 104 and the interconnecting portions 108 has a base portion 112 and a top portion 114. The cleats 104 and the interconnecting portions 108 taper from the base portions 112 towards the top portion 114. Additionally the cleats 104 and the interconnecting portions 108 further have smooth surfaces 116 and soft curves 106 to prevent dirt from sticking on the sole 100.

[0050] Figure 5 illustrates a front view of the spikeless footwear 102, in accordance with an aspect of the present invention. The front view shows a ball area 118 of the footwear 102, which is slightly lifted upward.

[0051] Figure 6 illustrates a back view of the spikeless footwear 102, in accordance with an aspect of the present invention. The back view shows a heel area 120 of the footwear 102, which is substantially fiat or parallel to the ground.

[0052] Turning now to Figure 3, a side view of the spikeless footwear 102 is illustrated, in accordance with an exemplary embodiment of the present invention. The side view clearly shows the base and top portions 112 and 114 of the cleats 104. Further it shows that the cleats 104 at the heel area 120 and a fore foot area 122 are continuously engaged to ground, while the cleats 104 at the ball area are upwardly inclined in correspondence with the pitch of this portion of the outer sole 100. As can be seen in Figure 3 and particularly in Figure 2, the cleats 104 and interconnecting portions 108 extend substantially continuously from the heel area 120 through the fore foot area 122 and to the ball area 118, terminating at a forward most portion of the outer sole 100.

[0053] The outer sole 100 for the spikeless footwear 102 is constructed from a material
comprising at least one of plastic, polyurethane, rubber or any combination thereof. In the
drawings, an upper is illustrated in phantom. This upper may correspond to any type of athletic
or fashion shoe, boot, sandal, or the like. For example, the upper may be that of a golf shoe and
may be formed of any desired material which is secured to the outer sole 100 in any desired
means, for example, by adhesion, welding, stitching, etc. Additionally and/or alternatively, a
midsole and/or another interlayer may be disposed between the upper and outer sole 100.

[0054] The integrated cleats 104 on the outer sole 100 have a larger space between them than
conventional cleated shoes. That is, there are less cleats 104 on the sole 100 which thus creates
more gaps in the cleat structure. Due to the increased spacing of the cleats, each individual cleat
bears a larger proportion of the downward force during use. This increases traction and avoids
aquaplaning. There are between 40 and 65 number of cleats 104 on the outer sole 100 and the
distance between the cleats 104 is at least about 15 mm. Further, the larger space between the
cleats 104 facilitates minimization of dirt accumulation. This leads to grip and traction
improvement, thereby reducing aquaplaning and slipping effect during the golf swing or similar
activities. Additionally, as described herein, the cleats 104 have a streamlined shape. That is,
the cleats 104 are smooth and there is minimal unevenness on the surfaces thereof. This
streamlined shape prevents accumulation of debris and encourages the removal thereof during
use of the shoe and when manually cleaned by the user. Also as described, the cleats 104 and
interconnecting portions 108 extend over the outer sole 100 in a pattern that resembles an
organic structure such as a tree leaf or an animal membrane. This unique pattern resists the
accumulation of debris, thus resulting in increased traction and reduced aquaplaning. As can be
seen for example in Figure 2, the cleats 104 have the appearance of nodes distributed across the
various sectors of the outer sole 102, longitudinally from the heel to the toe, and laterally from
the medial side edge to the lateral side edge. The interconnecting portions 108 have the
appearance of branches or webs or veins which extend between and connect the various cleats
104. Many of the cleats 104 have five interconnecting portions 108 extending radially or near-
radially therefrom. Other cleats 104 have as many as six or seven interconnecting portions 108
extending therefrom. Still other cleats 104, particularly those positioned along the outermost
edges of the outer sole 102, have four, three, or two interconnecting portions 108 extending
therefrom. The interconnecting portions 108 extend generally radially from the respective cleats
and, in many instances, are generally equally spaced about the respective cleat 104. For example, where a cleat 104 includes six interconnecting portions 108, the portions 108 are spaced angularly at about 60 degrees around the cleat 104. It is this unique construction which gives the outer sole 102 the appearance of an organic structure, such as a tree leaf or animal membrane. Of course, the specific numbers of cleats 104 and the number of interconnecting portions 108 extending from each cleat 104 and the relative angles of extension are merely illustrative. These exemplary numbers may vary depending upon a particular application. Under the broad scope of this disclosure, a cleat 104 may include zero to eight or more interconnecting portions 108 extending therefrom equally and/or non-equally spaced.

An interconnecting portion 108 includes a first end affixed to a particular cleat 104 and an opposite second end extending therefrom. This second end may or may not be affixed to another adjacent cleat 104. The interconnecting portions 108 extending around a particular cleat 104 may be of equal or unequal length.

The unique attributes of the outer sole 100 allows the footwear 102 to be used not just over greens on a golf course, but also over smooth and hard surfaces peripheral to the playing area without damaging the surfaces and preventing quick wear and tear of the cleats 104 when used over the hard surfaces. The outer sole 102 does not include the protruding hard or metal spikes nor any sharp corners or edges associated with conventional cleated shoes. These traditional features of cleated shoes form primary ground contacting surfaces which, on the one hand, provide a degree of traction to the conventional cleated shoes but which, on the other hand, can damage playing and non-playing surfaces and can subject the traditional soles to rapid wearing and degradation. Instead, the cleats 104 and interconnecting portions 108 include soft curves 106 and streamlined surfaces which reduce damage to surfaces on and off the playing grounds. Also, the soft curves 106 of the cleats 104 and interconnecting portions 108 resist wearing as compared to the spikes and sharp edges of traditional cleated footwear.

As mentioned, the cleats 104 and the interconnecting portions 108 taper from the base portions 112 towards the top portion 114. This construction contributes to the increased traction provided by the outer sole 102.
As described, the various cleats 104 of the outer sole 102 are connected by interconnecting portions 108. These interconnecting portions 108 extend across the outer sole 102 as seen in Figure 2 to form a support frame which increases the stability of the outer sole 102. In addition, as can also be seen in Figure 2, each of the various cleats 104 generally includes two to seven or more interconnecting portions 108 extending therefrom. This increases the relative stability of each of the cleats 104. Thus, even though the outer sole 104 includes less cleats than a traditional cleated shoe, the outer sole 104 and the individual cleats 104 remain stable. The outer sole 102 relies on the unique network of interconnecting portions for its stability, thus permitting the sole 102 to be thinner than in a conventional cleated shoe. As noted above, the sole base P is only about three to four millimeters. Yet, the outer sole 102 provides sufficient stability due to the support structure formed by the interconnecting portions 108 and cleats 104.

The descriptions of the various embodiments of the present invention have been presented for purposes of illustration, but are not intended to be exhaustive or limited to the embodiments disclosed. Many modifications and variations will be apparent to those of ordinary skill in the art without departing from the scope and spirit of the described embodiments. The terminology used herein was chosen to best explain the principles of the embodiments, the practical application or technical improvement over technologies found in the marketplace, or to enable others of ordinary skill in the art to understand the embodiments disclosed herein.
CLAIMS

1. An outer sole for a footwear comprising:
   a base extending from a heel portion, through a midfoot portion, to a ball portion of the footwear.
   a plurality of cleats disposed on the base throughout the heel, midfoot, and ball portions of the footwear; and
   a plurality of interconnecting portions extending from each of the cleats and extending across a portion of the base, at least one of the interconnecting portions being connected to an adjacent cleat;
   wherein the cleats and the interconnecting portions include soft curves configured to avoid debris from accumulating on the sole.

2. The outer sole of claim 1, wherein the number of cleats on the outer sole is less than 65.

3. The outer sole of claim 1, wherein the outer sole is constructed from a material comprising plastic, polyurethane, or rubber or any combination thereof.

4. The outer sole of claim 1, wherein a distance between the cleats is at least about 15 millimeters.

5. The outer sole of claim 4, wherein the at least 15 millimeters delimits areas absent of cleats configured to increase traction and to said avoid debris from accumulating on the sole.

6. The outer sole of claim 1, wherein each of the plurality of cleats and the interconnecting portions has a base portion and a top portion and wherein the cleats and the interconnecting portions taper from the base portions towards the top portions.

7. The outer sole of claim 1, wherein the cleats and the interconnecting portions further having smooth surfaces to said avoid debris from accumulating on the sole.
8. The outer sole of claim 1, wherein space between the cleats is sufficient to improve grip and thereby to avoid an aquaplaning effect.

9. The outer sole of claim 1, wherein the outer sole pattern has no sharp edges.

10. The outer sole of claim 1, wherein the soft curves comprise curved surface areas without straight edges and without planar surfaces, and wherein the curved surface areas are smooth and uninterrupted.

11. The outer sole of claim 1, wherein the soft curves comprise curved surface areas without acute, right, or obtuse angles, wherein the curved surface areas are smooth and uninterrupted.

12. The outer sole of claim 1, wherein the soft curves comprise a radius of curvature of about two to three millimeters.

13. The outer sole of claim 1, wherein the cleats and the interconnecting portions form a pattern that resembles an organic structure of a tree leaf or animal membrane.

14. The outer sole of claim 1, wherein two to seven of the interconnecting portions extend generally radially from each of the cleats and wherein the two to seven interconnecting portions are generally evenly spaced about the respective cleat.

15. A cleat for an outer sole of a footwear, comprising:
   a base portion configured to be disposed on the outer sole;
   a top portion disposed opposite from the base portion and configured to extend from the outer sole and to contact a surface during use of the footwear; and
   a plurality of elongated interconnecting portions each having a first end affixed to the base portion and a second end extending away from the base portion;
   wherein the base portion has a width larger than a width of the top portion such that the cleat generally tapers in a direction toward the top portion:
wherein the second end of at least one of the interconnecting portions is affixed to an adjacent cleat; and
wherein the cleats and the interconnecting portions include soft curves configured to avoid debris from accumulating on the sole.

16. The cleat of claim 15, wherein the soft curves comprise smooth and uninterrupted curved surface areas without acute, right, or obtuse angles.

17. The cleat of claim 16, wherein the soft curves comprise a radius of curvature of about two to three millimeters.

18. The cleat of claim 15, wherein the cleat, the interconnecting portions, and the adjacent cleat form a pattern that resembles an organic structure of a tree leaf or animal membrane.

19. The cleat of claim 15, the base portion has a diameter of about five to seven millimeters and wherein the interconnecting portion affixed to the adjacent cleat is at least fifteen millimeters long.

20. A method of increasing traction and wear resistance of an outer sole of a footwear, comprising:
   providing a plurality of cleats on the outer sole;
   spacing each cleat at least fifteen millimeters from an adjacent cleat;
   connecting each cleat to a plurality of adjacent cleats with interconnecting portions;
   forming the cleats and interconnecting portions with soft curves comprising smooth and uninterrupted curved surface areas without acute, right, or obtuse angles.
### INTERNATIONAL SEARCH REPORT

#### A. CLASSIFICATION OF SUBJECT MATTER

INV.
- A43B13/22
- A43B13/26
- A43B3/00
- A43B5/00
- A43B5/02

#### ADD.

According to International Patent Classification (IPC) and/or both national classification and IPC

#### B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
- A43B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic database consulted during the international search (name of database and, where practicable, search terms used)
- EPO-Internal

#### C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Further documents are listed in the continuation of Box C. See patent family annex.

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  - "A" document defining the general state of the art which is not considered to be of particular relevance
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**Date of the actual completion of the international search**

13 April 2017

**Date of mailing of the international search report**

26/04/2017

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Duquenoy, Alain
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<td>wO 83/02715 AI (STUBBLEFIELD JERRY D) 18 August 1983 (1983-08-18) figure 1</td>
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