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(54) **GOLF CLUB HEAD CONSTRUCTION AND METHOD FOR IMPROVED TARGET ALIGNMENT**

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(76) Inventor: **Jeremiah L. Oyer**, Chuluota, FL (US)

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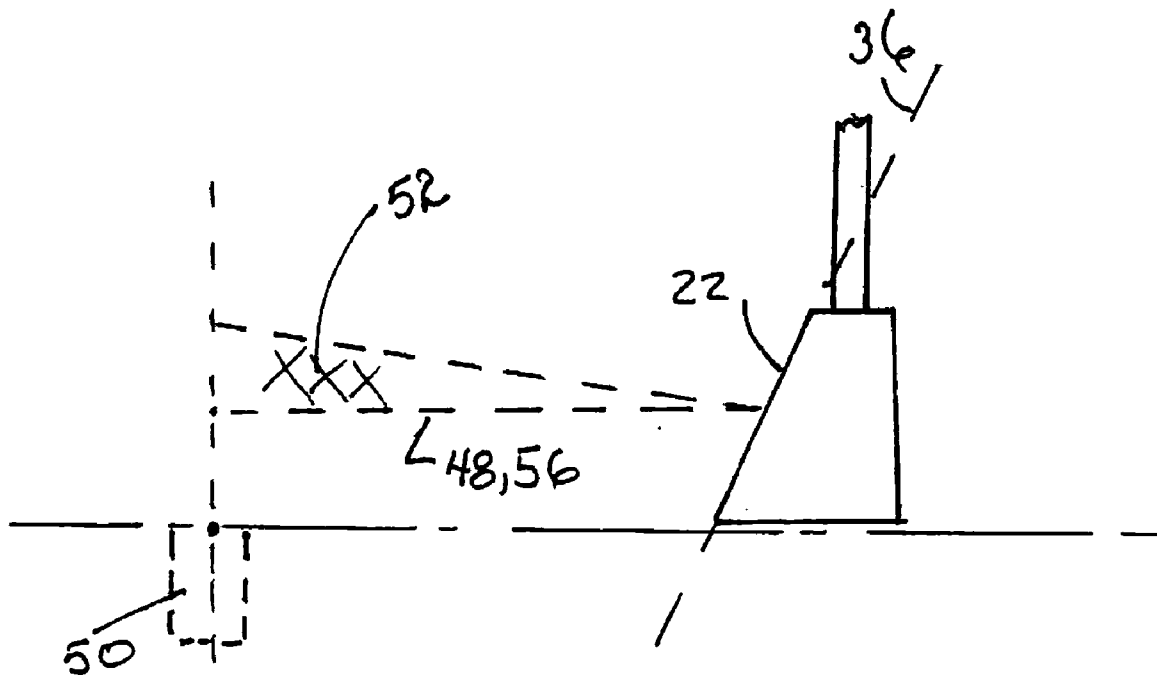
Correspondence Address:
CARL M. NAPOLITANO, PH.D.
ALLEN, DYER, DOPPELT, MILBRATH & GILCHRIST, P.A.
255 SOUTH ORANGE AVE., SUITE 1401, P.O. BOX 3791
ORLANDO, FL 32802-3791

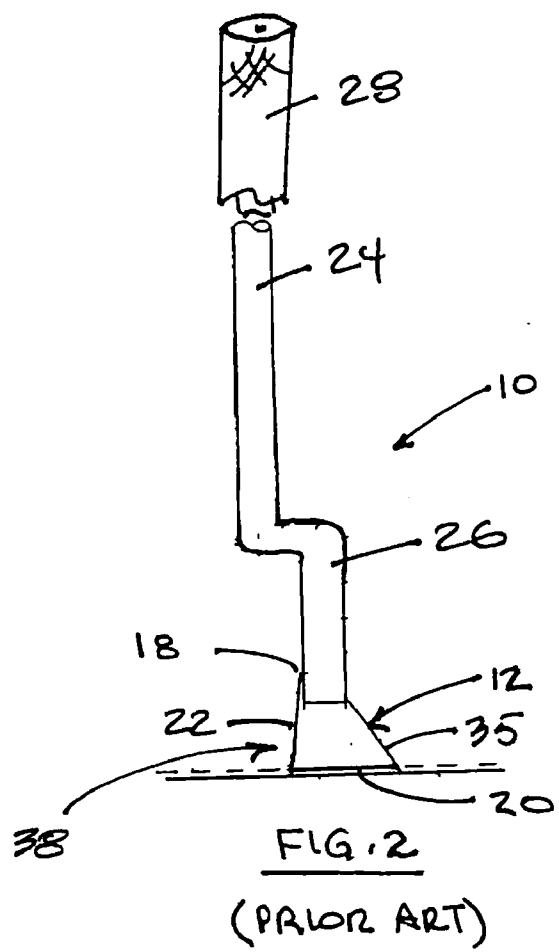
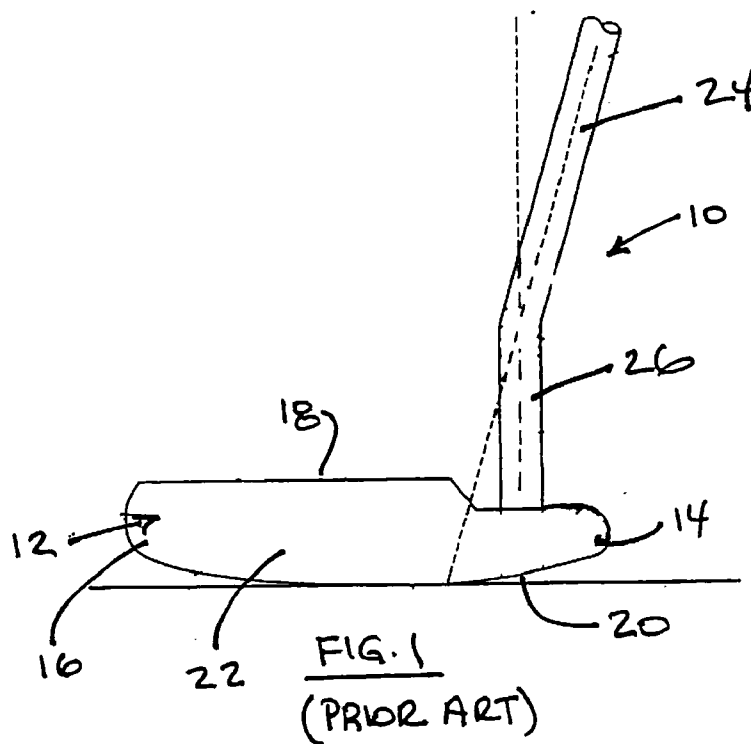
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(57) **ABSTRACT**

A golf club head is configured for an orientation of the face such that an intended target line is directed along an actual target line for a non-zero lofted club face and a preselected non-zero sole angle selected from sole angles within heel up and toe up orientations of the golf club head.

(21) Appl. No.: 11/676,379





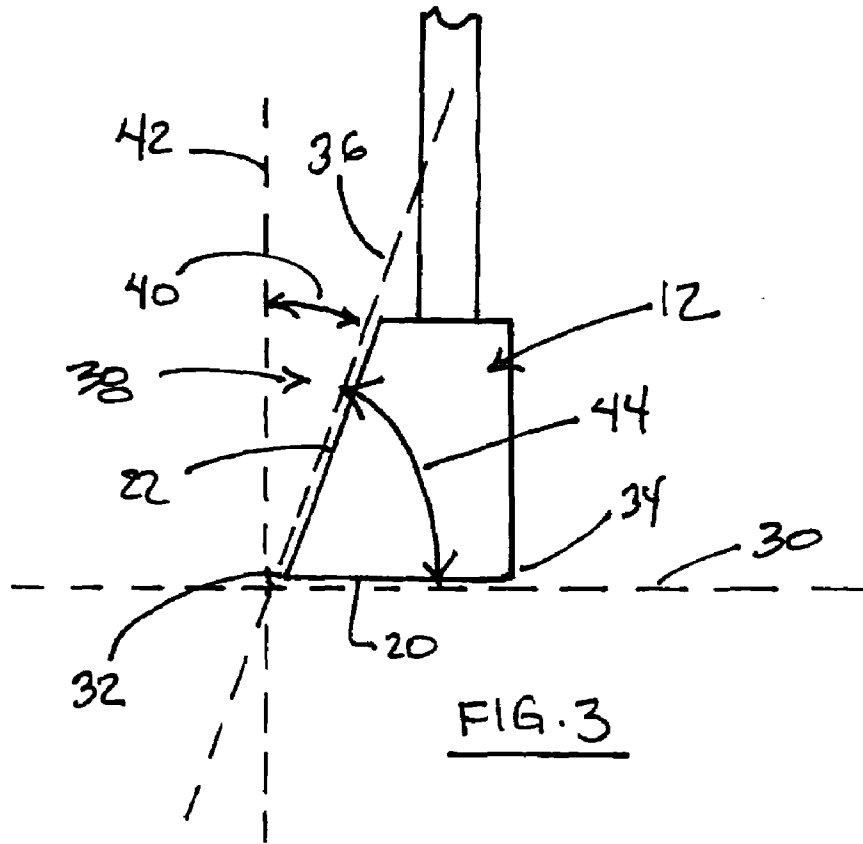


FIG. 3

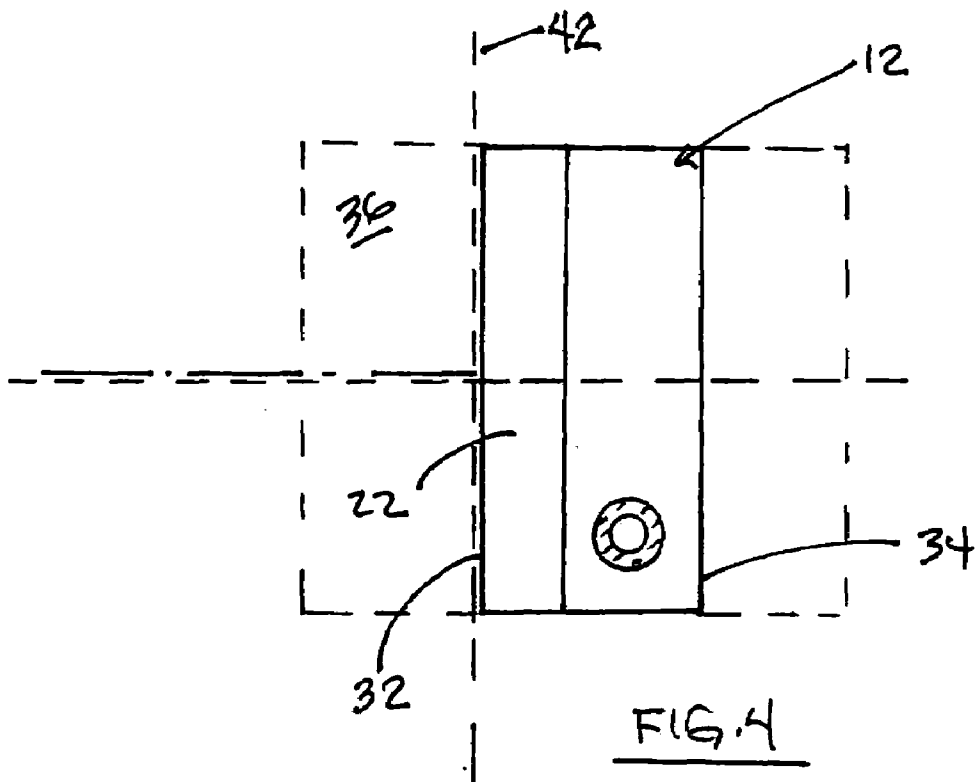
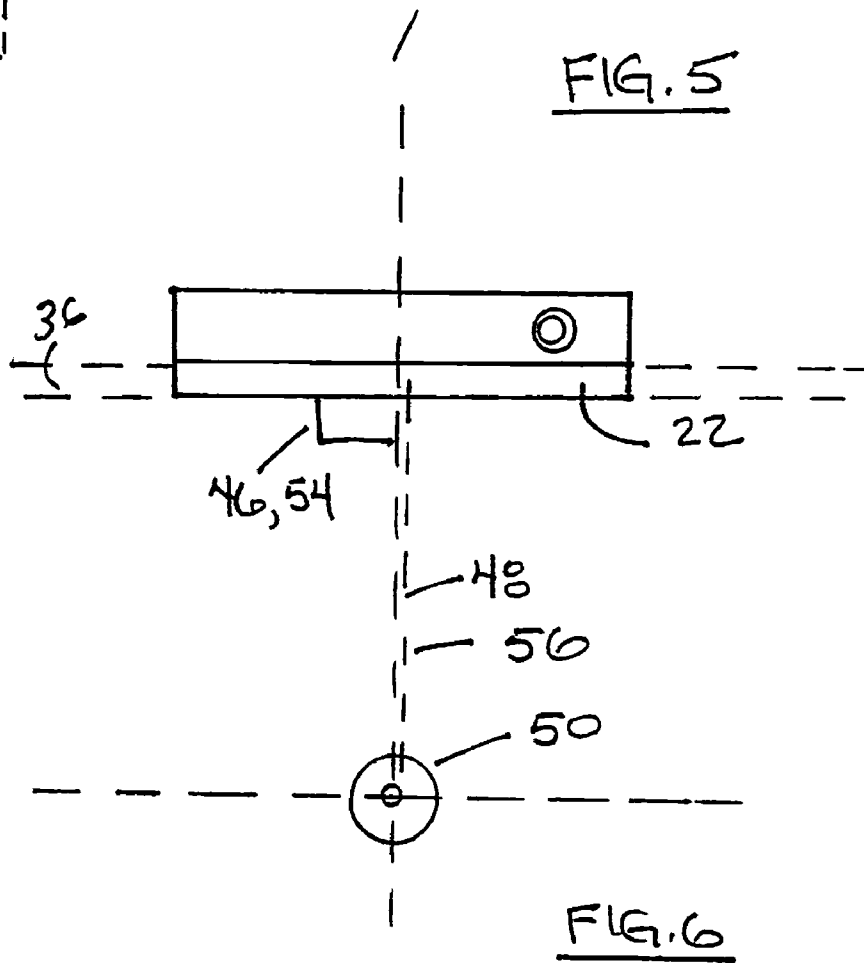
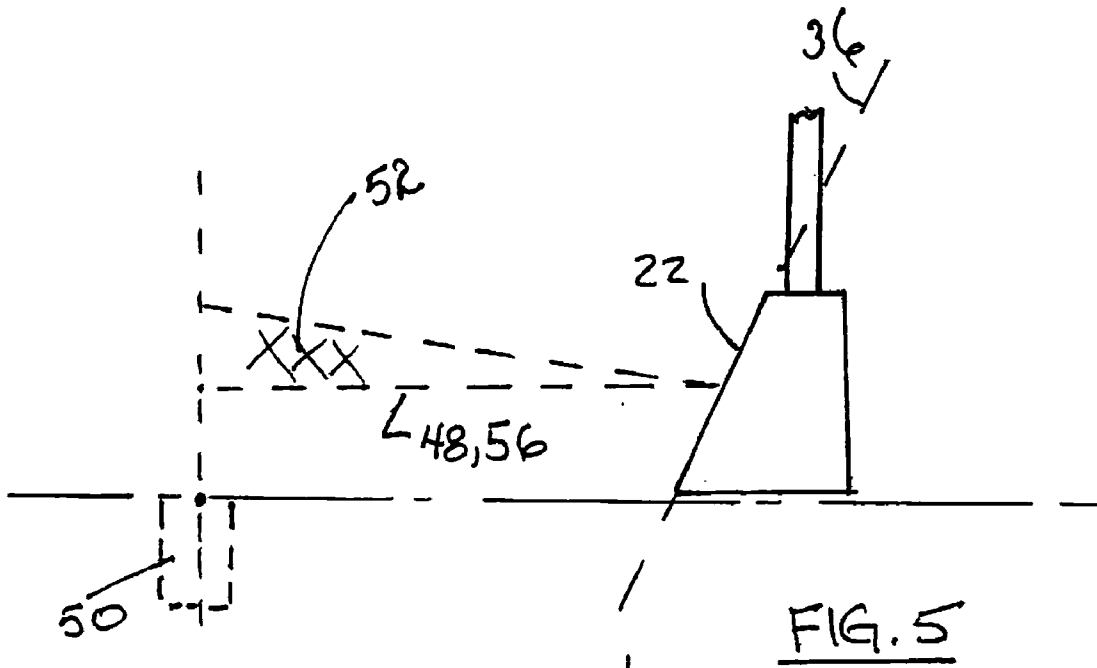


FIG. 4



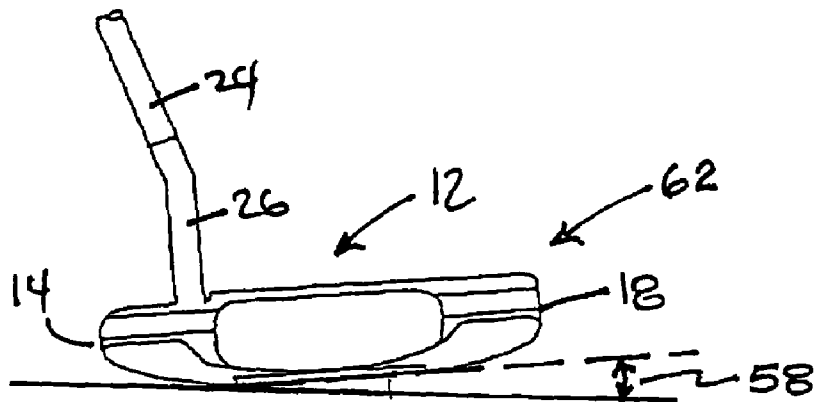


FIG. 7

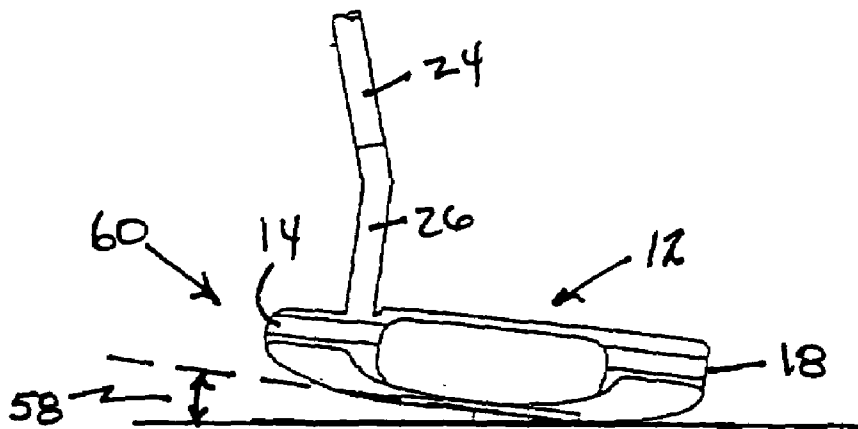


FIG. 8

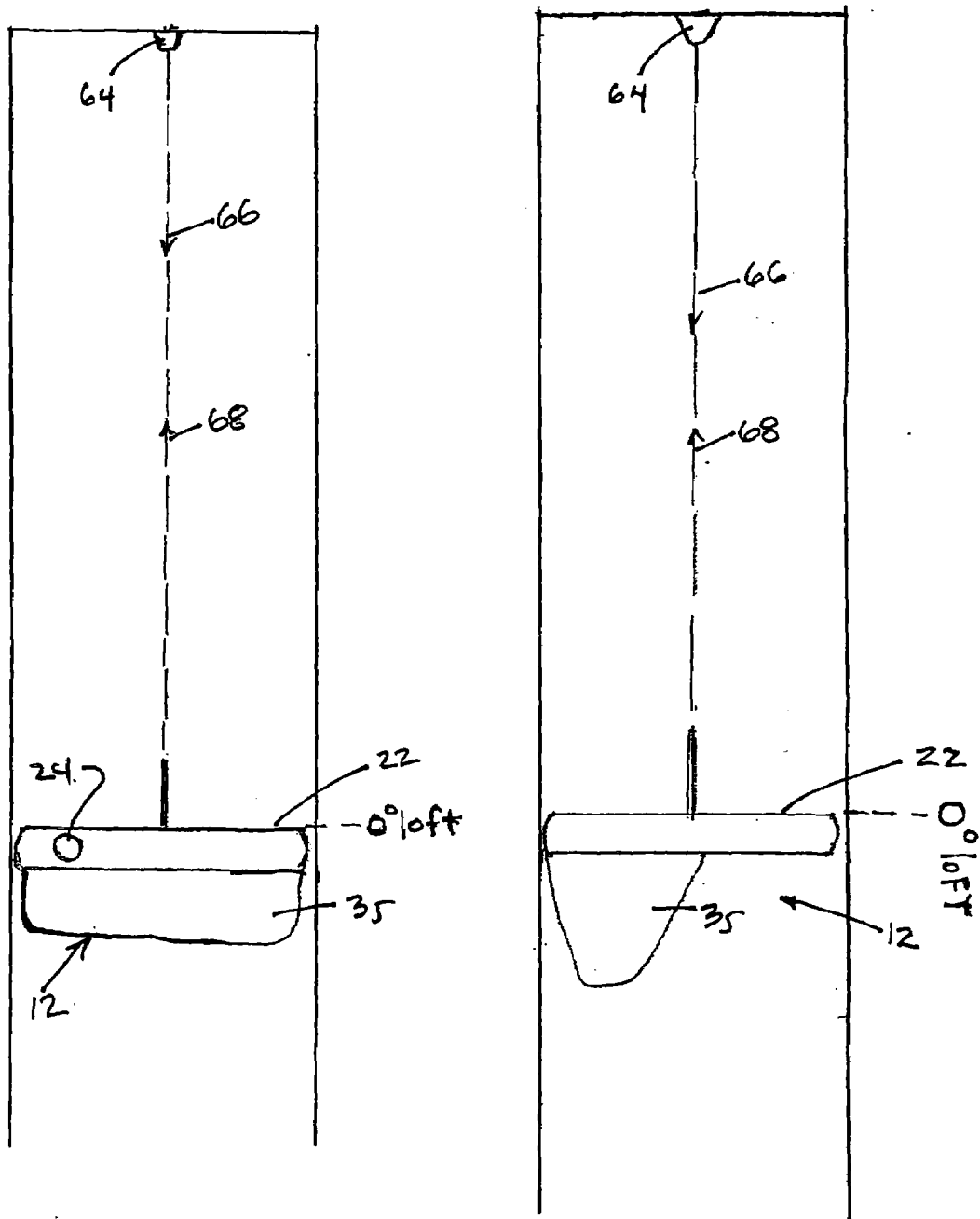


FIG. 9A
(PRIOR ART)

FIG. 9B
(PRIOR ART)

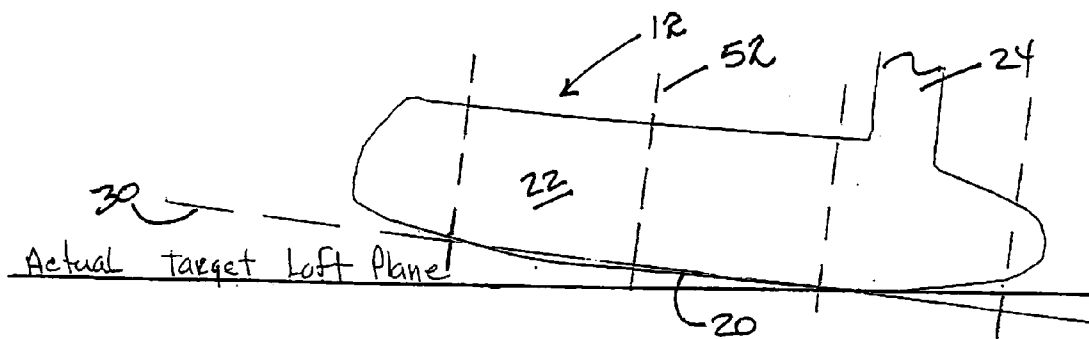


FIG. 11A
(PRIOR ART)

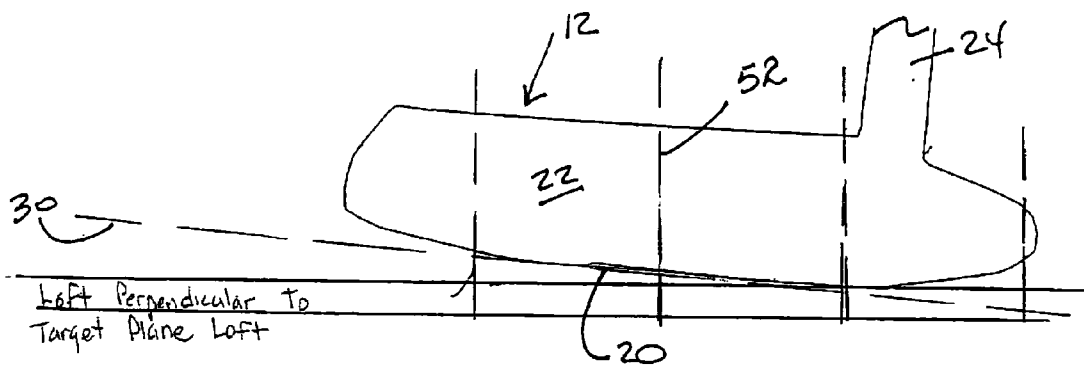


FIG. 11B

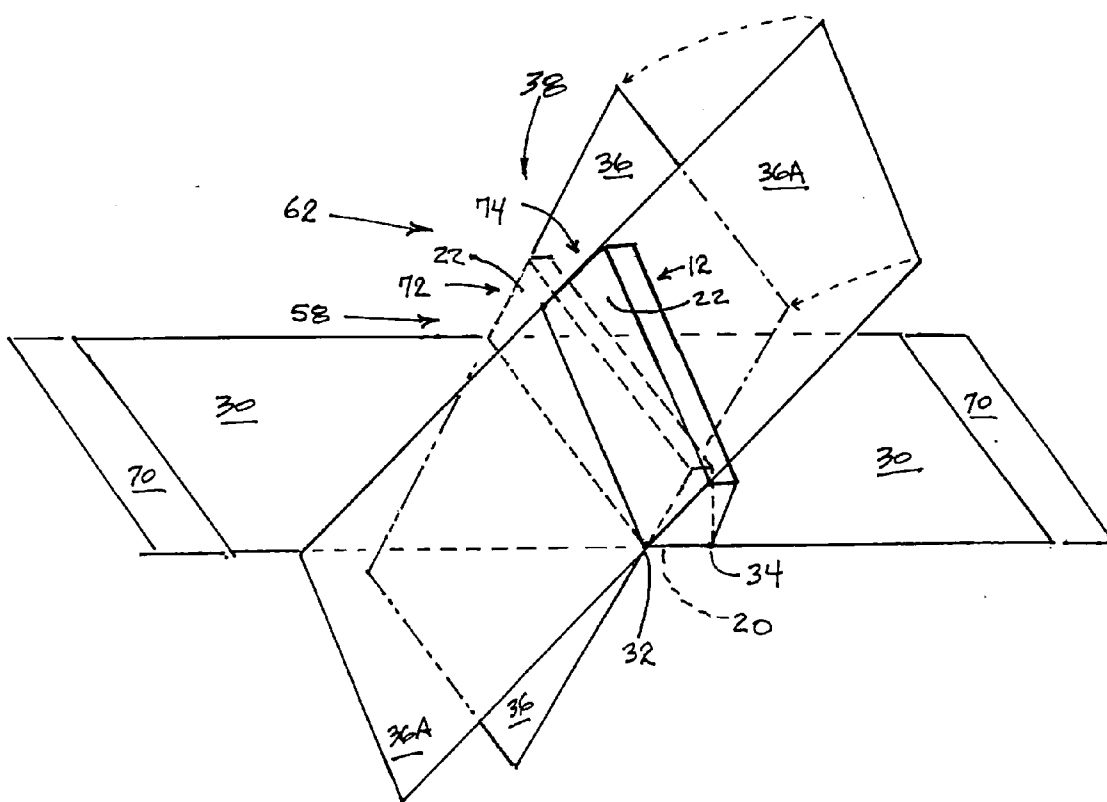
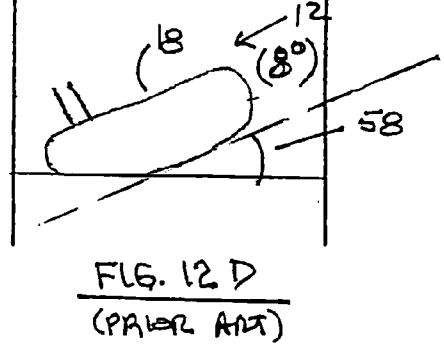
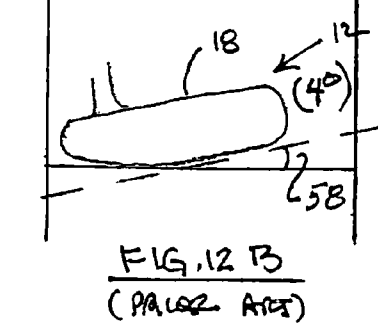
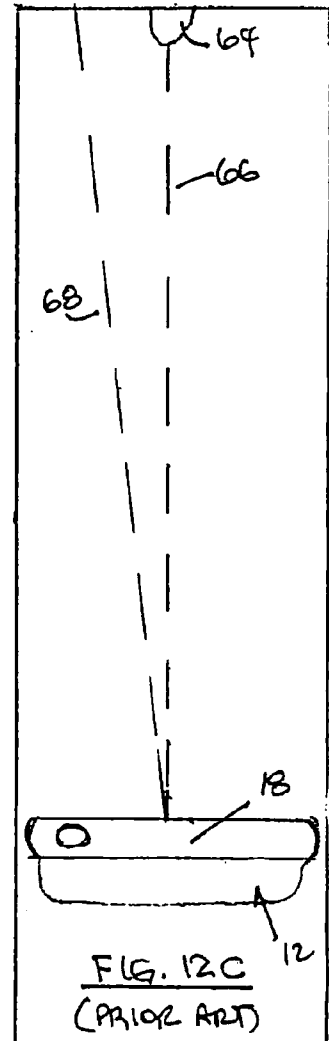
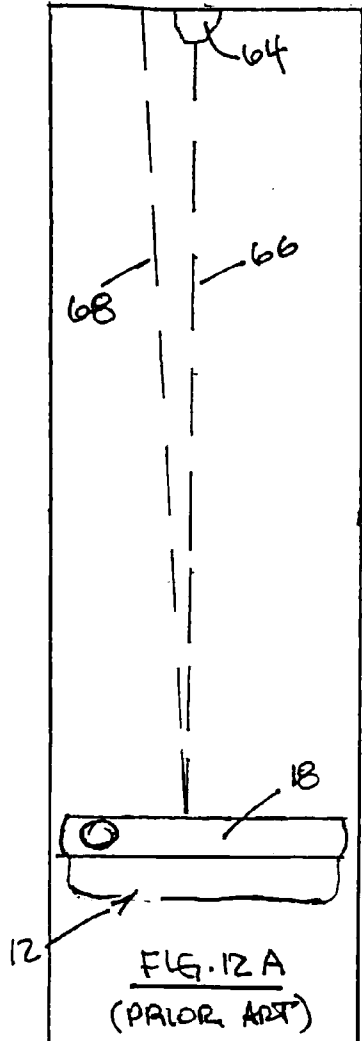
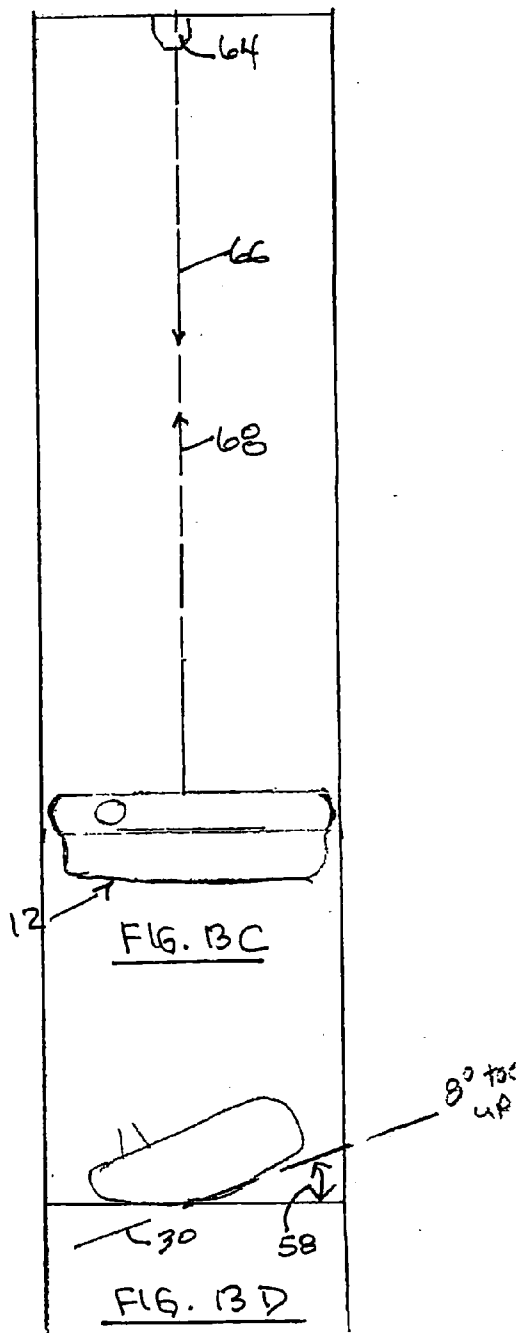
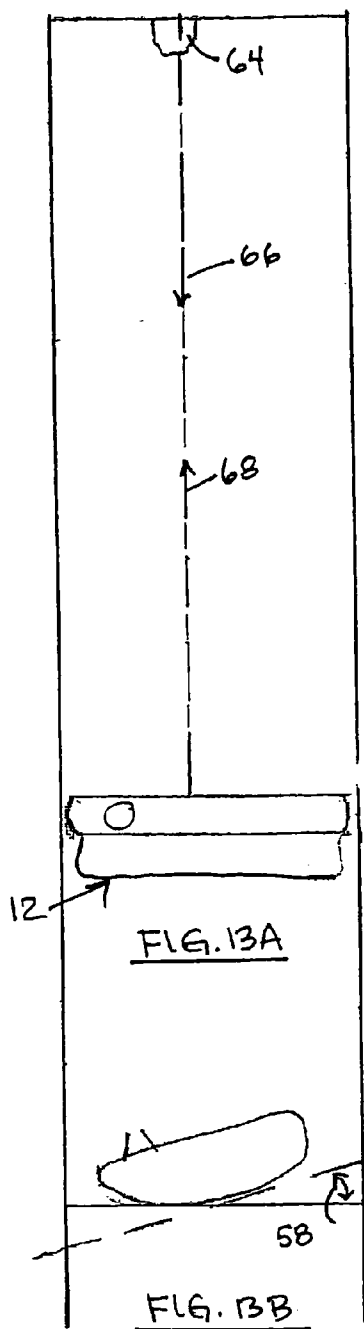
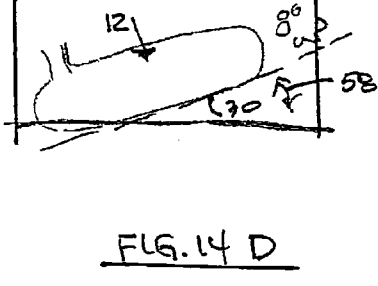
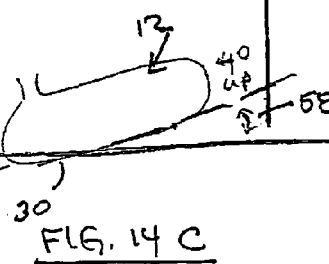
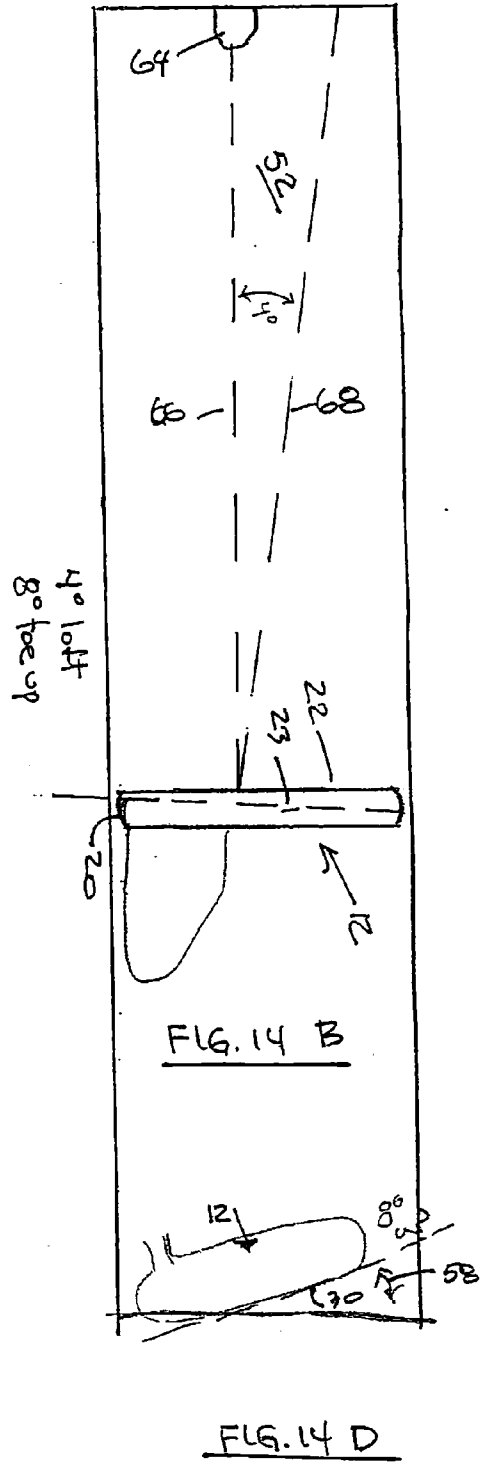
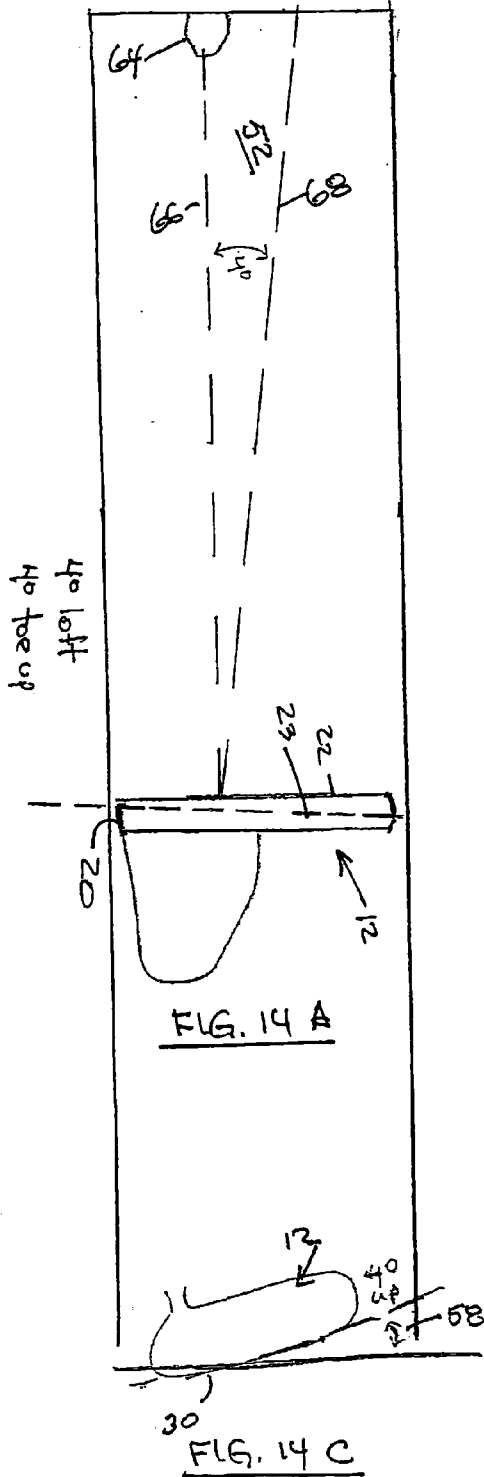


FIG. 11C







GOLF CLUB HEAD CONSTRUCTION AND METHOD FOR IMPROVED TARGET ALIGNMENT

FIELD OF THE INVENTION

[0001] The present invention generally relates to fitting a golf club to characteristics of a golfer, and more particularly to the fitting of a golf club head.

BACKGROUND OF THE INVENTION

[0002] Modifying a golf club to accommodate characteristics of a golfer is well known. By way of example, and as described in US Patent Application US 2002/0069133 to Currie et al. for a system and method for fitting putters, it is well known that a proper fitting of a golf club to the physique and playing style of an individual golfer will enhance performance. Further, while putting appears to be a relatively simple process, it requires a precise alignment of putter surface angles including lie angle and loft angle, by way of example. Currie et al. discloses a system that enables a golfer to customize a putter for the golfer's own physique and playing style and presents a golfer with a variety of putters having different club head styles. Included in the variety of putters with different club head styles are those putters having a variety of shaft lengths. The golfer is instructed to grip the shaft and if the bottom of the putter head is not laying flat with respect to a substantially horizontal plane, the putter head or shaft is then bent to modify the lie angle and loft angle so that the lie angle of the putter head with respect to the shaft causes the putter head to lie substantially flat on the ground surface. Currie further teaches the bending of the hosel so that the loft angle of the face of the putter head can be increased or decreased in order to achieve the loft angle from vertical at that point in the stroke where the golfer strikes the ball with the putter producing the optimum roll of the golf ball. Even a change of a few tenths of a degree will affect the ability of a golfer to accurately strike a golf ball with the face of a putter to cause the golf ball to roll along a desired travel path on the putting green toward the cup.

[0003] As is further well known in the art, the putter is weighted to provide a particular feel desirable to the golfer. Generally, the variables that are addressed when evaluating the putting strike are the force with which the putter head hits the golf ball and the orientation of the face of the putter head. However, a putter that is not correctly fitted to the swing and stance characteristics of the golfer leads to difficulty for the golfer attempting to successfully complete a putt. The keys to an effective putting stroke are proper alignment and sound putting fundamentals. The putting posture of the golfer is extremely important because it affects the individual's ability to execute a proper and consistent stroke. Each individual has a natural stroke plane. The objective of putting is to keep the putter on this natural plane, striking the golf ball with the correct momentum. Because a golfer is required to stand to the side of the ball and target line, their stroke plane creates a slight, but unique arc with the target line. The unique angle of an individual's stroke plane is determined by their posture and hand position. The variance of stroke planes can be ten degrees or more from one individual to the next. In order to enhance the individual's ability to consistently execute their natural stroke plane, it is important to match the lie of the putter with the angle of the stroke plane. By way of example, Currie discloses a method of the present invention enables a

golfer to obtain a putter with the matching lie angle to an individual's stroke plane at the point of purchase.

[0004] Unfortunately, golfers are not like a true pendulum support system. As the golfer strokes the putter head through their natural stroke plane to strike the golf ball and causes it to roll across the green towards the cup, several things can happen which will cause an intended path to differ from an actual path toward the target. The correct fitting of the putter to compensate for the swing and stance characteristics of the golfer will allow the golfer to properly aim at the target. As is well known, and as described by Currie, once a golfer has selected a club head style with which he or she feels most comfortable, the most important characteristics to fit a putter to the physique and playing style of an individual golfer are shaft length, lie angle, offset, loft angle, and total club weight. By customizing each of these characteristics to an individual golfer, a putter can be adjusted to suit an individual golfer's comfort and natural stroke plane. Otherwise, an individual golfer must adjust his or her body position to suit the putter, compromising comfort and stroke plane. A correct shaft length will allow the golfer to assume a comfortable posture, proper lie angle, and best achieve the natural stroke plane when moving the putter to cause the golf ball to follow the path desired across the putting green. A proper putter shaft length will allow the golfer to have a comfortable grip, a comfortable stance, and the ability to achieve the natural stroke plane when causing a golf ball to roll from a stationary position across a putting green into the cup. In general, accurate putting is all about assuring that all of the angles affecting the position of the face of the putter are proper as it strikes the golf ball.

[0005] The most basic of these angles is the lie angle, the angle between the putter head, generally measured along its sole, and the club shaft. There is a direct correlation between the shaft length of the putter and lie angle. One clearly affects the other. Typically, both shaft length and lie angle influence the posture of the golfer, how the golfer's arms hang when holding the putter, how the putter head sits with respect to the surface of the putting green, and most importantly the stroke plane of the putter. Those skilled in the art teach that the optimum lie angle of a putter head should compliment the natural stroke plane of an individual such that the putter head sits level or substantially parallel to a horizontal plane, the plane upon which the ball is moving. By way of continued example to the Currie reference, when a putter head sits level on the ground, the putter head will be in alignment with the travel path of the golf ball so that a force vector describing the momentum of the moving putter head will be in alignment with the desired travel path of the golf ball across the putting green toward the cup.

[0006] With reference to U.S. Pat. No. 4,932,662 to Blaisdell by way of further example, those skilled in the art teach that the lie angle should be adjusted so that the bottom of the putter head is sitting substantially flat with respect to a horizontal surface. It is well known that a putter head when caused to sit substantially parallel to a horizontal plane will increase the golfer's chances of hitting the golf ball in alignment with the center of mass of the putter head. Misalignment of the face of the putter head causes the golf ball to roll along a path over the putting green which will not cause the golf ball to fall into the cup. This misalignment of the face of the putter head is not done voluntarily by a golfer, but is typically due to characteristics of the golfer. Various club configurations such as use of a hosel offset or no offset can improve the ability of a golfer

to visually align the face of the putter head so that the golf ball will roll along a desired path. Small changes in loft angle will change the entire look of a putter and the rolling characteristics of the golf ball. Recommended loft angles may range from three to four degrees. The optimum loft angle of the face of the putter is different for every golfer, and even a small change in the loft angle, just tenths of a degree, will have a dramatic effect on the way the golf ball rolls along the putting green.

[0007] As is well known, the problem remains as to how to enable a golfer to select and customize a putter which will improve the ability to successfully roll a golf ball across a putting green and into the cup. As disclosed in Currie and in US Patent Application Publication 2002/0020033 to Aoki et al, either before or after the golfer selects a putter, the proper alignment is determined based on the putting characteristics of the golfer. This can be achieved by observing several putts along a flat surface to a target approximately 10-12 feet away. As taught in the Aoki reference, a laser beam may be employed to determine an optimum alignment and compared to the alignment of the golfer. Adjustments may then be made by selecting various interchangeable components or elements of the golf club to correct to a desirable alignment. A bending tool may be used to bend the hosel so that the lie angle of the putter results in the bottom surface of the club head being substantially parallel to a horizontal plane. The shaft or shaft angle may be changed, as suggested by Aoki.

[0008] The present invention is directed to providing an effective alignment of a golf club face to a target based on characteristics of the user, and in particular to a golfer that prefers to use a toe up or heel up positioning of the club head.

SUMMARY OF THE INVENTION

[0009] The present invention is directed to golf clubs and construction of a golf club head having loft for use by a golfer placing the head in a heel up or toe up position. Unlike the teaching known in the art including correcting for alignment of a golf club by modifying the club face through a bending of the hosel or shaft, embodiments of the present invention correct for alignment by modifying the club face with respect to the sole of the golf club.

[0010] One embodiment of the invention may be described as a golf club head comprising a sole defined by a sole plane passing therethrough, the sole extending between a leading edge and a trailing edge thereof; and a club face defined by a face plane passing therethrough, the club face having a loft defined by an angle between the face plane to the sole plane, the club face further operable within a face angle defined by a position of the club face relative to an intended target line directed toward a target, the face angle defined within a face angle plane perpendicular to the face plane, wherein a square face angle has an intended target line aligned with the actual target line. In keeping with the teachings of the present invention, the golf club head is configured for an orientation of the face plane such that the intended target line is directed along the actual target line for a non-perpendicular angle between the sole plane and the face plane, and a preselected non-zero sole angle selected from sole angles within heel up and toe up orientations of the golf club head.

[0011] A method aspect of the invention may be described as a method of fabricating a golf club head for providing a desired alignment to a target. The method may comprise selecting a golf club head having a non-zero loft, the golf club

head having a club face and a sole, wherein the sole is defined by a sole plane, and the club face is defined by a reference face plane, the club face further defined by a non-perpendicular angle measured between the reference face plane and the sole plane for providing the non-zero loft, providing a first club face orientation by positioning the sole, wherein the sole plane is parallel a ground plane defining a surface over which a golf ball is to be moved toward a target, aligning the reference face plane perpendicular to a target plane having an actual target line therein directed toward the target, providing a second club face orientation having a single non-zero sole angle selected from sole angles within heel up and toe up orientations of the golf club head, and forming the club face in the second club face orientation to be within a modified face plane that is parallel to the reference face plane when the golf club head is in the second club face orientation. Such a method provides the club face such that an intended target line is directed along the actual target line for the non-perpendicular angle between the sole plane and the face plane, and a golf club head with the loft providing a desired alignment to the target for a non-zero sole angle.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] Embodiments of the invention are described, by way of example, with reference to the accompanying drawings in which;

[0013] FIGS. 1 and 2 are partial front and end views of a putter;

[0014] FIGS. 3 and 4 are partial diagrammatical end and top views of a putter head;

[0015] FIGS. 5 and 6 are partial diagrammatical end and top views, respectively, of a putter head and target;

[0016] FIGS. 7 and 8 are rear elevation views of a putter head illustrating toe up and heel up orientations, respectively;

[0017] FIGS. 9A and 9B are diagrammatical plan and elevation views, respectively, illustrating one use of a light beam in determining alignment for a putter head;

[0018] FIGS. 10A, 10B and 10C are diagrammatical plan, rear and elevation views, respectively further illustrating use of a light beam in determining alignment for a putter head;

[0019] FIGS. 11A and 11B are partial diagrammatical front elevation views of a putter face illustrating face angle planes for uncorrected and corrected faces, respectively;

[0020] FIG. 11C is a diagrammatical perspective view of a putter head in a grounded position illustrated with a dashed line and the putter head in a toe up orientation;

[0021] FIGS. 12A and 12B, and 12C and 12D are diagrammatical plan and rear views, respectively further illustrating use of a light beam in determining alignment for a putter head;

[0022] FIGS. 13A and 13B, and 13C and 13D are diagrammatical plan and rear views, respectively further illustrating use of a light beam in determining alignment for a putter head; and

[0023] FIGS. 14A and 14B, and 14C and 14D are diagrammatical plan and rear views, respectively illustrating one modifying alternative for providing a desirable alignment for a putter head.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0024] The present invention will now be described more fully hereinafter with reference to the accompanying drawings, in which embodiments of the invention are shown. This

invention may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein. Rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art. Like numbers refer to like elements throughout.

[0025] While elements of a golf club and related terminology are generally well accepted, it is herein thought to be useful to initially define terms used in this specification to aid the reader and to clearly define the invention. With reference initially to FIGS. 1 and 2, consider a golf club such as a putter 10 herein described by way of example. As is well known in the art of putting, there is a heightened sensitivity to appropriate angles and those of the golfer. However, it is to be understood that the invention and embodiments herein described are easily related to other golf clubs, as will be appreciated by those skilled in the art. The putter 10 comprises a head 12 having a heel 14 and a toe 16. The putter head 12 further includes a top 18, an opposing sole 20, and a face 22 generally extending from the top 18 to the sole 20. The putter 10 includes a shaft 24 extending from a hosel 26 proximate the heel 14 to a grip 28 generally held by the golfer when striking a golf ball.

[0026] With reference to FIGS. 3 and 4, the head 12 may further be described as having the sole 20 sole defined by a sole plane 30 passing therethrough, with the sole extending between a leading edge 32 and a trailing edge 34. A flange 35 may be formed a portion of the trailing edge. The club face 22 may be further described as being defined by a face plane 36 passing therethrough. The putter 10 is well known to typically have loft 38. The loft 38 will generally be defined by a loft angle 40 measured between a reference plane 42 that is perpendicular to the sole plane 30 and the face plane 36. As is appreciated by those skilled in the art, the loft angle 40 may be described by an alternate loft angle 44 measured between the face plane 36 and the sole plane 30. As illustrated with reference to FIGS. 5 and 6, the club face 22 may further be considered as being operable within face angle 46 defined by a position of the club face 22 relative to an intended target line 48 directed toward a target 50, the face angle defined within a face angle plane 52 perpendicular to the face plane 36, wherein a square face angle 54 has the intended target line 48 aligned with an actual target line 56.

[0027] For embodiments of the present invention, the golf club head 12 is configured for an orientation of the face plane 36 such that the intended target line 48 is directed along the actual target line 56 for a non-perpendicular angle between the sole plane 30 and the face plane 36, such as the non-zero loft angle 40, and a preselected non-zero sole angle 58 selected from sole angles within heel up 60 and toe up 62 orientations of the golf club head 12, as illustrated with reference to FIGS. 7 and 8.

[0028] The reader will further appreciate the significance of such a structure for the club head 12 by considering the following features of typical golf club heads illustrated with reference to the series of diagrammatical images in FIGS. 9A-14B.

[0029] Consider a club head having a zero degree loft, no loft. With reference to FIGS. 9A and 9B, a laser light source 64 is positioned to direct a beam 66 onto the face 22 of the putter head 12, which for the example herein shown has no loft 38, or viewed as having a zero loft angle 40. For such a configuration, the light beam 66 is reflected, reflected beam

68, directly back without deviation in direction or orientation. Having the head 12 positioned in the toe up 62 or the heel up 60 orientation, as earlier described with reference to FIGS. 7 and 8, would therefore not affect the intended target line 48 (the beam 66) with the square face angle 54 as earlier discussed with reference to FIG. 6, by way of example.

[0030] However, now consider the head 12 having a non-zero loft angle 46 such as a 4° as illustrated by way of example with reference to FIGS. 10A-10C. With continued reference to the use of the beam 66 as one illustration, the reflected beam 68 is reflected from the face 22 of the putter head 12 but remains within the face angle plane 52 while the sole 20 is resting on or generally parallel to a ground plane 70. The reflected beam 68 is thus reflected back toward the target 50, as earlier described. As illustrated with reference to FIG. 10C, the reflected beam 68 is deflected upward by 4°.

[0031] It is herein noted that while generally flat surfaces are herein described for the face 22, it is for ease in illustrating only, and it is to be understood that other than flat surface may be modified as will herein be described for embodiments of the invention. By way of example, while a target line may be described as being perpendicular to the face, a target line will also be understood to those skilled in the art to be radially outward from a curved surface that may form such a face.

[0032] As earlier described in the background section, and with reference again to FIGS. 3, 6 and 7, typical methods of manufacturing the putter 10 rely upon the head 12 being soled wherein the sole 20 rests on or is generally parallel to the ground plane 70. However, the more likely use of the putter 10 by the golfer is within the toe up 62 or the heel up 60 orientations. As illustrated with reference to FIG. 11A, for the toe up 62 orientation, the face angle plane 52 is "tilted" and as a result causes the face plane 36 for this non-zero loft angle 40 to direct the face away from the actual target line 56, as earlier described with reference to FIG. 5. The putter head 12 is actually unintentionally being aimed away from the intended target 50.

[0033] By modifying the face 22 relative to the sole 20 as taught by the present invention, and as illustrated with reference to FIG. 11B, the face angle plane 52 will result in the intended target line 48 to be the actual target line 56.

[0034] By way of further example, and with reference to FIG. 11C, consider the relationship between the sole plane 30 and the face plane 36 while the sole plane is aligned with the ground plane 70 or generally parallel thereto. In the grounded position 72, wherein the sole 20 is resting or close to the ground plane 70, the face 22 is directed toward the target 50 as earlier described with reference to FIG. 5. For the head 12 having the non-zero loft angle, the face 22 will be within a second face plane 36A when the head is used for a non-zero sole angle 58, the toe up orientation 62 as herein described by way of example as a tilted position 74. As supported by the earlier discussions, the modified face plane 36A is tilted with respect to the face plane 36 for the soled club head. The tilting results in the intended target line 48 being other than the actual target line 56. By modifying the face 22 of the head 12 such that the modified face plane 36A passing through the face is aligned with the face plane 36 for the head being soled, the intended target line 48 will be corrected to the actual target line 56 for the head 12 having a preselected non-zero loft angle 40 and used at a preselected non-zero sole angle 58.

[0035] As further illustrated with reference to FIGS. 12A-12D for the typical putter, the beam 66 hitting the face 22 of the putter head 12 is deflected away from the intended target

line 48, herein illustrated for the non-zero loft angle putter head 12 use at four and eight degree toe up 62 orientations. With continued reference to FIGS. 12A and 12C, it is further realized that the golfer looking down onto the top of the head would believe to have the head and thus its face properly aligned from the point of view of the golfer.

[0036] With reference to FIGS. 13A-13D, the putter head 12 modified or manufactured according to the present invention will have the beam 66 and reflected beam 68 within the face angle plane 52 directed toward the target 50. Thus, to accurately manufacture the putter 10, or its head 12 having the non-zero loft angle 40 must have the face 22 modified relative to the sole 20 when the putter is intended to be used in the toe up 62 or heel up 60 orientations. For a preselected non-zero loft angle 40 and a preselected sole angle 58, there will be a specific orientation of the face plane 36 to the sole plane 30. As illustrated with reference to FIGS. 14A-14D, the face 22 may be reformed to the face 23 (herein illustrated using a dashed line) through grinding, by way of example, so as to be modified with respect to the sole plane 30.

[0037] In fitting a club, such as the putter 10 herein presented by way of example, one may first determine the style putter desired by the golfer such as size, shape, color, overall weight, swing weight, length, type grip, and the like. The type of hosel may then be selected and placed on the shaft, with the shaft being bent to provide the desired swing plane, the swing path being one of opened to closed or square-to-square, and those path therebetween. As earlier described in the background, such procedures may be used in various sequences. However, modifying or selecting the head to have the face plane be at a preselected relation to the sole plane for the non-zero loft angle and non-zero sole angle desired by the golfer is now known to be important for providing a desired alignment of the head to the target.

[0038] In the interest of adding further perspective to the teachings of the present invention, consider a golf cup having a diameter of about 4.25 inches and the golfer attempting to roll a golf ball into the cup from a distance of about ten feet from the cup. If the putter head 12 has a loft angle 40 of four degrees, and the golfer addresses the ball with the intension of striking the ball within the toe up orientation of about ten degrees, both typical of many golfers, the golfer will believe to be aligning the face to the center of the cup for a relatively flat surface and will believe to be striking the ball at the center of the cup. However, without the present invention, the golfer will actually be striking the ball at actual target line misaligned from approximately 2.5 inches or greater from the center of the cup. The putt will be missed to the understandable disappointment of the golfer.

[0039] Many modifications and other embodiments of the invention will come to the mind of one skilled in the art having the benefit of the teachings presented in the foregoing descriptions and the associated drawings. Therefore, it will be understood that the invention is not to be limited to the specific embodiments disclosed, and that modifications and embodiments are intended to be included within the scope of the appended claims.

That which is claimed is:

1. A golf club head comprising:

a sole defined by a sole plane passing therethrough, the sole extending between a leading edge and a trailing edge thereof; and

a club face defined by a face plane passing therethrough, the club face having a loft defined by an angle between

the face plane to the sole plane, the club face further operable within a face angle defined by a position of the club face relative to an intended target line directed toward a target, the face angle defined within a face angle plane perpendicular to the face plane, wherein a square face angle has an intended target line aligned with the actual target line,

wherein the golf club head is configured for an orientation of the face plane such that the intended target line is directed along the actual target line for a non-perpendicular angle between the sole plane and the face plane, and a preselected non-zero sole angle selected from sole angles within heel up and toe up orientations of the golf club head.

2. The golf club head according to claim 1, wherein the head is a putter head.

3. The golf club head according to claim 1, wherein the club face includes a non-zero loft angle defined by an orientation of the face plane to a reference plane extending from the leading edge of the sole and perpendicular to the sole plane.

4. The golf club head according to claim 3, wherein the non-zero loft angle is four degrees.

5. The golf club head according to claim 3, wherein the non-zero sole angle is selected from any angles greater than zero.

6. The golf club head according to claim 1, further comprising a hosel positioned for connection to a shaft.

7. A golf club head comprising:

a sole defined by a sole plane passing therethrough, the sole extending between a leading edge and a trailing edge thereof;

a club face defined by a face plane passing therethrough, the club face forming a loft angle defined by an orientation of the face plane to a reference plane extending along the leading edge of the sole and perpendicular to the sole plane, the club face operable at a face angle defined by a position of the club face relative to an actual target line directed toward a target, the face angle defined within a face angle plane being perpendicular to the reference and face planes, wherein a square face angle has an intended target line aligned with the actual target line;

wherein the golf club head is configured for an orientation of the face plane to be such that the intended target line is directed toward the target for a non-zero loft angle at a preselected non-zero sole angle, the sole angle being measured between the sole plane and a surface plane on which a golf ball is moving, the preselected non-zero sole angle selected from angles within heel up and toe up orientations of the golf club head.

8. The golf club head according to claim 7, wherein the head is a putter head.

9. The golf club head according to claim 7, wherein the non-zero loft angle is four degrees.

10. The golf club head according to claim 9, wherein the non-zero sole angle is selected from any angles greater than zero.

11. A golf club head comprising:

a sole defined by a sole plane extending therewith, the sole extending between a leading edge and a trailing edge thereof; and

a club face defined by a face plane extending therewith, the club face having a nonzero loft angle defined by an orientation of the face plane to a reference plane extend-

ing from the leading edge of the sole and perpendicular to the sole plane, the club face further operable at a face angle defined by a position of the club face relative to an intended target line directed toward a target, the face angle defined within a face angle plane perpendicular to the reference and face planes for providing a square face angle,

wherein the intended target line is directed at the target when the sole plane is parallel and generally proximate a surface plane over which a golf ball is to be moved, and wherein the club face is configured to have an orientation of the face plane to be such that the intended target line is within the face angle plane for the non-zero loft angle at a preselected non-zero sole angle, the preselected non-zero sole angle being measured between the sole plane and a surface plane on which a golf ball is moving, the preselected non-zero sole angle selected from angles with heel up and toe up orientations of the golf club head.

12. The golf club head according to claim 11, wherein the head is a putter head.

13. The golf club head according to claim 12, wherein the non-zero loft angle is four degrees.

14. The golf club head according to claim 13, wherein the non-zero sole angle is selected from angles greater than zero.

15. The golf club head according to claim 12, further comprising a hosel positioned for connection to a shaft.

16. A method of fabricating a golf club head for providing a desired alignment to a target, the method comprising:

selecting a golf club head having a non-zero loft, the golf club head having a club face and a sole, wherein the sole is defined by a sole plane, and the club face is defined by a reference face plane, the club face further defined by a

non-perpendicular angle measured between the reference face plane and the sole plane for providing the non-zero loft;

providing a first club face orientation by positioning the sole, wherein the sole plane is parallel a ground plane defining a surface over which a golf ball is to be moved toward a target;

aligning the reference face plane perpendicular to a target plane having an actual target line therein directed toward the target;

providing a second club face orientation having a single non-zero sole angle selected from sole angles within heel up and toe up orientations of the golf club head; and forming the club face in the second club face orientation to be within a modified face plane that is parallel to the reference face plane when the golf club head is in the second club face orientation,

thus providing the club face such that an intended target line is directed along the actual target line for the non-perpendicular angle between the sole plane and the face plane, and a golf club head with the loft providing a desired alignment to the target for a non-zero sole angle.

17. The method according to claim 16, wherein the selecting comprises selecting a putter head.

18. The method according to claim 16, wherein the club face forming to be within a modified face plane comprises grinding a surface of the club face.

19. The method according to claim 16, wherein the single non-zero sole angle selected from sole angles within heel up and toe up orientations of the golf club head comprise angles greater than zero.

20. The method according to claim 16, wherein the aligning comprises use of a light beam.

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