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ABSTRACT

The present invention is directed to a laser system for use in combination with a golf club. This laser system enables first and second beams of light to be projected therefrom to assist a golfer in setting up for a golf shot, aiming a golf shot, diagnosing one or more frailties in the golfer’s swing, and/or increasing a level of consistency of the golfer’s swing from one swing to the next. Indeed, these first and second light beams from the laser system may be utilized to provide information to enable one to discern if the golfer’s swing deviates from an initial shaft plane of the golf club.
### Hozel / Aperture Height 4.0

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<th>Vertical Plane Beamsplitter Angle 45 deg +0.25 Deg +0.5 Deg</th>
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GOLF CLUB LASER SYSTEM AND METHOD OF USING THE SAME

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority of U.S. Provisional Patent Application Ser. No. 60/551,662, filed Mar. 9, 2004, which is fully incorporated herein by reference.

STATEMENT REGARDING SPONSORED RESEARCH OR DEVELOPMENT

[0002] Not applicable.

REFERENCE TO A MICROFICHE APPENDIX

[0003] Not applicable.

FIELD OF THE INVENTION

[0004] The present invention generally relates to the game of golf, and more particularly to at least generally improving a golfer’s game using a golf club equipped with a laser system.

BACKGROUND OF THE INVENTION

[0005] In the game of golf, it is generally desirable to get a golf ball in a hole/cup in as few strokes as possible. Accordingly, many products have been developed to at least generally assist a golfer in improving the golfer’s game. Among these products, several attempts have been made to utilize lasers in association with one or more golf clubs to enhance the golfer’s game. However, many of these products are cumbersome, significantly change the weight or balance of the club, and/or are designed to only be used in conjunction with a specialized target. Moreover, many of these products do not provide the performance desired to actually enhance a golfer’s game.

[0006] Take putting for example, the size and slope of greens tends to vary widely from hole to hole and course to course. Indeed, a golfer may be faced with the task of making a relatively short putt of only a couple feet and the challenge of making a relatively long putt of tens of feet all in the same round of golf. This undertaking of trying to make a putt is generally complicated by the “lie” of the golf ball. In other words, for example, not all 10-foot putts are the same. To the contrary, some may be uphill, some may be downhill, some may travel over a substantially flat surface, some may include one or more side-to-side breaks, and some may even include combinations of the prior.

[0007] To make the shot (i.e., putt the ball into the hole), it is commonly desirable to at least generally align the ball and the putter with a mark (imaginary or otherwise) at which the ball is to be shot, stroked, hit, rolled, or the like. However, the golfer may not be aware that the golfer opens and/or closes the face of the golfer’s putter during the normal golf swing. Moreover, and by way of example, the golfer may not be aware that the golfer’s generally pendular putting stroke includes undesired deviations from a preferred substantially planar motion of the club shaft.

[0008] The prior art has failed to provide an effective laser-based system that is at least generally diagnostic of a golfer’s swing and the tendencies thereof. Further, the prior art has failed to provide an effective laser-based system that enables a golfer to at least generally address the many variables in shots and lies that the game of golf provides. That is, the prior art has failed to provide a laser-based system for enhancing a golfer’s game that is at least generally useful over a wide range of golf shot situations.

SUMMARY OF THE INVENTION

[0009] Accordingly, it is an object of the present invention to provide a laser system for a golf club that enables diagnostic evaluation of a golfer’s swing. Relatedly, it is another object of the present invention to provide a laser system for a golf club that enables one to determine whether a golfer is opening and/or closing a face of the golf club during various stages in the golfer’s swing. Still another object of the present invention to provide a laser system for a golf club, the accuracy of which is not significantly affected by flexion of the golf club shaft during the golf swing. Yet another object is to provide a laser system for a golf club that does not significantly affect the weight distribution of the golf club. Still yet another objective is to provide a laser system for a golf club that promotes developing a consistency of a golfer’s swing/stroke. And still yet another object is to provide golf club system that is capable of at least generally enhancing a golfer’s game, a portion of this golf club system including a golf club that may be utilized in golf competitions. These objects, as well as others, may be met by the following invention.

[0010] In one aspect, the present invention is directed to a laser system for use in combination with a golf club. This laser system may be said to include a light source and a beam splitter for splitting a light beam from the light source into at least first and second light beams. This beam splitter is generally designed so that at least one of the first and second light beams traverses both an xz-plane and a yz-plane of a Cartesian coordinate system while the face of the golf club is substantially parallel to an xz-plane of the Cartesian coordinate system. Herein, a “beam splitter” generally refers to an apparatus that is capable of at least generally dividing a common light beam into first and second light beams exhibiting corresponding and differing first and second vectors. For instance, the first light beam may include about 30% of the original, common light beam, and the second light beam may include about 70% of the original, common light beam.

[0011] In one embodiment this laser system may be located at least generally within a shaft of the golf club. By contrast, the laser system may be designed to be releasably interconnected with an exterior of the golf club in another embodiment. For instance, the laser system may be configured to be releasably interconnected with the shaft of the golf club in an appropriate snap-on fashion.

[0012] Some embodiments of this laser system may be equipped with the ability to adjust an orientation of at least a portion of the beam splitter relative to the light source. So, for instance, a portion of the beam splitter may be capable of exhibiting numerous angles and/or orientations relative to another portion of the beam splitter and/or the light source. By contrast, other embodiments of this laser system may have a beam splitter with first and second portions that exhibit substantially fixed orientations and/or angles relative to each other, the light source, the shaft, and/or the face of the golf club.
Another aspect of the invention is directed to a golf club assembly that includes a shaft having a hosel end and an opposing handle end (or butt end). A handle or grip is interconnected with the shaft toward the handle end of the shaft, and a head assembly equipped with a hosel is interconnected with the shaft toward the hosel end of the shaft. Further, this golf club assembly is equipped with a laser system including a light source that is located at least generally within the shaft. This light source is generally spaced from the hosel end of the shaft by a first distance and spaced from the handle end of the shaft by a second distance. Preferably, the first distance is less than the second distance. In other words, it is generally preferred that the light source is generally disposed closer to the hosel end of the shaft than to the handle end of the shaft. This preferred position of the light source in the handle generally reduces a tendency for inaccurate light beam projections from the laser system as a result of flexion of the shaft during a swinging of the golf club assembly.

The laser system may include a battery unit. This battery unit is generally disposed within the shaft of the golf club assembly. More particularly, it is generally preferred that the battery unit be disposed toward a handle end of the shaft. This preferred positioning of the battery unit may be said to facilitate access to the battery unit to ease replacement of batteries associated with the battery unit. It should be noted that some embodiments of the golf club assembly may include laser systems that have battery units disposed in other appropriate locations such as, but not limited to, the handle, and the head assembly of the golf club assembly. While a position of the battery unit within the shaft may be maintained or at least generally promoted in any of a number of appropriate manners, it is preferred that rubber O-rings or a silicone-based adhesive be utilized to also provide a dampening function.

Some embodiments of the laser system associated with the golf club assembly include a beam splitter, such as the beam splitter described above. This beam splitter may be positioned in any appropriate location as long as it can at least generally receive light from the light source and provide first and second beams therefrom. In one preferred embodiment, the beam splitter is attached to at least one of the hosel of the head assembly and the shaft.

Still another aspect of the invention is directed to a golf club system that includes a first golf club having a laser system disposed with a shaft of the same, and a second golf club devoid of such a laser system. Moreover, the second golf club has a substantially identical loft and weight as the first golf club. This golf system may be said to provide a benefit of enabling a golfer to practice with the first golf club to enhance the golfer’s game and also utilize the second golf club in competitions in which a golf club equipped with a laser system may not be permitted.

With regard to this golf system, the first and second golf clubs may have one or more similar characteristics. For instance, the second golf club may exhibit a substantially identical weight ratio as the first golf club. The second golf club may have a substantially identical shaft length as the first golf club. The second golf club may have a substantially identical handle as the first golf club. The second golf club may have a substantially identical club face as the first golf club. Indeed, the first and second golf clubs, for all practical purposes, may substantially look and feel like the same club.

The first and second clubs of this golf system may be any appropriate clubs. For instance, in one embodiment, the first and second golf clubs may both be putters. In other embodiments, the first and second golf clubs may both be irons or woods.

Yet another aspect of the invention relates to a method of executing a golf swing. In this method, first and second visible spots are displayed on at least one surface by projecting corresponding first and second light beams from a laser system associated with a golf club. In addition, the golf club is swung while the first and second visible spots are being displayed. These first and second visible spots travel in a direction substantially parallel to a shaft plane of the golf club during the swinging step. This may be said to provide a benefit of enabling a golfer to determine if the shaft plane of the golf club exhibits an undesired relationship relative to a desired ball path and/or target line.

At least one of the first and second spots that are displayed may be displayed only at least partially overlapping one or both of these spots being located at predetermined distances from the golf club. For instance, the first spot may be displayed only a short predetermined distance from a face of a head of the golf club while the second spot is displayed a greater predetermined distance from the face of the golf club. The surface(s) on which the first and second spots are displayed may be any appropriate surface(s) including, but not limited to a floor, a green, and the ground.

When the golf club is swung, it may be said that an orientation of at least a portion of the shaft plane of the golf club is at least generally displayed. So, for example, if one or both the first and second spots travel in a path that is substantially parallel to a desired target line and/or ball path during the swing, one may determine that the golfer’s swing was accomplished within the original shaft plane of the golf club. Conversely, if one or both the first and second spots travel in a path that is not aligned with or not substantially parallel to a desired target line and/or ball path during the swing, one may determine that the golfer’s swing deviated from the original shaft plane of the golf club and/or that the club face was opened and/or closed during the swing. At least in one embodiment, this feature may be said to be beneficial in determining whether a golfer is opening or closing the face of the club during the golfer’s swing and/or whether the golfer is moving the club toward and/or away from the golfer’s body during the swing.

Still yet another aspect of the invention is directed to a method of using a laser assembly in combination with a golf club. In this method, a first light beam is projected in a first direction substantially parallel with a shaft plane of the golf club. Further, a second light beam is projected in a second direction characterized by having an at least generally downward component. In other words, the second light beam is directed at least generally toward a surface such as a floor, ground surface, or the like. A location at which the second light beam may be said to at least generally intersect or interface with this surface may be said to be indicative of an end point of a target line that is remote from a head of the golf club. This target line may be characterized as being found at least generally within a plane that is substantially vertically oriented and that extends through a central portion of the head of the golf club.

The first and second light beams that are projected may be derived from a common light source. Indeed, a beam
splitter may be utilized to assist in providing these first and second light beams. As such, it may be said that the method may include the steps providing a common light beam and at least generally splitting the common light beam to provide the first and second light beams.

[0024] The first and second light beams that are provided in this method may or may not be of the same magnitudes. In one embodiment, the first and second light beams may exhibit corresponding first and second intensities in which the second intensity is greater than the first intensity. This may be beneficial in the case where the end point of the target line is a significant distance from the face of the golf club.

[0025] In some embodiments of the method, the target line may be traversed by both the first and second light beams. This target line may be substantially parallel with or may be found at least generally within the shaft plane of the golf club.

[0026] A further aspect of the invention is in the preferred relative angles of the light beams respecting the shaft axis of the club and the projected beams toward a target at a variety of target distances.

[0027] Various refinements exist of the features noted in relation to the above-described aspects of the present invention, and further features may also be incorporated as well. These refinements and additional features may exist individually or in any combination. While the present embodiment is described in terms of a laser and its collimated light, any energy source providing a concentrated beam of energy which may be tracked on a surface might be utilized. Light at wavelengths other than visible might be used. Generally, each of the various features and refinements discussed herein in relation to the present invention may be utilized alone or in any combination in any of the aspects of the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0028] FIG. 1 is a diagrammatic representation of a laser system of the invention.

[0029] FIG. 2 is a perspective view of a golf club assembly of the invention.

[0030] FIG. 3 is a longitudinal cross-sectional view of the golf club assembly of FIG. 2.

[0031] FIG. 4 is an exploded view of another embodiment of a golf club assembly of the invention.

[0032] FIG. 5 is a table illustrating experimental vertical and horizontal cross-over angles for one embodiment of the invention.

[0033] FIG. 6 is a line graph illustrating the data shown in the table of FIG. 5.

[0034] FIGS. 7A-D are diagrammatic representations of one embodiment of the invention.

[0035] FIGS. 8A-D are diagrammatic representations of another embodiment of the invention.

[0036] FIGS. 9A-D are diagrammatic representations of yet another embodiment of the invention.

[0037] FIG. 10 is an elevation view of the golf club assembly of FIGS. 2-3.

[0038] FIG. 11 is a perspective view of a golf system of the present invention.

DETAILED DESCRIPTION OF THE DRAWINGS

[0039] The present invention will now be described in relation to the accompanying drawings, which at least assist in illustrating the various pertinent features thereof. While the following drawings illustrate a laser system of the invention in relation to a putter, it should be noted that other embodiments of the invention include a laser system that is or at least may be associated with another golf club such as an iron or a wood.

[0040] FIG. 1 illustrates a laser system 10 for use in combination with a golf club. This laser system 10 generally includes a power source 12, a light source 14, and a beam splitter 16. More particularly, the power source 12 may be electrically interconnected to the light source 14 in any appropriate manner such as via electrical wire 18. This power source 12 may be any appropriate power source. In one preferred embodiment, the power source 12 is a battery unit that includes one or more batteries (e.g., 3 AAA batteries or one or more button cells). Moreover, the light source 14 may be any appropriate light source capable of providing a light beam 20 sufficient to be at least generally divided by the beam splitter 16 and projected to at least two locations as described herein. The beam splitter 16 of this laser system 10 may be any appropriate device that enables a light beam 20 from the light source 14 to be at least generally split or divided into first and second light beams 22, 24, respectively. At least in one regard, these first and second light beams 22, 24, and or visual spots provided as a result of these light beams 22, 24, may be said to at least generally be disposed within a shaft plane of the associated golf club. Additionally or alternatively, these light beams 22, 24, and or the spots provided thereby, may coincide with one or both a desired ball/target line and a center line of a head of the golf club.

[0041] The above-described power source 12, light source 14, and beam splitter 16 are generally disposed in an appropriate housing 26. This housing 26 is generally equipped with a first port 30 to enable the first light beam 22 to be projected out from the housing 26, and a second port 32 to enable the second light beam 24 to be projected out from the housing 26. These first and second ports 30, 32 may refer to any appropriate features enabling light beams to travel therethrough. For instance, one or both of these first and second ports 30, 32 may be openings in the housing 26. As another example, one or both of these first and second ports 30, 32 may refer to at least generally transparent or at least semi-transparent windows enabling beams of light to pass therethrough.

[0042] In one embodiment of the laser system 10 of FIG. 1, the housing 26 may refer to a shaft and/or hosel of a golf club. In other words, the power source 12, light source 14, and beam splitter 16 may be disposed at least generally within one or both the shaft and the hosel of the golf club. In another embodiment, this housing 26 may refer to an appropriate casing that may be releasably interconnected with an exterior of a golf club. Such an embodiment may include an appropriate mounting mechanism 28 to enable the laser system 10 to be releasably interconnected with a golf club. For instance, this mounting mechanism 28 may
refer to a snap-on mechanism that enables the laser system 10 to be releasably interconnected with a shaft and/or hosel of a golf club. In one preferred embodiment, this mounting mechanism 28 enables the laser system 10 to be adjusted rotationally or axially about the shaft of the golf club so at least one of the light beams 22, 24 may be projected in the desired direction. Moreover, the beam splitter 16 of the laser system 10 may include an adjustment feature to enable the same to be adjusted independent of the shaft axis of the golf club. This adjustment feature of the beam splitter 16 may be said to enable a golfer to adjust a vertical component of one or both the first and second light beams 22, 24.

[0043] Alternatively, the beam splitter 16 of the laser system 10 may include a fixed angle of projection for providing the second light beam 24. This fixed angle of projection preferably includes an at least generally downward component so that the second beam 24 is projected at an angle at least generally toward, for example, the ground or floor surface. In such an embodiment, the mounting mechanism 28 may be appropriately configured to enable the laser system to be attached to a shaft of a golf club at various locations along a length of the shaft of the club. The position of the laser system 10 on the shaft of the club in such an embodiment may be dependent upon the distance that the golfer is from a desired target location. For example, the laser system 10 may be interconnected with a shaft of a putter at a first location that is near a hosel of the putter to provide an appropriate second beam 24 for a 10-foot putt. Continuing with the example, the laser system 10 may be interconnected with the shaft of the putter at a second location that is closer to a grip of the putter and further from the hosel than the first location to provide any appropriate second beam 24 for a 20-foot putt.

[0044] FIGS. 2-3 show a golf club assembly 40 that includes a shaft 42 having a hosel end 44 and an opposing handle (or grip) end 46. A head assembly 48 is interconnected with the shaft 42 of the golf club assembly 40 at or near the hosel end 44 of the shaft 42. More particularly, a hosel 50 of the head assembly 48 is attached to the hosel end 44 of the shaft 42. Further, a grip 52 of the golf club assembly 40 is disposed over at least the handle end 46 of the shaft 42.

[0045] Referring particularly to FIG. 3, disposed at least generally within the shaft 42 of the golf club assembly 40 is a light source 54. This light source 54 may be any appropriate light source capable of generating an appropriate light beam 56. An example of an appropriate light beam 56 may be one produced by a conventional laser pointer. In any event, electrically interconnected with the light source 54 (via electrical wire 58) is a battery unit 60. This battery unit 60 is disposed within the shaft 42 of the golf club assembly 40 toward the handle end 46. To turn the light source 54, on and off, the golf club assembly 40 is equipped with an appropriate switch 62 located toward the Hosel end 44 of the shaft 42. It should be noted that other embodiments may exhibit any of a number of other appropriate locations on the golf club assembly 40 for the switch 62. Such a light source as the types utilized for laser pointers are modified as is known by those skilled in the art to provide a significant distance between the light source 54 and the battery unit 60, enabling the light source 54 to thus be located in the hosel 50 with the battery unit 60 in the handle end 46.

[0046] Still referring to FIG. 3, the golf club assembly 40 also includes a beam splitter 64. This beam splitter 64 is illustrated as being disposed at least generally within the hosel 50 and the Hosel end 44 of the shaft 42. However, other embodiments may have the beam splitter 64 disposed within the shaft 42 toward the hosel end 44 of the same yet above the hosel 50. Moreover, this beam splitter 64 is generally positioned so that the light source 54 is disposed at least generally between the beam splitter 64 and the battery unit 60. As shown, the beam splitter 64 may include a cylinder portion 66 to enable the beam splitter 64 to be fitted into a cooperatively cylindrical aperture 71 defined in the hosel 50 and the Hosel end 44 of the shaft 42. In one embodiment, an appropriate adhesive such as a silicone adhesive may be disposed between this cylinder portion 66 of the beam splitter 64 and one or both the hosel 50 and the Hosel end 44 of the shaft 42 to interconnect the beam splitter 64 with the hosel 50 and/or shaft 42. In another embodiment, the cylinder portion 66 of the beam splitter 64 may include threading to enable the same to be at least generally screwed/torqued into engagement with one or both the hosel 50 and the Hosel end 44 of the shaft 42. This threading feature of the cylinder portion 66 of the beam splitter 64 may be said to provide a benefit of facilitating adjustment of an at least generally lateral beam deflection aspect of the beam splitter 64 by axially rotating the same about a shaft axis 68 of the golf club assembly 40. Still other embodiments may include other appropriate manners of interconnecting the beam splitter 64 with the shaft 42 and/or the hosel 50. The beam splitter is conventional other than its physical adaptation to be contained within the hosel end 44.

[0047] As shown in FIG. 3, the beam splitter 64 may be said to reflect a first portion of the light beam 56 so that the reflected beam 70 is reflected at an at least generally obtuse angle “C2” (e.g., an angle greater than 90 degrees and less than 180 degrees). This angle “C2” is preferably dependent upon a desired endpoint of a target line that is remote from a face 74 of the head assembly 48 of the golf club assembly 40. For example, if the desired endpoint of a target line is 15 feet away from the face 74 of the golf club assembly 40, the angle “C2” may be of a first magnitude. Further, if the desired endpoint of a target line is 30 feet away from the face 74, the angle “C2” may be of a second magnitude less than the first magnitude. This orientation of the reflected beam 70 enables the same to intersect the target line at the end point thereof. Accordingly, an illuminated “spot” of sorts may be shown on the ground, floor, or the like where the reflected beam 70 traverses the target line (or more preferably, the end point thereof). After the desired degree of reflection, this reflected beam 70 generally exits the golf club assembly 40 via an first port 72 defined in the hosel 50 and the Hosel end 44 of the shaft 42. This first port 72 may refer to an aperture/opening, a window of sorts, or any other appropriate port that is capable of allowing the reflected beam 70 to pass through.
therein that extends at least generally along the shaft axis 68. Alternatively, this second port may refer to an appropriate window of sorts that allows the transmitted beam 76 to at least generally pass through the beam splitter 64. This transmitted beam 76 is preferably substantially parallel with, and more preferably coaxial with, the shaft axis 68 of the golf club assembly 40. This transmitted beam 76 exits the golf club assembly 40 via the second port and may be said to provide an illuminated “spot” of sorts on the ground, a floor, a golf ball, or other appropriate structure. Indeed, this transmitted beam 76 may provide an illuminated spot on the ground behind and/or to the side of a golf ball.

With regard to the above described first and second ports, one or both may be shaped to allow only a part of one or both of the beams 70, 76 to pass therethrough. This feature may provide for the illuminated spots to exhibit one or more desired patterns and/or shapes on the ground, floor, and/or ball. For example, these illuminated spots may be resemble a line segment, an arrow, a circle, a dot, a polygon, or any other appropriate shape, letter, number, or symbol.

FIG. 4 illustrates a variation of the golf club assembly 40, and accordingly, a single prime designation is utilized to distinguish various features of the golf club assembly 40. A grip 52 of this golf club assembly 40 is shown as having a hole 53 defined therein to enable the battery unit 60 to be inserted into the handle end 46 of the shaft 42. This battery unit 60 may be adhesively affixed to an interior of the handle end 46 of the shaft 42 so that a cover 63 may be freely accessed to remove/replace batteries disposed therein. Alternatively, the battery unit 60 may have a plurality of O-rings 61 disposed thereof to facilitate maintaining a position of the battery unit 60 within the handle end 46 of the shaft 42. In such an embodiment, these O-rings 61 are generally disposed between the battery unit 60 and the shaft 42.

FIGS. 5-6 illustrate experimental data utilized in determining an appropriate magnitude of the angle “α” shown in FIG. 3 for that particular golf club assembly 40. It should be noted that other settings of the beam splitter 64 may be appropriate for other golf clubs. In any event, for particularly effective training in the putting stroke, the data shown indicates that for a target distance of about 10 feet from the face 74 of the golf club assembly 40, no additional horizontal offset of the beam splitter 64 is utilized. In other words, the beam will intersect the ball/target line within the horizontal plane at 10 ft. Target distances prior or after this initial set point, will be symmetrically offset from the ball/target line crossing the ball/target line at a desired distance. Moreover, the angle of the beam splitter 64 is such that the angle “α” may be an obtuse angle greater than 90 degrees from the normal shaft axis inclination. In other words, the projected beam will propagate towards the ground plane and intersect the ball target line at a desired distance. It should be noted that the angle(s) at which the beam splitter 64 is arranged may depend on such factors as, hosel height, port height, hosel offset, shaft plane lie angle, and a posture of the golfer. This ability to predict any horizontal and/or vertical offset desired to illuminate a desired end point of a target line enables a golfer to utilize the golf club assembly 40 to provide information regarding a target line of virtually any distance. Accordingly, the beam angles may be adjusted to enhance the training for specific putting distances.

FIGS. 7A-7D are diagrammatic representations of how one embodiment of the invention may work. More particularly, and referring to FIG. 7A, target line 80 refers to a desired direction in which one or both the head assembly 48 of the golf club assembly 40 and a ball that is struck thereby will ideally follow. The reflected beam 70 (FIG. 3) provides an illuminated spot 82 at the endpoint of the target line 80, and the transmitted beam 76 (FIG. 3) provides an illuminated spot 84 beside the target line 80. It is important to note that the face 74 (or at least a blade) of the head assembly 48 is at least generally perpendicular to the target line 80. Moreover, a shaft plane of the golf club assembly 40 is at least generally parallel with the target line 80. Referring to FIG. 3, a “shaft plane” herein refers to a plane within which the shaft axis 68 is found. In addition, this “shaft plane” is at least generally perpendicular to a plane including the face 74 (or in some cases, the blade) of the head assembly 48. Incidentally, the following description of FIGS. 7A-9D will be in relation to a right-handed golfer using a right-handed putter. It should be noted that the invention can also apply to a left-handed golfer using a left-handed putter. Further, the invention may also apply to golf club assemblies other than putter-type assemblies.

As the head assembly 48 is moved forward from the position in FIG. 7A to the position shown in FIG. 7B, the illuminated spots 82, 84 move from their original locations to the locations indicated by spots 82', 84'. Since the paths of travel 86 of these spots 82, 84 are substantially parallel with the target line 80, a golfer can determine that the golfer’s putting stroke did not deviate from the original shaft plane of the golf club assembly 40. Moreover, the golfer can determine that the face 74 of the golf club assembly 40 was not opened or closed during the putting stroke.

Conversely, FIGS. 7C-D show that the paths of travel 86 of the spots 82, 84 are not parallel with the target line 80. Based on the paths of travel shown in FIG. 7C, the golfer can determine that the face 74 of the golf club assembly 40 was closed during that portion of the putting stroke. Similarly, based on the paths of travel shown in FIG. 7D, the golfer can determine that the face 74 of the golf club assembly 40 was open during that portion of the putting stroke.

FIGS. 8A-8D are diagrammatic representations of how another embodiment of the invention may work. More particularly, and referring to FIG. 8A, target line 80 refers to a desired direction in which one or both the head assembly 48 and a ball that is struck thereby will ideally follow. The reflected beam 70 provides an illuminated spot 82 beside the endpoint 83 of the target line 80, and the transmitted beam 76 provides an illuminated spot 84 beside the target line 80. Again, the face 74 (or at least a blade) of the head assembly 48 is at least generally perpendicular to the target line 80. And again, a shaft plane of the golf club assembly 40 is at least generally parallel with the target line 80.

As the head assembly 78 is moved forward from the position in FIG. 8A to the position shown in FIG. 8B, the illuminated spots 82, 84 move from their original locations to the locations indicated by spots 82', 84'. Since the paths of travel 86 of these spots 82, 84 are substantially parallel with the target line 80, a golfer can determine that the golfer’s putting stroke did not deviate from the original
shaft plane of the golf club assembly 40. Moreover, the golfer can determine that the face 74 of the golf club assembly 40 was not opened or closed during the putting stroke.

[0057] Conversely, FIGS. 8C-D show that the paths of travel 86 of the spots 82, 84 are at least generally arcuate and not parallel with the target line 80. Based on the paths of travel 86 shown in FIG. 8C, the golfer can determine that, even though the face 74 of the golf club assembly 40 remained substantially perpendicular to the target line 80, the golfer’s putting stroke deviated from the original shaft plane of the golf club assembly 40 in that the golf club was brought in towards the golfer’s body during the putting stroke. Similarly, based on the paths of travel 86 shown in FIG. 8D, the golfer can determine that the golfer’s putting stroke deviated from the original shaft plane of the golf club assembly 40 in that the golf club was pushed out away from the golfer’s body during the putting stroke.

[0058] FIGS. 9A-9D are diagrammatic representations of how yet another embodiment of the invention may work. The reflected beam 70 traverses the endpoint of the target line 80 and provides an illuminated spot 82 thereon, and the transmitted beam 76 traverses the target line 80 and provides an illuminated spot 84 thereon. Again, the face 74 (or at least a blade) of the head assembly 48 is at least generally perpendicular to the target line 80. And again, a shaft plane of the golf club assembly 40 is at least generally parallel with the target line 80.

[0059] As the head assembly 78 is moved forward from the position in FIG. 9A to the position shown in FIG. 9B, the illuminated spots 82, 84 move from their original locations to the locations indicated by spots 82', 84'. Since the paths of travel 86 of these spots 82, 84 are substantially parallel with the target line 80, a golfer can determine that the golfer’s putting stroke did not deviate from the original shaft plane of the golf club assembly 40. Moreover, the golfer can determine that the face 74 of the golf club assembly 40 was not opened or closed during the putting stroke.

[0060] Conversely, FIGS. 9C-D show that the paths of travel 86 of the spots 82, 84 are at least generally arcuate and not parallel with the target line 80. Based on the paths of travel 86 shown in FIG. 9C, the golfer can determine that the golfer’s putting stroke deviated from the original shaft plane of the golf club assembly 40 in that the golf club was brought in towards the golfer’s body during the putting stroke. Moreover, since a line segment connecting the spot 82 and the spot 82' would not be substantially parallel to the target line 80, the golfer can also determine that the face 74 of the club was opened during the putting stroke. Similarly, based on the paths of travel 86 shown in FIG. 9D, the golfer can determine that the golfer’s putting stroke deviated from the original shaft plane of the golf club assembly 40 in that the golf club brought in toward the golfer’s body during the putting stroke. In addition, since a line segment connecting the spot 82 and the spot 82' would not be substantially parallel to the target line 80, the golfer can also determine that the face 74 of the club was closed during the putting stroke.

[0061] Accordingly, it may be said that the embodiments disclosed in relation to FIGS. 7A-9D allow a golfer to analyze the golfer’s swing/stroke. In addition, it may be said that the embodiments disclosed in relation to FIGS. 7A-9D allow a golfer to appropriately set up or align one or both himself and the golf club assembly 40 for a swing/shot. In this regard, the golfer may simply analyze the positions of the spots 82, 84 to determine whether they are disposed in appropriate locations prior to a swinging of the club assembly 40. In other words, the invention allows the golfer to analyze a positioning of the shaft 42 and/or a position of the face 74 relative to the target line 80.

[0062] Indeed, the ability to provide for vertical and horizontal adjustment of the reflected beam 70 (FIG. 3) and optionally, the transmitted beam 76 (FIG. 3) enables the golf club assembly 40 to be adapted so that the reflected beam 70 traverses the end point 83 of a target line 80 at any distance. Further, this ability to provide for vertical and horizontal adjustment enables the golf club assembly 40 to be adapted so that the reflected beam 70 provides an illuminated spot on or beside the end point 83 of the target line 80. Referring to FIG. 10, “horizontal adjustment” refers to the ability of the golf club assembly 40 (e.g., the beam splitter 64 thereof) to be adjusted so that the reflected beam 70 can be aimed or directed to at least generally approach, traverse, or diverge from a club plane 90 that is substantially perpendicular to the face 74 (or a blade) and that at least generally extends out from and into the page of FIG. 10. Referring to the Cartesian coordinate system, this club plane 90 may be said to be substantially parallel to (or even coplanar with) the yz-plane. Incidentally, it is preferred that the target line 80 be found within this club plane 90.

[0063] By contrast, “vertical adjustment” refers to the ability of the golf club assembly 40 (e.g., the beam splitter 64 thereof) to be adjusted so that the reflected beam 70 can be aimed or directed to at least generally approach, traverse, or diverge from a ground plane 92 (e.g., floor plane, green plane, or the like) that is substantially perpendicular to the club plane 90 and that at least generally extends out from and into the page of FIG. 10. Again, referring to the Cartesian coordinate system, this ground plane 92 may be said, for illustrative purposes, to be substantially parallel to (or even coplanar with) the xz-plane. Incidentally, FIG. 10 also illustrates a shaft plane 94 that includes the shaft axis 68 and that at least generally extends out from and into the page of FIG. 10.

[0064] FIG. 11 illustrates a golf system 100 that includes a first club 102 equipped with a laser system (such as the golf club assembly 40) and a second club 104 that is devoid of a laser system. While these first and second clubs 102, 104 of the golf system 100 are illustrated as being putting, other embodiments of the golf system 100 include first and second clubs that are both irons or are both woods. In any event, it is preferred that the first and second clubs 102, 104 have numerous characteristics in common. For instance, it is preferred that both clubs 102, 104 have substantially identical loft angles and weights. These clubs 102, 104 also preferably exhibit substantially identical weight ratios, shaft lengths, grips, and faces. Indeed, these first and second clubs 102, 104, for all practical purposes, preferably look and feel like the same club to the golfer. This golf system 100 may be said to provide a benefit of enabling a golfer to practice with the first club 102 to enhance the golfer’s game and also utilize the second club 104 in competitions that may not allow use of a golf club equipped with a laser system (such as club 102).
Those skilled in the art will now see that certain modifications can be made to the assembly and related methods herein disclosed with respect to the illustrated embodiments, without departing from the spirit of the instant invention. And while the invention has been described above with respect to the preferred embodiments, it will be understood that the invention is adapted to numerous rearrangements, modifications, and alterations, and all such arrangements, modifications, and alterations are intended to be within the scope of the appended claims.

What is claimed is:

1. A laser system for use in combination with a golf club, comprising:
   a. a light source;
   b. a beam splitter for splitting a light beam from the light source into first and second light beams, wherein the beam splitter is designed so that at least one of the first and second light beams traverses both an xz-plane and a yz-plane of a Cartesian coordinate system, wherein an x-y plane of the Cartesian coordinate system is substantially parallel with a face of the golf club.
2. A laser system, as claimed in claim 1, wherein:
   the laser system is disposed within a shaft of the golf club.
3. A laser system, as claimed in claim 1, wherein:
   the laser system is reassemblable in interconnectable with the golf club.
4. A laser system, as claimed in claim 3, further comprising:
   means to adjust an orientation of at least a portion of the beam splitter relative to the light source.
5. A golf club assembly, comprising:
   a. a shaft having a hosel end and an opposing handle end;
   b. a handle interconnected with the shaft toward the handle end of the shaft;
   c. a head assembly including a hosel that is interconnected with the shaft toward the hosel end of the shaft; and
   d. a laser system comprising:
      a. a light source disposed within the shaft, wherein the light source is separated from the hosel end of the shaft by a first distance, wherein the light source is separated from the handle end of the shaft by a second distance, and wherein the first distance is less than the second distance.
6. A golf club assembly, as claimed in claim 5, wherein:
   the laser system comprises a battery unit disposed within the shaft.
7. A golf club assembly, as claimed in claim 6, wherein:
   the battery unit is disposed toward the handle end of the shaft.
8. A golf club assembly, as claimed in claim 5, wherein:
   the laser system comprises a beam splitter.
9. A golf club assembly, as claimed in claim 8, wherein:
   the beam splitter is attached to at least one of the hosel of the head assembly and the shaft.
10. A golf system, comprising:
   a first golf club having a laser system disposed within a shaft of the first golf club; and
   a second golf club devoid of a laser system, wherein the second golf club has a substantially identical loft and weight as the first golf club.
11. A golf system, as claimed in claim 10, wherein:
   the second golf club has a substantially identical weight ratio as the first golf club.
12. A golf system, as claimed in claim 10, wherein:
   the second golf club has a substantially identical shaft length as the first golf club.
13. A golf system, as claimed in claim 12, wherein:
   the second golf club has a substantially identical handle as the first golf club.
14. A golf system, as claimed in claim 13, wherein:
   the second golf club has a substantially identical club face as the first golf club.
15. A golf system, as claimed in claim 14, wherein:
   the first and second golf clubs are both putters.
16. A golf system, as claimed in claim 14, wherein:
   the first and second golf clubs are both woods.
17. A method of executing a golf swing, the method comprising the steps of:
   displaying first and second visible spots on at least one surface by projecting corresponding first and second light beams from a laser system associated with a golf club; and
   swinging the golf club during the displaying step, wherein the first and second visible spots travel in a direction substantially parallel to a shaft plane of the golf club during the swinging step.
18. A method, as claimed in claim 17, wherein:
   the displaying step comprises displaying at least one of the first and second spots on at least one surface at at least one predetermined distance from the golf club.
19. A method, as claimed in claim 17, wherein:
   the displaying step comprises displaying both of the first and second spots on at least one surface at corresponding first and second predetermined distances from the golf club.
20. A method, as claimed in claim 17, wherein:
   the at least one surface comprises at least one of a floor and a ground plane.
21. A method, as claimed in claim 17, wherein:
   the swinging step comprises displaying an orientation of at least a portion of the shaft plane of the golf club.
22. A method of using a laser assembly in combination with a golf club, the method comprising the steps of:
   projecting a first light beam in a first direction substantially parallel with a shaft plane of the golf club;
   projecting a second light beam in a second direction having a downward component, wherein the second
light beam intersects an end point of a target line that is remote from a head of the golf club, wherein the target line is located within a substantially vertically oriented plane that extends through a central portion of the head of the golf club.

23. A method, as claimed in claim 22, wherein:
the first and second light beams are projected from a common light source.

24. A method, as claimed in claim 22, further comprising:
providing a common light beam; and
splitting the common light beam to provide the first and second light beams.

25. A method, as claimed in claim 22, wherein:
the first and second light beams comprise corresponding first and second intensities, wherein the second intensity is greater than the first intensity.

26. A method, as claimed in claim 22, further comprising:
traversing the target line with the first and second light beams.

27. A method, as claimed in claim 22, wherein:
the target line is substantially parallel with the shaft plane of the golf club.

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