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Simmons

(54) **ADJUSTABLE DISPLACEMENT PERCEPTION COMPENSATION GOLF PUTTER APPARATUS AND METHOD**

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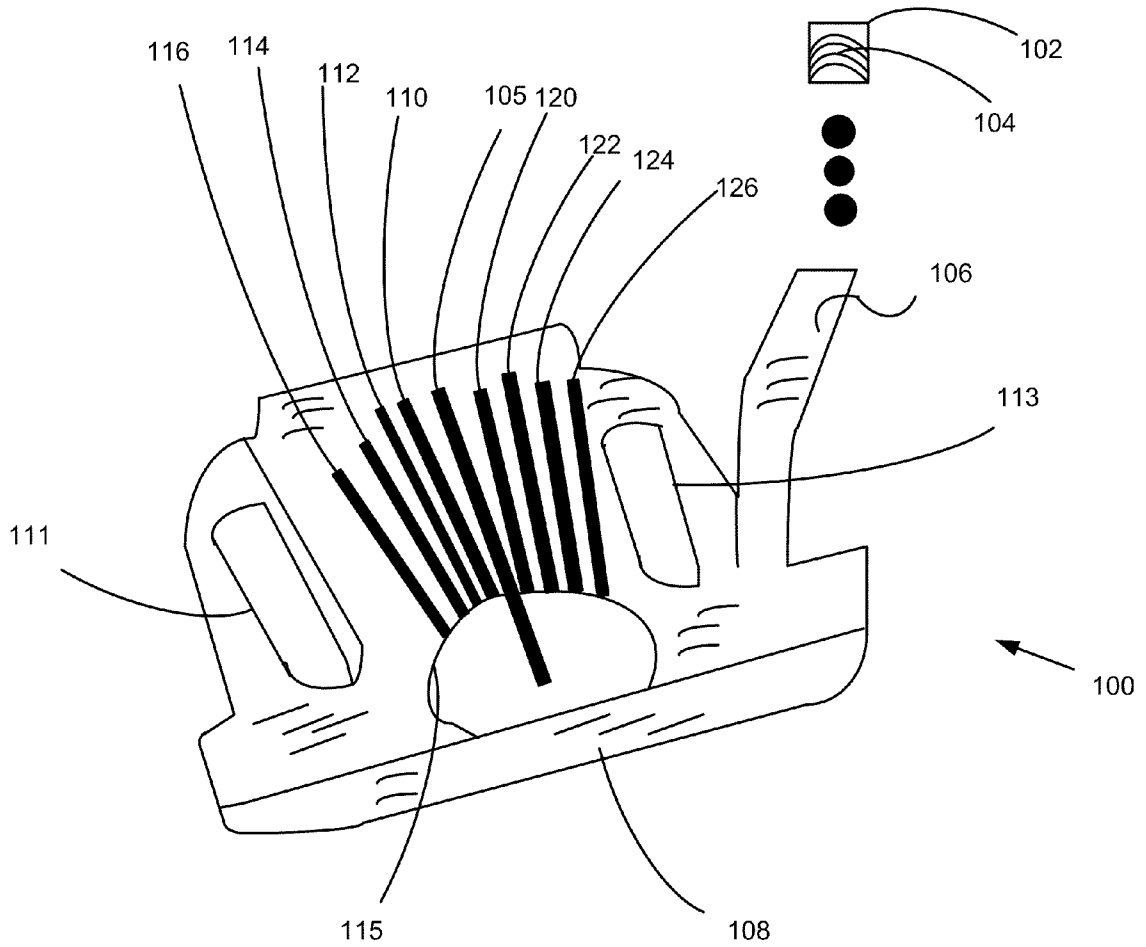
(57) **ABSTRACT**

A method to reduce parallax effect and reduce aiming error while a golf player is putting is disclosed. The player positions a golf putter along a first selected alignment marker to align a multi-alignment marker golf club with a line of putt. Aiming along the first selected alignment marker of the golf putter body, the player perceives correct alignment, but actual results in an alignment error to the line of putt. After receiving feedback (from coach or self), a second selected alignment marker is chosen. The player positions the club face along the second selected alignment marker to the line of putt and the result is evaluated. The alignment marker selection process repeats until the player finds a marker that achieves a consistency of aiming that aligns a club face along the line of putt.



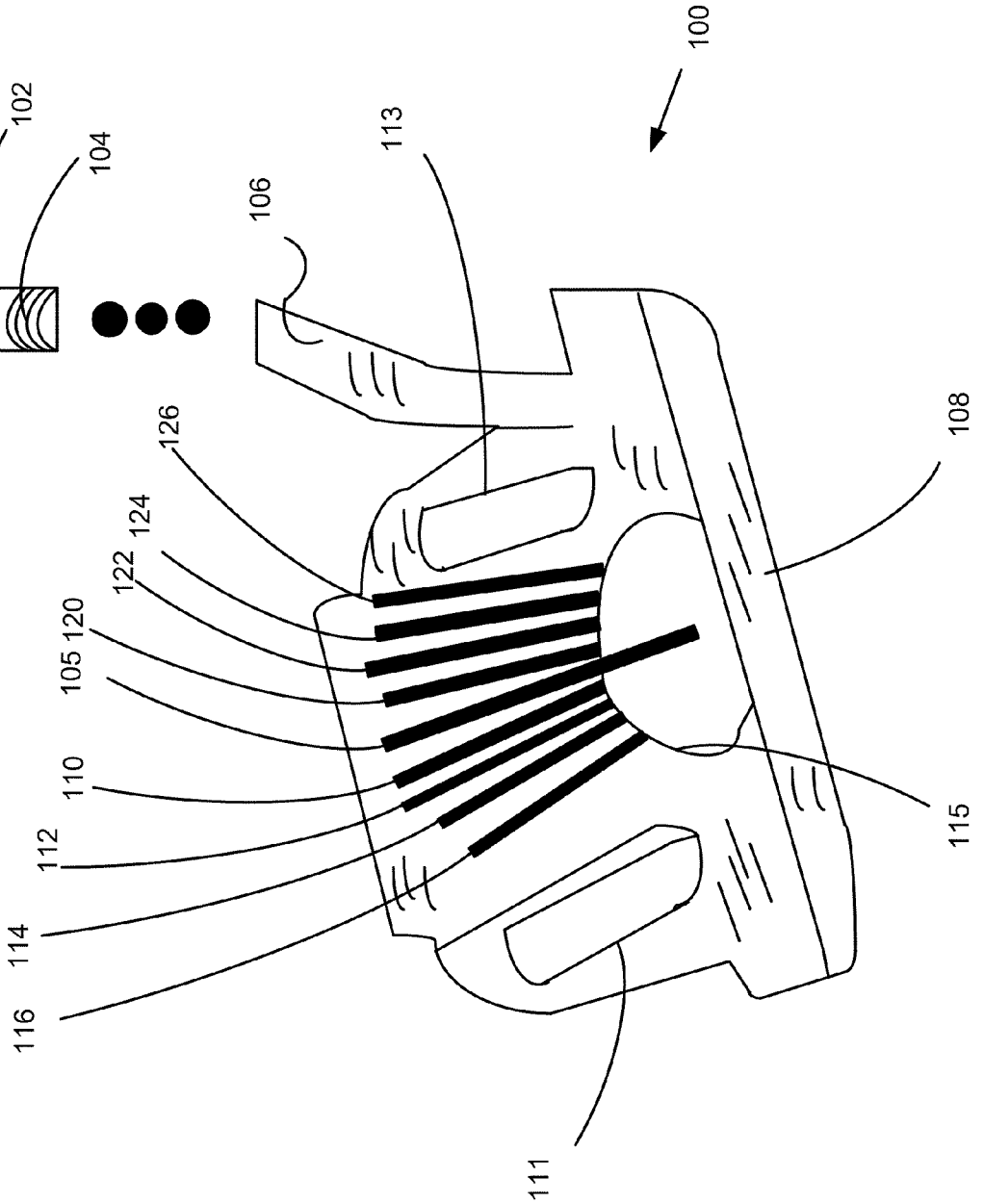

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Figure 1

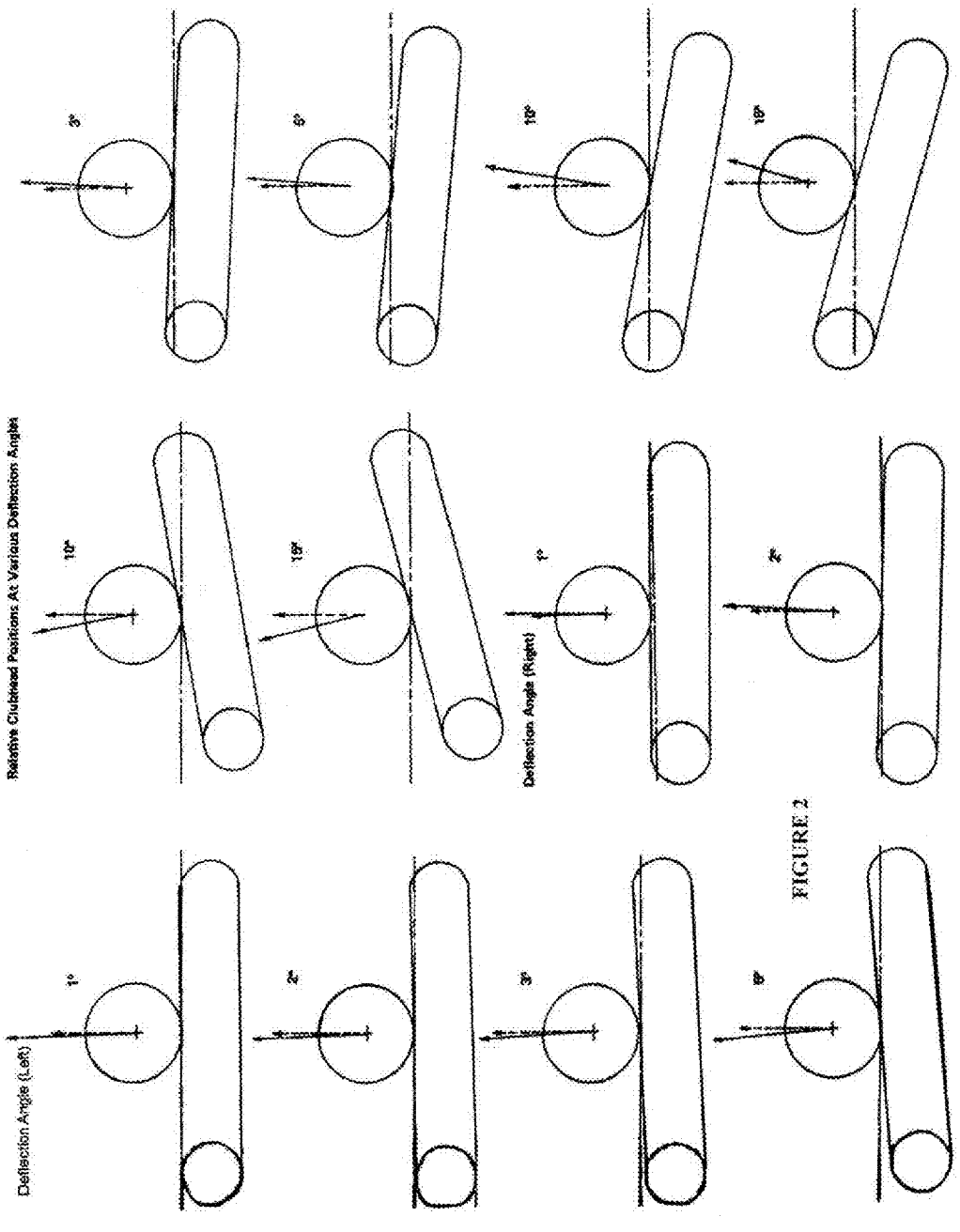

FIGURE 2

These pictures show the amount of deflection or angle your ball will be off-target if hit to the right or left of the correct alignment or 0 degrees. Notice how difficult it is to see incorrect alignment at 1 degree.

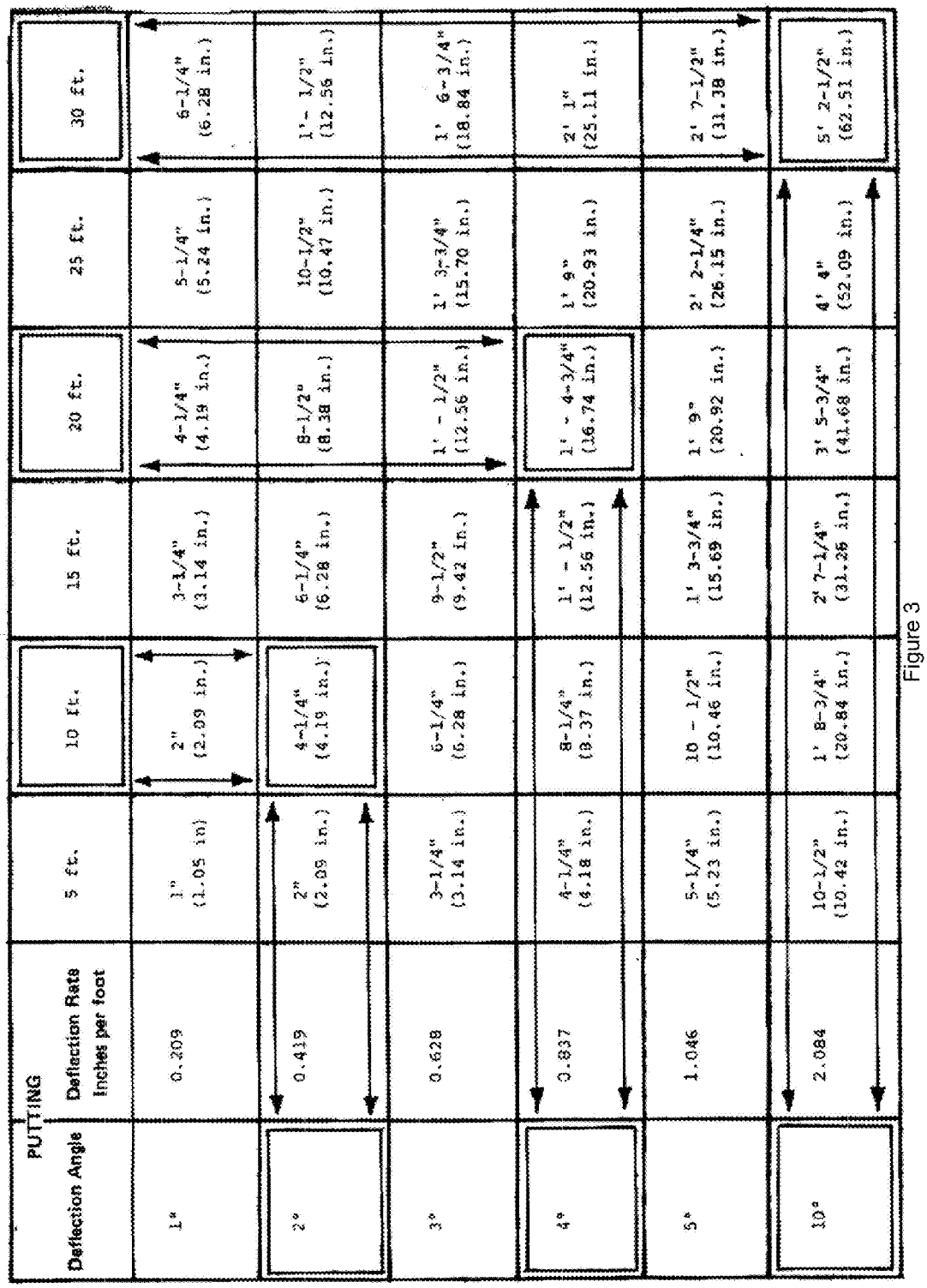
Distance in feet
Deflection in inches
PUTTING
Deflection Angle
Deflection Rate Inches per foot
5 ft.
10 ft.
15 ft.
20 ft.
25 ft.
30 ft.
1°
0.209
1" (1.05 in)
2" (2.09 in.)
3-1/4" (3.14 in.)
4-1/4" (4.19 in.)
5-1/4" (5.24 in.)
6-1/4" (6.28 in.)
2°
0.419
2" (2.09 in.)
4-1/4" (4.19 in.)
6-1/4" (6.28 in.)
8-1/2" (8.38 in.)
10-1/2" (10.47 in.)
1'- 1/2" (12.56 in.)
3°
0.628
3-1/4" (3.14 in.)
6-1/4" (6.28 in.)
9-1/2" (9.42 in.)
1' - 1/2" (12.56 in.)
1' 3-3/4" (15.70 in.)
1' 6-3/4" (18.84 in.)
4°
0.837
4-1/4" (4.18 in.)
8-1/4" (8.37 in.)
1' - 1/2" (12.56 in.)
1' - 4-3/4" (16.74 in.)
1' 9" (20.93 in.)
2' 1" (25.11 in.)
5°
1.046
5-1/4" (5.23 in.)
10 - 1/2" (10.46 in.)
1' 3-3/4" (15.69 in.)
1' 9" (20.92 in.)
2' 2-1/4" (26.15 in.)
2' 7-1/2" (31.38 in.)
10°
2.084
10-1/2" (10.42 in.)
1' 8-3/4" (20.84 in.)
2' 7-1/4" (31.26 in.)
3' 5-3/4" (41.68 in.)
4' 4" (52.09 in.)
5' 2-1/2" (62.51 in.)

Figure 3

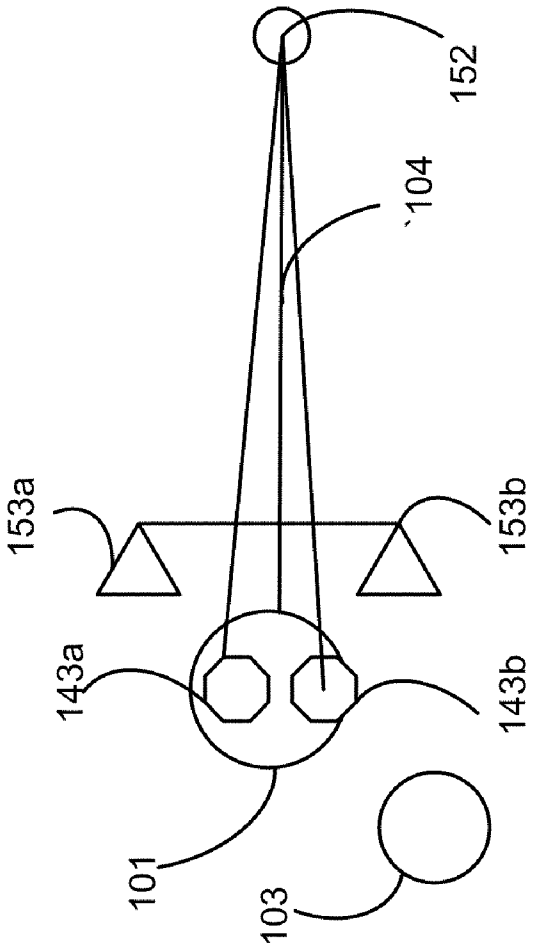

Figure 4

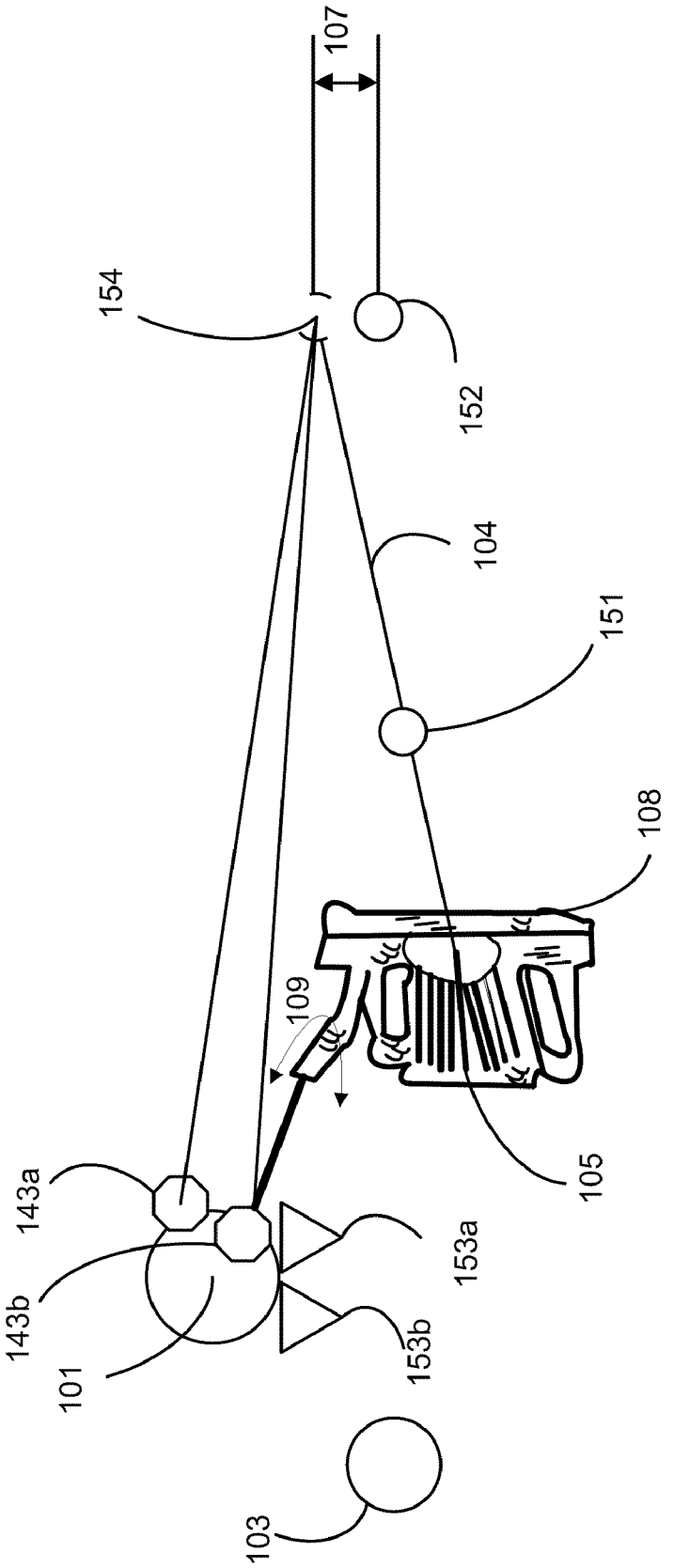

Figure 5

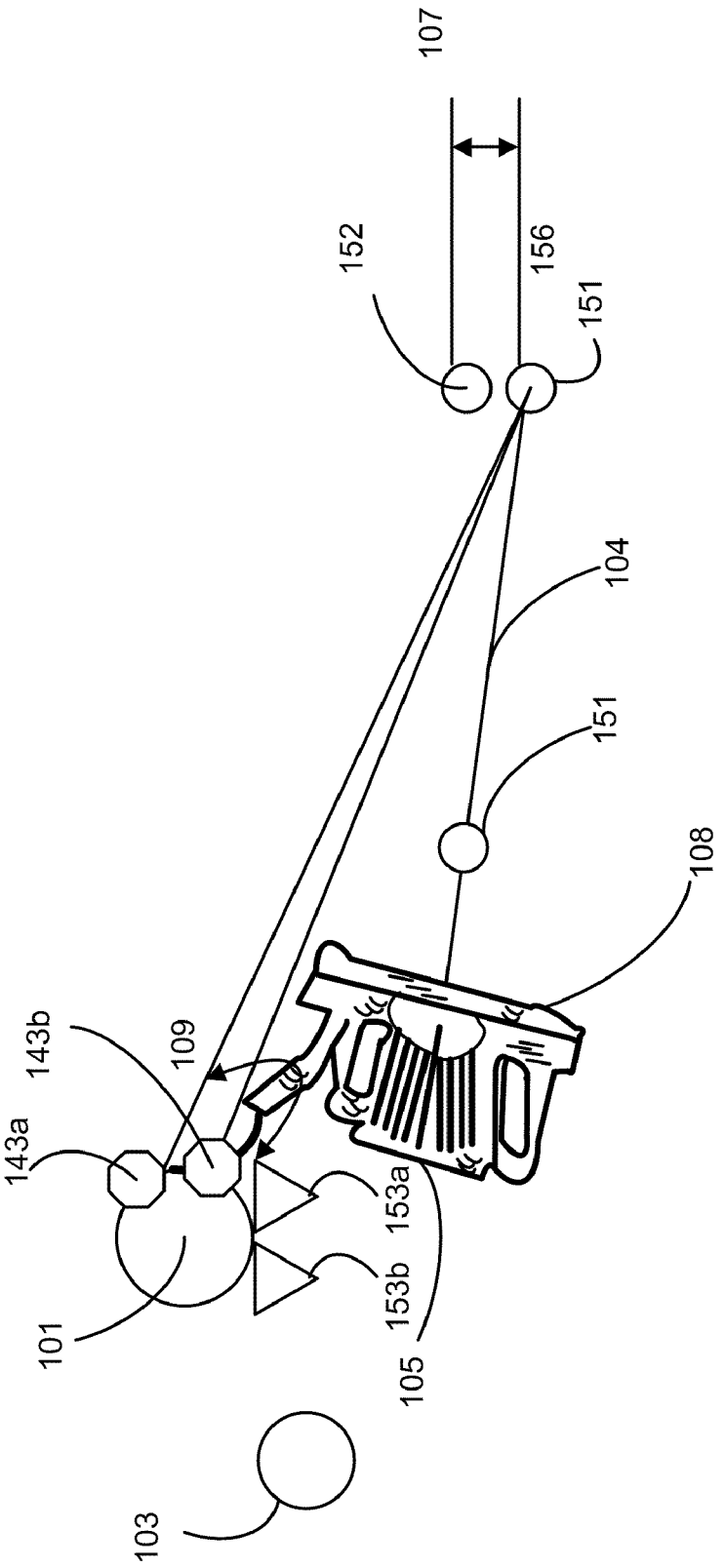

Figure 6

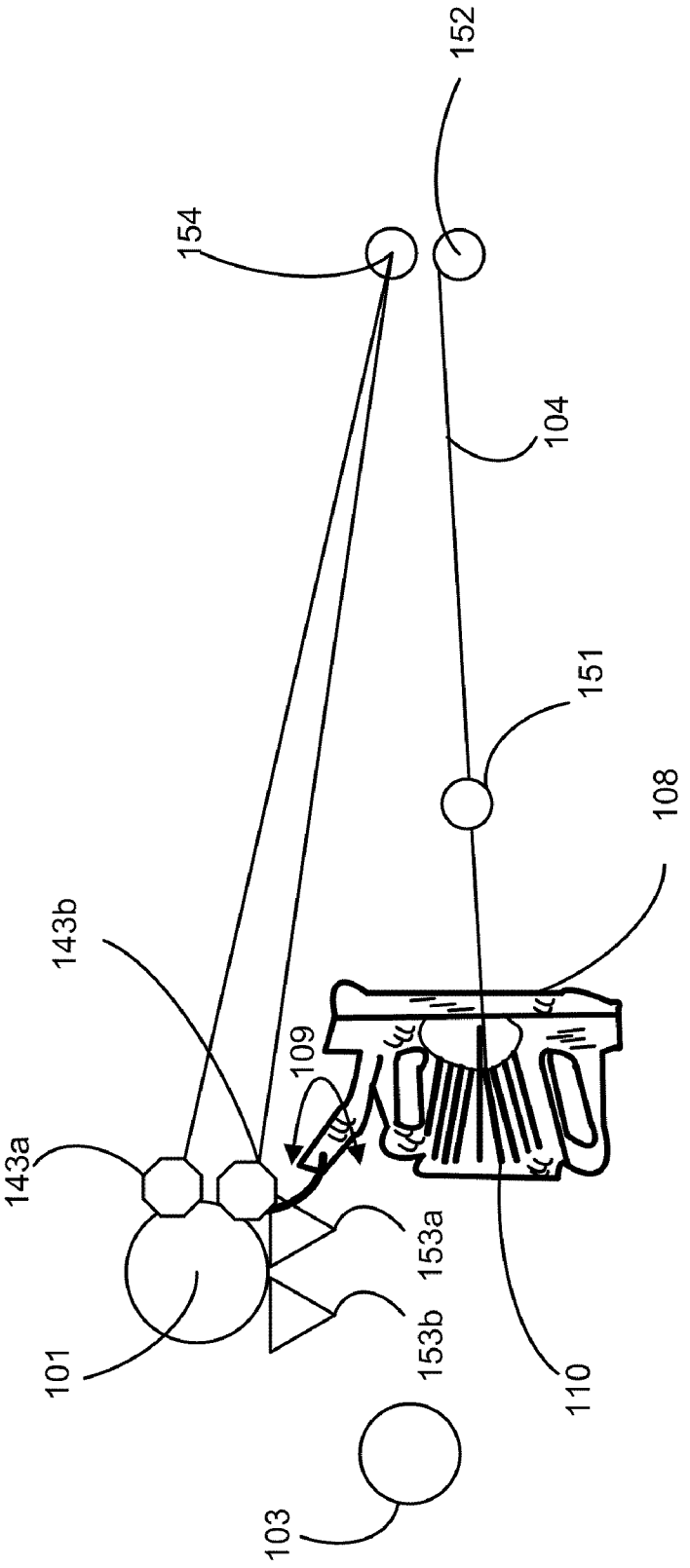

Figure 7

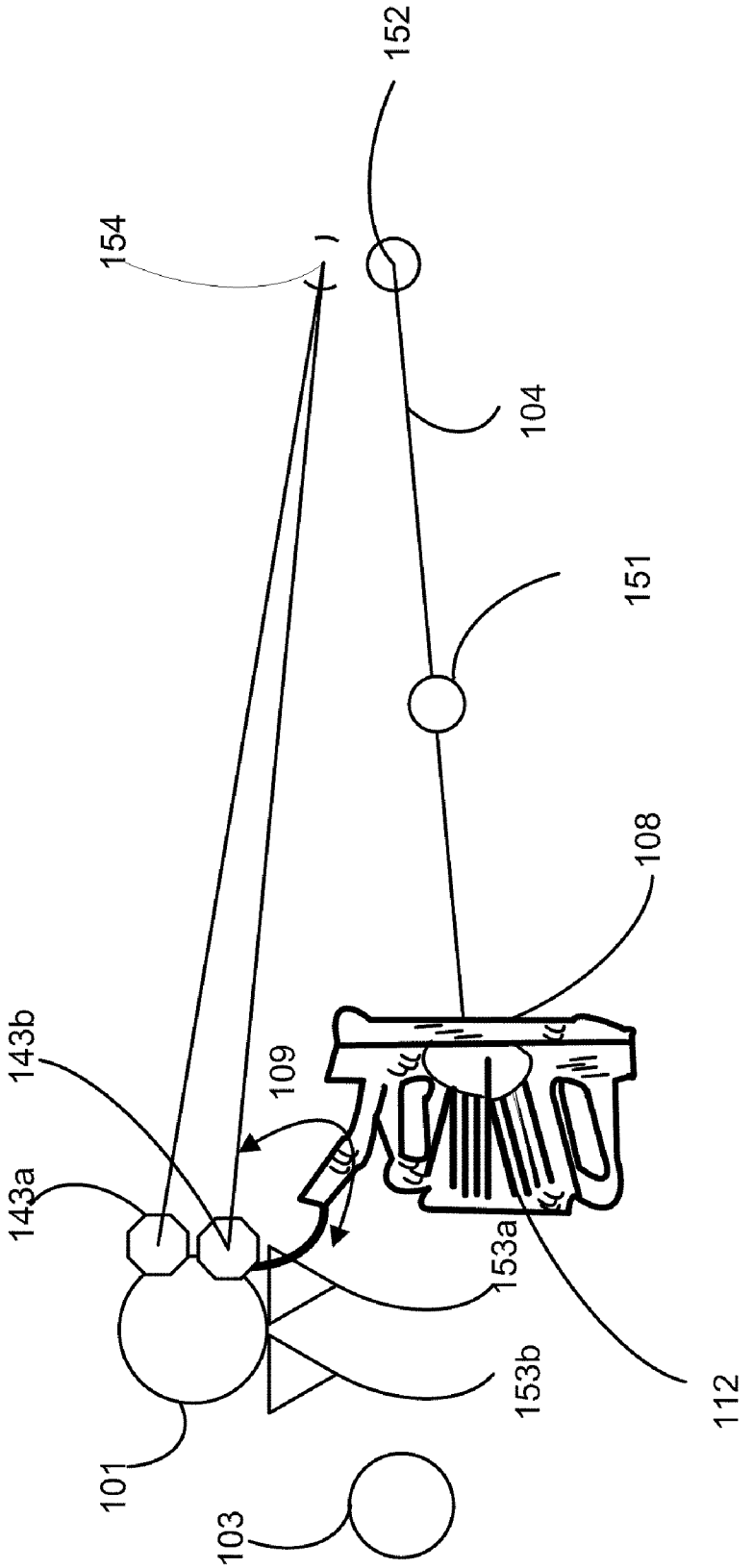

Figure 8

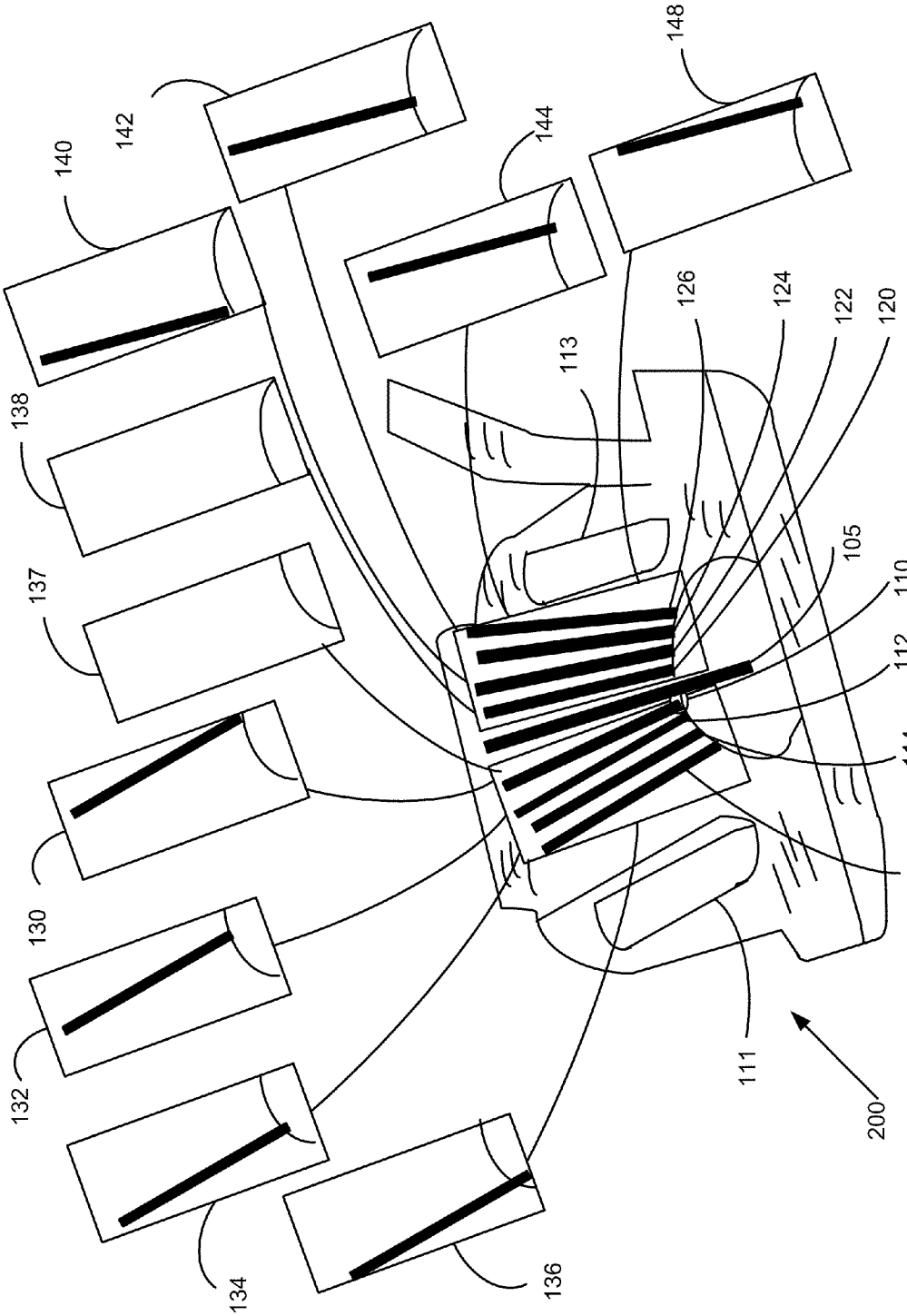
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Figure 9

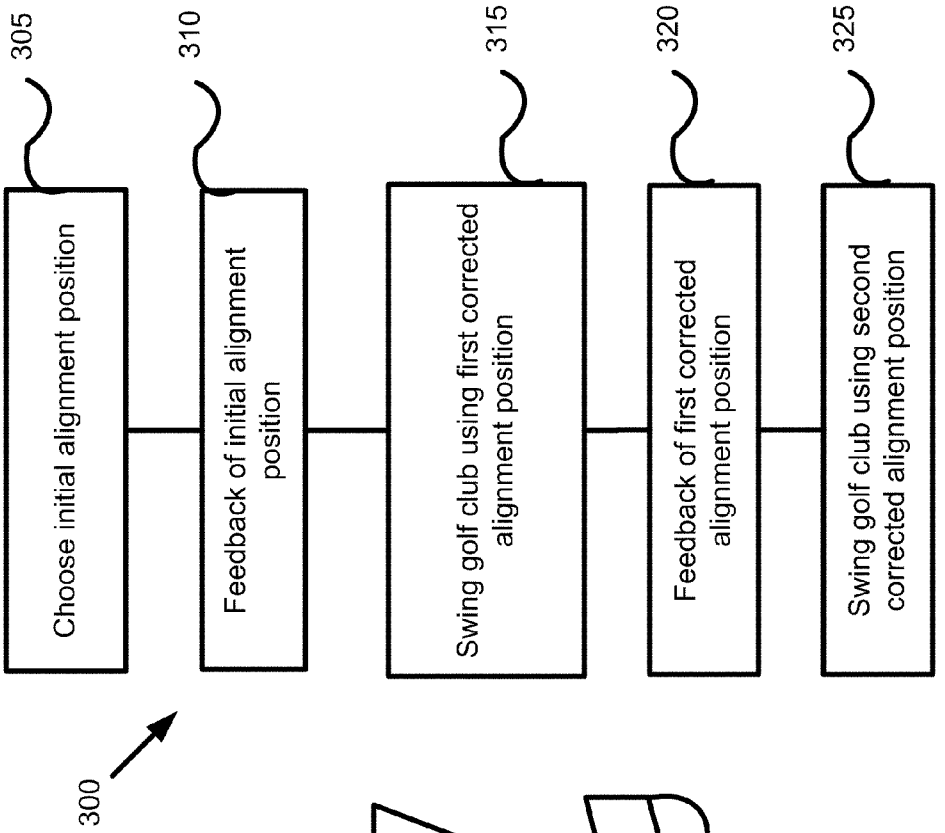

Figure 11

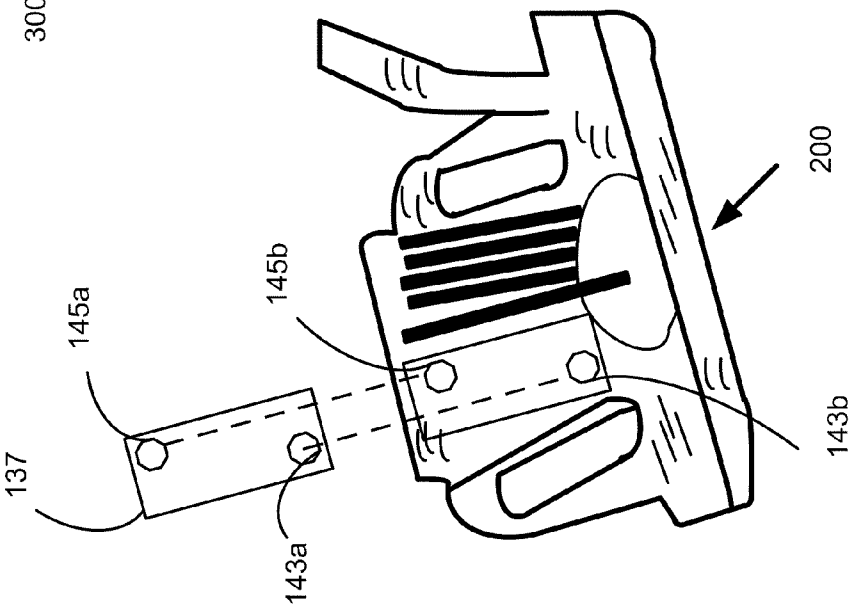

Figure 10

ADJUSTABLE DISPLACEMENT PERCEPTION COMPENSATION GOLF PUTTER APPARATUS AND METHOD

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The invention relates generally to the field of golf equipment and assemblies, and specifically in one exemplary aspect to an adjustable golf putter apparatus and method to improve targeting and aiming accuracy.

[0003] 2. Description of Related Technology

[0004] Golf equipment and assemblies are well known in the art. Such assemblies are utilized to improve golf shots of players. Golf is a strategic game that involves hitting accuracy both in the long game (e.g., off the tee) and the short game (e.g., once on the green). The main difference between a high golf score (over 100) and a low golf score (less than 80) equates to player consistency and accuracy. One way to lower a player's score is to improve aiming accuracy of a golf club putter along a selected line toward the hole while in the short game. Golf coaches instruct their students that the key to successful putting and choosing a desired line is proper and consistent face alignment (aiming) to hit the ball on the desired line.

[0005] However, even with this instruction, more than 9 out of 10 players don't properly aim at the target and most are off by several degrees, which is enough to miss an important putt causing a higher golf score. Why are players off with aiming? Why are players with a great stroke still missing the target? A study of the United States Golf Association (USGA) rules of how a player may address the ball provides insight into the golf putting aiming issue. USGA rules, for instance, rule 16-1 recites:

[0006] "a: Touching Line of Putt: The line of putt must not be touched except:

[0007] (i) the player may remove loose impediments, provided he does not press anything down;

[0008] (ii) the player may place the club in front of the ball when addressing it, provided he does not press anything down;

[0009] e. Standing Astride or on Line of Putt. The player must not make a stroke on the putting green from a stance astride, or with either foot touching, the line of putt or an extension of that line behind the ball." As a result, a player standing astride is forced to stand in a side address position relative to a line of putt.

[0010] In complying with USGA rules, players experience a built-in perception skew or "parallax" in their relative perception with "of the location" of target golf hole caused by a side on address position. Even with hours of practice and emphasis on perfect golf mechanics and form, many players fail to reduce their golf putting score because repetitive practice with numerous conventional golf putters don't compensate for perception inadequacies associated with "side-on" viewing of the target. In other words, players who have developed a great golf putting stroke may be focusing their efforts on an aspect of putting that doesn't result in a marked improvement.

[0011] Why is aiming so important? Studies by golf professionals have shown that approximately 90% of aiming error associated with the golf putter transfers to how a golf ball rolls toward a target golf hole. In contrast to an aiming error, golf professional studies illustrate that only 15% of a path error transfers to how a golf ball rolls toward a target golf hole. As a consequence, any reduction in aiming error will result in significant improvement (a lower golf score) for all levels of players when putting toward a target golf hole. Golf instructors report 2, 3, or 4 degree aiming errors as common for players of all skill levels. Aiming errors (e.g., angle errors, golf club face alignment) become even more significant further a player is from a target golf hole.

[0012] Using a center line that is perpendicular to a face of the club, various testing experiments have demonstrated 9 out of 10 players did not line up correctly and exhibited aiming errors when aligning the face of the golf putter with the target. With standard USGA target golf hole size of 4.25 inch diameter (2.125 inch radius from dead center), aiming errors between the golf club face with the target golf hole cause an increasing number of misses between the target and the golf ball as the golf club face is positioned further from the target, e.g., a two degree aiming error results in a target miss for a golf hole located at 6.3 feet away; a three degree aiming error results in a target miss for a golf hole located at 3.76 feet away; and a four degree aiming error results in a target miss for a golf hole located at 2.82 feet away.

[0013] Using a conventional golf club, players align the golf putter to the target golf hole using binocular vision, e.g., through two eyes. However, binocular vision does not produce a true location of the relative spatial angle of the golf club face to the target golf hole because each eye of a player perceives a distinctive directional and alignment information for hitting the golf ball toward target golf hole. In one instance, a player's left eye (due to positioning on face, relative viewing angle to the target, and dominance in far or near sighted capability and/or as relative to right eye visual capabilities) perceives a first desired hitting location right of target golf hole. In yet another instance, a player's right eye (due to positioning on face, relative viewing angle to the target, and dominance in far or near sighted capability and/or as relative to left eye visual capabilities) perceives a desired hitting location left of a target golf hole. Finally, both right and left eyes (due to dominance of one or both in near and far sighted capability as well as positioning) to cause a third desired hitting location for alignment of golf club face to hit the golf ball toward a target golf hole. Consequently, disparate directional information from one or both eyes (either alone or in concert therewith) result in a "parallax" or skewed viewing perception that causes alignment errors of a golf putter face relative to a target golf hole.

[0014] Conventional patented golf putter technologies teach and suggest a desirability to choose perpendicular alignment of a golf putter face toward a target golf hole and align a golf putter face along a chosen golf ball path alignment to achieve golf putting accuracy. For instance, U.S. Pat. No. 4,659,083 by inventor Sczepanski discloses a desirability of perpendicular alignment of the club face with that of a target golf hole using a multitude of directional indicia oriented to the path of movement of the face of the club. In yet another instance, U.S. Pat. No. 4,291,883 by inventor Smart discloses a desirability of correcting golf ball path error using a primary plate with a removable sight rod and a number of recesses in the plate, for setting the angle of a directional rod and to direct a player's golf swing along a desired path toward the target golf hole.

[0015] In contrast to conventional golf putters and golf ball alignment procedures, a golf putter and golf putter alignment process may further be desired to reduce the parallax problem (e.g., human binocular vision problem). For instance, novel

design golf putters and golf putter alignment processes may further provide a wider variety of user adaptability and/or improved user accuracy as well as provide various types of and configurations that are adjustable to fit a user without requiring complicated attachment/de-attachment hardware. For instance, a manufacturer or user may find it beneficial that a golf putter have one or more removable and replaceable components.

[0016] In yet other applications, a player may further desire the golf putter to be easily assembled or disassembled "on the fly" and adjustability to a player desired configuration so that assembly/removal time is minimized. In addition, a player may desire the golf putter device durable but also conformable to use and to create minimal restriction to a user's movement. Furthermore, an improved golfing apparatus and methodology that is adaptable to either one-on-one coaching (e.g., player and instructor) and/or player alone golf putter practice activities.

[0017] Thus, what is needed are improved golfing apparatus and methodology that permits easy initial configuring and reconfiguring, i.e., provide adaptability, and upgrade capability so that the same unit be utilized (or added-on to) if new functionality is desired. Furthermore, such improved apparatus and methods would also ideally allow a person other than a professional or licensed personal to adjust or retrofit the golfing device, correct player perception errors and consistently provide a guide for aiming the putter without having to change a player's perception of a target location. Finally such improved apparatus and methodology should permit creation of user-customized golf putter configurations and customized fit and appearance of the golf putter as well as new patterns requiring minimal efforts, e.g., minimal adjustment or removal and replacement or adaptation of existing components, and provide more repeatability and correct alignment than conventional golf putters.

SUMMARY OF THE INVENTION

[0018] In a first aspect of the invention, a methodology is disclosed that involves a player and a coach working together to reduce an effect of parallax when a player putts a golf ball toward a target golf hole. In one embodiment, a player addresses the ball and initially aligns a player chosen single alignment marker of a multi-alignment marker to align a golf club face to a target golf hole. In one embodiment, the player chosen alignment marker aligns the golf club face to strike a golf ball toward a target golf hole.

[0019] In one embodiment, coach positions himself behind the player to view an orientation angle of golf putter. In one variant, coach faces player's forward direction swing area (and/or rear area) and views orientation angle of golf club face relative to golf ball and projected line of putt. The coach provides feedback. The feedback may include, in one embodiment, affirm a player's chosen alignment marker of the golf club face. In one alternative embodiment, the feedback may include a suggestion of an alternative alignment marker, e.g., coach chosen alignment marker. After selection of one or more alignment marker positions and in a trial and error method to produce repeatable correct alignment of the line of putt, a selected alignment marker is marked or recorded or remembered for use in future putting situation.

[0020] Advantageously, based each player's unique visual capability (e.g., right and left eye balancing and binocular vision capability and positioning of each eye in a person's face) and perception of golf putter face angle, the selected alignment marker provides a proper angle (orientation) for future play on a golf course.

[0021] In one embodiment, a modular replaceable top of the body includes an alignment marker layout substantially matching that of the selected alignment marker. In one embodiment, the modular replaceable top of the body portion includes a fastening apparatus, for instance, that connects detachably with one or more mating connectors to secure the replaceable top of the body portion to the golf putter. In one variant, the mating connectors are mating tabs or fasteners that removably lock with each other upon being pressing into or fitted into one another.

[0022] In a second aspect of the invention, a methodology is disclosed that reduces effect of parallax while player is putting toward target golf hole. In one embodiment, player addresses the ball and initially player aligns chosen single alignment marker of multi-alignment marker golf club body to target golf hole. In one embodiment, player chosen alignment marker is aimed along the line of putt resulting in a player perceived off-perpendicular putter face. Player receives feedback as to correct putter face angle after choosing an alignment marker. If the golf putter is off alignment with line of putt, e.g., left or right of a line of putt, a player chooses an alternative alignment marker (e.g., next alignment marker) on replaceable, multi-alignment marker golf club body until consistently able to properly align putter face to the line of putt.

[0023] Continuing with this aspect, upon successful repeated alignment, replaceable face portion is chosen that has alignment marker layout substantially matching that of player chosen alignment marker.

[0024] These and other embodiments, aspects, advantages, and features of the present invention will be set forth in part in the description which follows, and in part will become apparent to those skilled in the art by reference to the following description of the invention and referenced drawings or by practice of the invention. The aspects, advantages, and features of the invention are realized and attained by means of the instrumentalities, procedures, and combinations particularly pointed out in the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025] FIG. **1** is a front side perspective view of golf putter illustrating multi-alignment marker design to provide player a variety of alignment marker positions to provide multiple face alignment positions to golf ball for more consistent aiming along the line of putt in accordance with an embodiment of the present invention;

[0026] FIG. **2** is a graphical illustration of multiple deflection angles and how a golf ball will be off target if at selected orientation angle in accordance with an embodiment of the present invention;

[0027] FIG. **3** is a table illustrating effect of aiming angle errors as a function of distance between golf club face and target golf hole in accordance with an embodiment of the present invention;

[0028] FIG. **4** is a graphical illustration of player standing aside the line of putt that shows absence of parallax in accordance with an embodiment of the present invention;

[0029] FIG. **5** is a first graphical illustration of parallax (left eye dominance) to show apparent displacement or difference in orientation of target golf hole as viewed from two different

lines of sight, e.g., right and left eye, by player having golf putter of FIG. **1** in accordance with an embodiment of the present invention;

[0030] FIG. **6** is a second graphical illustration of parallax (right eye dominance) to show apparent displacement or difference in orientation of target golf hole as viewed from two different lines of sight, e.g., right and left eye, by player having golf putter of FIG. **1** in accordance with an embodiment of the present invention;

[0031] FIG. **7** is a graphical illustration of initial alignment and how golf coach provides instruction to the player having the golf putter of FIG. **1** to compensate and align the golf club face to the line of putt to compensate for parallax situation illustrated in FIG. **3** in accordance with an embodiment of the present invention;

[0032] FIG. **8** is a graphical illustration of corrected alignment and how golf coach provides instruction to the player having the golf putter of FIG. **1** to compensate and align the golf club face to the line of putt to compensate for parallax situation illustrated in FIG. **3** in accordance with an embodiment of the present invention;

[0033] FIG. **9** is a front perspective view of a modular, multi-alignment marker design golf putter being fitted with removable, interchangeable, alignment marker inserts to provide a non-perpendicular alignment marker for player based on the individual's own parallax viewing angle in accordance with an embodiment of the present invention;

[0034] FIG. **10** is a front, partially disassembled perspective view of the modular, multi-alignment design golf putter of FIG. **9** to illustrate attachment by fasteners on opposite side of the removable, interchangeable, alignment marker inserts that connect along a right or left side of the main alignment marker in accordance with an embodiment of the present invention; and

[0035] FIG. **11** is a flow diagram illustrating an exemplary methodology to compensate for parallax to align a player's golf club face to a golf ball to achieve more consistent alignment of putter face along the line of putt in accordance with an embodiment of the present invention.

DETAILED DESCRIPTION

[0036] Reference is now made to the drawings wherein like numerals refer to like parts throughout.

[0037] As used herein, the term "parallax" refers without limitation to an apparent change in the position of an object caused by a change in a viewer's position or displacement or difference of orientation of an object as viewed from different lines of sight, and is measured by the angle or semi-angle of inclination between the two lines of sight, e.g., a golf player's right and left eye or the like;

[0038] the term "visual perception" refers to without limitation to eyes of a human being in a different position in the head cause different views simultaneously;

[0039] the term "depth perception" refers to without limitation the visual ability to perceive the world in multiple dimension, e.g., three dimensions; the term "motion parallax" refers to when an observer moves, an apparent relative motion of several stationary objects against the background give clues about their relative motion;

[0040] the term "stereopsis" refers to without limitation to the process by which the brain makes fine depth discrimination and exploits parallax created by different views from each eye to gain depth perception and estimate distance of objects or the like; the term "quantitative stereopsis" refers to without limitation to a process by which depth seen is very similar to the actual depth of the object being judged; the term "qualitative stereopsis" refers to without limitation a process by which depth is correctly near or farther from the fixation point but the amount of depth does not grow with distance of the object from the fixation point;

[0041] the term "binocular vision" refers to without limitation vision in which both eyes are used together; the term "monocular vision" refers to without limitation vision in which one eye is used to view an object; the term "eye dominance" refers to without limitation when an image of one eye of a human takes dominance or precedence over the other eye;

[0042] the term "fastener" refers without limitation to any means of coupling, connecting, or mating of one or more surfaces, structures, or devices, such as latch, loop, glue, epoxy, composite material, adhesive tape, Velcro (registered trademark), screw, button, slidable frame, gutter, slot, sliding member, slotted member, alignment marker member, frame member, frame member, magnetic strip(s), corrugated frame, corrugated structure, array of perforations or the like to secure and interlock the replaceable, multi-alignment marker proximal to a golf club face or the replaceable marker portion of the golf putter;

[0043] the term "stroke" refers without limitation to forward movement of a club made with the intention by a player of striking at or advancing a golf ball toward a target golf hole;

[0044] the term "grounding" or "grounded" refers without limitation to a player touching or lightly resting a sole of a club on the ground behind the ball in preparation to making a stroke;

[0045] the terms "stance" and "taking a stance" refers without limitation to a player placing feet in a position for and preparatory to making a stroke;

[0046] the terms "addressing" and "address position" refers without limitation to when a player has taken a stance and has grounded a golf club;

[0047] the term "line of putt" refers to without limitation is a line that a player wishes a ball to take after a stroke on a putting green;

[0048] the term "standing astride" the line of putt refers without limitation to when a player faces a target golf hole with a foot on each side of a line drawn between a player's feet toward a target golf hole with a player's head up and eyes level looking toward a target golf hole along the line of putt; and

[0049] the term "side on" to a line of putt refers without limitation to a line of putt where the position of a player is changed, a player's head at a different angle, and eyes are not level when looking toward a target golf hole along the line of putt.

Overview

[0050] In one salient aspect, the present invention discloses apparatus and methods for, inter alia, configuring and utilizing a golf putter as well as provide custom capabilities, in one variant, to produce various configurations to conform to, for instance, a user's unique binocular vision, perception, right and left eye dominance, stereopsis that may be customized to a particular golf course terrain or topology. In particular, the present invention discloses an apparatus and process to provide a modular golf putter apparatus having a multi-alignment marker club top of body, for instance, to provide player and/or coach flexibility to fine tune level of golf play on an individual basis, e.g., golf putter device easily adjusted to match an individual's physical dimensions and visual percep-

tion to achieve a closer fit and function and provide improved accuracy and adjustability properties thereof.

[0051] Furthermore, the present invention discloses a golf putter apparatus applicable for professional and amateur alike play so players while participating in a golf outing or golf practice round (e.g., prior to tournament play, for instance, in USGA golf tournament) may have golf club adjustment and attachment capability, for instance, quick release fasteners that removablely attach alignment markers on top of body configurations attached thereto.

[0052] In light of the present invention, users may customize golf putter configuration and choose a desired level of golf play responsive to golf course or terrain or environment for a particular day or event; thus, this present inventive apparatus provides adaptability as compared with conventional, single alignment marker golf clubs. Furthermore, both coach and player individually or in unison reconfigure golf putter by choosing different alignment marker or changing insert on club top of body to an alternative material (steel, aluminum, graphite . . .) to customize putter physical characteristics, e.g., adjust weight and balance of or minimize weight composite materials to improve user comfort (decreasing overall weight as compared to conventional non-configurable golf putters) and prevent unnecessary restriction of user movement (provide built-in flexibility).

[0053] Accordingly, the apparatus advantageously allows multiple configuration styles and supports many different system configurations through its ability to provide a significant flexibility of rapid adjustment to create new "customized" fit, e.g., using, for instance, fasteners including screw-in mating connectors, friction connection, magnetic attachment attachments, multi-shim attachments, and removable and attachable to provide quick-connects and disconnects.

Exemplary Extension Apparatus

[0054] Referring now to FIGS. **1**, **5**, **6**, **7**, **8**, **9**, and **10** include exemplary embodiments of the golf putter apparatus of the invention are described in detail. It will be appreciated that while described primarily in the context of golf putter apparatus to compensate for player perception, at least portions of the apparatus and methods described herein may be used in other applications, such as for example and without limitation applications including sports equipment manufacturing and testing setting environment to fine tune golf club balancing and customize "tailor" a feel and calibrate swinging capability of a prospective new golf club configuration in an automated or semi-automated assembly environment in accordance with physical attributes of a prospective golf participant, the environment that the new golf club configuration may experience, proposed methodology of swinging, providing functionality and interchangeability of piece parts, rehabilitating golf players who have physical limitations, physical ailments, and/or recovering from recent surgery or other sports injury, and the like.

[0055] Moreover, it will be recognized that the present invention may find utility beyond purely alignment and golf putter parallax concerns. For example, the "golf putter apparatus and hitting process" described subsequently may be conceivably modified to be useful in customizing physical properties and dimensionality of a hitting surface for golf ball so as to mitigate physical forces experienced by player when contacting a golf ball with putter club face, and the like. A myriad other functions will be recognized by those of ordinary skill in the art given the present disclosure.

[0056] Referring to FIG. **1**, golf putter **100** is disclosed illustrating an assembled and modular configuration, respectively. Golf putter **100** includes grip **104** and shaft **102** having shaft conformal portion **106**. In comparison to conventional perpendicular striking surface putters, golf putter **100** advantageously provides a high center of mass to maintain club face stability. Furthermore, shaft **104** and club face **108** may be constructed of, for instance, steel, aluminum, graphite, a composite polymer material, or the like.

[0057] On top of body of putter **100**, multiple non-perpendicular alignment markers **110** through **116** located left of club face center **105** and alignment markers **120** through **126** located right of center **105** are utilized for alignment purposes. As illustrated in FIG. **6**, modular golf plates **130** through **148** include one or more individual alignment marker (s), e.g., alignment marker **112**. In one embodiment, alignment marker **132** corresponds to alignment marker **112** on the multiple non-perpendicular alignment markers, e.g., spaced apart and angled at two (2) degree increments. In one embodiment, modular golf plates **130** through **148** may have one or more individual alignment markers.

[0058] Referring to graphical illustrations in FIGS. **2** and **3**, relative deflection or angle of golf ball determines if your ball will be off target if hit to the right or to the left of the correct alignment. In particular, one (1) degree angle alignment errors are very difficult to correct. However, a one (1) degree angle alignment error results in a one (1) inch deflection from center of target golf hole **152**. Even though a golf hole has a radius of 2.125 inches and if this was the only error, the player would sink golf ball **151** into target golf hole **152**. Unfortunately, other errors such as path error associated with putter back swing and through swing add additional errors, so when combined with angle alignment errors result in a significant overall error that results in missed strokes (e.g., higher golf scores.)

[0059] Referring in particular to FIG. **3**, one (1) degree angle error results in one (1) inch error for a five (5) foot putt; thus, to improve player's golf game and lowers overall golf score, player **101** needs to recognize and correct even seemingly small angle alignment errors. In particular, angle alignment errors occur as a result of a player's unique binocular vision and apparent displacement between distance seen by right and left eye of the player and by changes in player's viewing positions.

[0060] As best illustrated in FIG. **4**, player **101** is "standing astride" line of putt **104**. In this example, player **101** faces target golf hole **152** with feet **143***a*, **143***b* on each side of a line drawn between player's feet, e.g., left foot **145***a*, right foot **145***b*, pointing toward a target golf hole **152**. Continuing with this example, player **101** has head up and left eye **143***a*, right eye **144***b* both level looking toward target golf hole **152** along the line of putt **104**.

[0061] Referring to FIGS. **5** and **6**, player **101** is standing "side on" the line of putt **104**. More specifically, "side on" line of putt **104** occurs where the position of player **101** is changed, e.g., player's head at a different angle, eyes, e.g., left eye **143***a*, right eye **143***b*, are not level when looking toward target golf hole **152** along line of putt **104**, and player's feet, e.g., left foot **145***a*, right foot **145***b*, are pointed substantially perpendicular to line of putt **104**. As best illustrated in FIG. **5**, left eye **143***a* dominate of player **101** aligns club face **108** to target golf hole **151** located at first location **154**. As best

illustrated in FIG. **6**, right eye **143***b* dominate of player **101** aligns club face **108** to target golf hole **152** at second location **156**.

[0062] Using principles of the present invention, player **101** grasps golf putter **100** having a golf face **108** including multi-alignment markers (e.g., **110-116** and **120-126**). In one embodiment, after swinging club face **108** using alignment marker **105**, player **101** chooses and aligns an initial non-perpendicular alignment marker, e.g., e.g., initial non-perpendicular alignment marker **110**, to hit golf ball **148** toward target golf hole **150**. Advantageously, player **101** has multiple adjustment alignment markers proximally located to top of body above club face **108** to correct for visual perception displacement error **107** (e.g., binocular vision, stereopsis, and the like) associated with standing side-on (parallax) to line of putt **104**.

[0063] Referring to FIGS. **7** and **8**, coach **103** provides feedback to player **101** having golf putter **100** of FIG. **1** to compensate and align golf club face **108** to the target golf hole **152** to compensate for parallax situation illustrated in FIG. **4**. Coach **103** observes a rear view of player **101** proposed putter addressing direction. For example, coach **103** may be a certified instructor, spouse, friend, or anyone else who can perceive positioning of golf putter **100** of player **101** where center marker **105**, e.g., the line on top of body directly above sweet spot of the face and perpendicular to the face, is directed in relationship to player's **101** perception of where it is pointed. For instance, coach **103** may shout a suggestion to player **101** that correct alignment is left of current aiming position of player **101**. In response to this suggestion, player **101** would choose a different non perpendicular alignment marker (e.g., markers **110-116** or **120-126**) and ask coach **103** whether center marker **105** (e.g., the line top of body perpendicular to the face **108**) is now aligned along line of putt **104**. In response to this suggestion, player **101** would, if still off in alignment of line of putt **104**, choose another different marker and repeat this process until marker **105** is directed along the line of putt. As such, player **101** aligns club face **108** perpendicular to line of putt, e.g., target line, which player **101** perceives as left (or right) of the target line.

[0064] In yet another embodiment, advantageously, from a rear view, a coach **103** provides quantitative stereopsis and/or qualitative steropsis inputs of golf ball **151** relative to golf club face **108** to improve its aiming alignment. Coach **103** located proximal to target golf hole **152** observes player **101** initial choice of alignment marker **110** (e.g. how to aim golf club face **108**, which improve player **101** putting by overcoming other errors which have significantly less effect on how ball **151** rolls) for striking golf ball **151**. In one variant, coach **103** observes an angle of golf club face **108** relative to golf ball **148** and projected path of golf ball **151** based on player **101** initial non-perpendicular alignment marker **110** selection.

[0065] A player **101** aims alignment marker **105** of putter **100** along line of putt **104** which indicates an initial direction of the player's perception the location of line of putt **104**. In one embodiment, coach **103** provides initial (first) feedback to player **101** advising use of initial alignment marker **110** in response to player's initial perception of the relative location of the line of putt. Player **101** aligns (twists **109**) club face **108** to a first corrected alignment marker, e.g., alignment marker **110**, responsive to first feedback provided by coach **103** and/or based on observations of player **101** relative to displacement distance visually perceived from target golf hole **152**.

[0066] Advantageously, player **101** positions club head **108** to align golf putter **108** with hole without loss of stabilization due to club's high moment of inertia partially resulting from curved neck **106** of shaft **102** connecting to club head **108**. In one embodiment, coach **103** provides second (additional) feedback regarding choice of first corrected alignment marker **110** in response to the actual (not player perceived) direction alignment marker **105** and the face **108** are pointed. In yet other embodiments, coach **103** continues to provide feedback regarding player's choice of golf face **108** position and angling until satisfied with chosen position.

[0067] Player **101** aligns (twists **109**) multi-alignment marker golf face **108** along a second corrected non-perpendicular alignment marker, e.g. alignment marker **112**, in response to second feedback provided by coach **103**. Afterwards, player **101** swings golf face **108** using second corrected alignment marker **112** to hit golf ball **151** toward target golf hole **152**. Player **101** replaces modular, multi-alignment marker on body of club **108** with modular alignment marker (e.g., one of **130** through **148** modular alignment markers) relative to first and second corrected alignment marker **110**, **112** respectively for future putting situations.

[0068] Advantageously, as compared with conventional golf putting, binocular vision of player **101** (e.g., parallax) where player **101** sees displacement of golf ball **151** from two different perspectives is corrected through choice of alignment marker or modular golf face by trial and error of player **101** and/or in combination with assistance of coach **103** without circumventing USGA rule 16-1, e.g., player **101** may not stand "astride" to the line of the putt and corrects for binocular vision. In contrast to conventional golf putter hitting a golf ball perpendicular, e.g., one alignment marker, on club face, a multitude of alignment markers provide compensation for parallax caused by desperate views by right and left eyes of player to determine a hitting player address angle for current as well as future golf play.

[0069] In FIG. **9** modular (e.g., interchangeable) alignment markers to right of the middle tilt to the left, e.g., markers **130**, **132**, **134**, **136**. The interchangeable markers to the right of middle tilt to the right from bottom to top, e.g., markers **140**, **142**, **144**, and **148**. If a marker position is not being utilized for a given player, then plates **137** or **138** are utilized. Advantageously, in contrast to previous conventional golf putters, modular alignment markers may be interchangeable so that golf putter alignment may be customized in accordance with player capability and unique visual perspective and depth perception of object location. For instance, golf putter **200** customizes play for player **101** to correct for right eye and left eye dominance and a disparate location between different viewing angles that varies a distance between golf ball **151** and target golf hole **152** using different alignment markers that are angled away from perpendicular on golf putter **100** to properly align putter **200** along a line of putt.

[0070] As best illustrated in FIG. **10**, modular alignment markers **130-148** fasten or unfasten to golf putter **200** by one or more fasteners. For example, mating fasteners **145***a*, **143***a* on a back side of one of the modular alignment markers **130-148**, e.g. modular alignment marker **137**, for instance, inserted into mating fasteners **143***b*, **145***a* respectively on top of body of putter **200**. Alternatively, other attachment mechanisms made utilized for modular alignment markers attachment including snapped into (using fasteners known to those skilled in the art) or friction or force fit or the like.

[0071] Advantageously as compared to conventional perpendicular only striking surface club face, inventive features include a High Moment of Inertia (H.M.O.I.). For instance, the H.M.O.I. is partially due to curved neck **106** near golf club face **108** as well as distributed weighted club head **108**. As a result of H.M.O.I., golf club face **108** may be aligned (twisted **109**) to various orientations of club face **108** and shaft advantageously provides high resistance to twisting during play (e.g., vertical axis stability is maintained) as player **101** addresses club face **108** along one of many alignment marks on top of body of putter **100**. In addition, cutouts **111** and **113** (shown in FIG. **1**) provide an improved weight distributed club head **108** to maintain H.M.O.I.

[0072] Advantageously, as compared with conventional golf putter alignment marking on a surface of the putter, in one exemplary embodiment, golf putters **100**, **200** center marker **105** extending beyond alignment markers on the side thereof toward golf club face to increase player visualization of putter face orientation to that of the ball. Advantageously, an orientation and spaced-apart attachment in a semi-circular fashion at one end of alignment markers on side thereof (e.g., alignment markers **110**, **112**, **114**, **116**, **120**, **122**, **124**, **126**) main alignment marker (e.g., alignment marker **105**) in a graduated fan-out arrangement provides player increased depth perception and spatial perception of target hole as compared to player utilizing an in-line alignment marker present on many conventional putters to align a club face with that of target hole.

Exemplary Methods

[0073] Referring now to FIG. **11**, an exemplary embodiment of an individualized method **300** to compensate for aligning a player's golf club to a golf ball to hit a target golf hole is described. While described primarily in the context of the exemplary embodiments of apparatus **100** and **200** shown in FIGS. **1** and **4-10**, it will be appreciated that the methodology presented herein may be readily adapted to many different configurations of apparatus **100** and **200** as recognized by those of ordinary skill in the art.

[0074] In step **305**, player **101** positions golf putter **100** to align one of multi-alignment markers to an alignment marker to strike club face for golf ball **151**. In step **310**, coach **103** observes a rear in-line view of player **101** forward direction swing area. In one variation of step **310**, coach **103** may observe an angle of golf club face **108** and a projected line of putt from in front of player **101**.

[0075] In step **320**, player **101** swings golf face **108** using alignment marker **110** to hit golf ball **151** toward the target golf hole **152** along line of putt **104**. In step **325**, coach **103** provides initial (first) feedback to player **101** regarding choice of alignment marker **110** in response to actual (not player perceived) direction alignment marker **105** and face **108** are pointed in relation to line of putt **104**.

[0076] In step **320**, coach provides second (additional) feedback regarding alignment marker **110** in response to relative location of the hit of golf ball **151** toward the target golf hole **152**.

[0077] In step **325**, player **101** aligns modular, multi-alignment marker along second corrected alignment marker **112** in response to second feedback by coach **103**. Afterwards, player **101** positions modular, multi-alignment marker of golf face **108** along second corrected alignment marker to contact golf ball and hit golf ball toward target golf hole along line of putt **104**. In one variation of step **325**, using golf putter **200**, player **101** replaces multi-alignment marks on top of body with one of modular golf markers(s) **130-148** with best of first and second corrected alignment marker (e.g., **110**, **112**) for future putting situations involving player **101**.

[0078] It will be appreciated that while certain aspects of the invention have been described in terms of a specific sequence of steps of a method, these descriptions are only illustrative of the broader methods of the invention, and may be modified as required by the particular application. Certain steps may be rendered unnecessary or optional under certain circumstances. Additionally, certain steps or functionality may be added to the disclosed embodiments, or the order of performance of two or more steps permuted. All such variations are considered to be encompassed within the invention disclosed and claimed herein.

[0079] While the above detailed description has shown, described, and pointed out novel features of the invention as applied to various embodiments, it will be understood that various omissions, substitutions, and changes in the form and details of the device or process illustrated may be made by those skilled in the art without departing from the invention. The foregoing description is of the best mode presently contemplated of carrying out the invention. This description is in no way meant to be limiting, but rather should be taken as illustrative of the general principles of the invention. The scope of the invention should be determined with reference to the claims.

What is claimed is:

1. An individualized, adaptable golf putting alignment methodology to improve a player's golf putting accuracy of a golf ball on a line of putt from feedback by a coach, the method comprising:

grasping by a player a golf putter having a multi-alignment marker on a top of a body of the golf putter and proximal to a golf club face;

aligning by the player an initial alignment marker by placing the golf club face in an address position;

positioning of the coach proximal to the target golf hole;

observing by the coach an in-line front view a player's forward direction swing area;

observing by the coach an angle of the golf club face relative to the golf ball and a projected line of putt movement from an in-line rear view of the player;

swinging the golf club face by the player positioning the initial alignment marker on the top of the body of the golf putter to hit the golf ball toward the target golf hole; wherein during swinging, a shaft of the golf putter remains substantially stable and provides high resistance to twisting;

providing first feedback by the coach to the player regarding choice of the initial alignment marker in response to relative perspective or actual location of the hit of the golf ball toward the target golf hole;

aligning by the player by placing the golf club face to align golf club face along a first corrected non-perpendicular alignment marker responsive to the first feedback by the coach;

swinging by the player the golf club face having a first corrected non-perpendicular alignment marker to contact and hit the golf ball toward the target golf hole;

providing second feedback by the coach regarding choice of the first corrected non-perpendicular alignment marker in response to relative location of alignment line

perpendicular to the golf club face and location with respect to the line of putt toward the target golf hole; and

aligning by the player along the multi-alignment marker proximal to the golf club face positioning a second corrected non-perpendicular alignment marker responsive to the second feedback by the coach; and

swinging by the player using the second corrected non-perpendicular alignment marker to contact the golf ball and hit the golf ball toward the target golf hole along the line of putt.

2. The method of claim **1**, further comprising the step of replacing the multi-alignment marker with a modular replaceable marker having a hitting pattern that is responsive to the first feedback or the second feedback to correct for player parallax associated with the player standing side on to the line of putt.

3. The method of claim **2**, wherein the modular replaceable marker includes an alignment marker layout substantially matching that of the first corrected non-perpendicular alignment marker or the second corrected non-perpendicular alignment marker.

4. The method of claim **2**, wherein the modular replaceable marker comprises a fastening apparatus that connects detachably with one or more mating connectors to secure the modular replaceable marker to the golf putter.

5. The method of claim **4**, wherein the mating connectors comprise mating alignment markers or tabs that removably lock with each other upon being pressed into or fitted into one another.

6. The method of claim **1**, wherein the first feedback comprises a verbal indication from the coach that alignment is left of the line of putt and to pick an alignment marker for hitting the golf ball along the line of putt that is left of a current marker position.

7. The method of claim **6**, wherein the second feedback comprises a verbal indication from the coach that alignment is located right of line of putt and to pick an alignment marker right of a current marker position to hit the golf ball along the line of putt, wherein the second feedback utilized to substantially correct for stereopsis and responsive to customize a putter hitting pattern to substantially compensate for at least one of player's binocular vision or a player's right eye or left eye dominance.

8. The method of claim **5**, wherein the second corrected non-perpendicular alignment marker aligns the club face perpendicular to the line of putt while a player's perception indicates that the club face is not perpendicular to the line of putt; and wherein positioning of the club face for hitting the second corrected non-perpendicular alignment marker corrects for parallax associated with the player standing side on to the line of putt.

9. The method of claim **5**, wherein the first feedback and the second feedback comprises a first and second trial alignment marker positions that substantially align club face perpendicular to the line of putt; and wherein a player's perception when taking a stance indicates that the club face is anti-perpendicular to the line of putt.

10. A method to reduce to parallax effect and reduce aiming error while a player is putting along a selected line of putt toward a target golf hole, the method comprising:

addressing by the player a golf putter having a modular, multi-marker alignment surface;

aligning a golf club face by the player along a first selected alignment marker to the selected line of putt, the first selected alignment marker creates a first orientation golf putter face to strike the golf ball, wherein the golf putter maintains a high resistance to twisting substantially independent of selection of one of the modular, multi-marker alignment markers;

hitting the golf ball along the first selected alignment marker by the player along the selected line of putt;

receiving feedback to correct putter face angle;

aligning along a second selected alignment marker by the player of the golf club face along the selected line of putt, the second selected alignment marker creates a second golf putter face to address the club face to hit the golf ball along the selected line of putt;

addressing the golf ball along the second selected alignment marker by the player toward the selected line of putt; and

repeating selection process of one or more additional alignment markers and addressing and observing the golf ball until the player achieves a desired consistency of sinking the golf ball into the target golf hole.

11. The method claim **10**, further comprising the step of replacing the modular, multi-alignment marker with a modular replaceable golf marker having a selected alignment marker that achieves the desired consistency of sinking the golf ball into the target golf hole for future putting situations involving the player.

12. The method of claim **11**, wherein the modular replaceable golf marker includes an alignment marker layout substantially matching that of the first or the second selected alignment markers.

13. The method of claim **12**, wherein the modular replaceable golf marker comprises a fastening apparatus that connects detachably with one or more mating connectors to secure the modular replaceable golf maker to a top of a body of the golf putter.

14. The method of claim **13**, wherein the mating connectors comprise mating alignment markers or tabs that removably lock with each other upon pressing into or fitted into one another.

15. The method of claim **13**, wherein the feedback comprises a verbal indication that alignment is left of center and to pick an alignment marker left of current marker position to substantially compensate for parallax associated with standing side on to the selected line of the putt.

16. The method of claim **13** wherein the feedback comprises a verbal indication that alignment is right of center and to pick an alignment marker right of a previous marker position to substantially compensate for positioning of player's feet in a preparatory position to make a stroke; wherein a player's eyes being not level when looking at the target golf hole, and wherein the player's feet are substantially perpendicular when creating a forward movement of the club face with the intention of striking and moving the golf ball along the selected line of putt.

17. The method of claim **13**, wherein the first alignment marker comprises a position that aligns the club face perpendicular to a putt line while a player's perception indicates that the club face is not perpendicular to the selected line of putt; and wherein the player has a side on stance to the selected line of putt.

18. The method of claim **13**, wherein the first alignment marker and the second alignment mark comprises a first and second trial alignment marker positions that are chosen to converge on a position to align the club face perpendicular to

the selected line of putt; wherein a player's perception indicates that the club face is anti-perpendicular to the selected line of putt; wherein feet of the player are pointing substantially perpendicular to the selected line of putt for movement of the club face toward the target golf hole; wherein a player' eyes are positioned not level when looking at the target golf hole; and wherein a player's head is positioned at a different angle than that of the player's eyes.

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