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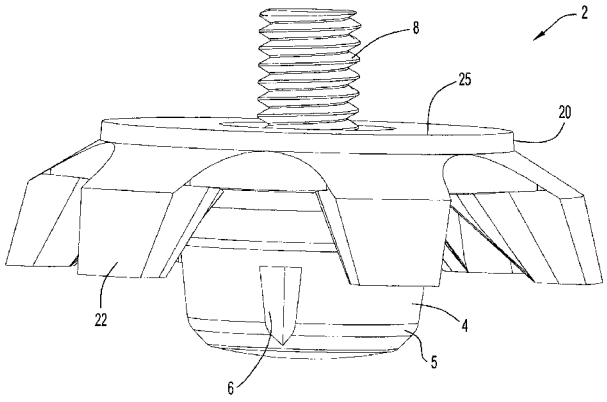


FIG.1

(57) **Abstract**: A cleat for use with an athletic shoe includes a hub, a stud of substantially non- flexible material and extending downwardly and away from a lower surface of the hub, a cleat connector extending upwardly and from an upper surface of the hub and configured to engage a shoe-mounted mating connector disposed on a sole of the shoe, the upper surface opposing the lower surface of the hub, and at least one dynamic traction element extending downwardly from the lower surface of the hub and adapted to flex upwardly when the cleat is connected to a shoe and the at least one dynamic traction element is forced downwardly to contact a ground surface due to a weight load applied to a shoe. The distal end of the stud extends further from the lower surface of the hub than the distal end of each unflexed dynamic traction element such that, when the shoe to which the cleat is connected is forced downward toward the ground surface, the stud contacts and/or begins to penetrate the ground surface to provide initial traction before each dynamic traction element makes contact with the ground surface.

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IMPROVED TRACTION CLEAT FOR FIELD SPORTS

CROSS REFERENCE TO RELATED APPLICATIONS

This application claims priority under 35 U.S.C. §119(e) from U.S. Provisional Patent Application Serial No. 61/031,412, filed February 26, 2008, and entitled "Improved Traction Cleat for Field Sports," the entire contents of which are hereby incorporated by reference.

FIELD OF THE INVENTION

The present invention pertains to footwear cleats for field sports and, more particularly, to improvements in such cleats that result in improved traction without sacrificing running speed.

BACKGROUND

Footwear cleats used in soccer, rugby, lacrosse, American football and other field sports typically take the form of individual replaceable hard plastic or metal studs that threadedly engage respective receptacles mounted in the outsole of an athletic shoe. Depending on preferences and conditions, the studs typically range in length from ten millimeters to eighteen millimeters. For muddy and similar poor field conditions, longer studs are more desirable because they penetrate the ground more deeply to provide better traction. That is, it is the surface area of the stud in contact with the sod (i.e., the turf and top soil) below the ground level that engages the sod for traction during a push-off for a running step or during an attempt to stop. Therefore, more stud surface area makes contact with the sod as penetration into the sod increases.

However, when studs penetrate the sod more deeply, the wearer is unable to run as fast as he/she can when there is less penetration. For example, a 15mm stud penetrates the ground only to approximately 10mm on initial impact, and as the runner pushes off to take the next step, the downward force causes the stud to initially sink toward the maximum 15mm depth. This is referred to as secondary sink or penetration. The limit of this secondary penetration is provided by the outsole of the shoe abutting the ground. The result of secondary penetration is a significant loss of power on the push off for each step, thereby limiting running speed.

In addition, a not insignificant amount of the wearer's energy (i.e., force and time) is used in withdrawing a long stud from the muddy turf with each step.

Moreover, long studs are a cause of many field sport injuries. The longer the stud, the more deeply anchored it becomes in the turf. When studs are deeply anchored, forces applied to ankles, legs and knees are more likely to create injuries since the stud and shoe cannot readily break away from the turf in response to lateral impact from collisions and tackling. In other words, when the shoe does not easily break away from the turf, a portion of the leg is more likely to break or become sprained in response to lateral force applied to a knee or leg.

It is also known to provide golf shoes with plastic cleats that do not penetrate the ground. This is a highly desirable characteristic for golf shoe cleats because ground penetration, particularly on putting greens, can damage the grass root system and leave uneven marks that adversely affect the ability to accurately put a golf ball. A highly efficient type of golf cleat for this purpose provides dynamic traction wherein traction elements on the cleat flex under the load of the wearer's weight and, in doing so, provide traction without penetrating the ground. Examples of dynamic traction cleats may be found, for example, in U. S. Patent Nos. 6,209,230, 6,305,104 and 7,040,043, the disclosures of which are incorporated herein by reference in their entireties. In these patents, cleats are disclosed which take the form of a hub with a connector such as a threaded shaft extending from the hub top surface that can be selectively secured to a mating connector mounted in a golf shoe outsole. Plural flexible traction elements extend generally downward and outward from the hub periphery to engage grass blades and turf, and thereby provide traction, as the traction elements flex under the weight of the wearer.

SUMMARY

It is an object of the invention to provide a cleat configuration for field sports that permits shorter studs to be used without sacrificing traction performance and running speed under poor field conditions, and that thereby conserves the wearer's energy and minimizes injuries.

It is another object of the invention to utilize the principles of dynamic traction in combination with standard type field traction studs to permit the length of the studs to be reduced without sacrificing traction under poor field conditions. More specifically, it is an object of the invention to utilize dynamic traction to reduce secondary penetration by field studs into muddy and soggy sod.

In accordance with the present invention, a cleat for use with an athletic shoe comprises a hub, a stud of substantially non-flexible material and extending downwardly and away from a lower surface of the hub, a cleat connector extending upwardly and from an upper surface of the hub and configured to engage a shoe-mounted mating connector disposed on a sole of the shoe, the upper surface opposing the lower surface of the hub, and at least one dynamic traction element extending downwardly from the lower surface of the hub and adapted to flex upwardly when the cleat is connected to a shoe and the at least one dynamic traction element is forced downwardly to contact a ground surface due to a weight load applied to a shoe. The distal end of the stud extends further from the lower surface of the hub than the distal end of each unflexed dynamic traction element such that, when the shoe to which the cleat is connected is forced downward toward the ground surface, the stud contacts and/or begins to penetrate the ground surface to provide initial traction before each dynamic traction element makes contact with the ground surface.

The combination of at least one substantially non-flexible stud with at least one dynamic traction element accordance with the present invention results in a cleat with enhanced traction while minimizing injuries to the user and conserving user energy during sports or other activities.

The above and still further features and advantages of the present invention will become apparent upon consideration of the following detailed description of a specific embodiment thereof, particularly when taken in conjunction with the accompanying drawings wherein like reference numerals in the various figures are utilized to designate like components.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a side view in elevation of an example embodiment of a cleat in accordance with the present invention.

Fig. 2 is a bottom view in plan of the cleat of Fig. 1.

Fig. 3 is a view in perspective including the top surface of the cleat of Fig. 1.

Fig. 4 is a view in perspective of the stud for the cleat of Fig. 1.

Fig. 5 is a top view in plan of the body part including hub for the cleat of Fig. 1.

Fig. 6 is a side view in elevation of a modified version of the cleat of Fig. 1 including a stud having a greater axial dimension.

Fig. 7 is a top view in plan of a modified cleat of Fig. 1 including an alignment structure on a top surface of the hub.

Fig. 8 is a side view in elevation of another example embodiment of a cleat in accordance with the present invention.

Fig. 9 is a bottom view in plan of the cleat of Fig. 8.

Fig. 10 is a view in perspective of the body part including hub of the cleat of Fig. 8.

Fig. 11 is a side view in elevation of a further example embodiment of a cleat in accordance with the present invention.

Fig. 12 is a bottom view in plan of the cleat of Fig. 11.

Fig. 13 is a view in perspective including the top surface of the cleat of Fig. 11.

Fig. 14 is a view in perspective of the body portion including the hub for the cleat of Fig. 11.

Fig. 15 is a view in plan of a shoe sole including a plurality of cleats of Fig. 11 connected to the shoe sole.

DETAILED DESCRIPTION

In accordance with the present invention, a cleat comprises a hub including at least one stub formed from a substantially inflexible or non-flexible material extending downwardly from the hub, at least one dynamic traction element extending downwardly from a lower surface of the hub and a cleat connector extending from an upper surface of the hub and configured to engage with a mating connection on a shoe. Each dynamic traction element is configured or adapted to flex upwardly toward the hub when force is applied downwardly on the cleat (e.g., due to a weight load applied by a wearer of a shoe to which the cleat is attached).

In addition, the cleat is designed such that a distal end of the stud extends a greater distance below the lower surface of the hub than the distal end of each unflexed dynamic traction element. This results in the stud making contact and/or penetrating a ground surface (e.g., sod) to provide initial traction before each dynamic traction element makes contact with the ground surface.

An example embodiment of a cleat according to the present invention is depicted in Figs. 1-5. Referring to these figures, cleat 2 includes a body part comprising a central hub 20 and a stud 4 which extends through a central opening in the hub as described below. The body part with hub 20 is similar in design to the cleat described in U.S.

Patent No. 6,305,104 and particularly as illustrated in Figures 4-6 of that patent with one major exception: the hub 20 has a centrally disposed circular cut-out portion. Stud 4 extends coaxially through the cut-out portion of hub 20 and includes a male threaded section 8 that extends away from an upper end 25 of the hub and is configured to engage with a female threaded connector receptacle located in a shoe outsole to connect the cleat to the shoe.

Referring to Fig. 4, the threaded section 8 is formed as an integral part of stud 4. The threading may be single or multiple threads and may be accompanied by any suitable locking mechanism to prevent inadvertent disengagement of the threaded section from a corresponding female threaded connector in the shoe outsole. The stud 4 also includes a lower traction portion 11 which projects from a lower surface 27 of the hub and includes a tapered, frusto-conical bottom portion 5 at the terminal end of the lower traction portion 11 to facilitate traction on turf or a ground surface when the cleat is forced against the ground surface.

A series of cut-out or notched sections 6 is disposed around the periphery of the stud, the notched sections being located at angularly spaced positions with respect to each other and extending in a longitudinal direction of the stud, where a portion of each notched section 6 is located at the tapered portion 5 of the stud. The notched sections 6 also provide enhanced gripping or traction against the ground surface as the stud is forced into the ground surface. While the cleat of Figs. 1-5 includes three notched sections 6, any suitable number (e.g., one or more) notched sections can optionally be provided along the ground-engaging portion of the stud. As can best be seen in Fig. 2, the notched sections 6 have a V-shaped cross-section. However, the notched sections can also have other cross-sectional configurations (e.g., curved or multi-faceted cross-sectional configurations).

As further shown in Figs. 4 and 5, the stud 4 can be designed as a separate piece from the body part including hub 20, where the stud is releasably secured to the hub during attachment of the combination to a shoe-mounted connector. In this regard, the stud 4 includes an annular upward-facing flange 10 disposed between the lower traction portion 11 and threaded section 8. The flange 10 is suitably dimensioned so as to abut a corresponding annular shoulder formed by radially-inward extending projections 24 angularly spaced from each other along the central aperture of the hub 20 and located near the hub lower surface 27. In particular, when the stud 4 is inserted through the central aperture of hub 20 at the hub lower surface 27, annular flange 10 on the stud 4

engages with the radially-inward extending projections 24 of the hub 20 so as to force hub 20 against the shoe sole as the stud 4 is engaged with the shoe-mounted connector. This arrangement permits the stud and/or hub to be independently replaced upon disengagement of the assembled unit from the shoe. Alternatively, the stud and hub may be molded together, preferably from polymers of different hardness to accommodate the structural and functional requirements that render the stud able to penetrate a ground surface, such as sod, and the dynamic elements to resiliently flex under load.

The cleat of the present invention can be provided with studs having different lengths. For example, the stud 4 shown in Figs. 1-5, when connected with the hub 20, has a length of about 11 mm as measured from the upper surface 25 of the hub to the terminal end of the stud 4. In Fig. 6, the cleat 102 has been modified to include a stud 104 which is slightly longer in axial dimension in relation to stud 4 of Figs. 1-5. In particular, when stud 104 is connected with hub 20 as shown in Fig. 6, the stud has a length of about 14 mm as measured from the upper surface 25 of the hub to the terminal end of the stud 104. Other stud lengths, such as stud lengths having dimensions from about 10 mm or smaller to about 16 mm or larger in axial dimension, can also be used with cleats in accordance with the invention. As noted above, in embodiments in which the stud is not molded with the hub, cleats can be easily modified by combining the body portion including hub of the cleat with studs of different lengths depending upon a particular application in which the cleat is to be used. Different sized studs can also be combined with hubs having different numbers and/or types of dynamic traction elements.

The stud can be constructed of any suitably rigid material, such as hard, non-flexible plastic or polymer materials or metals or metal alloy (e.g., aluminum), or any other conventional materials known for cleats. The invention is concerned with the combination of the stud and the body part, and specifically with surrounding the stud with the traction elements on the body part to achieve enhanced traction of the cleat for particular applications.

In particular, the hub bears a plurality of depending resiliently flexible (i.e. dynamic) traction elements 22. The traction elements 22 extend outwardly and downward from the hub lower surface 27 at angularly spaced locations along the hub periphery. Each traction element 22 preferably flexes substantially independently from the others, although adjacent traction elements may cooperate to provide traction. Each traction element 22 is resiliently deflectably secured to the hub 20, so that, under the

weight of the wearer, the traction element is deflected upward toward the sole of the wearer's shoe.

The dynamic traction elements are made from a resilient material such as polyurethane or other flexible elastomer. The hub may be made from the same material as the dynamic traction elements or, alternatively, from a different material. In the embodiment of Figs. 1 - 5, the body part including hub 20 and traction elements 22 is made (e.g., via a molding process) entirely from a single material such as polyurethane or other flexible, durable elastomer.

It is noted that the cleat of Figs. 1-5 shows six dynamic traction elements 22 arranged in a symmetrical pattern around the hub 20. However, the cleat can include any suitable number of dynamic traction elements (for example, one or more dynamic traction elements) arranged in any suitable symmetric or asymmetric patterns along the hub depending upon a particular application and traction function required for the cleat.

The traction elements 22 depicted with the cleat of Figs. 1-5 include multi-faceted surfaces that can have a slight taper inward toward the terminal ends of the traction elements. However, it is noted that the cleats of the present invention can include one or more dynamic traction elements having any one or more suitable geometric configurations, including two or more traction elements on a single cleat having different geometric configurations and/or different lengths or axial dimensions, so long as the dynamic traction elements maintain their resilient flexibility during use of the cleat as described above. In addition, the dynamic traction elements may be provided with small barbs extending downward from their distal ends to enhance traction by digging slightly into the turf or ground surface as they flex under load.

Preferably, gussets 24 are provided along an internal side portion of the traction elements and extending the longitudinal dimension of the traction elements between a terminal end of the traction elements and the lower hub surface 27 (see Fig. 2). The gussets 24 act as resilient "springs" to aid the natural resilience of the traction elements and to pull the elements back into their unflexed positions (as shown in Figs. 1-3) when they are not under load (for example, when the shoe is lifted by the wearer from the ground). In addition, each gusset 24 acts as a wear surface when the arms are deflected against the shoe sole, so that even the sides of the turf-engaging portions are substantially protected from abrasion.

In the preferred embodiment described above, the dynamic traction elements, when unflexed, are said to extend downwardly and outwardly from the bottom surface of

the hub. By outwardly it is meant that the dynamic element axis and/or outward facing surface diverges downwardly and away from the longitudinal axis of the stud 104 and hub. It will be appreciated, however, that dynamic traction elements are not necessarily required to extend outwardly and that such outward extension can be eliminated without departing from the scope of the invention. Specifically, the dynamic elements may extend only downwardly, as long as they flex to provide traction and resist undesired excess ground penetration of the stud under a weight load.

As can best be seen in Fig. 1, the stud 4 extends downward away from the lower surface 27 of the hub 20 a distance that is greater than the distance from which each of the dynamic traction elements 22 extends from the hub lower surface 27 when the dynamic traction elements are in their original, relaxed and un-flexed positions. During use of the cleat, as the wearer of the shoe steps on turf, the stud makes initial contact and/or penetrates the turf or ground surface before the dynamic traction elements make contact and begin to flex and provide traction for the cleat. When the stud 4 penetrates the turf sufficiently, the dynamic traction elements 22 contact the ground and interact with grass blades to resist lateral motion relative to the turf.

In addition, a generally V-shaped gap or "notch" is formed between adjacent dynamic tractions elements 22. During engagement of the cleat 2 with turf or a ground surface, the dynamic traction elements 22 also provide traction by the cooperation of each pair of adjacent traction elements, as the V-shaped "notch" between them traps grass when the user's foot moves laterally through the grass. Moreover, additional traction is provided as grass blades are trapped between the shoe sole and the cantilevered dynamic traction elements 22 as the elements 22 flex toward the sole, thereby mechanically locking the shoe to grass blades exposed above the sod. As the user lifts his or her foot, the traction elements 22 spring back to their unflexed state, releasing the hold on the grass blades contemporaneously with when the shoe is lifted from the ground surface.

Thus, the cleat of Figs. 1-5 provides enhanced traction in which the rigid and substantially non-flexible or inflexible stud initially engages and/or penetrates a ground surface when the user's shoe to which the cleat is attached makes contact with the ground, followed by additional traction by the dynamic traction elements flexing upward toward the shoe sole to engage with grass blades or other turf matter to provide further traction in combination with the stud until the user decides to lift the shoe from the ground surface. This cleat design further allows the stud to be of shorter length in relation to conventional

cleats employing rigid studs, since the dynamic traction elements enhance the traction of the cleat in combination with the traction provided by the stud.

While the cleat embodiment described above and depicted in Figs. 1-5 includes a single hard and substantially non-flexible or inflexible stud and one or more flexible dynamic traction elements, it is to be understood that plural studs may be included in the hub described above and shown in Figs. 1-5 or, alternatively, plural studs may be included as part of a larger cleat structure along with dynamic elements. For example, in some applications it may be desirable to have one or more bridges or other structure interconnecting plural cleat sections so as to form an integral cleat with two or more studs and two or more dynamic traction elements.

It is also within the scope of the invention to provide a shaped boss on the top surface of the cleat hub to permit different orientations of the cleat on a shoe sole during its connection with the shoe. For example, referring to Fig. 7, a modified cleat includes a hub 20' with a hexagonal boss 26 on the top surface 25. The hexagonal boss 26 permits six different orientations of the cleat on the shoe sole, where boss 26 would mate with a corresponding hexagonal recess in the sole or sole-mounted connector while the stud 4 is connected into the connector receptacle in the shoe sole. Other geometric configurations for the boss are also possible (e.g., triangular, rectangular, etc.), where such geometric configurations would also correspond with recess configurations on the shoe sole.

In the previous embodiments, the threaded section of the stud connects the cleat with a corresponding female threaded portion in the shoe sole. However, it is noted that any other suitable connection elements can also be provided on portions of the stud and/or portions of the hub of the cleat to facilitate connection with corresponding connection elements disposed on or in the shoe sole.

In one embodiment depicted in Figs. 8-10, a cleat 202 is depicted that is similar to the cleat of Fig. 1 in relation to the function of the stud and dynamic traction elements extending from a lower surface of the cleat but with the exception that the hub 220 includes connecting elements disposed on the upper surface of the hub that connect with corresponding connection elements provided on the shoe sole to facilitate an easy connection of the cleat 202 with the shoe sole. In particular, the upper surface of the hub 220 of cleat 202 includes an externally screw-threaded spigot 230 positioned at a central location along the hub and free-standing posts 232 arranged at rotationally spaced positions along the hub periphery. The spigot 230 and posts 232 facilitate a connection with corresponding socket and teeth provided on a shoe sole in a manner substantially

similar to the cleat connection described in U.S. Patent Nos. 6,810,608 and 7,107,708, the disclosures of which are incorporated herein by reference in their entireties. The spigot 230 of hub 220 is rotated within the shoe sole socket such that the posts 232 engage with the teeth of the shoe sole to connect the cleat with the shoe sole.

As can be seen in Fig. 9, cleat 220 includes eight dynamic traction elements 222 that are rotationally spaced from each other along the periphery of the hub 220 and have a substantially similar shape and design and also function in a similar manner as the traction elements 22 described above and depicted in the embodiment of Figs. 1-5. Each traction element 222 further includes a gusset 224 provided along an internal side portion of the traction element and extending the longitudinal dimension of the traction element between a terminal end of the traction element and the lower hub surface, where the gussets 224 act as resilient "springs" to aid the natural resilience of the traction elements and to pull the elements back into their unflexed positions.

The stud 204 is also substantially similar in design to the stud 4 depicted in Fig. 4, including tapered section 205 and notched sections 206 near the terminal end of the lower traction portion of the stud to enhance traction of the cleat when the stud engages and/or penetrates the ground surface. In the embodiment of Figs. 8-11, stud 204, when connected with the hub 220, has a length of about 15 mm as measured from the upper surface 225 of the hub to the terminal end of the stud 204.

The stud further includes a threaded section 208 that engages with a female threaded section disposed within a central opening of the hub 220, where the hub central opening further extends through spigot 230. As may best be seen in Fig. 10 (which depicts the body portion of the cleat including the hub 220 but without the stud 202), an annular ring 240 extends from the lower surface of the hub 220 and defines a portion of the hub central opening through which the stud 202 extends. The stud 202 can include a flange located between its lower traction portion and its threaded section 208 that fits within and engages the inner wall surface portion of ring 240 when the stud threaded section 208 engages with the female threaded section within the hub central opening. As seen in Fig. 8, a portion of threaded section 208 extends slightly beyond the terminal end of spigot 230. However, the stud can be configured such that the terminal end of the stud threaded section lies within the spigot upon complete threaded engagement of the stud with the hub. In addition, a releasable connection of the stud with the hub can be achieved in any other suitable manner. Alternatively, the stud can be molded with the hub to form a single, integral piece.

The cleat embodiment of Figs. 8-10 therefore includes connection elements disposed on the hub rather than the stud that facilitate connection of the cleat with the shoe sole. This cleat can also be designed such that studs having different axial dimensions can be installed with the hub to facilitate different stud lengths extending beyond the lengths of the dynamic traction elements depending upon different applications in which the cleat is to be used.

While each of the embodiments illustrated in Figs. 1-10 describes a cleat and stud combination where the entire unit is symmetrical about a central longitudinal axis extending through the stud and the central aperture of the hub, it is noted that cleats incorporating the principles of the present invention may also be asymmetrical.

An example of such an asymmetrical cleat is illustrated in Figs. 11-14, where the body part including the hub 320 in this cleat is transversely configured as a teardrop or irregular ellipse. However, it is to be understood that other irregular or asymmetric configurations can also be used. As can be seen in Fig. 12, the bottom surface 327 of the hub 320 has an apertured frusto-conical configuration through which the threaded stem 308 of the stud 304 extends. Six dynamic traction elements 322 are disposed in two arrays of three elements along the longer curved sides of the hub periphery. The traction elements 322 include gussets 324 and are substantially similar in design, function and operability as the traction elements 24 described above and depicted in the embodiment of Figs. 1-5. The particular locations of the dynamic elements can be selected to provide different traction effects. In this regard, the cleat of Figs. 11-13 is typically intended to have only one angular orientation when secured to a shoe sole. Uniquely positioning an asymmetrical cleat on a shoe outsole is described in U.S. Patent Nos. 6,834,446 and 6,940,707, the disclosures of which are incorporated herein by reference in their entireties.

The stud 304 is substantially similar to the studs of the previous embodiments, including a threaded section 308 that is inserted through a central opening of the hub 320, and a tapered section 305 and notched sections 306 near the terminal end of the lower traction portion of the stud to enhance traction of the cleat when the stud engages and/or penetrates the ground surface. The stud 302 further includes a flange located between its lower traction portion and its threaded section 308 that is suitably dimensioned so as to abut with a corresponding annular shoulder formed along the central aperture of the hub 320 and located near the hub lower surface 327. When the stud 304 is inserted through the central aperture of hub 320 at the hub lower surface 327, the annular flange on the

stud 304 engages with the annular shoulder of the hub 320 so as to force hub 320 against the shoe sole as the stud threaded section 308 engages with a corresponding female threaded connector section in the shoe sole.

In addition, as can be seen in Fig. 13, two connecting posts 330 extend from the upper surface 325 of the hub 320 and are arranged with respect to each other in the longitudinal direction of the teardrop shaped hub with the central opening in the hub being disposed between the two posts. Each post 330 has a curved and generally U-shaped configuration and is configured to engage with corresponding connecting structure in the shoe sole. The connecting posts 330 and corresponding connecting structure in the shoe sole facilitate a suitable alignment of the asymmetrical cleat on the shoe sole when the stud threaded section 308 is connected to the shoe sole to secure the cleat to the shoe. In the embodiment of Fig. 15, a shoe sole 400 is depicted in which cleats 302 are secured to the shoe sole in different orientations. Other orientations are also possible and can be designed for particular applications in which different types of traction are desired.

The various embodiments described above are only some examples of different ways to implement the principles of the invention in which at least one rigid and substantially inflexible or non-flexible stud is combined with at least one other traction element (e.g., one or more dynamic traction elements) with the stud extending a further distance from a lower surface of the hub of the cleat in relation to the other traction element so as to enhance traction and performance of the cleat for a variety of different applications.

It will be further appreciated that the traction elements surrounding the stud on the hub of the cleat need not all be dynamic traction elements. In other words, at least some of the peripherally disposed traction elements may be relatively inflexible or non-flexible to provide static traction and effect different overall tractional characteristics, as desired for particular applications. Examples of combinations of dynamic and static traction elements are described in the previously referenced U.S. Patent No. 6,834,446. Moreover, one or more static traction elements may project downwardly from hub locations that are radially inward of the hub periphery. Further still, and as noted above, any two or more traction elements on a cleat can have different geometric shapes or configurations and also different lengths as measured from an upper or lower surface of the hub to the terminal end of the traction elements.

One or more studs may also be provided at various locations with respect to the hub. While the previous example embodiments depict a stud positioned at a generally

central location of the hub, it is noted that a cleat can be provided with a stud located at any non-central location along the hub or, alternatively, two or more studs located at varying positions along the hub.

As noted above, the cleat can be designed such that the stud easily separates from the hub upon disengagement with the shoe sole (e.g., as shown in the embodiment of Figs. 1-5) or upon disengaging with the hub (e.g., via a screw threaded connection as shown in the embodiment of Figs. 8-10). Alternatively, the stud can be molded with the hub so as to form a cleat as a single, integral unit (i.e., where the stud is inseparable from the hub).

In the embodiments described above, the body member including the hub and traction elements can be formed in a single molding (e.g., "one shot") step. Alternatively, the body member can be formed in two or more steps, with different components or parts of the body member being molded together to form a single, integral body member. The multiple molding process may be used, for example, to effect different functional characteristics (e.g., different hardness characteristics for different portions of the hub) or aesthetic (e.g., different color) characteristics.

In addition the advantages described above, the capability of providing studs of different lengths without sacrificing functional performance serves to enhance the comfort of the wearer. Specifically, athletic shoes with longer studs are less comfortable to walk in than athletic shoes with shorter studs or no studs. With improvements in comfort, there is also less stress on muscles and joints.

Having described example embodiments of traction cleats, variations and changes will be suggested to those skilled in the art in view of the teachings set forth herein. It is therefore to be understood that all such variations, modifications and changes are believed to fall within the scope of the present invention as defined by the appended claims.

What is Claimed:

1. A cleat for use with an athletic shoe, the cleat comprising:

a hub;

a stud of substantially non-flexible material and extending downwardly and away from a lower surface of the hub;

a cleat connector extending upwardly and from an upper surface of the hub and configured to engage a shoe-mounted mating connector disposed on a sole of the shoe, the upper surface opposing the lower surface of the hub; and

at least one dynamic traction element extending downwardly from the lower surface of the hub and adapted to flex upwardly when the cleat is connected to a shoe and the at least one dynamic traction element is forced downwardly to contact a ground surface due to a weight load applied to a shoe;

wherein the distal end of the stud extends further from the lower surface of the hub than the distal end of each unflexed dynamic traction element such that, when the shoe to which the cleat is connected is forced downward toward the ground surface, the stud contacts and/or begins to penetrate the ground surface to provide initial traction before each dynamic traction element makes contact with the ground surface.

2. The cleat of claim 1, wherein the stud has a configuration that tapers in a direction toward a terminal end of the stud.

3. The cleat of claim 1, wherein at least a portion of the cleat connector comprises a connecting portion of the stud that is configured to engage with the shoe-mounted mating connector.

4. The cleat of claim 3, wherein the connecting portion of the stud comprises a threaded section that engages with a corresponding threaded section of the shoe-mounted mating connector.

5. The cleat of claim 3, wherein the connecting portion of the stud is configured to extend through an aperture in the hub to engage with the shoe-mounted mating connector and secure the hub and stud to the shoe.

6. The cleat of claim 5, wherein the stud is releasably securable to the hub when the connecting portion of the stud is engaged with the shoe-mounted mating connector.

7. The cleat of claim 5, wherein the cleat connector further comprises connecting structure disposed on the upper surface of the hub.

8. The cleat of claim 1, wherein the cleat connector comprises connecting structure disposed on the upper surface of the hub, and the stud includes a connecting section that releasably secures the stud to the hub.

9. The cleat of claim 1, further comprising a plurality of dynamic traction elements disposed along a perhiphery of the hub.

10. The cleat of claim 9, wherein the stud extends from a central location of the hub lower surface.

11. The cleat of claim 9, wherein the hub has a symmetrical geometry.

12. The cleat of claim 9, wherein the hub has an asymmetrical geometry.

13. The cleat of claim 12, wherein the hub has a geometry of an irregular ellipse.

14. The cleat of claim 13, wherein the dynamic traction elements are arranged in two arrays extending along opposing curved sides of the hub periphery and in a longitudinal direction of the hub.

15. The cleat of claim 1, further comprising a boss formed on the upper surface of the hub, wherein the boss has a geometry configured to engage with a corresponding recess in the shoe sole so as to facilitate different orientations of the cleat on the shoe sole upon connection of the cleat with the shoe.

16. A shoe comprising a sole and a plurality of cleats as recited in claim 1, wherein the sole includes a plurality of mating connectors disposed at different locations along the sole and to which the cleat connectors of the cleats are secured.

17. The shoe of claim 16, wherein the hub of each cleat has an asymmetrical geometry, and the cleats are arranged on the shoe such that the hub of each cleat has a different orientation on the shoe sole with respect to the hub of at least one other cleat.

18. The cleat of claim 1 wherein said dynamic traction element also extends outwardly from the lower surface of said hub.

19. A method of using a cleat with a shoe, the cleat comprising a hub, a stud of substantially non-flexible material and extending downwardly and away from a lower surface of the hub, a cleat connector extending upwardly and from an upper surface of the hub, the upper surface opposing the lower surface of the hub, and at least one dynamic traction element extending downwardly from the lower surface of the hub, wherein the distal end of the stud extends further from the lower surface of the hub than the distal end of each unflexed dynamic traction element, the method comprising:

securing the cleat to the shoe by connecting the cleat connector of the cleat to a shoe-mounted mating connector disposed on a sole of the shoe; and

pressing the shoe toward a ground surface such that the stud contacts and/or begins to penetrate the ground surface to provide initial traction before each dynamic traction element makes contact with the ground surface and each dynamic traction element flexes upwardly toward the shoe sole when the dynamic traction element engages the ground surface due to a weight load applied to the shoe.

20. The method of claim 19, wherein the cleat connector comprises a securing portion disposed on the stud, and the securing the cleat to the shoe comprises:

connecting the securing portion of the stud to the shoe-mounted mating connector of the shoe.

21. The method of claim 20, wherein the stud is removably securable to the hub, and the securing the cleat to the shoe further comprises:

inserting the securing portion of the stud through an aperture in the hub prior to connecting the securing portion to the shoe-mounted mating connector of the shoe;

wherein the connection of the securing portion of the stud to the shoe-mounted mating connector secures the hub to the shoe sole.

22. The method of claim 19, wherein the cleat connector comprises a securing portion disposed on the hub, and the securing the cleat to the shoe comprises:

connecting the securing portion of the hub to the shoe-mounted mating connector of the shoe.

23. The method of claim 22, wherein the stud is removably securable to the hub, and the method further comprises:

securing the stud to the hub by connecting a securing portion of the stud to a corresponding stud securing portion of the hub.

24. The method of claim 19, wherein the stud is removably securable to the hub, and the hub is configured to be connected to the shoe sole with studs having different lengths.

25. The method of claim 19, wherein the hub has an asymmetrical geometry, and the method further comprises:

securing a plurality of cleats with hubs having asymmetrical geometries to the shoe such that the hub of each cleat has a different orientation on the shoe sole with respect to the hub of at least one other cleat.

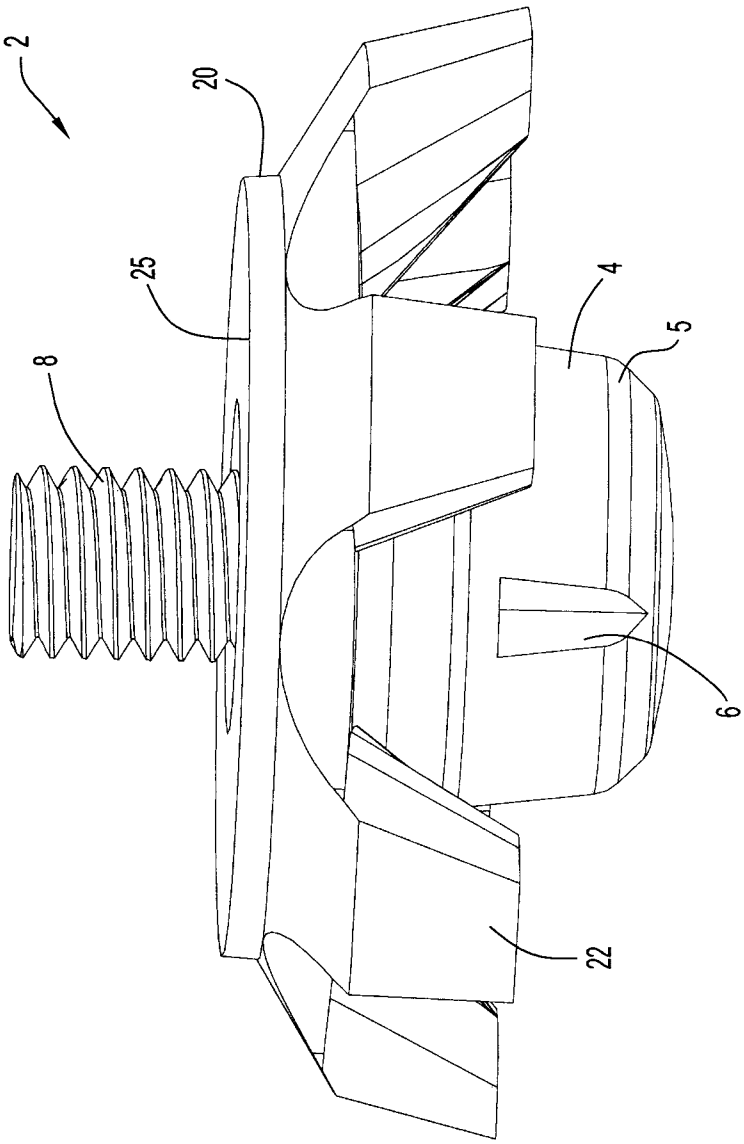


FIG.1

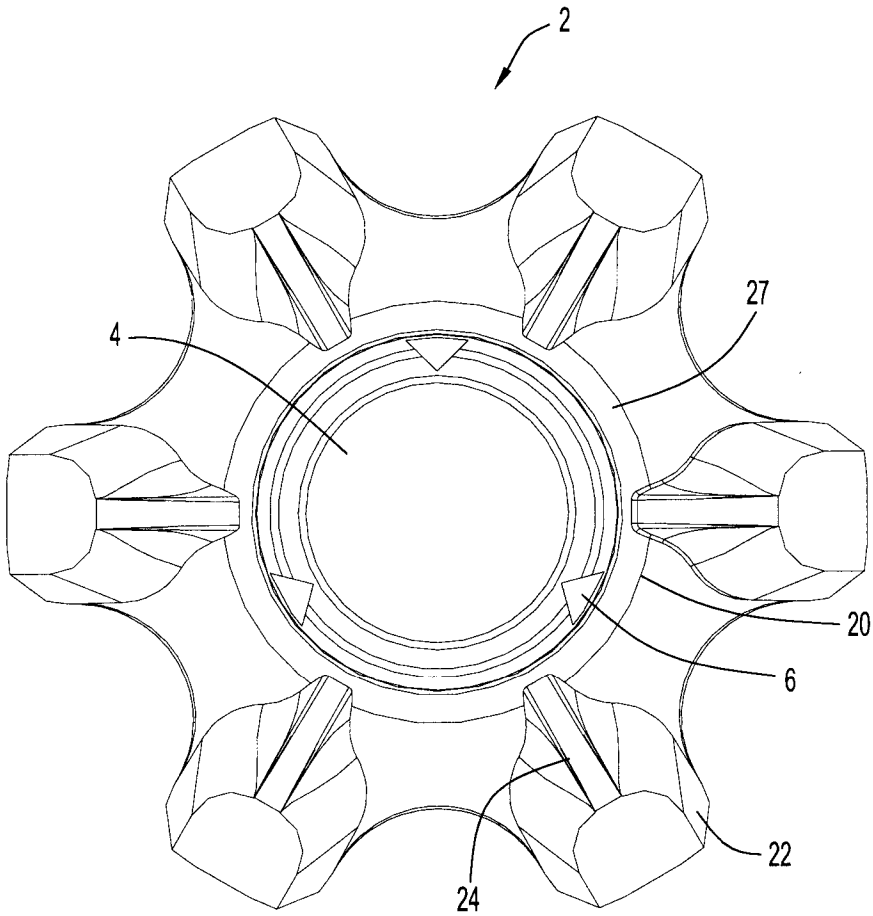


FIG.2

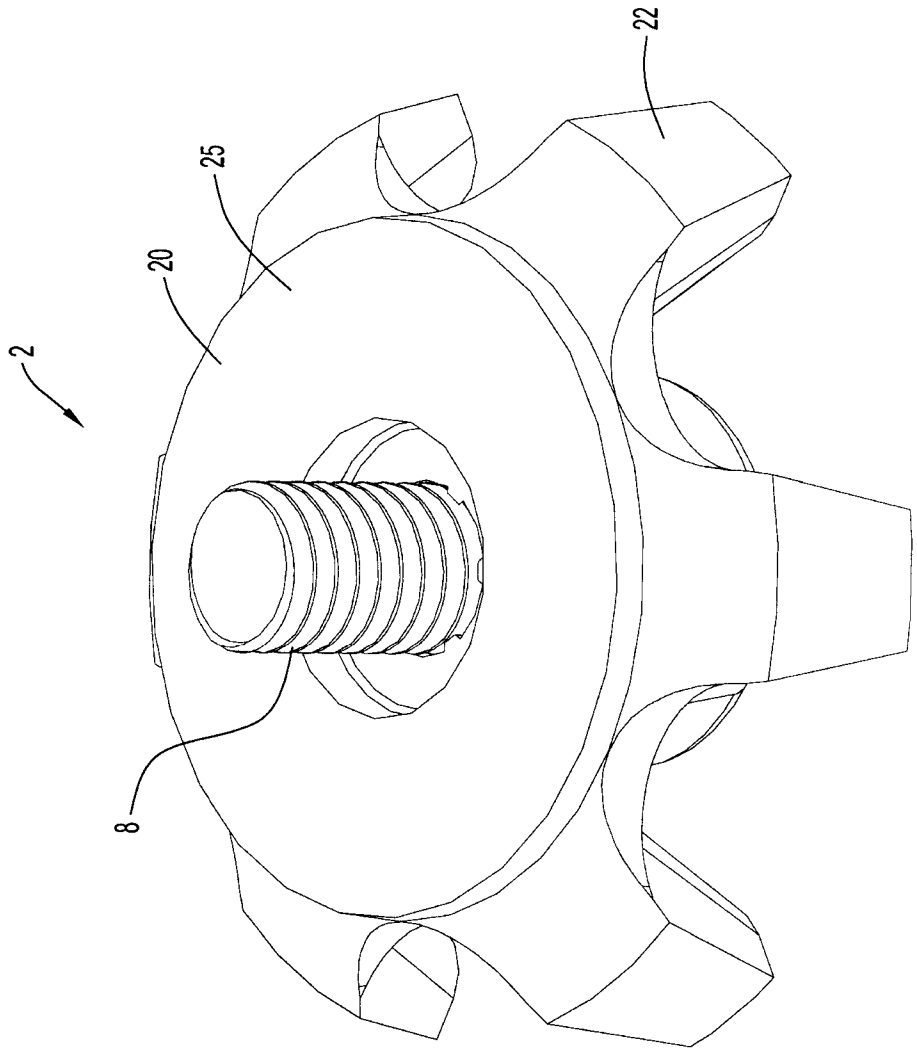


FIG.3

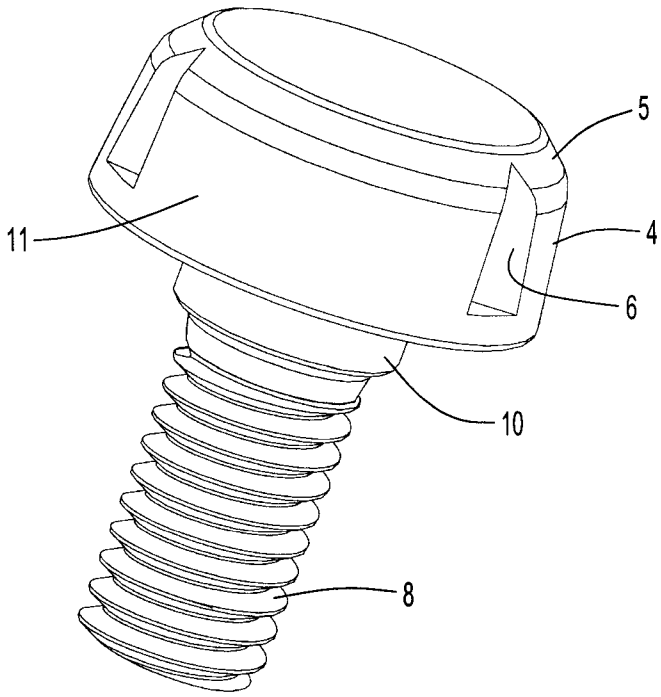


FIG.4

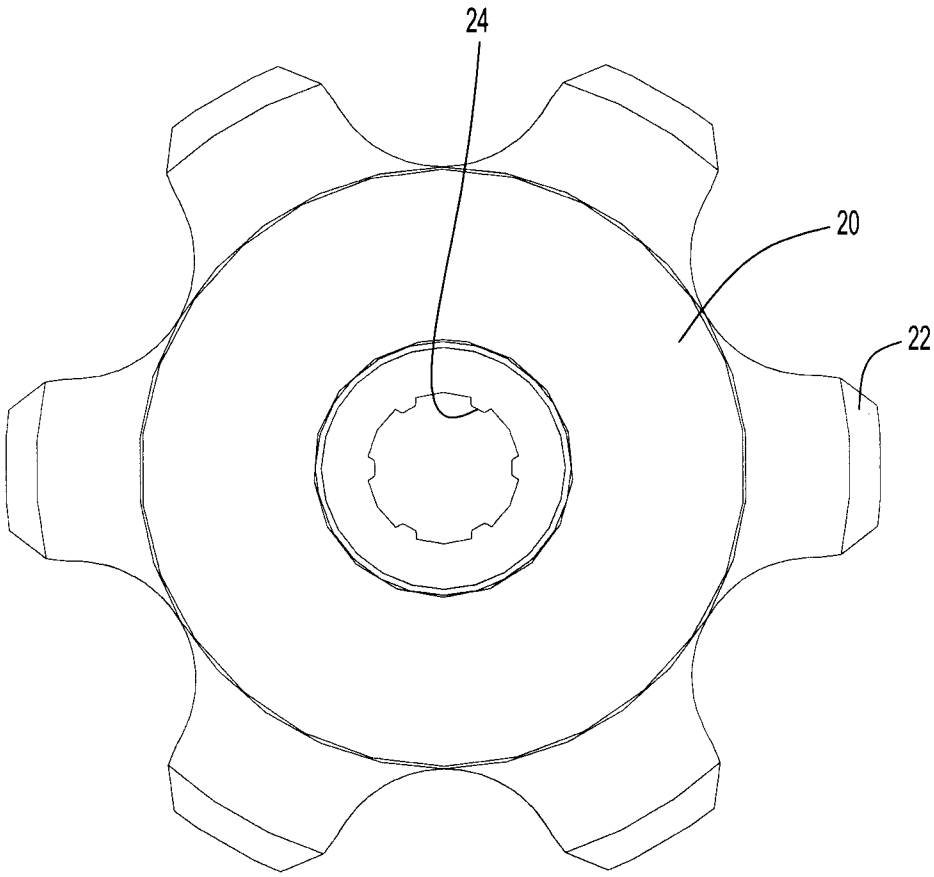


FIG.5

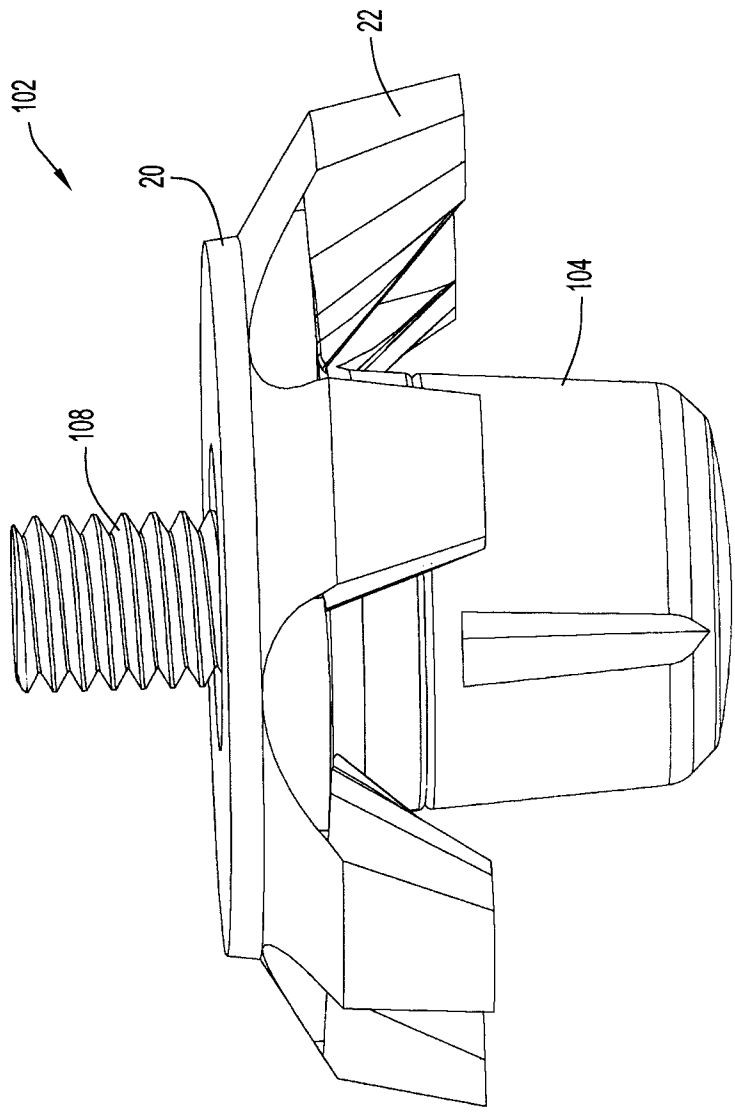


FIG.6

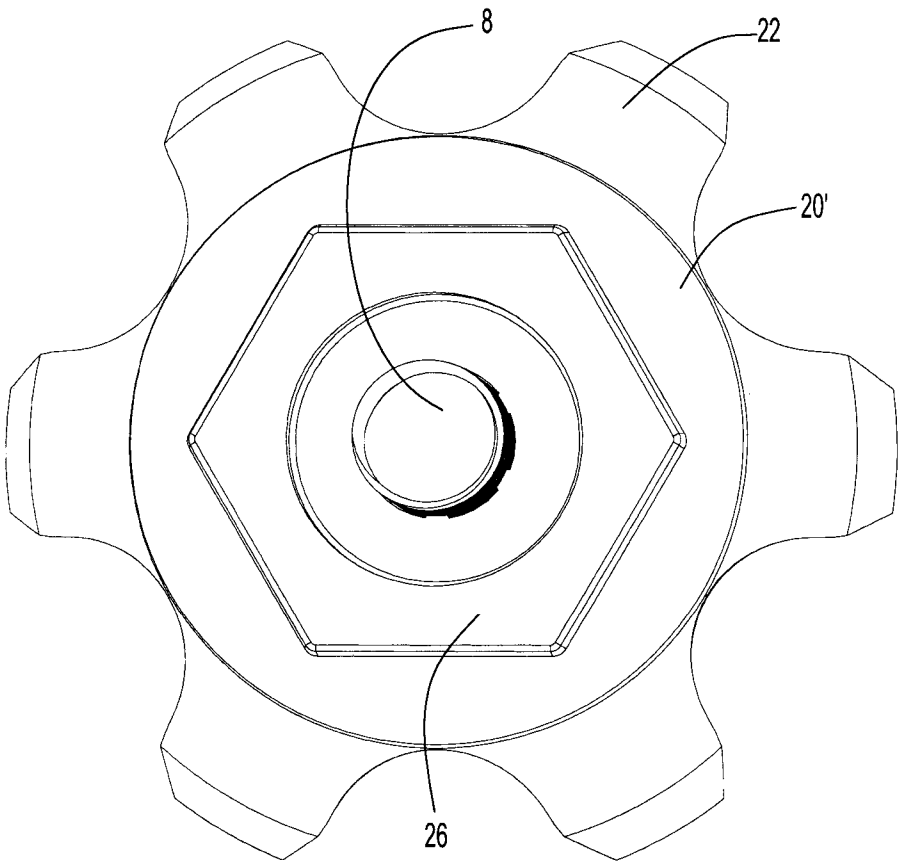


FIG.7

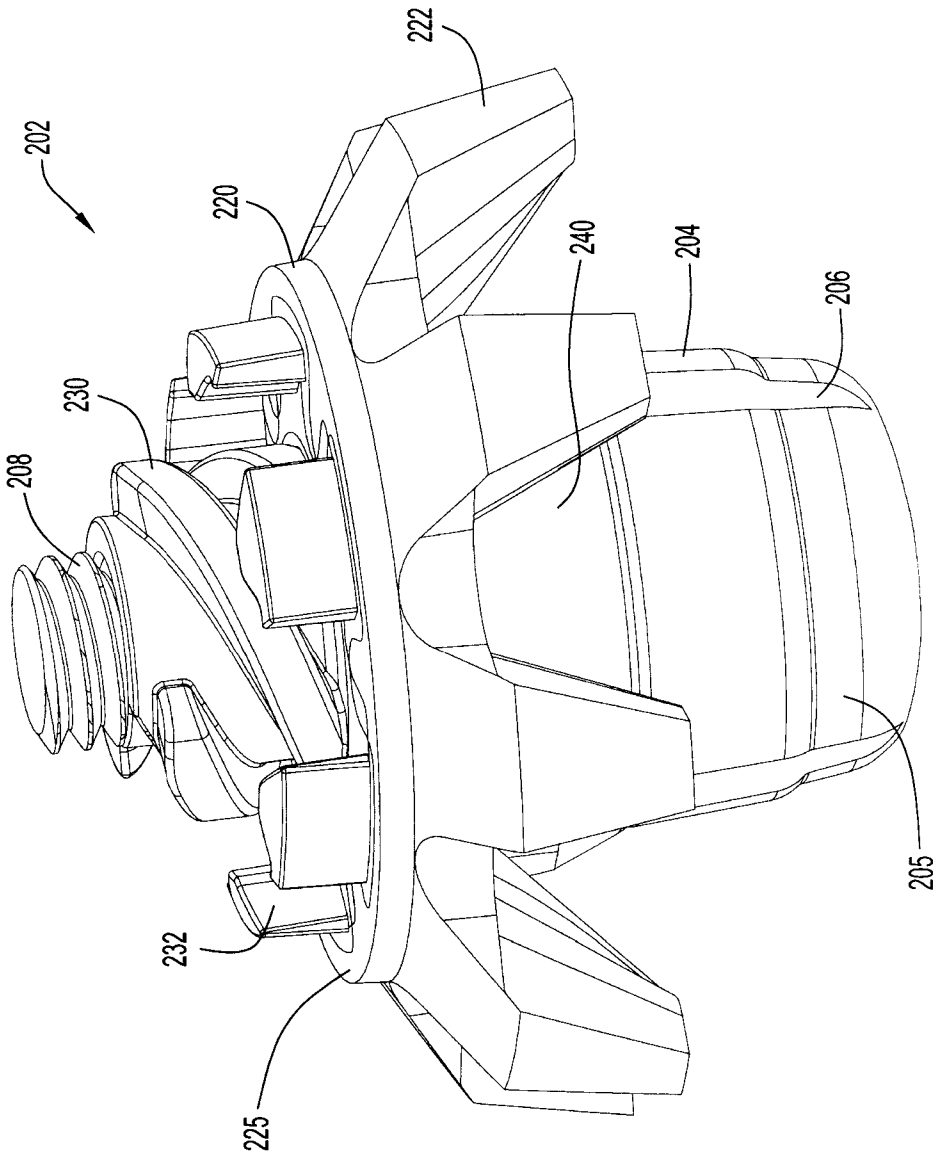


FIG.8

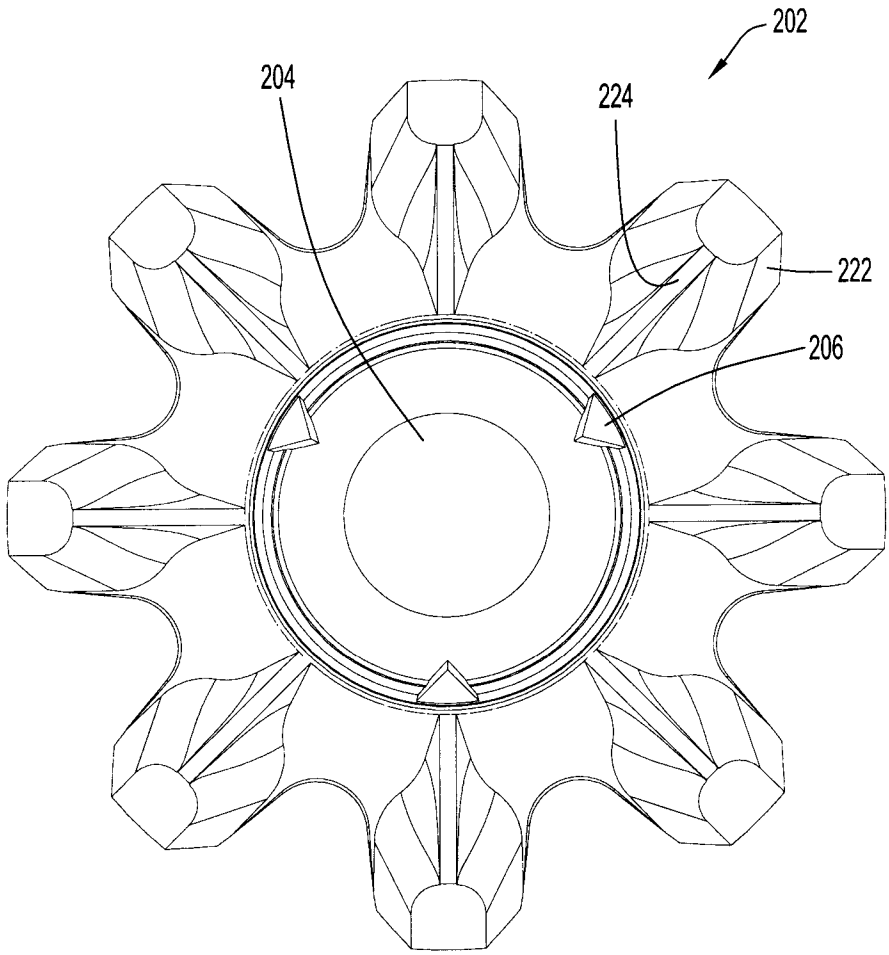


FIG.9

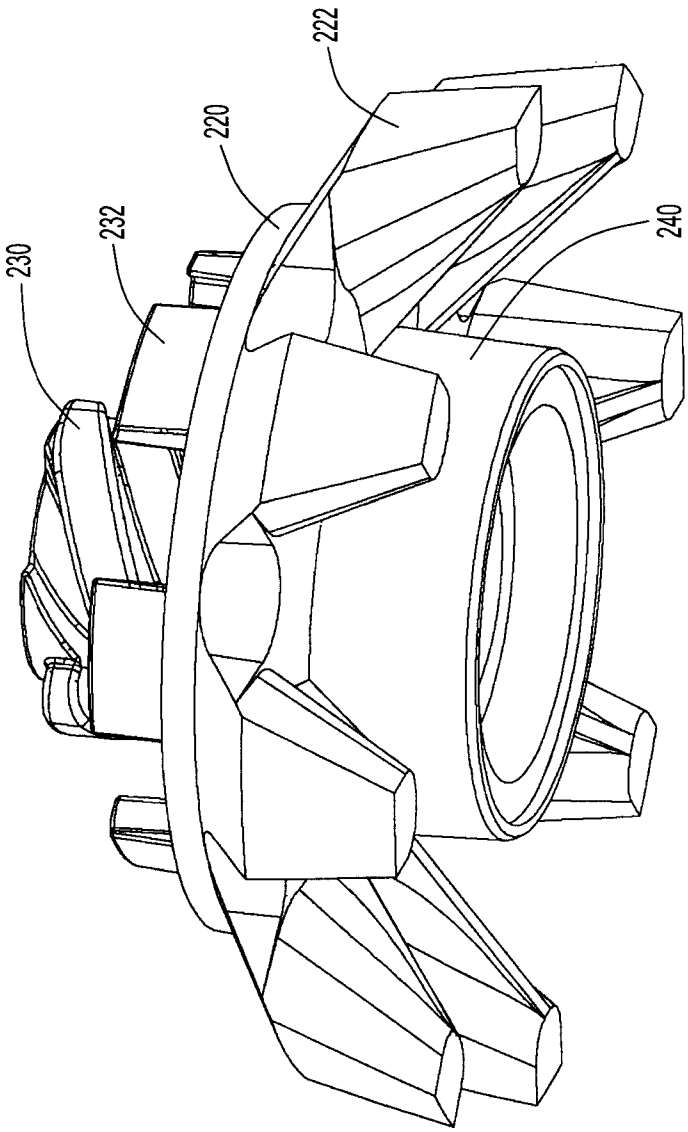


FIG.10

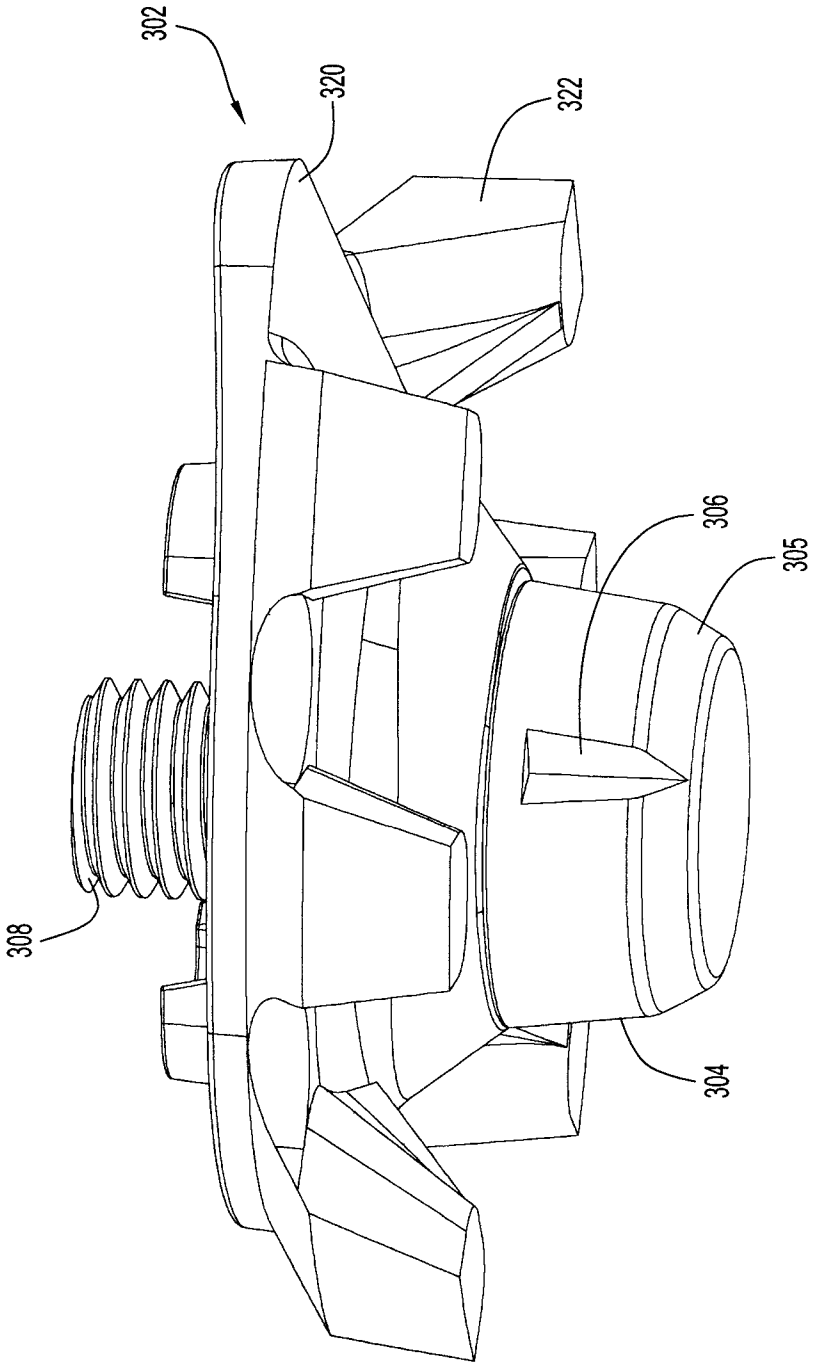


FIG.11

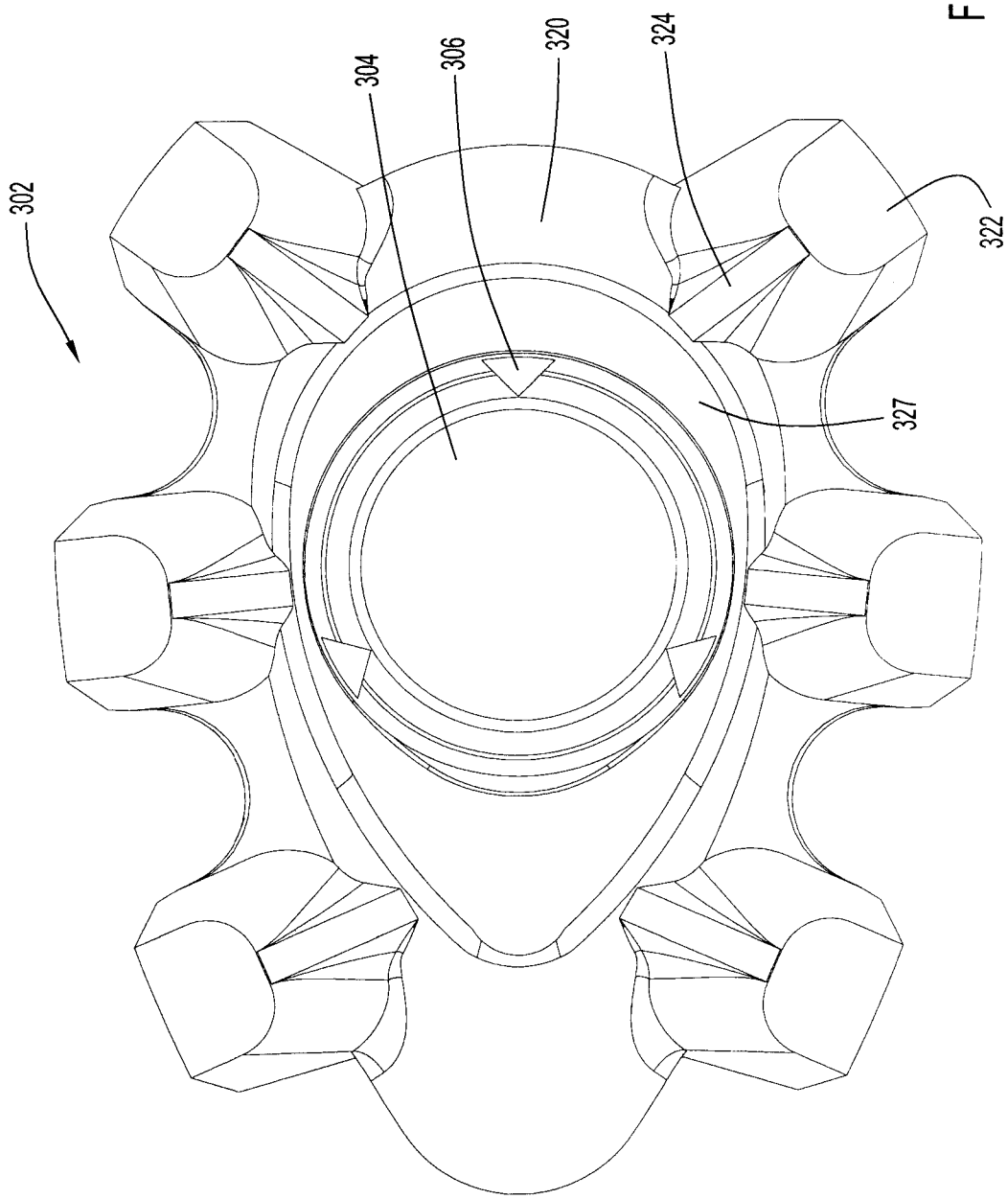


FIG.12

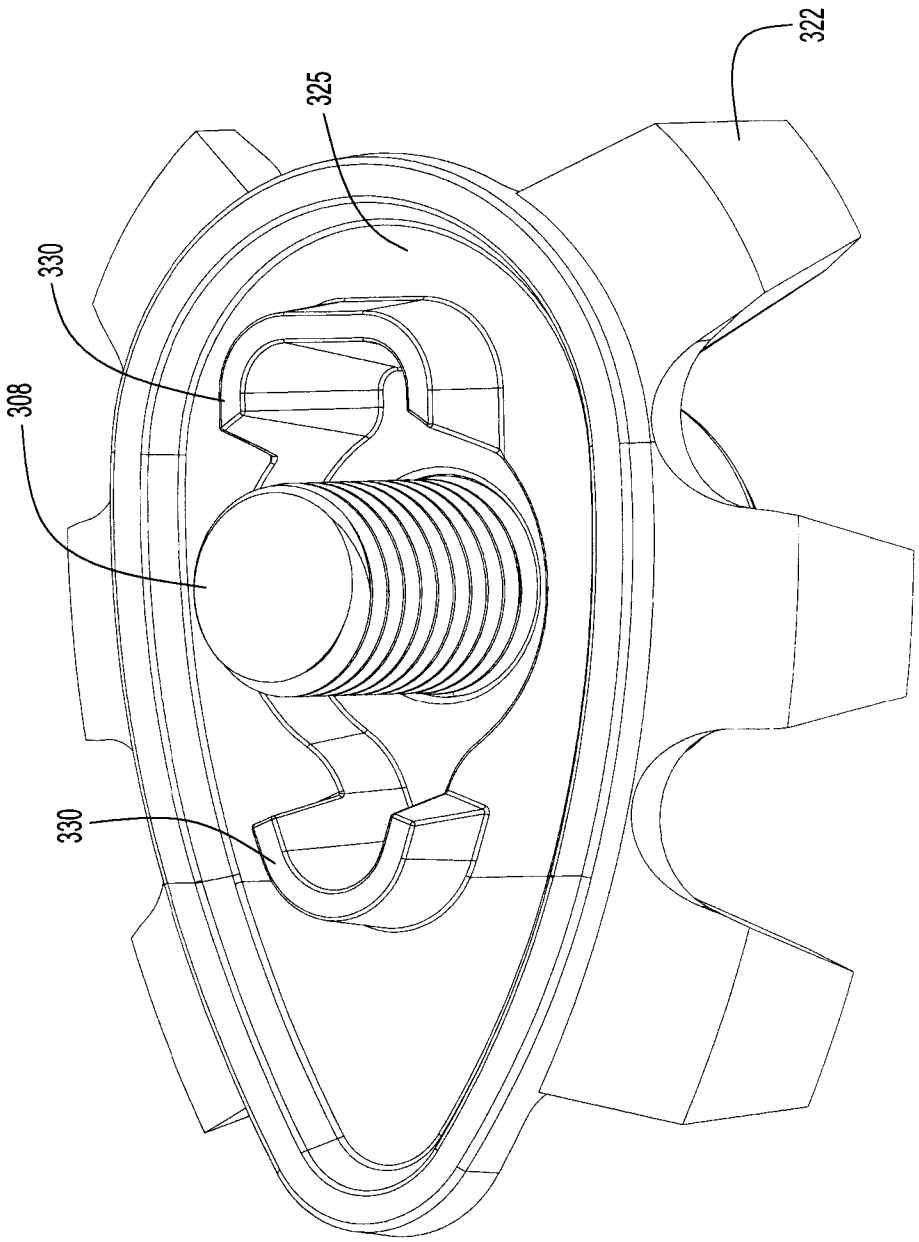


FIG.13

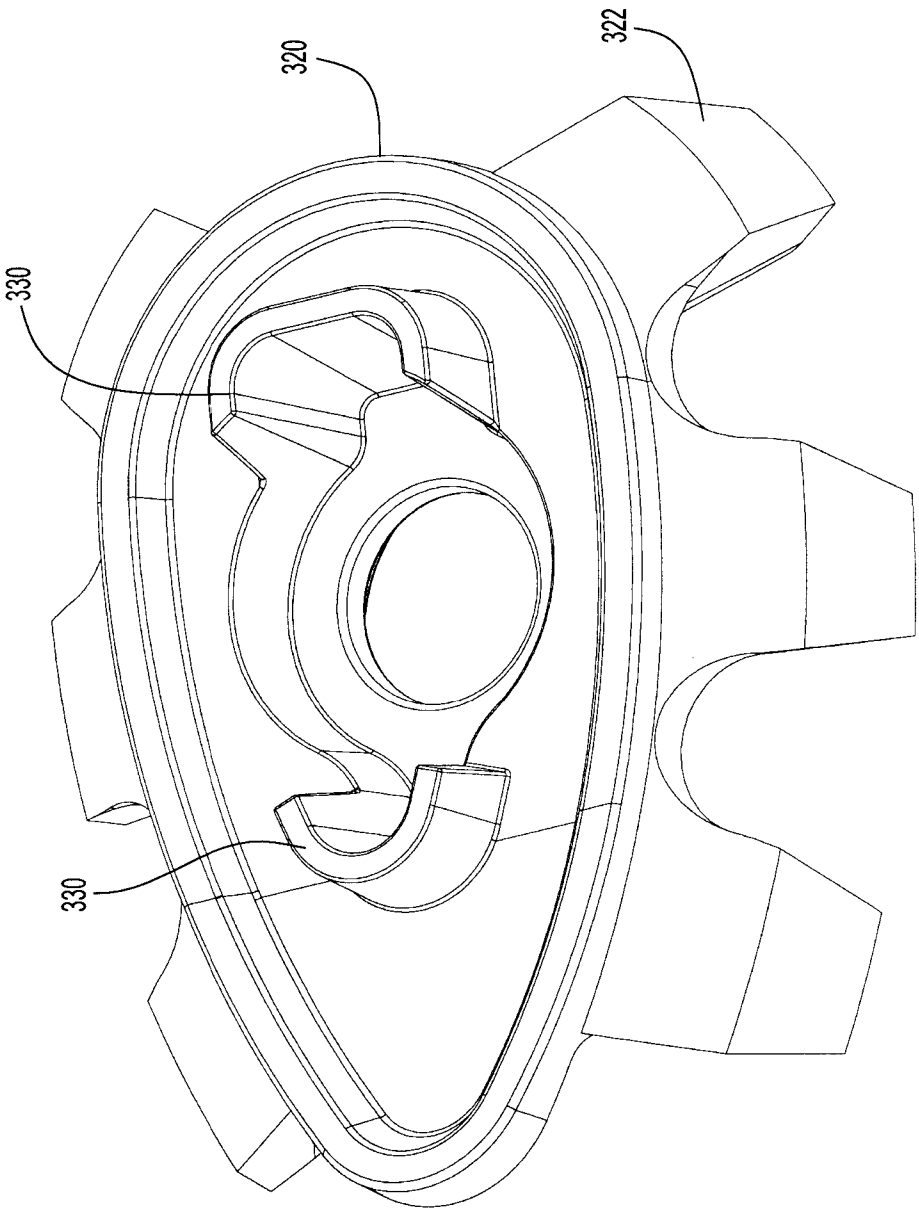


FIG.14

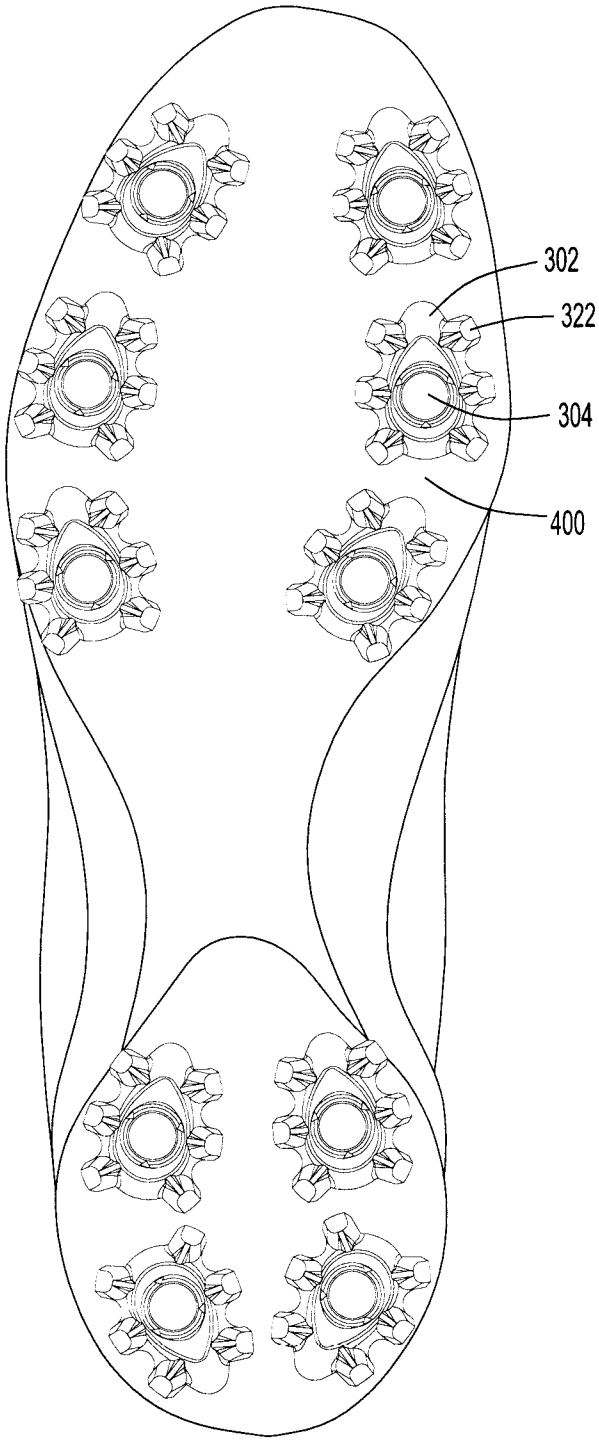


FIG.15

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2009/035252

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - A43B 5/00 (2009.01)
USPC - 36/124
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC(8) - A43B 5/00; A43C 15/02 (2009.01)
USPC - 36/62, 114, 124, 127, 134

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

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
PatBase

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5,940,993 A (RONCI) 24 August 1999 (24.08.1999) entire document	1-4, 9, 11, 16, 19
Y		5-8, 10, 12-15, 17-18, 20-25
Y	US 5,926,980 A (ADAM) 27 July 1999 (27.07.1999) entire document	5-7, 10, 21, 23-24
Y	US 6,904,707 B2 (MCMULLIN) 14 June 2005 (14.06.2005) entire document	7-8, 12-15, 17-18, 20-23, 25
Y	US 4,782,604 A (WEN-SHOWN) 08 November 1988 (08.11.1988) entire document	14
Y	US 2003/0131502 A1 (TERASHIMA) 17 July 2003 (17.07.2003) entire document	17, 25

☐ Further documents are listed in the continuation of Box C. ☐

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
12 May 2009	18 MAY 2009
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	Authorized officer: Blaine R. Copenheaver PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774