GOLF CLUB HAVING A CAM-LOCKED INSERT

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ABSTRACT

An adjustable customized golf club, e.g., a golf putter, as well as a method for using the club, wherein the club has a head, a striking surface attachment, and one or more lock fittings that positively lock the striking surface attachment to the head. The striking surface attachment is one of several selectable attachments, each with different performance characteristics, e.g., rebound. The one or more lock fittings positively lock the striking surface attachments to the putter head such that the club components are firmly fixed, yet are still quickly removable and replaceable. One embodiment provides a golf club comprising a head that houses a cam for engagement with posts disposed on a striking surface attachment.
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[0001] This application claims the benefit of U.S. Provisional Application No. 60/860,207, filed Nov. 21, 2006, which is incorporated herein by reference in its entirety.

BACKGROUND

[0002] 1. Field of the Invention

[0003] The present invention relates generally to a golf club, and more particularly, to a golf putter having a replaceable striking surface attachment.

[0004] 2. Background of the Invention

[0005] Most golfers recognize that putting with accurate direction and distance requires a club that communicates a precise sense of touch and feel. The desire to maximize this precise touch and feel and to accurately control the direction of the ball has spawned literally hundreds of golf putter designs. Examples of these various designs include increased putter head mass to accommodate short backswings and lengthen ball travel, balanced putter head mass to improve directional accuracy, decreased putter head mass to increase accuracy, and special putter face striking surfaces that impart a heightened sense of feel and touch in controlling the rebound characteristics of the ball. This last aspect, concerning putting face striking surfaces, is the subject of the present application.

[0006] Golfers typically favor customized golf clubs that enhance, improve, or correct their particular style of play. For manufacturers, this customizing presents a significant challenge, especially when attempting to sell golf clubs to the mass market at competitive prices. With putters, manufacturers have experimented extensively with offering varieties of putter striking surfaces to accommodate personal preferences for club feel and touch. Thus far, manufacturers have offered two principal ways to purchase customized golf putters: 1) one-time customization, in which the manufacturer typically offers a full line of putters with basic designs, but with a variety of striking surfaces designed to appeal to diverse tastes; and 2) adjustable customization, in which a manufacturer typically offers a multi-component putter with a putter head that accepts a variety of interchangeable striking surface attachments, each suitable for different playing styles or playing conditions. The ultimate goal of each of these customization methods is to give the golfer a specialized feel and control that will persuade the golfer to purchase the customized putter instead of a non-customized putter.

[0007] In addition to appealing to golfers’ desire for customized clubs, some putters attempt to conform to United States Golf Association (USGA) rules to be acceptable for USGA sanctioned play. For customized putters featuring varying striking surfaces or varying attachments, manufacturers desiring USGA conformance must pay particular attention to the USGA rules concerning the attachment of club components and the adjustability of clubs. Specifically, Appendix II.1.a of the USGA rules states that “all parts of the club shall be fixed so that the club is one unit, and it shall have no external attachments except as otherwise permitted by the Rules.” Concerning adjustability, Appendix II.1.b.ii of the USGA rules, adopted to accommodate multi-component putters, states that all methods of adjustment require that “all adjustable parts are firmly fixed and there is no reasonable likelihood of them working loose during a round.” For one-time customized putters, these rules are typically no obstacle because construction of the club is completed and fixed at the factory, i.e., the club has a fixed face. For adjustable customized putters, however, the multi-components sometimes are not firmly fixed nor positively locked and can have a tendency to work loose and/or fail to deliver the feel and performance of firmly fixed components.

[0008] Turning to examples of the two types of customized putters, U.S. Pat. No. 5,458,332 to Fisher and U.S. Pat. No. 5,531,439 to Azzarella disclose one-time customized fixed-face golf putter heads having recesses into which inserts are wedged and permanently fitted. In addition, U.S. Pat. No. 5,674,132 to Fisher also discloses an insert welded into the recess of a golf putter head, but also adds an adhesive layer that securely holds the wedge insert within the recess. In adding this adhesive layer, U.S. Pat. No. 5,674,132 teaches that the adhesive helps to avoid the loosening of the insert by repeated contact of the insert bottom with the ground, during normal usage of the club. However, these one-time customized striking surface putters do not accommodate the desire to fine-tune the putter or to quickly change striking surfaces for varied playing conditions. In other words, if a striking surface is attached to a putter head by a wedge, permanent fit or a wedged fit with adhesive, the striking surface is not quickly removable.

[0009] To address this desire to repeatedly change striking surfaces, the adjustable customization designs incorporate multi-component putter heads with replaceable parts, e.g., striking surface inserts or striking surface attachments. Applicant’s U.S. Pat. No. 5,332,214 discloses a golf putter that includes a multi-component head having an elastomeric striking surface, a support member for the elastomeric striking surface, a weight, a body member, and screws. The body member includes a recessed area extending substantially across the front of the body member, a central cavity extending through the body member for receiving the weight and holes through the body member for receiving the screws. The support member includes holes for receiving the screws when the support member is fitted into the recessed area. The elastomeric striking surface is cast or adhesively secured to the support member, together making a striking surface insert.

[0010] Similarly, U.S. Pat. No. 4,121,832 to Ebbing, U.S. Pat. No. 5,690,562 to Sturm, U.S. Pat. No. 5,746,664 to Reynolds, Jr., U.S. Pat. No. 5,839,974 to McAllister, and U.S. Pat. No. 5,921,871 to Fisher all disclose golf putters having an insert fastened to a putter head using threaded screws. Each of these designs uses screws to firmly fix and positively secure the components of the putter head in a manner similar to that taught by applicant’s U.S. Pat. No. 5,332,214 and determined by the USGA to be in conformance with its rules. Unfortunately, this use of screws complicates adjusting of the club by requiring tools and frustrates the golfer’s ability to quickly fine-tune his putter or to easily adapt the club for varying playing conditions. In the end, golfers typically make a one-time adjustment after the purchase of the club and forgo attempts to customize the club before playing. Thus, if a striking surface is attached to a putter head using a screw, the striking surface is not quickly removable.

[0011] In an attempt to simplify adjustable customization, other types of removable insert golf putters teach interference fits in lieu of screws. However, in each case the fit is either poorly secured or secured so tightly that further adjustment is impossible. As an example of a poorly secured fit, U.S. Pat. No. 5,542,675 to Micciche et al. discloses an adaptor that
snaps onto the putter head, providing an elastomeric striking surface for the putter head. Micciche explains that the putter head adapter is “adapted to engage” around the putter head, but fails to disclose how the adaptor engages the putter head or how loose or rattling fits, caused by variances in manufacturing such as shrinkage and inconsistent dimensions, are avoided. U.S. Pat. No. 5,620,381 to Spalding discloses a removable putting face insert having a resilient rear wedge portion that is sized and positioned to press fit within a recess of the putter head. However, Spalding specifically teaches that the press fit arrangement is tight enough such that alteration of the club by a golfer is virtually impossible. U.S. Pat. No. 5,718,644 to Donofrio discloses a putter head that can retain an insert by frictional fit. However, Donofrio specifically contemplates that the insert is permanently attached and impossible to remove, and actually prefers the use of high strength epoxy for the permanent attachment, or alternatively, welding, brazing, bolts, screws, integral latches, or other mechanical fasteners. Thus, if a striking surface is attached to a putter head using high strength epoxy, welding, brazing, bolts, screws, or integral latches as a permanent attachment, the striking surface is not quickly removable.

[0012] In another attempt at adjustable customization, U.S. Pat. Nos. 5,690,561 and 5,688,190 to Rowland et al. disclose the removable application of textured adhesive backed pads to a club face. However, the use of temporary adhesive will over time fail to provide a positive lock as the effectiveness of the adhesive deteriorates with use.

[0013] Thus, conventional adjustable customized golf putters fail to satisfy golfers’ preferences for easily customizing or fine-tuning the putter to adapt to changing playing styles or changing playing conditions. Putters fastened with screws or similar fasteners can require tools and can prolong replacement of the striking surface insert such that a golfer experimenting with different inserts loses the unique feel of the prior inserts. In short, the striking surface inserts of these types of putters are not quickly removable. In addition, the golfer can lose the screws or similar fasteners, making the club useless.

[0014] Although simplifying adjustment, the conventional adjustable customized putters that use interference fits or temporary adhesive also fail to positively secure the insert. The interference fits fail, in part, due to the many variables in manufacturing, including shrinkage and process variations that contribute to inconsistent shapes and dimensions. The consequence of this inconsistency is an undesirable looseness. Likewise, the temporary adhesives do not provide a positive lock and, in addition, deteriorate over time.

[0015] As used herein, “looseness” is defined by any independent movement of a club component perceptible to a golfer while using the club to strike a ball. Perceptible includes feeling or hearing independent movement. For example, feeling or hearing a rattle is indicative of looseness. Looseness in a putter prevents replication of the feel of a fixed face putter, and prevents even acceptable performance of the putter.

SUMMARY OF THE INVENTION

[0016] The present invention is an adjustable customized golf club that positively locks a striking surface attachment to a club head and provides for the quick replacement of the striking surface attachment. The representative embodiment of the golf club is a golf putter. However, as one of ordinary skill in the art would appreciate, the present invention applies equally well to other types of golf clubs, such as wedges, drivers, fairway woods, and irons. According to the representative embodiment, the primary components of the putter include a putter head, a striking surface attachment, and one or more lock fittings. The striking surface attachment is fixed to a front face of the putter head by the one or more lock fittings.

[0017] With one lock fitting, the present invention positively locks the striking surface attachment to the putter head without looseness. As used herein, “positively lock” or “to provide a positive lock” means to firmly fit a club component without looseness as if it were part of a fixed-face putter, while still allowing quick removal and replacement of the component. In a representative embodiment, a player can break the positive lock by hand and without the use of tools to remove and replace a component, such as the striking surface attachment. As used herein, “toolless” and “toollessly” refer to this removing and replacing of components without the use of tools. Also, as used herein, a “tool” refers to a device that is primarily designed to join or separate components, and, specifically, does not include a golf tee, coin, key (e.g., a house key or car key), ball mark repairer, or other similar devices that are intended merely to assert force on a component for disassembly in places not accessible by hand. A positive lock releasably bonds components, but does not create a permanent attachment such as is typically found between a club shaft and club head. In contrast to a positive lock, a permanent attachment can only be broken by a destructive force that damages the components.

[0018] Also, as used herein, the terms “quick” and “quickly,” when used in relation to removing, replacing, or attaching a component, such as a striking surface attachment, encompass actions completed with speed and without delay, such that, for example, a typical player does not lose the feel of a prior component configuration, i.e., does not forget how the prior component configuration felt. Examples of component attachments that satisfy this criteria include a component that magnetically bonds to another component; a component that hooks to or onto another component; a component that compresses into or out of another component; a component that slides into, over, around, or on another component; a component that snaps into, over, around, or on another component; a component that wedges inside or around another component; a component that clips into, over, around, or on another component; a component that rolls into, over, around, or on another component; a component that twists into, over, around, or on another component; a component that swells or expands into or around another component; a component that grips onto, around, or over another component; and a component that rotates into engagement with another component. In contrast, examples of component attachments that do not satisfy the criteria of “quick” and “quickly” include a wedged, permanent fit, a wedged fit with adhesive, and an attachment using screws. Of course, components that can only be separated by a destructive force, such as with the permanent fit or the wedged fit with adhesive, do not satisfy the criteria of “quick” and “quickly.”

[0019] When multiple lock fittings fix the striking surface attachment to the putter head, a first preferred embodiment of the present invention includes at least a primary lock fitting and a secondary lock fitting. The primary lock fitting releasably secures the striking surface attachment to the front face of the putter head and provides the strong, tight fit required to
eliminate looseness. The secondary lock fitting can also contribute to the strong, tight fit, but at a minimum retains and aligns the striking surface attachment in the putter head before the primary lock fitting positively locks the striking surface attachment to the putter head.

[0020] The striking surface attachment can be a single component or can be constructed of a striking surface and a support member or members supporting the striking surface. In either case, the one or more lock fittings act on the single or multiple components to positively lock all components of the putter. In an embodiment, one or more lock fittings can act on a component of the striking surface attachment while another one or more lock fittings of the same or different type can act on other components of the striking surface attachment. For example, the striking surface attachment may comprise a carrier plate that is locked to the putter head by one type of lock fitting and a striking surface may be locked to the carrier plate by the same or another type of lock fitting.

[0021] For a single lock fitting configuration, the lock fitting is a component that connects the striking surface attachment to the putter head by a bond strong enough to eliminate looseness but weak enough to enable easy disassembly and assembly (which can be toless). For a multiple lock fitting configuration, the multiple lock fittings together connect the striking surface attachment to the putter head and provide the bond strong enough to eliminate looseness, yet nevertheless enable easy disassembly and assembly (which can be toless). As such, a lock fitting can be mechanical, magnetic, or frictional (i.e., interference fit). In a preferred embodiment, the lock fitting is a rotatable cam that engages with posts on the striking surface attachment to positively lock the striking surface attachment to the putter head. This lock fitting may be used in combination with other lock fittings, such as a magnetic fitting, a hook and loop fastener; a press-fit adaptor; a flexible rib; a locking pin; spring-loaded bearings; a quick-turn fastener; a cap nut and threaded extension; a spring rod with a catch-and-release mechanism; a spring-loaded catch-and-release; a spring clip; a swell fastener; a spring latch; a flexible strap; a dovetail slot; a lap joint; and a cam-lock. Various types of lock fittings suitable for this purpose are described in U.S. Provisional Application No. 60/860,207 and U.S. Patent Application Publication No. US 2007/0021236, each of which is incorporated herein by reference in its entirety. Although these embodiments describe specific types of lock fittings, other equivalent types could suffice without departing from the spirit and scope of the present invention.

[0022] In addition to the structure described above, the present invention also provides a method for replacing a striking surface attachment of a head. According to this method, a golfer removes the striking surface attachment by breaking the bond created by the one or more lock fittings. In a toless embodiment of the one or more lock fittings, the golfer uses her hands and possibly an ordinary golf accessory (e.g., a golf tee or ball mark repairer) to disengage the striking surface attachment without tools. For example, with a cam-locked striking surface attachment, the golfer rotates a cam to align notches therein with posts disposed on the striking surface attachment so that the attachment may be removed by simply pulling it away from the head. With the striking surface attachment and head separated, the golfer can choose another striking surface attachment with different performance characteristics. The golfer then engages that striking surface attachment with the head as required by the one or more lock fittings, e.g., for the cam-locking fastener, the golfer aligns the striking surface attachment with the head and inserts the posts into holes provided in the face of the head. The cam is then rotated to create a mechanical lock with the posts and to simultaneously draw the striking surface attachment firmly against the face of the head. The golfer can repeat this method of the present invention as many times as desired, to experiment with the club in a store before purchasing it, and later, on the golf course, before commencing a round of golf to adapt to changing playing preferences and playing conditions. Thus, the bonding characteristics of the one or more lock fittings enable quick adjustments, and timely, tactile comparisons of striking surface attachments.

[0023] Accordingly, an object of the invention is to provide a golf club having a firmly fixed and positively locked replaceable striking surface attachment that can be quickly removed and replaced with another striking surface attachment.

[0024] Accordingly, an object of the invention is to provide a golf club having a firmly fixed and positively locked replaceable striking surface attachment that can be quickly and/or tolessly removed and replaced with another striking surface attachment.

[0025] Another object of the present invention is to provide one or more lock fittings to secure a striking surface attachment to a golf club head by a bond strong enough to eliminate looseness of the components but weak enough to enable toless disassembly and assembly.

[0026] Another object of the invention is to provide a golf club that accepts striking surface attachments that can be quickly changed on a golf course or in a store to enable comparison of one attachment to another without losing the feel of the prior attachment(s).

[0027] Another object of the present invention is to provide a golf putter that golfers can quickly fine-tune to accommodate varying playing conditions, putting styles, ball types, and putting strokes.

[0028] Another object of the present invention is to provide a golf club having a firmly fixed and positively locked replaceable striking surface attachment that can be quickly and/or tolessly removed and replaced with another striking surface attachment, and to provide, when necessary to avoid any potential USGA rules conflict or if otherwise desirable, a further securing of the striking surface attachment to the head by screws or other similar means.

[0029] These and other objects and advantages of the present invention are described in greater detail in the detailed description of the invention, and the appended drawings. Additional features and advantages of the invention will be set forth in the description that follows, will be apparent from the description, or may be learned by practicing the invention.

**BRIEF DESCRIPTION OF THE DRAWINGS**

[0030] FIG. 1 is a schematic diagram of an adjustable customized putter, according to a representative embodiment of the present invention.

[0031] FIGS. 2A-2C are schematic diagrams of exploded perspective views of an adjustable customized putter with magnetic lock fittings, according to a representative embodiment of the present invention.

[0032] FIG. 2D is a schematic diagram of an enlarged view of the striking surface shown in FIG. 2C.

[0033] FIG. 3A is a schematic diagram of a perspective view of a striking surface attachment and putter head having
a cam-locking interface, according to a representative embodiment of the present invention. [0034] FIG. 3B is a schematic diagram of a perspective view of a striking surface attachment and locking cam, according to a representative embodiment of the present invention. [0035] FIG. 3C is a schematic diagram of a perspective view of a striking surface attachment and locking cam in an unlocked position, according to a representative embodiment of the present invention. [0036] FIG. 3D is a schematic diagram of a perspective view of a striking surface attachment and locking cam in a locked position, according to a representative embodiment of the present invention. [0037] FIG. 3E is a schematic diagram of a perspective view of a putter head having a cam-locking interface, according to a representative embodiment of the present invention. [0038] FIG. 3F is a schematic diagram of a perspective view of a striking surface attachment and locking cam in an unlocked position, according to a representative embodiment of the present invention. [0039] FIG. 3G is a schematic diagram of a perspective view of a putter head having a cam-locking interface with a lever-actuated cam, according to an embodiment of the present invention.  

**DETAILED DESCRIPTION OF THE INVENTION**

[0040] The present invention is an adjustable customized golf club with a replaceable striking surface attachment, and a method for replacing the striking surface attachment. The representative embodiment of the golf club is a golf putter. [0041] Referring to FIG. 1, the present invention, broadly stated, includes a putter head 1, a striking surface attachment 2, and one or more lock fittings 3. The configuration of putter head 1 is designed to match the configuration of striking surface attachment 2 such that the two components fit squarely and tightly together. For example, putter head 1 can have a cavity into which a matching shaped portion of striking surface attachment 2 fits. The one or more lock fittings 3 positively lock striking surface attachment 2 to putter head 1 such that striking surface attachment 2 does not loosen, yet still permit quick removal of striking surface attachment 2. The result is a firmly fixed but quickly breakable bond. In a further representative embodiment, a player can toollessly form and break the firmly fixed but quickly breakable bond. In another representative embodiment, a player can use a tool to quickly break or unlock a bond provided by one or more lock fittings.

[0042] Although FIG. 1 shows a single lock fitting positively locking striking surface attachment 2 to putter head 1, more than one lock fitting can be used to create this unique bond. With multiple lock fittings, the present invention includes at least a primary lock fitting and a secondary lock fitting. Either one or both of the primary lock fitting and the secondary lock fitting provide the bond strong enough to eliminate looseness but weak enough to enable quick disassembly and assembly.

[0043] Striking surface attachment 2 is one of a plurality of striking surface attachments that can be fixed to putter head 1. Each striking surface attachment has differing rebound and hardness characteristics, and can be made of elastomeric or non-elastomeric materials. Although shown as a single component in FIG. 1, striking surface attachment 2 can also be constructed of two or more components. For example, stricking surface attachment 2 could comprise a striking surface and one or more support members supporting the striking surface. Such a striking surface and support member may in turn be attached to each other by a lock fitting described herein.

[0044] Thus, with a plurality of striking surface attachments and the unique bond provided by one or more lock fittings 3, the present invention provides an adjustable customized putter that can be quickly fine-tuned to an individual's preferred feel to cooperate with differently constructed golf balls or to respond to the variable conditions of putting greens. Using the present invention, a golfer can quickly change striking surface attachments without losing the feel of the replaced striking surface attachment, enabling her to compare the differences between the striking surface attachments. Once a golfer finds a striking surface attachment that fits her needs, one or more lock fittings 3 positively lock striking surface attachment 2 to putter head 1 to create the secured, firmly fixed attachment.

[0045] In light of the above-described primary components of the present invention, the following discussion describes examples of preferred embodiments of the structures and methods of the present invention. Although the present invention is applicable to any adjustable customized putter with a striking surface attachment positively locked (but quickly removable) by one or more lock fittings to a putter head, the following description and schematics outline specifically designed components that implement this inventive concept. These specific designs should not be construed as limitations on the scope of the invention, but rather as examples of putter components and lock fittings that could be used to practice the invention. As would be apparent to one of ordinary skill in the art, many other variations on the components are possible, including different shapes, geometries, and component configurations. In addition, to provide a complete putter, many other ancillary components could be added to the primary components of the present invention, including, for example, a putter shaft and hosel. Accordingly, the scope of the invention should be determined not by the embodiments illustrated, but by the appended claims and their equivalents.

[0046] With regard to the drawings, wherever possible, the same reference numbers are used throughout to refer to the same or like parts.

[0047] Referring to FIGS. 2A-2C, a first preferred embodiment of the present invention uses magnets as the one or more lock fittings 3. In FIG. 2A, magnetic discs 24 positioned in recesses 22 of putter head 1 positively lock striking surface attachment 2 to putter head 1. In FIG. 2B, the magnetic sheet 36 adhered to putter head 1 positively locks striking surface attachment 2 to putter head 1. FIG. 2C illustrates the use of a first magnet 32 on the putter head 1 and a second magnet 49 on the striking surface attachment 2 to provide the positive lock. In this example, the first magnet 32 and second magnet 40 are magnetic sheets.

[0048] For each of the embodiments illustrated in FIGS. 2A-2C, an example of a suitable magnet is a multiple pole magnet, such as a Plastalloy 65 magnet produced by Electrodyne of Batavia, Ohio. However, as one of ordinary skill in the art would appreciate, other types of magnets could be used, including various types of solid and bonded magnets.

[0049] In both FIGS. 2A and 2B, at least a portion of striking surface attachment 2 must be metallic or magnetic to facilitate the bond with magnetic discs 24 and magnetic sheet 36. For example, in FIGS. 2A and 2B, striking surface attach-
ment 2 comprises a support member 26 with a metallic back plate 27 mounted on one side and a striking surface 28 mounted on the other. Alternatively, metallic back plate 27 can be a magnetic sheet with a polarity opposite to the polarities of magnetic discs 24 and magnetic sheet 36. Also, alternatively, the locations of magnetic discs 24 and metallic back plate 27 or magnetic sheet 36 could be switched such that magnetic discs 24 are on striking surface attachment 2 while metallic back plate 27 or magnetic sheet 36 are on putter head 1.

[0050] Although the magnetic bond alone can positively lock striking surface attachment 2 to putter head 1, both FIGS. 2A and 2B incorporate a secondary lock fitting by having a cavity 18 in the front face 16 of putter head 1. Cavity 18 is sized and shaped to receive striking surface attachment 2 in a tight, secured fit. Through minimizing tolerances between cavity 18 and striking surface attachment 2, by for example using all injection molded components, the secondary lock fitting provided by cavity 18 contributes to the positive locking of striking surface attachment 2.

[0051] Alternatively, magnetic discs 24 and magnetic sheet 36 could be hook and loop fasteners, or other similar planar fasteners that provide a positive lock. In such cases, metallic back plate 27 would be made of an appropriate complementary surface.

[0052] For FIGS. 2A and 2B, removing striking surface attachment 2 from putter head 1 is accomplished by applying a force to striking surface attachment sufficient to overcome the magnetic field between magnetic discs 24 and magnetic sheet 36. Preferably, a golfer inserts a golf tee into either of passageways 20, which extend from front face 16 to the exterior of putter head 1. The golf tee breaks the positive lock and pushes striking surface attachment 2 out of cavity 18. Alternatively, a player pulls striking surface attachment 2 out of cavity 18 by inserting his finger into depression 21 located on the front toe (as in FIG. 2A) and/or the rear heel of putter head 1, or anywhere along the perimeter of front face 16. As another alternative, cavity 18 can be deeper in one section such that pushing striking surface attachment 2 in the deeper area raises the opposite end of striking surface attachment 2 for quick removal.

[0053] FIG. 2C illustrates an exploded view of a putter that uses magnets for the one or more lock fittings 3. As shown, the putter includes a putter head 1 that includes a metal core 31, a sheet magnet 32 attached to the face of the metal core 31, and a shell 34 molded over and bonded to the entire surface of metal core 31, except for the face of metal core 31. Shell 34 is preferably made of Surlyn™. Putter head 1 also includes a shaft 33 attached to an opening 35 in shell 34 and metal core 31, as well as fasteners 37 that join sheet magnet 32, metal core 31, and shell 34 together. Fasteners 37 also preferably extend beyond sheet magnet 32 to align striking surface attachment 2 onto putter head 1, by engaging openings in one or more components of striking surface attachment 2.

[0054] Striking surface attachment 2 includes a striking surface 38 molded onto at least the face of a support member 39, and a sheet magnet 40 attached to a face of support member 39 opposite striking surface 38. Striking surface 38 is preferably an elastomer molded around the front face and edges of support member 39. Support member 39 is preferably made of metal. To improve the bond between striking surface 38 and support member 39, striking surface 38 preferably includes strips 42 that align with grooves (not shown) in support member 39. Sheet magnet 40 has a polarity opposite of sheet magnet 32 to provide the positive lock between striking surface attachment 2 and putter head 1. Moreover, sheet magnet 40 and support member 39 preferably have openings 41 that receive fasteners 37 to align striking surface attachment 2 with putter head 1.

[0055] To remove striking surface attachment 2 from putter head 1 of the putter of FIG. 2C, a player must apply a force to striking surface attachment sufficient to overcome the magnetic field between sheet magnets 32 and 40. Preferably, a golfer grasps striking surface 38 and pulls striking surface attachment 2 away from putter head 1 to quickly break the positive lock. To assist a player's grasp of striking surface attachment 2, striking surface 38 preferably includes a grip member, such as a flange or ridge 43, an indentation 44, or a tab 45, as shown in FIG. 2D. An indentation could also be provided in putter head 1 to assist a player's grasp of striking surface attachment 2.

[0056] Referring to FIGS. 3A-3F, a further preferred embodiment of the present invention is a lock fitting that involves the insertion of posts or pins into openings in a front face of the putter head and the capture of the posts or pins by a locking device. In this embodiment, posts 604 and 606 are inserted into openings 614, 616 and are captured by a rotating cam 610. The lock fitting described in FIGS. 3A-3F may be utilized as a primary lock fitting or as a secondary lock fitting that is used in conjunction with a primary lock fitting of another type, such as the magnetic lock fitting described above with respect to FIGS. 2A-2D). For example, the magnetic lock fitting could serve as a secondary lock fitting that holds an insert in place sufficient to allow a golfer to try out the putter with the insert and then quickly change out the insert for another insert. Then, after the golfer has chosen a desired insert, the lock fitting described in FIGS. 3A-3F could serve as the primary lock fitting that secures the desired insert to the front face of the putter head and provides a strong, tight fit without looseness, in compliance with applicable USGA rules.

[0057] As shown in FIG. 3A, a putter head 601 may house the rotating cylindrical cam 610 such that a user-engageable end 612 protrudes or is otherwise accessible from an outer surface of the putter head 601. The user-engageable end 612 may have a hex key configuration, as shown, such that it is engageable by a corresponding tool for quick adjustment. Alternatively, the user-engageable end 612 may have a different tool interface or may have a toolless interface such that a user can rotate the cam 610 manually or by a golf accessory, such as a ball marker, golf tee, coin, key (e.g., a house key or car key), ball mark repairer, or other similar device. Such a toolless user-engageable end 612 may have a thumbscrew, a lever, a wing (e.g., as on a wing nut), a slat forced thereon for rotation by engagement with a coin or ball marker, holes engageable by insertion of prongs of a ball mark repairer or divot tool, or any other suitable interface. As an example, FIG. 3G illustrates toolless user-engageable end comprising a lever 607. The putter head 601 has been removed from view in FIGS. 3B-3D and FIG. 3F for clarity.

[0058] As shown in FIGS. 3A and 3F, the cam 610 may be housed within a cylindrical bore 611 in the putter head 601 and is free to rotate, for example, by at least about 180 degrees. In assembling the putter, the cam 610 may be inserted into the bore 611 from its open end (in the forefront of the view shown in FIG. 3A) and held in place by a holding pin or other element (not shown), which may be inserted into hole 635 in the surface 608 of the putter head 601 and which
limits the movement of cam 610 in an axial direction while still allowing cam 610 to rotate about its axis. The cam 610 may have a corresponding cutout or slot 634 for reception of the holding pin or other element so as to prevent movement of the cam 610 outward from the bore 611 (see FIGS. 3B-3D and FIG. 3F). The cutout 634 and holding pin may also be configured to limit or stop rotation of the cam 610 in one or both directions. For example, the cutout 634 may be a slot through half of the thickness of the cylindrical cam 610 and the holding pin may protrude into the cutout 634 by less than the distance of the radius of the cylindrical cam 610 such that it would prevent further counter-clockwise rotation of the cam 610 as shown in FIG. 3A. Rotation is prevented by the holding pin, which abuts a part of the slot 634. Starting from the position of cam 610 shown in FIG. 3A, upon rotation of the cam 610 by about 180 degrees in the clockwise direction, the holding pin would accordingly limit any further rotation in that direction by abutting an opposite part of the slot 634.

As shown in FIGS. 3A-3C and FIG. 3F, the striking surface attachment 602 is attached to the putter head 601 by bringing it in proximity of the putter head face 608 such that the posts 604, 606 are aligned with openings 614, 616 in the face 608. The openings 614, 616 in the face 608 are configured to be aligned with portions of the cam 610 having notches 622 and 624. As shown, the notches 622, 624 are cut through approximately half of the thickness of the cam 610 and are generally equal in width to the width of the corresponding post 604, 606 so as to allow the posts 604, 606 to pass through the cam 610 without interference.

The posts 604, 606 may be generally cylindrical in shape, having a length that is about equal to or somewhat larger than the diameter of the cam 610. Each post 604, 606 has a circular cutout 626, 628 having a radius of curvature approximately equal to the radius of the cam 610. Upon insertion of the posts 604, 606 into the openings 614, 616 (see FIGS. 3C and 3F), the cam 610 may be rotated in a clockwise direction by a hex key (or other suitable engagement device) so that the non-notched portions 630, 632 of the cam 610 come into engagement with the circular cutouts 626, 628 of the posts 604, 606, as shown in FIG. 3D. In doing so, the non-notched portions 630, 632 may come into contact with, and occupy the space defined by, the cutouts 626, 628 to create an interference fit and to retain the posts 604, 606 within the putter head 601 in a locked position. In this manner, the posts 604, 606, as well as the entire striking surface attachment 602, are drawn toward putter head 601 and held snugly in place.

The specific dimensions of the components described herein may be configured such that a friction fit is created in addition to the interference fit between the posts 604, 606 and the cam 610 to help prevent a tendency for the cam to rotate into the open unlocked position (FIGS. 3A-3C and 3F). For example, the striking surface attachment 602 may have a non-planar shape, either by design or by variances in manufacturing. Cam 610 can pull against posts 604, 606 to flatten out such non-planar shapes and provide a further friction fit.

In one implementation, the striking surface attachment 602 may be design with a slight bow such that its ends come into contact with the putter head front face 608 before a center portion of the striking surface attachment does. Thus, when the cam 610 is rotated from the unlocked position to the locked position, the posts 604, 606 are drawn into the openings 614, 616 by applying a force against the bowing force built into the striking surface attachment, thereby pretensioning the post-cam engagement.

In another implementation, the striking surface attachment 602 may be twisted, rippled, or otherwise non-planar due to manufacturing variances, such that certain portions of it contact the putter head front face 608 before other portions. Thus, when the cam 610 is rotated from the unlocked position to the locked position, the posts 604, 606 are drawn into the openings 614, 616 such that the striking surface attachment 602 is pulled against the front face 608 and flattened out. The force required to pull the striking surface attachment flattened thereby pretension the post-cam engagement. In this manner, materials that provide better “feel” (e.g., elastomer) but are often susceptible to manufacturing variances, can be used for the striking surface attachment 602, because the planar putter front face 608 (e.g., made from materials that are easier to machine flat, such as metal) and the post-cam mechanism pull the striking surface attachment 602 flat.

The scope of the present invention also encompasses various other configurations that create a tight fit between the posts 604, 606 and the cam 610 such that rotation of the cam is prevented.

The lock fitting described herein has significant and surprising benefits over conventional attachment means. By utilizing a mechanical structural lock in conjunction with a frictional fit, the cam lock fitting enables the striking surface attachment 602 to be held firmly against the face of the club head 601 while under constant tension. By providing a non-planar striking surface attachment (e.g., with a bowed shape) in alternative embodiments, the tension force with which the attachment 602 is held against the face 608 is increased. The mechanical structural lock formed by the non-notched portions 630, 632 of the cam 610 being located in the cutouts 626, 628 of the posts 604, 606 substantially prevents any displacement of the striking surface attachment 602 in a direction away from and perpendicular to the surface 608 of the club head 601, the integrity of any frictional forces notwithstanding.

To remove or replace the striking surface attachment 602, the cam 610 is rotated by its user-engageable end 612 back into the unlocked position shown in FIGS. 3A-3C and 3F. Then, the striking surface attachment 602 may simply be pulled out from the openings 614, 616 since the notches 622, 624 are so aligned to allow the posts 604, 606 to pass. A new or different striking surface attachment 602 may then be attached as previously described.

In an embodiment of the present invention, the striking surface attachment 602 may comprise two or more components and may include different types of lock fittings in addition to the cam-locked fitting described in FIGS. 3A-3F. For example, the striking surface attachment 602 may comprise a carrier element 618 and a striking surface 620. The carrier element 618 may include posts 604, 606 as described above for cam-locked attachment to the putter head 601 while the striking surface 620 and the carrier element 618 may lock together by a different lock fitting, such as a magnetic or adhesive fitting. Any additional components may be locked to one or more of the striking surface 620 and the carrier element 618, or any other element that may be a part of the striking surface attachment 602.

In a further embodiment, the carrier element 618 and the striking surface 620 can be attached by a dovetail
attaching similar to that described with reference to FIGS. 14B-14G of U.S. Provisional Application No. 60/860,207, which is incorporated herein by reference. With such a configuration, the striking surface 620 could be recessed within the club head cavity so that it could not be removed without first unlocking the cam and removing the striking surface attachment (which would meet applicable USGA rules). As one of ordinary skill in the art would appreciate, there are other possible combinations of attachment means between the striking surface 620 and the carrier element 618, and the carrier element 618 and the club head 601.

[0069] In other embodiments of the present invention, lock fittings may be provided that supplement the cam lock fitting to connect the striking surface attachment (whether comprised of one component or more) to the club head 601. For example, striking surface attachment 602 shown in FIG. 3A can have a magnet that adheres to a metal or magnetic face of the club head 601. Various other lock fittings may be provided in combination with the cam lock fitting described herein to provide an additional layer of security, such as those described in U.S. Provisional Application No. 60/860,207. In use, for example, a golfer may selectively attach a variety of striking surface attachments to the head using a magnetic fitting during a practice or warm-up session to determine which attachment is best suited for the current play conditions. When a particular striking surface attachment is chosen, the golfer may then further secure the attachment to the head via the cam lock fitting described herein. Other lock fittings may likewise be used in combination with the cam lock fitting.

[0070] Each of the above embodiments uses one or more lock fittings to positively lock and firmly fix the components together. The present invention therefore provides a critical fit within a range between an ineffective fit that is loose and a tight fit that is burdensome to interchange, i.e., is not quickly interchangeable. However, because the rules and decisions of golf governing bodies (e.g., USGA, Professional Golfers’ Association (PGA), and The Royal & Ancient Golf Club of St. Andrews) can be inconsistent and subject to frequent change, the present invention allows for the use of fasteners that require tools as an additional securing means for releasably securing a striking surface attachment to a club head. Specifically, if a particular interpretation of a rule were to require a fastener that requires tools, e.g., a screw, the present invention adds this fastener in addition to the one or more lock fittings.

[0071] For example, the additional securing means could include at least one passageway in the club head aligned with at least one opening in the striking surface attachment, and at least one elongate connecting member, e.g., a screw, positioned within the passageway and opening, and holding the components together. In this manner, the one or more lock fittings still provide the positive locking, making the additional fastener a feature necessary solely to comply with official rules, but not to achieve a component fit comparable to that of a fixed-face putter. A golfer could still quickly replace striking surface attachments to find a desired feel by using only the one or more lock fittings, but when necessary to conform to rules prohibiting readily changeable parts, the golfer would simply add a screw or some other fastener to the putter.

[0072] Various methods of removing the attachments of the present invention have been shown by way of example. These methods are intended to be purely exemplary of the invention, and other methods of manually disengaging the attachments may be employed.

[0073] In addition, although the preferred embodiments of the present invention describe specific component configurations, one of ordinary skill in the art would understand that combinations and modifications to these configurations are possible. For instance, although a hosel is shown as a component of the golf club, the present invention in some embodiments, it should be understood that a hosel is not necessary to accomplish the objects of the present invention. Further, although some embodiments of the present invention incorporate more than one lock fitting, it should be understood that for each embodiment, the method of attaching the striking surface attachment could employ one or more lock fittings. In addition, although some embodiments describe the striking surface attachment as having the separate components of a striking surface and a support member, these components could be integrated into a single piece such that the striking surface attachment is a single component.

[0074] As apparent to those skilled in the art, various modifications and variations can be made in the manually replaceable striking surface attachments of the present invention and in the construction of these attachments without departing from the scope or spirit of the invention. As an example, striking surfaces may be made from numerous types of materials, including but not limited to rubber, plastics, elastomers, non-elastomers, titanium, aluminum, and copper, as well as other materials usable in the golf club art.

[0075] In addition to changing striking surface properties with different materials, the loft of the golf club putter can be adjusted in various manners. Golfers typically prefer a putter loft anywhere from zero to eight degrees. Changing loft can be accomplished by varying the angle of the front of the striking surface, or by varying the straightness of the back side of the striking surface so that when the striking surface attachment is coupled to the putter head, a certain degree of loft can be achieved.

[0076] In practicing the present invention, the striking surface of the striking surface attachment may include either an elastomeric or non-elastomeric material, depending upon the golfer’s preference. Preferred elastomeric striking surfaces include any of the elastomers defined in U.S. Pat. No. 4,422,638, assigned to the assignee of the present application and incorporated herein by reference in its entirety. Preferably the elastomeric striking surface has the controlled properties defined in the ‘638 patent. However, according to the present invention, the striking surface of the putter is quickly changed, the elastomeric striking surface can be suitably chosen to meet the playing characteristics desired by the individual golfer, with those characteristics being changed simply by selecting an elastomer having different touch, feel, hardness, and rebound characteristics.

[0077] As apparent to one skilled in the art, various polymers, including polymers having different chemical formulations, can be fabricated to meet the hardness and rebound characteristics essential to provide an elastomeric striking surface in accordance with the present invention. Polyester elastomers marketed by DuPont under the trade name HYTREL are presently preferred materials. HYTREL 8122, which provides a fast or high rebound, and HYTREL 4069, which provides a slow or low rebound, are illustrative of such elastomers. Moreover, the thickness of the elastomeric surface can vary. Although it has been found that a thickness of
three-sixteenths (3/16") inch is acceptable; the thickness can be increased or decreased. “Elastomer” as used herein is intended to designate any synthetic plastic material that provides the rebound characteristics useful in a putter face.

[0078] The characteristics of the putter can also be modified by judicious selection of the material for the putter head. Thus, preferably the putter head comprises metal such as stainless steel or brass, but again can be of a different metal, or plastic, to provide varying characteristics in the putter.

In addition to customizing the putter by selecting specific materials for the putter head, striking surface, and the striking surface attachment, a further preferred embodiment of the present invention uses the same or similar process to make each of these components. Using materials that are all injection molded (rather than using some injection molded components and some cast components) achieves a tighter fit between the components, and avoids dimensional variances due to such factors as dissimilar coefficients of thermal expansion and inconsistent manufacturing tolerances. As an example of this embodiment, both the putter head and striking surface attachment can be made of a thermoplastic material such that the striking surface attachment fits securely in the putter head without looseness. With accurate alignment and fit, this positive locking of the striking surface attachment could serve as either the primary, secondary, or sole lock fitting for attaching the striking surface attachment to the putter head. In addition to a thermoplastic material, composites are an example of other suitable materials.

[0080] Although this specification illustrates the present invention using the representative embodiment of a golf putter one of ordinary skill in the art would appreciate that the structures, functions, and methods described herein apply equally well to other types of golf clubs. Indeed, the head, the striking surface attachment, and the one or more lock fittings of the present invention could be components of clubs such as wedges, drivers, fairway woods, and irons. Moreover, the present invention provides these other types of clubs with most, if not all, of the same benefits described above in the context of a golf putter.

[0081] Other embodiments of the invention will be apparent to those skilled in the art from consideration of the specification and practice of the invention disclosed herein. It is intended that the specification and examples be considered as exemplary only, with a true scope and spirit of the invention being indicated by the claims.

[0082] The foregoing disclosure of embodiments of the present invention has been presented for purposes of illustration and description. It is not intended to be exhaustive or to limit the invention to the precise forms disclosed. Many variations and modifications of the embodiments described herein will be obvious to one of ordinary skill in the art in light of the above disclosure. The scope of the invention is to be defined only by the claims, and by their equivalents.

What is claimed is:

1. A golf club comprising:
   a head having one or more openings in a face thereof;
   a rotatable cam disposed within the head and extending generally along the length of the head, the cam having one or more notches configured to be aligned with the one or more openings; and
   a replaceable striking surface attachment having one or more posts, wherein the cam is rotatable to a first position that allows the insertion of the one or more posts into the one or more openings and is rotatable to a second position in which the one or more posts are retained in a locked position in the one or more openings.

2. The golf club of claim 1, wherein each of the one or more posts has a circular cutout that engages with a non-notched portion of the cam to lock the striking surface attachment onto the head.

3. The golf club of claim 1, wherein the cam has a user-engageable portion to rotate the cam, the user-engageable portion having an interface that engages with a tool.

4. The golf club of claim 3, wherein the interface is a hex key interface.

5. The golf club of claim 1, wherein the cam has a user-engageable portion to rotate the cam, the user-engageable portion having an interface that allows for engagement and rotation by a user either manually or with a golf accessory.

6. The golf club of claim 5, wherein the interface allows for engagement and rotation with any one or more of a ball marker, divot tool, or golf tee.

7. The golf club of claim 1, wherein the striking surface attachment has a non-planar configuration prior to attachment to the head.

8. The golf club of claim 1, wherein the cam, upon rotation, draws the posts into the openings to create a tight fit.

9. The golf club of claim 1, wherein the striking surface attachment comprises a support member and a striking face.

10. The golf club of claim 9, wherein the support member and the striking face are attached to each other by a magnetic fitting.

11. The golf club of claim 1, wherein the cam comprises a slot that engages with a pin such that the rotational motion of the cam is limited to about 180 degrees.

12. The golf club of claim 11, wherein the pin is inserted through a hole in the face of the head to engage with the slot in the cam.

13. A golf club comprising:
   a head having two openings in a face thereof;
   a retaining member disposed within the head; and
   a replaceable striking surface attachment having two engagement members, each of the engagement members having a circular cutout configured to engage a portion of the retaining member,
   wherein each of the engagement members are retained by the retaining member upon a rotation of the retaining member to thereby hold the replaceable striking surface attachment firmly against the face of the head.

14. The golf club of claim 13, wherein the retaining member is a cylindrical cam having two notched portions that are aligned with the two engagement members of the striking surface attachment.

15. The golf club of claim 14, wherein the cam is rotated to create an interference fit between the two engagement members and two non-notched portions of the cam.

16. The golf club of claim 13, wherein the rotation of the retaining member is limited to about 180 degrees.

17. The golf club of claim 13, wherein the retaining member is configured to be rotated manually.

18. The golf club of claim 13, wherein the retaining member is configured to be rotated with the aid of a golf accessory.

19. A method of attaching a striking surface attachment to a face of a golf club, comprising:
providing a cylindrical cam within a head of the golf club, the cam extending generally from a heel portion of the head to a toe portion of the head; placing the striking surface attachment into abutment with the face, the striking surface attachment having at least one cam-engaging portion that extends through at least one opening in the face; and rotating the cam to engage the at least one cam-engaging portion of the striking surface attachment such that the striking surface attachment is thereby held firmly against the face of the golf club.

20. The method of claim 19, wherein the at least one cam-engaging portion is a post having a circular cutout that receives a portion of the cam, upon rotation, to create an interference fit that holds the striking surface attachment firmly against the face of the golf club.

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