



US 20040147337A1

(19) **United States**(12) **Patent Application Publication**
Cosmo(10) **Pub. No.: US 2004/0147337 A1**(43) **Pub. Date: Jul. 29, 2004**(54) **GROUND CONTACT PUTTER****Publication Classification**(76) Inventor: **Mary Anne Cosmo, Garland, TX (US)**(51) **Int. Cl.⁷ A63B 69/36; A63B 53/04**(52) **U.S. Cl. 473/293; 473/313; 473/330**

Correspondence Address:

Monty L. Ross**Locke Liddell & Sapp LLP****Suite 2200****2200 Ross Avenue****Dallas, TX 75201-6776 (US)**

(57)

ABSTRACT

A ground-contact putter is disclosed, the putter having a putter head that is rested continuously on an underlying putting surface during the putting stroke. The putter head has two end portions that contact the underlying putting surface and a centrally disposed ball-striking portion that is elevated above the putting surface. The putter head is oriented so that the longitudinal axis through the center of the putter head is perpendicular to the ball-strike direction. The putter shaft can be attached to the putter head either perpendicularly or at an angle. The putter head can optionally comprise a core, ground-contact surfaces and ball-strike surfaces made of different materials.

(21) Appl. No.: **10/438,080**(22) Filed: **May 14, 2003****Related U.S. Application Data**

(63) Continuation-in-part of application No. 10/350,447, filed on Jan. 24, 2003.

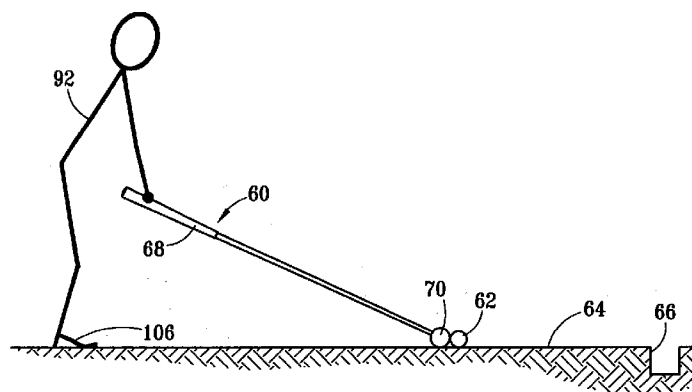
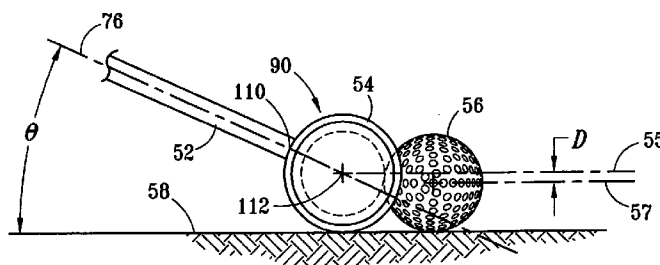


FIG. 1

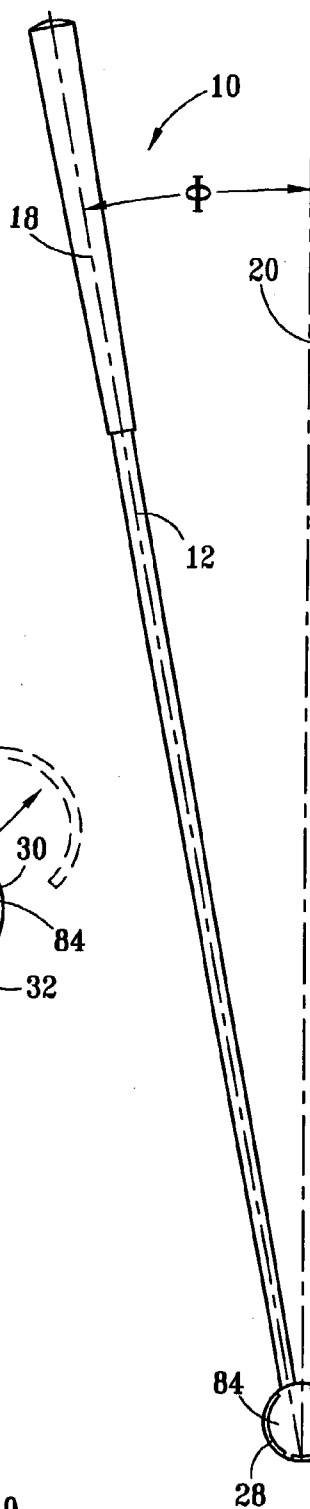


FIG. 2

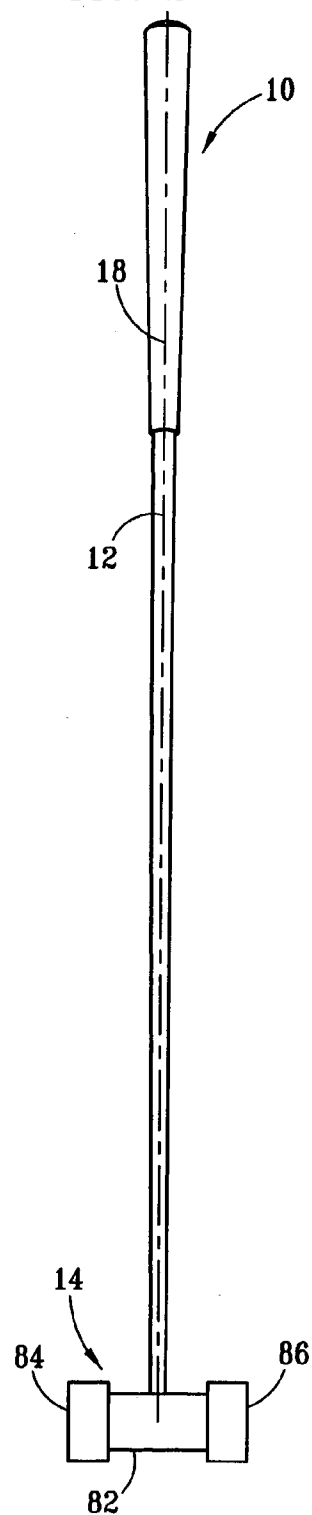


FIG. 3

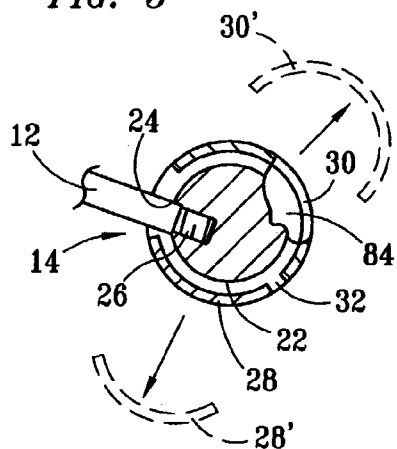


FIG. 4

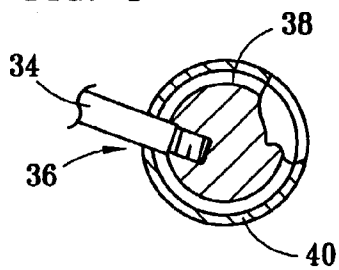


FIG. 5

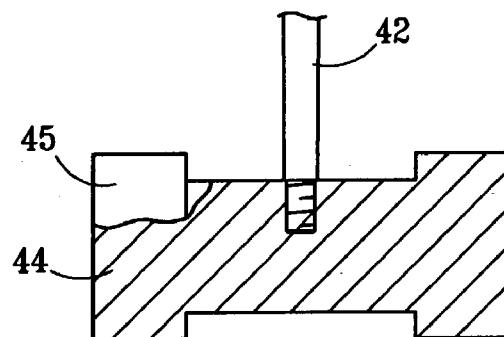


FIG. 6

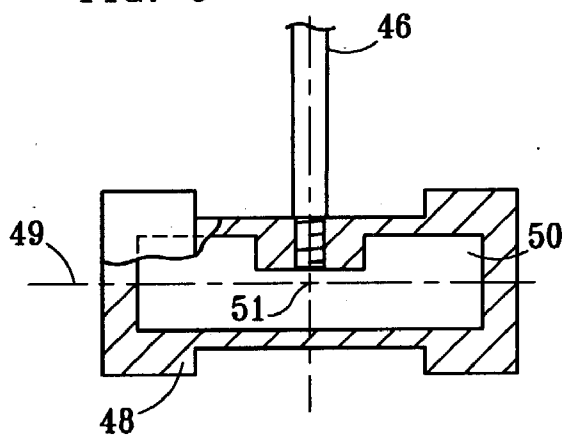


FIG. 7

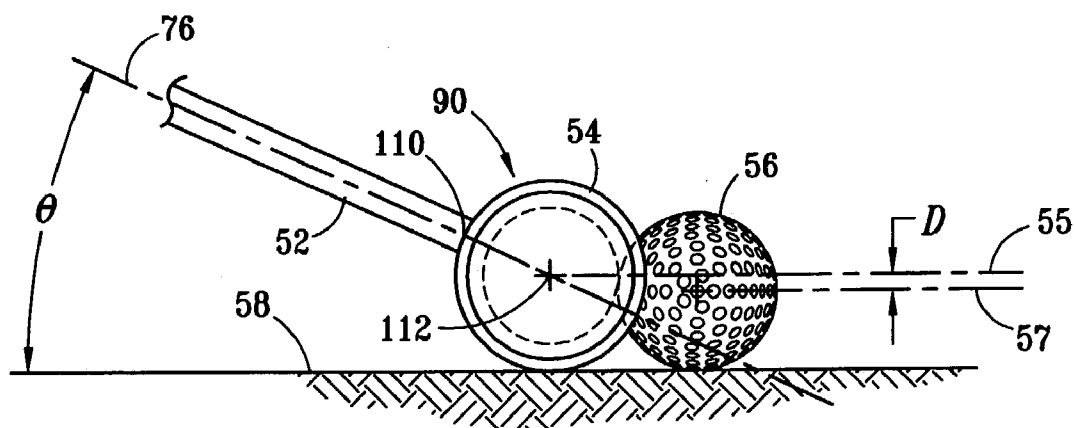


FIG. 8

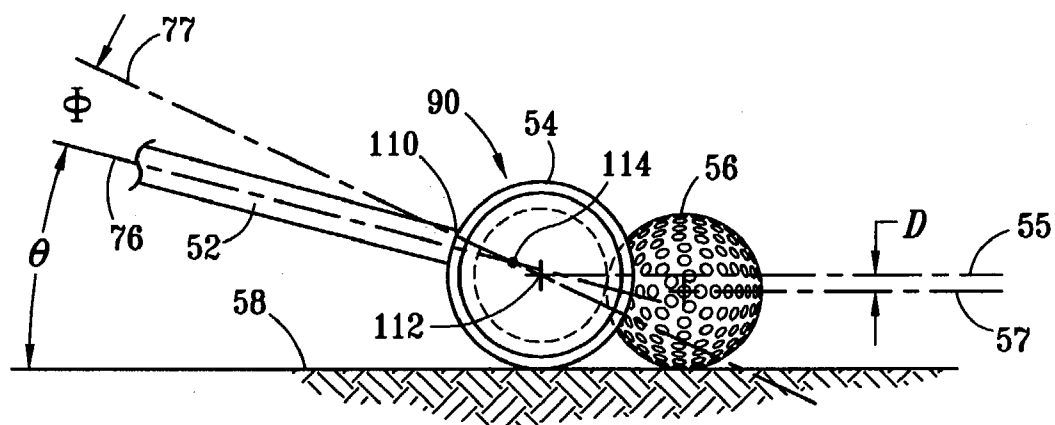


FIG. 9

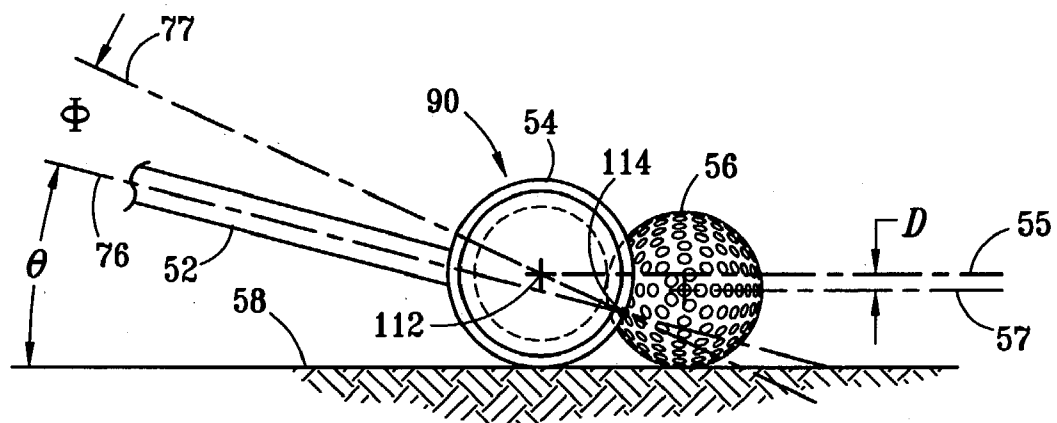


FIG. 10

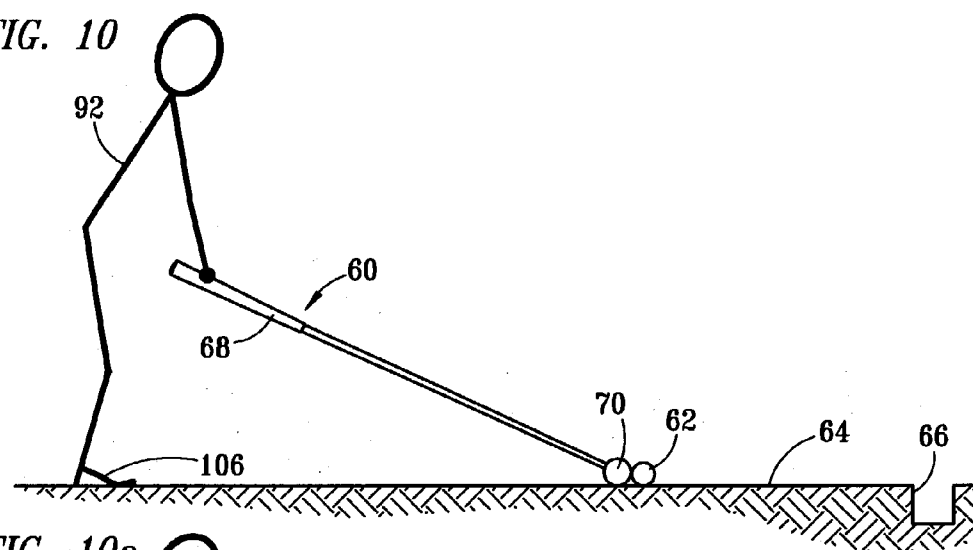


FIG. 10a

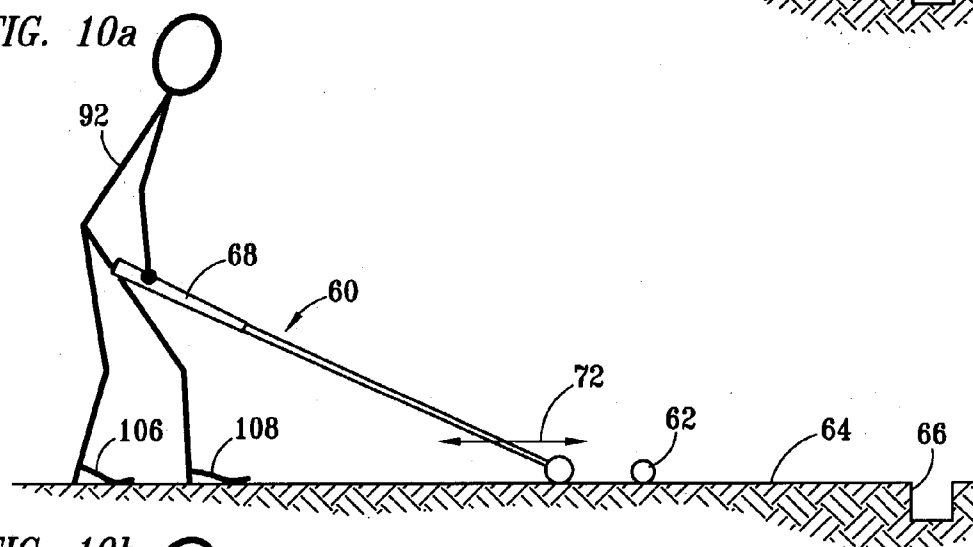


FIG. 10b

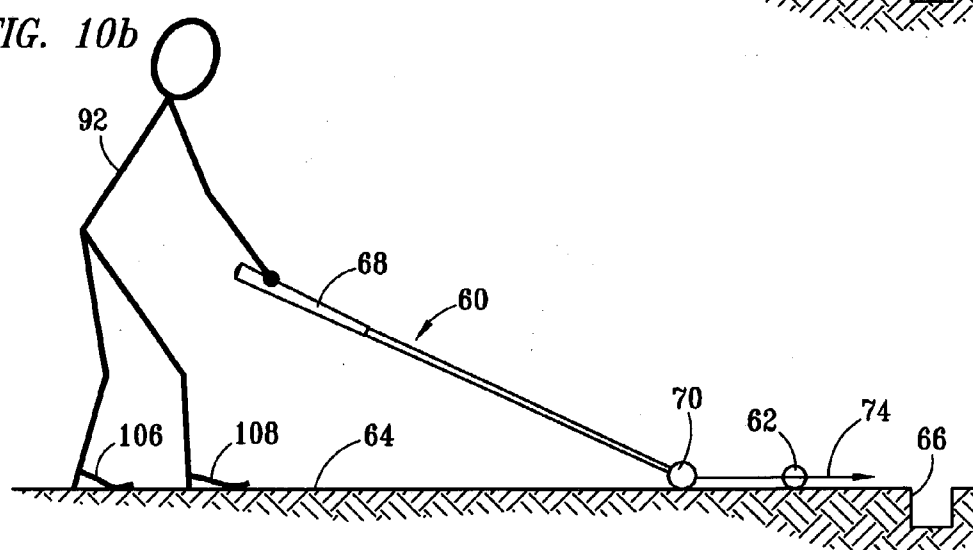


FIG. 11

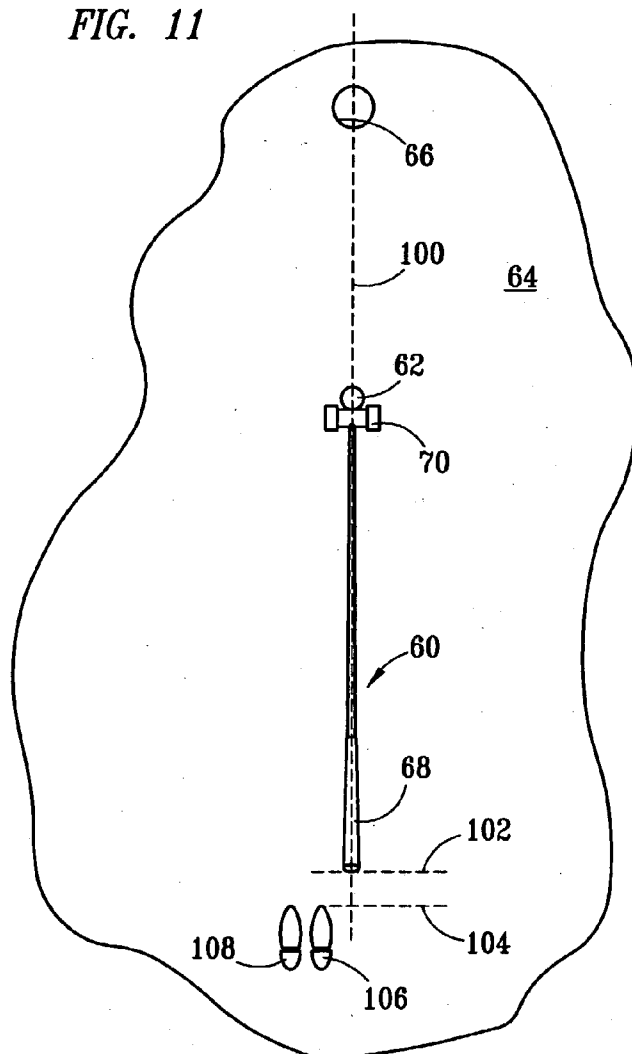


FIG. 12

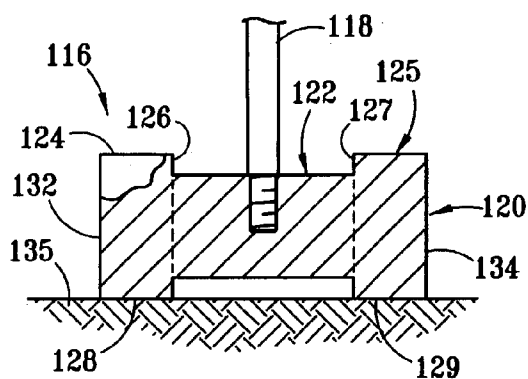
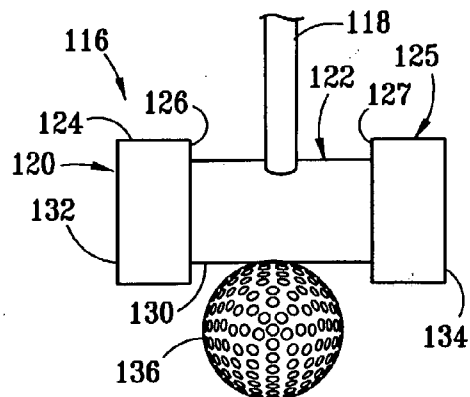


FIG. 13



GROUND CONTACT PUTTER

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] This invention generally relates to golf clubs and more particularly relates to a putter specially adapted to make continuous contact with the ground during use.

[0003] 2. Description of Related Art

[0004] Many different shapes and styles of putters are well known to persons familiar with the game of golf. All putters embody a head and a shaft. One end of the shaft is attached or connected to the head and the other end comprises a handgrip that is graspable by the user. The head typically comprises a ball-striking surface that is intended to contact a golf ball during the putting motion.

[0005] During use, conventional putters are supported by the hands of the player so that the sole of the putter is slightly above ground level and a little behind the ball. The player typically stands facing the ball, with his or her feet slightly apart and generally transverse to the direction in which the ball will travel when struck by the putter head. After observing or "reading" the topography of the green or other putting surface between the ball and the cup, the player causes the putter head to strike the ball, hopefully with appropriate force and in a direction such that the ball will roll smoothly across the ground and into the cup.

[0006] A push-type putter is disclosed in U.S. Pat. No. 3,349,937. This putter contains a convex striking face that contacts the golf ball and a convex sole that slides along the putting green. The convex striking face of the putter is disclosed as being at a greater elevation than the midsectional plane of the golf ball so that the putter imparts topspin to the ball, causing it to roll instead of slide across the putting green. Positioning of the shaft at a point equidistant from the two ends is disclosed to facilitate stroke alignment or aiming. Intersection of the shaft with the putter head at the focal point of the curved surfaces is preferred but not absolutely necessary.

[0007] A disadvantage of the putter disclosed in U.S. Pat. No. 3,349,937 is that the putter head contacts the underlying putting surface over the entire length between its two ends. This creates unnecessary drag on the putter head during the putting stroke. The increased drag slows the speed of the putter head and reduces the momentum delivered to the ball. Any surface conditions or irregularity in the portion of the putting surface that is contacted by the putter head also affects the putting stroke.

[0008] A putter is therefore needed that embodies the advantages of a push putter as disclosed in U.S. Pat. No. 3,349,937 and also overcomes the disadvantages previously associated with such a device.

SUMMARY OF THE INVENTION

[0009] A ground-contact putter as disclosed herein has a putter head that is rested on an underlying putting surface and pushed by the putter shaft forwardly across the putting surface to strike a golf ball toward a cup. The putter head has two end portions that contact the underlying putting surface and a centrally disposed ball-striking portion that is elevated above the putting surface. The putter head is oriented so that

the longitudinal axis through the center of the putter head is perpendicular to the ball-strike direction. The putter shaft can be attached to the putter head either perpendicularly or at an angle. The putter head can optionally comprise core, ground-contact and ball-strike surfaces made of different materials.

[0010] Unlike conventional putters, a putter is disclosed herein that is designed to maintain continuous contact with an underlying putting surface throughout the putting stroke while simultaneously minimizing contact with that surface. According to a preferred embodiment of the invention, a putter is provided that comprises a shaft and a putting head. The putting head can have a solid or partially hollow core, and preferably has a substantially cylindrical sidewall disposed around the core, and two ends. The cylindrical sidewall further comprises a ground contact portion disposed adjacent each end of the putter head and an intermediate ball striking portion disposed between the two ends. The portion of the sidewall disposed between the ground contact portions at the two ends preferably does not contact the underlying putting surface.

[0011] According to a preferred embodiment, the ground contact portions at the two ends of the putter head has a greater diameter than the intermediate ball striking portion, thereby avoiding frictional drag by the portion of the putter head disposed between the two ends as the putter head is pushed forwardly across an underlying putting surface. Recessing the ball contact surface between two adjacent larger-diameter end sections of the putter head can also aid in sighting and aligning the putter head, ball and hole prior to striking the ball. The ground contact portion and ball striking portion of the putter head can be made of the same or different materials. The shaft preferably has a handgrip at one end and the other end is preferably attached to the head at approximately the midpoint of the cylindrical sidewall. The major longitudinal axis through the shaft can deviate slightly from an axis perpendicular to the longitudinal axis through the head.

[0012] According to one embodiment of the invention, the major longitudinal axis through the shaft is perpendicular to the surface of the cylindrical putter head and, when extended, intersects the transverse central longitudinal axis through the putter head at an angle of 90°. According to another embodiment of the invention, the shaft axis, when extended, will intersect a perpendicular axis passing through the center of the putter head at a point disposed below the center of the putter head. According to another embodiment of the invention, the shaft axis, when extended, will intersect a perpendicular axis through the center of the putter head at a point disposed above the center of the putter head.

[0013] Under USGA Rules (Appendix II), when the subject putter is in the normal address position, the projection of the straight part of the shaft onto the vertical plane through the toe and heel of the putter will preferably diverge from the vertical by at least 10 degrees, and the projection of the straight part of the shaft onto the vertical plane along the intended line of play will preferably not diverge from the vertical by more than 20 degrees. Because the putter shaft is slanting to the rear rather than to the side of the putter face, a player using the putter disclosed herein will also have the advantage of being able to more easily sight along the shaft of the putter when lining up a putt. To impart a slight topspin

to the ball when struck, the diameter and construction of the cylindrical head are preferably such that the putter head impacts the ball surface at an elevation about $\frac{1}{8}$ inch above the elevation of the center of gravity of the ball.

[0014] According to another embodiment, which is not preferred but is still believed to be within the scope of the invention, the subject putter does not have a completely cylindrical sidewall but instead has convex, arcuate ground-contact and ball-strike surface sections connected by at least one other surface section having an external configuration that is not cylindrical and may, for example, be linear, concave, or convex or otherwise curvilinear with a different radius of curvature.

[0015] Use of the putter disclosed herein is believed to enhance the likelihood of a successful putt by reducing alignment errors prior to the putt and by reducing the opportunities for miss-striking the ball during the swing.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] The apparatus and method of the invention are further described and explained in relation to the following drawings, wherein:

[0017] **FIG. 1** is a side elevation view of a preferred embodiment of the putter of the invention, illustrating an example of one way in which the major longitudinal axis through the shaft can deviate from a vertical axis extending perpendicularly through the center of the putter head;

[0018] **FIG. 2** is a front elevation view of the putter of **FIG. 1**;

[0019] **FIG. 3** is a side detail view, partially broken away and partially in cross-section, showing an embodiment of the subject putter in which the putter head comprises one material for the core, a second material for the ground-contact surface, and a third material for the ball-strike surface;

[0020] **FIG. 4** is a side detail view, partially broken away and partially in cross-section, showing an embodiment of the subject putter in which the putter head of the invention comprises one material for the core portion and another material for the outer surface portion;

[0021] **FIG. 5** is a front detail view, partially broken away and partially in cross-section, showing the base of the shaft attached to a putter head of the invention in which the core and surface are unitarily made of a single material;

[0022] **FIG. 6** is a front detail view, partially broken away and partially in cross-section, showing the base of the shaft attached to a putter head of the invention in which the core is partially hollow;

[0023] **FIG. 7** is a side elevation view depicting the major longitudinal axis of the shaft, when extended, as being aligned with the center of the putter head of the invention and showing a preferred elevational relationship between the impact point of the ball strike surface of the putter head and the center of gravity of a conventional golf ball;

[0024] **FIG. 8** is a side elevation view as in **FIG. 7** but with the shaft axis intersecting the perpendicular axis through the center of the putter head at a point higher than the center of the putter head;

[0025] **FIG. 9** is a side elevation view as in **FIG. 7** but with the shaft axis intersecting the perpendicular axis through the center of the putter head at a point lower than the center of the putter head;

[0026] **FIG. 10** is a simplified diagrammatic view showing a player aligning the subject putter to putt a golf ball toward a cup disposed in the putting surface;

[0027] **FIG. 10a** is a simplified diagrammatic view showing a player advancing the subject putter to strike a golf ball toward a cup disposed in the putting surface;

[0028] **FIG. 10b** is a simplified diagrammatic view showing a player following through the putting motion after putting a golf ball toward a cup disposed in the putting surface;

[0029] **FIG. 11** is a diagrammatic plan view depicting a preferred position for the player and putter relative to a golf ball and to the hole at the moment of impact using the putter disclosed herein;

[0030] **FIG. 12** is a front detail view of a particularly preferred embodiment, partially broken away and partially in cross-section, showing the decreased diameter of the central portion of the putter head; and

[0031] **FIG. 13** is a top plan view of a putter as depicted in **FIG. 12**, showing the alignment of the shaft and a golf ball at the time of impact.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0032] Referring to **FIGS. 1 and 2**, ground-contact putter **10** of the invention preferably comprises shaft **12** having substantially transverse, cylindrical putter head **14** at one end and handgrip **16** at the other. Putter head **14** desirably further comprises ball-strike section **82** disposed between and recessed inwardly from end sections **84, 86**. Putter head **14** can be unitarily constructed from a single block of metal, such as aluminum, steel or alloys, or cast or molded from other metals, composite or polymeric materials, or from a combination thereof, by any suitable manufacturing technique. Preferably, if putter head **14** is made of metal, it can be anodized or otherwise treated to resist corrosion and further reduce friction with the ground, and optionally colored to esthetically enhance putter **10**.

[0033] Whether made of one or several materials, putter head **14** preferably comprises spaced-apart ground-contact surfaces **28** and an intermediate and recessed ball-strike surface **30**. Ground-contact surfaces **28** are desirably relatively hard, slick and corrosion resistant, whereas ball-strike surface **30** may have other features not present in ground-contact surfaces **28**. Ground-contact surfaces **28** may also preferably be coated with Teflon or another suitable material in order to reduce friction between putter head **14** and an underlying putting surface. Ground-contact surfaces **28** should also be configured so as not to damage the underlying putting surface. By making putter head **14** so that ground-contact and ball-strike surfaces **28, 30**, respectively, extend arcuately around at least a portion of the circumference of a substantially cylindrical putter head **14**, it is possible to accommodate players of different heights and different preferences regarding the angle at which the putter shaft is held relative to the underlying putting surface when putting.

Although putter head **14** preferably has substantially cylindrical ball-strike section **82** and end sections **84**, **86**, it can also embody surface sections that are not cylindrical without departing from the scope of the invention, provided that at least the ground-contact and ball-strike surface sections are convex arcuate sections as would otherwise subtend a cylindrical surface. In this latter case, putter head **14** is still considered to have substantially cylindrical end and ball-strike sections.

[0034] Applicant has learned that striking a golf ball by the application of a horizontally directed force to the outside surface of the golf ball at a point above the elevational midpoint of the ball will cause the ball to roll smoothly and evenly across a smooth putting surface. For this reason, the most forwardly extending part of ball-strike surface **30** will preferably be at an elevation that is slightly higher, most preferably about $\frac{1}{8}$ inch higher, than the midpoint of a golf ball. The outside diameter of conventional golf balls can vary slightly according to the type and manufacturer but is believed to be a little less than two inches. Therefore, according to one particularly preferred embodiment of the invention, the center of ball-strike surface **30** of putter head **14** is preferably about $1\frac{1}{8}$ inches above the underlying putting surface and about $\frac{1}{8}$ inch above the elevational midpoint on the outside surface of the golf ball. The width of putter head **14** between end sections **84**, **86** and the width of ground-contact surfaces **28** is desirably large enough to stabilize the forward motion of the putter head while it is being pushed toward the ball during the putting motion. The width of ball-strike surface **30** is preferably comparable to those of other conventional putters. The area of ground-contact surface **28** that frictionally engages the underlying putting surface should not, however, be so large as to cause excessive drag during putting or so narrow as to cut a trough into the surface of a putting green.

[0035] Shaft **12** can be made of any conventional material using methods known in the art of golf club construction. Shaft **12** can be made, for example, of metal, graphite or boron fibers, engineered polymers or even wood. The lower end of shaft **12** can be inserted directly into putter head **14** either perpendicularly or at in a rearwardly slanting angular alignment. Although not shown, it will be appreciated that shaft **12** can also be attached to putter head **14** using a hosel. According to a preferred embodiment of the invention as shown in **FIG. 1**, major longitudinal axis **18** through shaft **12** slants rearwardly at an angle ϕ relative to vertical axis **20** through the center of putter head **14**. The point of intersection between axis **18** and axis **20** can be above the center, at the center, or below the center of putter head **14** whenever putter **10** is oriented with ball-strike surface **30** in a forwardly facing position. Angle ϕ can range up to about 20 degrees, and is most preferably at least about 10 degrees. The angular relationship of the putter shaft to the putter head is further discussed in relation to **FIGS. 7-9** below.

[0036] As shown in **FIGS. 3-6**, putter shaft **12**, **34**, **42**, **46**, respectively, is preferably attached to the putter head by threads, but can also be attached using welds, pins, epoxy or other similarly effective means. In **FIG. 3**, for example, the preferred attachment is by means of threads that engage cooperating threads in bore **24** of putter head **14**. Various techniques and commercially available products, e.g., tack welds, Loctite® adhesive, or other similarly effective means,

can be used to prevent putter head **14** from accidentally loosening or becoming disengaged from putter shaft **12** during use.

[0037] Various preferred structural configurations for putter heads of the invention are further described and explained in relation to **FIGS. 3-6** of the drawings. While these configurations illustrate various embodiments of the invention, those of ordinary skill in the art will appreciate upon reading this disclosure that the inventive aspects of the subject putter can also be similarly applied to putter heads having somewhat different configurations, provided that the ground-contact surfaces and the ball-strike surface of the putter head are substantially cylindrical and that the shaft is attached to the putter head in such manner that the putter head can be pushed smoothly and with little frictional resistance across a putting surface to contact a golf ball at a point slightly above the elevational midpoint of its outer surface.

[0038] In **FIGS. 3 and 4**, putter heads **14**, **36** are rotated to one of an infinite number of possible address positions, whereby shafts **12**, **34**, respectively, will form an acute angle with an underlying putting surface as described in greater detail below. Referring to **FIG. 3**, putter head **14** is shown as having a solid core **22** with two separate surface sections **28**, **30** inlaid opposite each other to form the ground-contact and ball-strike surfaces, respectively. Alternatively, as shown in putter head **36** depicted in **FIG. 4**, core **38** can be surrounded or coated entirely by a single surface material **40** that is different from the material used to make the core. In **FIG. 5**, shaft **42** is attached to a solid metal head **44** having a substantially cylindrical surface **45**. In **FIG. 6**, shaft **46** is attached to a thickened wall section of a putter head **48** having an internal void **50**. In each of **FIGS. 3-6**, the lower end of the shaft extends into and is held in a fixed positional relationship to the putter head so that when viewed from the front or back, as illustrated for example in **FIG. 6**, the shaft is substantially perpendicular to the midpoint **51** of central longitudinal axis **49** through the putter head, and any angular deviation of the major longitudinal axis of the shaft away from perpendicular occurs in the same plane as the line of sight between the shaft, the center of the putter head and the ball (not shown).

[0039] **FIG. 7** depicts a putter **90** with shaft **52** partially broken away and putter head **54** contacting golf ball **56**. Both putter head **54** and golf ball **56** rest on underlying putting surface **58**. Shaft axis **76** is perpendicular to the cylindrical surface of putter head **54** at point **110** and, if extended, passes through midpoint **112** of the central longitudinal axis through putter head **54**. The most forwardly extending part of the ball-strike surface of putter head **54** has an elevation **55** slightly above the elevational midpoint **57** of golf ball **56**. Elevation **55**, preferably corresponding to the center of the ball-strike surfaced of putter head **54**, is preferably a distance **D** above the elevation **57** of the center of gravity of golf ball **56**. Although angle Θ between the major longitudinal axis **76** of shaft **52** and underlying putting surface **58** can be any acute angle less than about 90 degrees, angles ranging from about 30 to about 85 degrees, and most preferably from about 30 to about 45 degrees, can be most comfortable and effective for the player. Where angle Θ is greater than about 45 degrees, the vertical component of force applied by the user through the handgrip of the shaft will be greater than the horizontal component, contributing

to increased frictional drag between the underside of the putter head and the putting surface during the putting motion. Where angle Θ is less than about 30 degrees, the user may have to squat or stoop to an excessive extent in order to advance the putter head toward the ball.

[0040] Referring to FIG. 8, longitudinal axis 76 through shaft 52, when extended, intersects perpendicular axis 77 at a point 114 that is slightly higher than the elevation of midpoint 112 of putter head 54. The angle ϕ between axis 76 and axis 77 can be zero, but can range up to 20 degrees or more and is preferably at least about 10 degrees. Angle Θ can vary as described above in relation to FIG. 7. Intersection point 114 is preferably also the bottom center of the bore (seen, for example, as bore 24 in FIG. 3) into which the putter shaft is inserted, and is adjacent to the bottom center of the putter shaft when installed inside the bore.

[0041] Referring to FIG. 9, longitudinal axis 76 through shaft 52, when extended, preferably intersects perpendicular axis 77 at a point 114 that is slightly lower than the elevation of midpoint 112 of putter head 54. It is understood that the elevation of point 114 relative to putting surface 58 can vary according to angle ϕ D and angle Θ , as described above in relation to FIG. 5.

[0042] FIGS. 12 and 13 depict a preferred embodiment of ground-contact putter 116 wherein shaft 118 is secured to putter head 120. Putter head 120 further comprises ball-strike section 122 with ball-strike surface 130 disposed between larger-diameter end sections 124, 125. Spaced-apart end sections 124, 125 comprise annular walls 126, 127, end walls 132, 134, and ground contact surfaces 128, 129 (FIG. 12). End walls 132 and 134 are preferably circular in shape, although other shapes may be used as long as they do not interfere with the use of putter 116 as described herein. Putter head 120 can be formed by milling down a single block of material such as metal, by various molding techniques, or by any other method known to those of skill in the art. Although it will be appreciated upon reading this disclosure that a wide range of diameters can be used in making end sections 124, 125 of putter 120, it is preferred that annular walls 126, 127 extend at least $\frac{1}{4}$ inch radially beyond ball-strike section 122, at least within the circumferentially extending arcs bounded by ground-contact surfaces 128, 129, so that there will be sufficient clearance above the turf of underlying putting surface 135 to permit ball-strike section 122 to pass over the putting surface without any significant contact. While some blades of grass might, especially on longer-cut greens, brush against the underside of ball-strike section 122 during the putting stroke, the extent of any such contact should not be sufficient to significantly impede the forward movement of putter head 120 across underlying putting surface 135.

[0043] FIG. 13 is provided to illustrate how use of the ground-contact putter of the invention facilitates alignment of putter shaft 118 and golf ball 136 when golf ball 136 is contacted by the central portion of ball-strike surface 130 during putting. Ground-contact surfaces 128 on end sections 124, 125 make contact with significantly less surface area of underlying putting surface 0.135 than if ball-strike section 122 was a cylindrical section having the same diameter as end sections 124, 125. As a result, there is not as much friction between ground-contact surfaces 128 and underlying putting surface 135 as when ground-contact surface 128 extends the entire length of cylindrical head 120.

[0044] The method of using the ground contact putter of the invention is further described and explained in relation to FIGS. 10, 10a, 10b and 11. Referring to FIGS. 10 and 11, player 92 preferably stands behind and slightly to one side of ball 62 as depicted in FIG. 11 by footprints 106, 108 and imaginary lines 102, 104, and grasps the handgrip of shaft 68 of ground-contact putter 60 of the invention in one hand. Player 92 can sight along putter shaft 68 to assist in lining up the putt in a desired ball-strike direction. Once the putt is aligned, without lifting putter head 70 off the ground, player 92 elevates shaft 68 to a comfortable height at which to commence the putting stroke as described in relation to FIGS. 10a, 10b above. As illustrated in FIG. 11, the desired ball-strike direction is a straight line from ball 62 to cup (or hole) 66, although it will be appreciated that the ball-strike direction can be adjusted either right or left of the cup where underlying putting surface 64 embodies topography that will cause ball 62 to "break" as it rolls after being struck by putter head 70. After reading the topography of putting surface 64 and determining the desired ball-strike direction and line of travel of ball 62 to cup 66, player 92 preferably positions putter head 70 so that, when putter 60 is moved forwardly toward ball 62, the line of travel will be the same as the desired ball-strike direction and the cylindrical sidewall of putter head 70 will be centered on ball 62.

[0045] Referring to FIG. 10a, putter 60 is pushed forwardly along line 72 by player 92, with putter head 70 maintaining constant contact with underlying putting surface 64, so that putter head 70 contacts ball 62, causing ball 62 to move across putting surface, hopefully toward cup 66. It is preferred that the ball-strike surface of putter head 70 is sufficiently hard and contacts ball 62 with sufficient velocity that ball 62 is accelerated toward cup 66 as opposed to having putter head 70 remain in contact with ball 62 and simply push ball 62 toward cup 66. This results in a short period of contact and minimizes directional deviations during the ball-strike interval. During the putting motion, player 92 can optionally step forward, moving foot 108 slightly ahead of foot 106 if desired, although this is not recommended as it can introduce another angular variation into the putting stroke. As with conventional putters and putting methods, the force vector applied to the ball through the putter head during the putting stroke will affect both the pace and trajectory of the putt. Referring to FIG. 10b, player 92 will desirably continue to follow through after putter head 70 strikes ball 62, as indicated by lines 72 and 74. Putter head 70 continues to maintain contact with underlying putting surface 64 during the follow-through.

[0046] Other alterations and modifications of the invention will become apparent to those of ordinary skill in the art upon reading the present disclosure, and it is intended that the scope of the invention disclosed herein be limited only by the broadest interpretation of the appended claims to which the inventor is legally entitled.

1. A ground-contact putter comprising:
 - an elongated shaft having first and second ends;
 - a handgrip on the first end of the elongated shaft;
 - a putter head secured to the second end of the elongated shaft and oriented substantially transversely to the shaft, the head having two spaced-apart end sections separated by an intermediate ball-strike section;

- each end section comprising a ground-contact surface; and
- the intermediate ball-strike section being elevated above the ground-contact surfaces of the two end sections and further comprising a ball-strike surface disposed at an elevation above the midpoint of a golf ball.
2. The putter of claim 1 wherein the end sections are substantially cylindrical.
3. The putter of claim 2 wherein the ground-contact surfaces are substantially cylindrical.
4. The putter of claim 1 wherein the ball-strike section is substantially cylindrical.
5. The putter of claim 3 wherein the ball-strike surface is substantially cylindrical.
6. The putter of claim 1 wherein the putter head comprises a core, and the core and ball-strike surface are made of different materials.
7. The putter of claim 1 wherein the ground-contact surfaces and the ball-strike surface are made of different materials.
8. The putter of claim 7 wherein the ground-contact surface is made of a slick polymer.
9. The putter of claim 1 wherein the ground-contact surface comprises a corrosion-resistant metal.
10. The putter of claim 1 wherein the shaft and the putter head each comprise a central longitudinal axis and wherein the shaft axis is perpendicular to the putter head axis and the two axes intersect in the center of the putter head.
11. The putter of claim 1 wherein the shaft and the putter head each comprise a central longitudinal axis and wherein the shaft axis is perpendicular to the putter head axis and crosses above the putter head axis.

12. The putter of claim 1 wherein the shaft and the putter head each comprise a central longitudinal axis and wherein the shaft axis is perpendicular to the putter head axis and crosses below the putter head axis.

13. The putter of claim 1 wherein the shaft and the putter head each comprise a central longitudinal axis and wherein the shaft axis slants from about 10 to about 20 degrees rearwardly from an axis vertical to the putter head axis.

14. The putter of claim 6 wherein at least a portion of the core is hollow.

15. The putter of claim 1 wherein the head comprises a polymeric material.

16. The putter of claim 1 wherein the end sections have a diameter greater than a golf ball diameter.

17. The putter of claim 1 wherein the ball-strike surface is disposed at least about $\frac{1}{8}$ inch higher than the midpoint of a golf ball.

18. The putter of claim 1 wherein the shaft comprises a central longitudinal axis and wherein, when the putter head is positioned with the ball-strike surface facing forwardly and the ground-contact surface facing downwardly, an angle ranging between about 30 and about 85 degrees is formed between the shaft axis and a substantially level putting surface underlying the putter head.

19. The putter of claim 18 wherein the angle ranges between about 30 and about 45 degrees.

20. The putter of claim 1 wherein the putter head is secured to the shaft by a means comprising threads.

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