GOLF CLUB GRIP WITH HOUSING

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The invention generally relates to a grip for a golf club for housing an accessory to enhance the enjoyment of the game of golf. A grip of the invention prevents relative motion between the accessory and the club when the accessory is coupled to the club.
GOLF CLUB GRIP WITH HOUSING

FIELD OF THE INVENTION

The invention relates to golf clubs, more particularly to mechanisms for fastening accessories to clubs.

BACKGROUND

Golf is a popular sport played with a club that generally has a head, a shaft, and a grip. Golfers like interesting accessories and technologies that enhance their enjoyment of the game. Some accessories are provided as electronic devices to be coupled to a golf club. For example, U.S. Publication No. 2010/0308105 to Savarese describes electronic club tags that use light sensors to detect when a club is used and mentions that golf club grips could be made with openings where club tags could be put.

Golfers may desire a device that analyzes their playing, for example, by tracking their puts or drives with precision. To provide an on-club device that precisely models a swing could require an accelerometer, gyroscope, microchip, antenna, and battery, creating a device much bulkier than the thin club tags of Savarese.

One beneficial result of a grip of the invention is that it facilitates coupling an accessory to a golf club in such a way

SUMMARY

The invention provides a golf club grip with a housing element that holds a device in place on a golf club and prevents relative motion between the device and the club. The invention allows a grip to house another object via a housing, or void in the grip material. The housing can either be co-molded into the grip material, or inserted after the grip is made. A housing element can include a pliable material allowing devices to be interchanged during a golf game. A housing element including an elastic material binds a device into place under its own forces to prevent relative motion. By forming a housing integrally, or monolithically, with a grip, it is made attractive and affordable. Golfers avoid the distraction or aesthetic nuisance of an additional piece of visual clutter on their clubs. Thus the grip with housing of the present invention provides a handy and attractive way to place electronics or other accessories on or in golf clubs.

In certain aspects, the invention provides a grip for a golf club having a sleeve member with a gripping surface. One end of the sleeve is open to fit over the shaft of a golf club. At the other end is a housing with a void to house an accessory. Overall, the grip may generally have an elongated cylindrical shape, preferably slightly tapered on the outside. Generally, a grip of in the invention will have an internal bore to complement a shaft.

The housing can be provided as a continuation of the sleeve beyond a terminus of the shaft. It can include a cylindrical wall with or without a taper. Dimensions of the housing, including the cylindrical wall, can be described with references to an axis of a shaft if the grip were coupled to the shaft. However, these descriptions apply whether or not the grip is mounted to a club shaft. Where the housing includes a cylindrical wall protruding at an end of the grip, the grip has a maximum length from the shaft end to the housing end and the cylindrical wall may define a recess with a length measurable parallel to the shaft axis, an inner radius and an outer radius, each measurable perpendicular to the shaft axis, and a wall thickness also measurable perpendicular to the shaft axis.

In some embodiments, the length of the cylindrical recess is greater than about 2 mm, preferably greater than about 7 mm, and optionally between about 9 mm and about 15 mm. Either the internal or the external radius of the recess can be between about 5 mm and about 15 mm. The thickness of the wall around the recess may be between about 1 mm and about 4 mm. The maximum length of the grip may generally be between about 23 cm and about 31 cm. Generally, the grip may have a mass between about 20 grams and about 70 grams, and preferably the grip will have a mass between about 45 grams and about 55 grams.

In some embodiments, a ratio of the length of the recess to a thickness of the wall is greater than four and may be between about 5 and about 7. A ratio of the length of the recess to the internal or external radius can be between about 0.8 and about 5.

A grip according to the invention can be made with rubber, cotton, synthetic materials, leather, or a composite. It can be formed monolithically (i.e., all of one piece of one material) or as an assembly. The grip can be formed by injection molding, compression molding, or co-molding. A grip according to the invention allows an accessory to be inserted or removed. The grip provides for ease of interchange between accessories. In some embodiments, a material of the grip contributes to its ease of use.

The housing element of the grip can be made with a flexible material that can be peeled away from the accessory. For example, if the flexible material forms a cylindrical wall region, it can be “rolled down” or substantially turned inside-out. Preferably, a housing element is provided of a pliable material—capable of being repeatedly bent or deformed without substantial fatigue. The housing element can be rolled down or turned inside-out and may hold its shape in that configuration. When at rest (i.e., right-side-out) an interior surface of the recess may be configured to mattingly couple with a surface of the accessory.

In certain embodiments, the invention provides a cap, such as a butt cap, to cover or close the housing element, for example, when no accessory is positioned in the housing element or to cover an accessory that is housed within the element. A butt cap can be screwed on (for example by molded threads in the cap and in the grip), snap on, press-fit and can be a separate piece or can be formed with the grip by a flap or strap of material. A butt cap can be styled to make the grip appear as a standard grip (e.g., without a housing), or it can be fashioned to call attention to the functionality of the grip (e.g., with a logo or indicia showing that it is part of a grip with housing). In certain embodiments, a grip with housing with a separable cap element (screw on, flap, press-fit, etc.) even without another accessory provides a valuable feature for a golfer in the form of a small, closeable compartment on a golf club. A grip with housing with cap could be styled to call attention to this feature. For example, the grip, the cap, or both could have indicia (printing, embossed, etc.) calling attention to the storage compartment (“twist to open”, “bell bucket coins”, or “tee compartment”).

One beneficial result of a grip of the invention is that it facilitates coupling an accessory to a golf club in such a way
as to resist relative motion between them, for example, while the club is used to play golf. In some embodiments, the grip works in concert with an accessory that also couples to a shaft by means of a stem that exerts pressure on the inside surface of the shaft. The grip holds the accessory snugly in place, preventing relative motion. This can be accomplished in part by providing a cylindrical wall to cover a substantial part of an accessory, preferably, most of an accessory. The grip can be particularly designed to complement an accessory that mounts at the end of a shaft such that a majority of the accessory is outside of the shaft. In certain embodiments, a majority of the accessory will be housed within the grip. Particularly in view of the fact that some accessories have portions that are intended to be viewable by a golfer, the grip can be configured to leave at least a portion of the accessory exposed when housed in the grip. For example, a surface or display of the accessory can be visible to a golfer when the club is at address.

[0014] In certain aspects, the invention provides an accessory kit for a golf club. A kit according to the invention may include a grip and an accessory. The grip has a housing element to house the accessory and a sleeve for mounting on a shaft of the club. In some embodiments, the grip couples, or assists in coupling, the accessory to the club. For example, the housing element can receive the accessory within a substantially tubular sleeve protruding beyond an end of the shaft. In some embodiments, the tubular sleeve has an internal length roughly equal to an internal radius. Depending, for example, on desired manufacturing costs or tolerances, a ratio of the internal length to internal radius could be between about 0.5 and 1.5 or 0.8 and 1.2, and preferably greater than about 0.5 and possibly greater than about 0.8.

[0015] An accessory of the kit can include one or more of an accelerometer, a gyroscope, a light detector, a switch, a circuit, a microchip, a battery, a photovoltaic material, a screen or readout, a data communication such as a USB port or contact points, a micro-SD card slot, an RFID tag, a Wi-Fi card, an RF transceiver, a quartz crystal, or any combination thereof. Generally, the accessory will be configured to be housed within the housing and thereby subject to forces to resist or inhibit motion of the accessory relative to the club.

[0016] The invention includes the recognition of several modes of relative motion between an accessory and a club head. An accessory can move longitudinally relative to a club. In the longitudinal mode, motion is in a direction parallel to a shaft axis. An accessory can twist relative to a club, whereby the accessory turns around an axis coaxially with the shaft axis. An accessory may swivel relative to a club, indicating a motion around an axis that is perpendicular to a shaft axis. That is, for a generally round accessory mounted on a club such that an axis of the accessory defines an angle theta with the shaft axis, swiveling refers to motion wherein theta changes. An accessory may exhibit shear motion relative to a club, whereby the entire accessory is moved in a direction perpendicular to a shaft axis, with no change in theta. An accessory can rotate around its own rotational axis that is not co-axial with a shaft axis. Finally, an accessory can revolve around a shaft axis, whereby an axis of the accessory is displaced along a circle centered on the shaft axis, without regard to twist or rotation. Furthermore, and equally problematic with the use of accessories, motion of an accessory relative to a club can manifest as one of or any combination of different modes of motion.

[0017] Since the ability of data provided by motion tracking devices to describe actual motion of a golf club is impaired by any motion—even slight nudges—of the device relative to the club, the invention provides an improved ability to use accessories to track motion of a club by exerting forces on the accessory to inhibit, resist, or prevent any mode of relative motion.

[0018] In certain aspects, the invention provides a method of enhancing the pleasure derived from playing golf. Methods of the invention include combinations of providing a grip member to house an accessory coupled to a shaft of a golf club, coupling the accessory to a golf club so that the accessory is housed within the grip member, activating the accessory, and recording, by means of the accessory, data about a swing of the golf club. In some embodiments, the invention includes providing a computer readable medium having instructions thereon which, when executed by a processor, cause a computer device to receive or process the data from the accessory.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] FIG. 1 gives a perspective view of one embodiment of a device of the invention.  

[0020] FIG. 2 shows a grip in which a housing element is rolled back to facilitate access.  

[0021] FIG. 3 is a perspective view of a pliable, turned-down housing.  

[0022] FIG. 4 is a partial perspective view of a housing element extending from a grip.  

[0023] FIG. 5 illustrates a flexible-material housing being bent down.  

[0024] FIG. 6 reveals an accessory partially inserted to a club shaft near an inside-out housing.  

[0025] FIG. 7 shows a housing being folded down, away from an installed accessory.  

[0026] FIG. 8 illustrates an accessory and a housing.  

[0027] FIG. 9 shows an accessory coupled to a golf club and received within a housing.  

[0028] FIG. 10 shows a grip according to certain embodiments of the invention.  

[0029] FIG. 11 shows a perspective view of a grip with a slight taper.  

[0030] FIG. 12 shows a cutaway view of a grip according to certain embodiments of the invention.  

[0031] FIG. 13 shows a grip according to certain embodiments of the invention.  

[0032] FIG. 14A shows an accessory.  

[0033] FIG. 14B shows a grip according to certain embodiments of the invention.  

[0034] FIG. 14C shows a grip and accessory according to certain embodiments of the invention.  

[0035] FIG. 15A shows an accessory.  

[0036] FIG. 15B shows a cutaway view of a grip according to certain embodiments of the invention.  

[0037] FIG. 16 shows an exploded view of a multi-part grip with housing according to certain embodiments of the invention.  

[0038] FIG. 17A is a side view of a core part of a multi-part grip with housing according to certain embodiments of the invention.  

[0039] FIG. 17B is a perspective view of a core part of a multi-part grip with housing according to certain embodiments of the invention.
FIG. 18A is a side view of a cap component of a grip with housing according to certain embodiments of the invention.

FIG. 18B is a perspective view of a cap component of a grip with housing according to certain embodiments of the invention.

FIG. 18C is a perspective view of a cap component of a grip with housing according to certain embodiments of the invention.

Detailed Description

The invention generally provides a golf club grip configured to house an accessory, kits including such a grip, and methods of enhancing the pleasure of golf which involve accessories coupled to golf clubs by means of a housing in a grip.

FIG. 1 shows a grip for a golf club having a sleeve member 109 with a gripping surface, a shaft opening 107, and a housing element 105 configured to house an accessory. Flange 113 generally separates a bore for receiving a shaft from housing element 105. Flange 113 may define hole 103, which can be configured to receive part of an accessory (not pictured in FIG. 1). Flange 113 around the bottom of the housing portion of the grip can act as a stopper so the shaft does not protrude into the housing portion and does not make contact with the accessory when installed in the grip. In a rubber grip, this section can be the same durometer of the rest of the grip, or of a harder durometer. Housing element 105 can hold a variety of objects (including, but not limited to electronics, weights, training devices, accessories, bottle openers, tools, sunscreen, tees, key, or others). Preferably the interior housing portion of the grip is dimensioned properly to allow for expansion when shafted and still provide a tight fit around an accessory.

FIG. 2 shows housing element 105 partially rolled back toward distal portion 111 to facilitate access, and FIG. 3 shows housing element almost fully rolled back, i.e., turned inside-out.

Comparison of FIG. 3 to FIG. 4 illustrates that a grip of the invention is preferably made to be pliable. Pliable generally refers to a material that is easily flexible and resists fatigue. Natural rubber, synthetic rubber and compound materials can be used alone or in conjunction with a number of cord and surface configurations to offer a certain tactile, softness or gripping characteristics. A grip of the invention can be made with cord made of cotton, and grips can be half or full corded. Rubber grips can be made from a blend of liquid rubber and granulated cork, optionally pressure molded, sanded, or painted. Grips can be made of plastics or polymer materials such as, for example, Ethylene Propylene Diene Monomer (EPDM). Grips can be made of leather such as cowhide, calfskin or kangaroo. They can be spiral wrapped. Corded grips can be corded with strands of thread, e.g., to create a non-slip “rain grip”. The housing can either be co-molded into the grip material, or inserted after the grip is made. Co-molding the plastic into the rubber saves weight, allows for greater tolerance, and makes application more streamlined and results in a more attractive grip to some users. A grip or a component of a grip according to the invention can be injection molded, compression molded, or a combination thereof. Suitable materials or methods of making a grip are described in Golf Club Grip, U.S. Pub. 2007/0072066.

The invention provides grips with housing for use with any golf club including, for example, drivers, irons, hybrids, wedges, and putters. For example, where the invention provides a putter grip with a housing, the grip can be tubular, tapered, a paddle style (with a flat area for the thumbs), a pistol style (with a protruding area), or any other style known in the art. A grip of the invention can be substantially evenly round or have a reminder (i.e., a line or rib on the grip that reminds the golfer where the hand should be placed).

A grip can be made to have a graphic, emblem, or marked area. A mark, graphic, or emblem can include an area of a different thickness or texture (e.g., a bas-relief), a pigment, a sticker, a medallion, or other indicator. Generally, such an indicator may be a corporate logo or other visible element, a reminder (e.g., tactile), or both. In some embodiments, a grip of the invention is designed to complement a club with a repositionable shaft. Exemplary club systems are described in Interchangeable Shaft System, U.S. Pub. 2009/0197694; Interchangeable Shaft System, U.S. Pub. 2009/0264214; Interchangeable Shaft System, U.S. Pat. No. 7,699,717; Interchangeable Shaft System, U.S. Pub. 2011/0143854; Interchangeable Shaft and Club Head Connection System, U.S. Pat. No. 7,878,921; Interchangeable Shaft and Club Head Connection System, U.S. Pub. 2010/0261543; Interchangeable Shaft and Club head Connection System, U.S. Pub. 2009/0247316; Quick Release Connection System for Golf Clubs, U.S. Pub. 2008/0125239; Two-Part Hose Connection System for Golf Clubs, U.S. Pub. 2008/0254909; and Interchangeable Shaft for a Golf Club, U.S. Pat. No. 7,476,160, the contents of such of which are herein incorporated by reference in their entirety.

Grips that include a shaft repositionable relative to a club head sometimes provide that the club head may be repositioned at different relative rotations around the shaft axis. In some embodiments, a grip according to the invention includes a graphic, an indicator, or a shape, such that an appearance of the grip and club to a spectator is substantially similar regardless of the effective head-shaft position. For example, where a head can be fixed on a shaft in three different positions, each defined by an angular offset from the others of 120 degrees, a grip of the invention can exhibit three-fold rotational symmetry, whereby a visible element of the grip is repeated in three places, each offset from the others by a 120 degree angular offset. This way, regardless of an effective setting of the golf club, the club and grip appear the same, for example, on a camera recording the game of golf being played. That is, if the grip has a corporate logo on it designed to face forward from the golfer when the club is at address, the grip can have three such logos, so that one is always facing forward from the golfer when the club is at address.

With or without a logo or any other graphic or other visible element, a grip according to the invention can be made a solid color, or a multi-color theme according to a pattern or an irregular mix (e.g., tie-dyed, marbled, or speckled). In some embodiments, a customer chooses a shape for a grip and then a color and orders the grip, for example, from a web site. An ordering system can be configured to receive a customer specified color through an input means, such as an HTML or HTML5 color pickers, receiving Pantone color numbers, color matching to a customer-provided sample, color picking from a catalog, or other means. In one embodiment, a customer takes a picture of an item having a desired color (e.g., a color specimen) and sends the picture to a provider firm. The provider firm may optionally give instructions for including a color standard in the picture, for example, adjacent to the color specimen ("place your existing club next to a primary...")
Preferably, a grip of the invention will include sleeve member 109—an elongated cylindrical portion to sheath a shaft of a golf club and provide a golfer with a good grip on the club. FIG. 4 shows a close view of a grip of the invention revealing that sleeve member 109 can include textured portions, which can be ridges, valleys, knobs, divots, irregular protrusions or recesses, or any other suitable method of providing a gripping surface. Material of the grip can also be made tacky, for instance by choosing a soft rubber, polymer, or composite or by impregnating a primary material with an accessory compound.

Turning between FIG. 4 and FIG. 5 illustrates that a grip of the invention is preferably soft, flexible, or pliable. As seen in FIG. 5, housing 105 is bent down, exposing hole 103. This allows an accessory to be positioned at the end of the club with ease. A grip of the invention may include a rubber or other elastic material which can be bent down, but also which when at rest exerts force on an accessory, for example, by virtue of the tacky surface or the elastic or frictional properties of the material.

Whatever features, colors, materials, or contours are included, a grip may generally be described by its dimensions and other intrinsic properties. A grip of the invention generally includes a housing that is describable according to aspects of a recess therein. In some embodiments, the housing includes a generally cylindrical recess surrounded by a generally tubular wall. The “depth” of the recess can be described by measuring a length of the recess (or the surrounding wall) in a direction generally parallel to a shaft axis, if the grip were installed on a club. The size of the recess may also be described by reference to an internal radius (e.g., of the surrounding wall), measured in a direction perpendicular to the shaft axis. The housing may further be described with reference to a measurement of an external radius of the surrounding wall. A thickness of the wall may be described by a difference of the internal and the external radius.

In some embodiments, a length or an internal radius of the recess is between about 6 and about 26 mm. The external radius may be between about 8 mm and about 30 mm. Generally, the length of the wall (i.e., the length of the recess) may be greater than about 9 mm. In preferred embodiments, a length of the recess is between about 8 mm and about 13 mm; an internal radius is between about 10.5 mm and about 14.5 mm; an external radius is between about 11.5 mm and about 19.5 mm; or any combination thereof. In certain embodiments, the length of the recess may be about 11.5 mm, the internal radius may be about 12.5 mm, the thickness of the wall may be about 2 mm, the maximum length of the grip may be about 27 cm, or any combination thereof.

Generally, the grip may have a mass between about 40 grams and about 55 grams, or between about 15 grams and about 70 grams. Preferably, the grip has a mass between about 44 grams and about 53 grams. In certain embodiments, the mass is between about 48 grams and about 52 grams.

In some embodiments, the grip may be scaled up, or scaled down (e.g., for a club for a younger person or very tall person, or for a mini or outsized model club or grip for display as a demonstration) and proportions of the grip may then generally be described by reference to unitless ratios. In some embodiments, a ratio of a length of the recess to a thickness of the wall is greater than four and may be between about 5 and about 7. In some embodiments, a ratio of a length of the recess to a thickness of the wall is between about 5.5 and about 6.5. Preferably, a ratio of the length of the recess to a thickness of the wall is at least about 2.5 or about 3. In some embodiments, a ratio of a length of the recess to an internal or external radius of the recess is between about 7 and about 2.5, and may preferably be between about 8 and about 1.5. Generally, a ratio of an external radius of the recess to an overall length of the grip may be between about 0.02 and about 0.12, and may be between about 0.03 and about 0.09. Preferably, a ratio of an external radius of the recess to an overall length of the grip may be between about 0.05 and about 0.06. Generally, a ratio of a length of the recess to an overall length of the grip may be between about 0.01 and about 0.09, and may preferably be between about 0.02 and about 0.07. In some embodiments, a ratio of a length of the recess to an overall length of the grip may be between about 0.035 and 0.05.

A grip of the invention generally may have any mass depending on its scale and size. In some embodiments, a grip of the invention has a mass between about 10 grams to about 70 grams, preferably between about 30 grams and about 60 grams. In a preferred embodiment, a grip has a mass of between about 40 grams and about 55 grams, preferably between about 51 and about 53 grams.

In certain aspects, the invention provides a kit including a grip and an accessory 201. FIG. 6 shows accessory 201 having stem 205 partially inserted to a club shaft near an inside-out housing 105 at the end of sleeve member 109. One or more of cutout 207 can be provided in stem 205 allowing stem 205 to be squeezed to have a smaller circumference at least at part of its length (e.g., during insertion), thereby allowing accessory 201 to be coupled to the golf club substantially by an expansive force—the force exhibited in an outward direction generally perpendicular to the shaft axis by the “legs” of stem 205, due to its being squeezed into the golf club shaft. The accessory could also have no stem.

A relationship of the material of the grip to accessory 201 is exhibited, in part, in FIG. 7, showing a housing being folded down, away from an installed accessory. Where the material is pliable, the rubbery sleeve can be peeled back this way many times, allowing different accessories to be positioned therein. Due to the workable nature of the material, the grip should not interfere with the complete removal of accessory 201 from the club, as shown in FIG. 8. However, due to elastic properties, dimensions, and surface properties, when accessory 201 is fully positioned in the grip, as shown in FIG. 9, motion of accessory 201 relative to the club is prevented.

Due, at least in part, to the contact of housing 105 on accessory 201 as shown in FIG. 9, the grip exerts forces on accessory 201 that resist motion. When housed, accessory 201 is prevented from moving relative to a golf club in any of a number of modes including twisting, rotation, revolution, swiveling, shearing, longitudinal, or any combination thereof. This phenomenon relates to the coupling of an interior surface of housing 105 to an exterior surface 201. By matingly coupling—that is, substantially matching and complementing each other in dimensions—surface contact creates much of the desired force. Due to the mating coupling, there are surfaces in contact in every direction. In some
embodiments, any line that passes through a center of gravity of accessory 201 has at least one parallel line that passes through a mated pair of surfaces between accessory 201 and housing 105. That is, accessory 201 may be substantially surrounded by the housing. Accessory 201 may have a surface in contact with and bounded by material of the grip in each of an x, y, and z direction. Thus, pressure or friction exists at each or every potential direction of motion. Accordingly, a grip of the invention provides the beneficial result that relative motion between the accessory and the club is prevented during play, which includes restricting such motion to less than fractions of a millimeter in any relevant direction. In some embodiments, when a club is played, a coupled accessory moves less than about a tenth or a quarter of a millimeter relative to the club and, due to elastic properties of the grip, returns to its original position.

[0061] In some embodiments, for example as shown in FIG. 10, an outside wall of housing 105 will have a slight “reverse taper”. Reverse taper generally refers to a tapering in a direction opposite of tapering of sleeve member 109. Outside wall can taper in by an amount between about 2° and about 8°, preferably about 5°. Provision of a reverse taper can more tightly grip accessory 201, thereby preventing or inhibiting relative motion. FIG. 11 shows a perspective view of a grip in which housing element 105 exhibits a slight reverse taper. The base of housing element 105 includes an optional protrusion 335, discussed in more detail below.

[0062] FIG. 12 shows a cut-away view of a grip according to certain embodiments of the invention. As can be seen in FIG. 12, at the base of housing element 105 is a flange designed to separate an accessory from a shaft of a golf club. Sleeve member 109 is tapered, and housing element 105 exhibits a slight reverse taper with an angle between about 4° and about 6°. It can be seen from FIG. 12 that interior housing portion of the grip is dimensioned properly to allow for expansion when shifted and still provide a tight fit around accessory 201 (not shown in FIG. 12).

[0063] In some embodiments, the invention provides a grip that tapers over the top of accessory 201 to almost completely encapsulate it. One example such a grip is depicted in FIG. 13. This allows for more impact protection and increase the stability of the accessory inside the grip. By using a grip in which housing element 105 envelops much of accessory 201 (e.g., the grip in FIG. 13), relative motion between the accessory and the club is minimized (not shown in FIG. 13).

[0064] In some embodiments, a portion of the grip or the housing and a portion of accessory 201 each include a slot or a corresponding protrusion to prevent relative motion or to ensure proper alignment. For example, FIG. 11 shows a housing element 105 having a rib slot 335 designed to engage with a corresponding protrusion on accessory 201 (not shown). In the alternative, the housing element 105 has a rib protrusion designed to engage with a corresponding slot on accessory 201.

[0065] FIG. 14A shows accessory 201 having a rib protrusion 535, which corresponds to slot 537 shown in the housing interior of the grip shown in FIG. 14B. When accessory 201 is inserted into a grip, it will be found to only fit well at a single rotational position. This is illustrated by a top-down view of accessory 201 in housing element 105 in FIG. 14C. FIG. 14C shows that rib protrusion 535 matingly couples with slot 537 to prevent rotation and ensure proper alignment. A housing element or accessory of the invention can have one or more (e.g., any number) of the same or different slot or protrusions, the slot or protrusion being on either of the accessory or grip, as shown herein. For example, a grip could have two, three, or more of slot 537. Slot 537 can have any width, breadth, or dimensions as would be recognized as suitable by one of skill in the art.

[0066] In certain embodiments, accessory 201 and housing element 105 having a cross-sectional shape of their mating surfaces (e.g., outside surface of accessory and inside wall of housing) that is not round. For example, a triangular, oval, egg-shaped, T-shaped, or irregular-shaped accessory can be provided with a correspondingly-shaped housing recess. In this way, relative rotational motion can be prevented.

[0067] A slot and protrusion as shown in FIGS. 14A-14C cooperate to inhibit relative motion having a rotational component. FIGS. 15A and 15B show a slot 737 and a protrusion 735 that inhibit relative motion having a longitudinal component. FIG. 15B depicts a cutaway view of a top of a grip of the invention. As shown in FIG. 15A, around the top of accessory 201 is an annular protrusion 735. As accessory 201 is inserted into housing element 105, pliable material of the grip expands to receive protrusion 735 until protrusion 735 is matingly received within slot 737. As discussed above, a housing could have slot 737 and slot 537, or one or more of any combination of them. Also, or in the alternative, one or more of any combination of protrusion 335, 535 or 735 could be on or in housing element 105.

[0068] FIG. 16 shows a multi-part grip with housing according to certain embodiments of the invention. Grip core 913 can be positioned over a shaft of a golf club. Grip surface 909 covers grip core 913, with a bottom edge of grip surface 909 received under bottom trim element 941. End cap 905 is mated with grip core 913 under grip surface 909 such that top trim element 943 covers a top edge of grip surface 909. While FIG. 16 generally depicts a long grip core and short cap, either one could be long than the other, or they could be about equally long. In the alternative, the grip core and cap could be comprised as a single unit.

[0069] In FIG. 16, grip surface 909 is shown as a generally cylindrical element having a textured surface (here, a trompe l'oeil representing a leather wrap). In other embodiments, grip surface 909 is provided by a spiral-wrapped material such as a leather (optionally with an adhesive element), grip tape, or any other suitable material in any suitable configuration.

[0070] FIGS. 17A and 17B show a grip core 913 in side view and perspective view, respectively. One end of grip core 913 presents trim element 941 at one end and at the other end presents a butt end to mate with end cap 905. Optionall, as seen in FIG. 17B, the butt end of grip core 913 includes a protrusion 335, which can matingly couple with a complementary surface of an accessory. FIGS. 18A-18C show end cap 905 to cover the butt end of grip core 913. End cap 905 supplies housing element 105 by nature of the shape of end cap 905, particularly in cooperation with butt end of grip core 913. A distal (i.e., butt) end of end cap 905 provides top trim element 943 to receive an edge of grip surface 909, thereby providing aesthetic closure and functionally securing grip surface 909 to a golf club.

[0071] In certain embodiments, the invention provides a housing that stabilizes an accessory relative to a club during play or a kit including such a housing and such an accessory. One exemplary accessory that can be stabilized by the grip with housing of the present invention includes an orientation and time-sensing alarm as described in Orientation/Time
Sensing Alarm Device For Golf Club, U.S. Pat. No. 6,753,778, incorporated by reference herein in its entirety. In some embodiments, provision of a housing of the invention allows the grip to house an electronic device that was previously only known to be containable within a shaft of the club (see, e.g., Golf Club Rhythmic Swing Meter, U.S. Pat. No. 6,517,352, incorporated by reference herein in its entirety) entirely or substantially (e.g., >than 60% of its volume) inside of the grip, and also substantially outside of the shaft of the club—providing for greater ease of interchangeability.

In certain embodiments, the invention provides a kit comprising a grip and accessory 201, for example, as illustrated in FIG. 8. Accessory 201 can confer any number of desirable functions to golf clubs. Accessory 201 can include a bottle opener, a cigar cutter, a compass, a flashlight, a figurine (e.g., a joke statuette, a sports mascot, or a decorative sculpture), or an electronic appliance.

In certain embodiments, accessory 201 includes one or more of a motion sensor, accelerometer, gyroscope, and light detector. A device can be included that detects or measures motion of the club in any one of, or any combination of, numerous modes including acceleration, translation motions, vibration, shock, tilt, and rotation.

Accessory 201 can offer a desired function such as swing improvement or training, situational on-off switching, or gesture recognition (e.g., two quick vertical shakes of a golf club signals an app on a golfer’s smart phone to mark a position on a map for future reference). In some embodiments, accessory 201 includes one or more of an accelerometer with low-g sensing ranges (e.g., roughly human generated), an accelerometer with high-g sensing ranges (e.g., roughly vehicle generated), a gyroscope, a multi-axis gyroscope unit, a multi-axis accelerometer unit, or a combination thereof.

Accessory 201 can include devices to measure one or more aspects of a swing. Exemplary systems and methods for describing swing tempo are described in Golf Swing Tempo Measurement System, U.S. Pat. No. 7,160,200, the contents of which are hereby incorporated by reference in their entirety. An electronic device accessory 201 can include a camera or an audio output, for example, to deliver instructions or tips to a golfer. Exemplary devices are described in Golfing Aids, U.S. Pub. 2009/0239673, incorporated herein by reference in its entirety. Electronic club tags that detect light or include an antenna are described, for example, in Golf Club Apparatuses and Methods, U.S. Pub. 2010/0308105, and in Golf Data Recorder with Integrated Missing Club Reminder and Theft Prevention System, U.S. Pub. 2009/0233735, the contents of both of which are incorporated by reference herein in their entirety.

Accessory 201 can capture data reflecting that a device is picked up or put down, make precise measurements of an object’s motion, or provide data to be recorded, so that a record is accumulated including an object’s history of motions or positions. Further a record of an object’s motions allows a different set of motions to be compared to each other, preferably with great precision, for example, by a computer processor (e.g. to determine if a later swing conforms to a desired objective more than an earlier swing—“Am I improving?”). An exemplary device including an orientation and position sensor with an RF transceiver is described in Miniaturized Wireless Inertial Sensing System, U.S. Pat. No. 7,672,781, the contents of which are hereby incorporated by reference in their entirety.

In certain embodiments, accessory 201 includes motion sensors as described above with requisite means (e.g., microchip or ASIC) to detect and interpret specified gestures. Defined gestures, such as tapping the head of a golf club while it is in a bag, or tapping the ground a specified number of times with a club while standing at address, allow users to activate different features or adjust a mode of operation. Gesture recognition is particularly useful in golf, where physical buttons and switches would be disfavored on a golf club. Switch (or button) free designs are more aesthetically pleasing, waterproof, and best in keeping with modern technological trends.

In some embodiments, the invention provides methods for enhancing the pleasure of playing golf involving providing a grip with housing and accessory 201. Accessory 201 can be configured to communicate with other electronic devices. For example, accessory 201 can include wireless communication means such as a 3G or 4G cell antenna, Bluetooth, or a Wi-Fi card. A chip on accessory 201 can communicate, directly or via a network, with another electronic device that offers some functionality to a golfer. For example, accessory 201 can communicate with a smartphone (e.g., Samsung Galaxy SII or another Android phone), an iPhone, a tablet computer, a laptop, or any other electronic device. Data collected by accessory 201 can be transmitted to another electronic device for further storage or processing. Exemplary systems and methods for improving performance to enhance enjoyment of golf by data collection are discussed in Method and System for Athletic Motion Analysis and Instruction, U.S. Pub. 2007/0270214, and Method and System for Athletic Motion Analysis and Instruction, U.S. Pub. 2006/0166737, the contents of each of which are hereby incorporated by reference in their entirety. Methods of the invention can include providing a grip in accordance with any embodiment of the invention.

In some embodiments, the invention provides software for processing data captured by accessory 201. Software can be an app that a golfer downloads onto a device, an application that a golfer installs onto a computing device, one or more programs that run on a web server accessible, for example, via a web page, or any combination thereof. By installing the golf-data analyzing software or running it in the memory of a computer device including a memory coupled to the processor, the processor can execute one or more programs to analyze data related to the playing of golf. Analysis includes displaying, comparing, and calculating (e.g., taking an average or interpolating a trend).

The invention provides a grip with housing that fastens accessory 201 to a golf club preventing relative motion therebetween, while still allowing for easy, during-game removal or placement of accessory 201. Thus, the invention further enables the electronic capture of detailed and precise information about actual swings and strokes, including the path of the club through air. By calibrating the club or providing specified dimensions of the club to accessory 201 or associated analysis software, motion data from devices (e.g., accelerometers) in accessory 201 can be used as a basis for calculating motion data of any other part of a club head. For example, if one or more accelerometers detects that a club is swung through 36 degrees of an arc in 1 second, and data is supplied that a sweet spot of a club face is 2 meters from the center of the circle defining the arc (i.e., the pivot point), then a processor can calculate that the sweet spot moved along a line of length $(36\times360)\times2\pi r$, where $r=2$ m in 1
s, which gives a distance, \( d = 0.1471 \text{ m} \) and a time \( t = 1 \text{ s} \). Thus, a computer device of the invention can calculate \( d = rt \) to determine (via \( r = \frac{d}{t} \)) that a golfer’s rate of swing is about 1.3 m/s. Methods of the invention include performing a calculation based on data about a golfer’s swing using a computer processor and providing the results for a golfer.

[0081] Accordingly, the invention provides systems for improving performance or enjoyment of golf including a club having a grip with a housing binding an accessory thereto, an electronic device communicatively coupled to the accessory and having a memory and a processor, and a computer-readable medium having program instructions thereon which, when executed, cause the processor to analyze data collected by the accessory about a golfer’s swing. It will further be appreciated that more than one of accessory **201** can be used by more than one golfer in concert to develop a social or competitive aspect of the game. For example, two golfers can program their accessories or electronic device to display each other’s stroke information, shot tracking, present position on a golf course, or other information to each other. They can compare shots, plan their progress through a golf course even when not within earshot of each other, and readily access (e.g., via the internet) data about the course, how pros play, or recommendations about clubs for certain shots. Communicating sports-related information is discussed in SYSTEMS AND METHODS FOR COMMUNICATING SPORTS-RELATED INFORMATION, U.S. patent application Ser. No. 13/156,116 to Tim Beno, et al., filed Jun. 8, 2011, the contents of which are hereby incorporated by reference in their entirety.

INCORPORATION BY REFERENCE

[0082] References and citations to other documents, such as patents, patent applications, patent publications, journals, books, papers, web contents, have been made throughout this disclosure. All such documents are hereby incorporated herein by reference in their entirety for all purposes.

Equivalents

[0083] Various modifications of the invention and many further embodiments thereof, in addition to those shown and described herein, will become apparent to those skilled in the art from the full contents of this document, including references to the scientific and patent literature cited herein. The subject matter herein contains important information, exemplification and guidance that can be adapted to the practice of this invention in its various embodiments and equivalents thereof.

What is claimed is:

1. A grip for a golf club, comprising:
   - a sleeve member;
   - a gripping surface;
   - a shaft opening at a first end for receiving a shaft therein at a first end; and
   - a housing element configured to house an accessory, wherein the grip has a maximum length from the first end to a second end, an interior bore configured to receive an end of a shaft, and an exterior surface to provide a grip.

2. The grip of claim 1 wherein the housing comprises a continuation of the sleeve member defining a cylindrical wall with an open end and a recess therein having a length measurable parallel to a shaft axis, an internal radius measurable perpendicular to the shaft axis, and a wall thickness measurable perpendicular to the shaft axis.

3. The grip of claim 2 wherein the length of the cylindrical recess is more than about 7 mm.

4. The grip of claim 2 wherein an interior surface of the recess is configured to matingly couple with a surface of the accessory.

5. The grip of claim 1 further configured to fasten the accessory to the shaft with sufficient force to prevent motion of the accessory relative to the shaft while the golf club is being used to play golf.

6. The grip of claim 1 further configured to house an accessory that is fastened to a golf club at least by an expansive force exerted by the accessory on an inside wall of the shaft.

7. The grip of claim 1, further configured to house an accessory during a game of golf such that a majority of the accessory is outside of the shaft, a majority of the accessory is inside of the grip, and a portion of the accessory is viewable to a player when the club is at address.

8. The grip of claim 1, wherein the housing element comprises a pliable material that can be turned inside-out and holds its shape when turned inside out.

9. The grip of claim 4, wherein the housing element comprises a flexible material that can be peeled away from the accessory.

10. The grip of claim 2, wherein a ratio of the length to the wall thickness is greater than four.

11. The grip of claim 2, wherein the length of the wall is greater than about 10 mm, and further wherein the maximum length of the grip is between about 23 cm and about 31 cm.

12. The grip of claim 1, wherein the grip has a mass between about 40 grams and about 55 grams.

13. The grip of claim 2, wherein the internal radius of the recess is between about 10 mm and about 15 mm.

14. The grip of claim 2, wherein the internal radius of the recess is between about 11.5 and about 13.5 mm.

15. The grip of claim 2, wherein a ratio of the length of the recess to the internal radius of the recess is greater than about 8.5.

16. An accessory kit for a golf club comprising:
   - a grip member, comprising a housing element configured to house an accessory and a sleeve member configured to receive a shaft of the golf club, thereby coupling the accessory to the golf club; and
   - an accessory configured to be housed within the housing element, thereby being subjected to a rotation resistant force, a shear resistant force, a twist resistant force, and a longitudinal resistant force, wherein each force prevents motion of the accessory relative to the golf club.

17. The kit of claim 16 wherein the housing element is configured to receive the accessory within a substantially tubular sleeve protruding beyond an end of the shaft and having a length as well as an internal radius and an external radius defining a wall thickness such that a ratio of the length to the internal radius is greater than about **0.8**.

18. The kit of claim 17 wherein the accessory comprises an accelerometer, a battery, and an RF transceiver.

19. A method of enhancing pleasure derived from playing golf, comprising:
   - providing a grip member to house an accessory coupled to a shaft of a golf club, the grip member comprising a sleeve with an opening at a first end to receive a shaft of the golf club and a cylindrical wall defining a recess at a
second end, wherein the recess has a length parallel to a shaft axis as well as an internal radius and an external radius perpendicular to a shaft axis defining a wall thickness, and further wherein a ratio of the length to the radius is between about 0.8 and about 3, and a ratio of the length to the thickness is between about 3 and about 20; coupling the accessory to a golf club so that the accessory is housed within the grip member; activating the accessory, and recording, by means of the accessory, data about a swing of the golf club.

20. The method of claim 19, further comprising:
providing a computer readable medium having instructions thereon which, when executed by a processor, cause a computer device to receive the data from the accessory.

21. The method of claim 20, wherein the sleeve and the cylindrical wall are monolithically formed of a pliable material and further wherein the ratio of the length to the internal radius is between about 0.7 and about 1.3.

22. The method of claim 21, further comprising:
coupling the accessory to the golf club such that each of a rotation resistant force, a swivel resistant force, a shear resistant force, a twist resistant force, and a longitudinal resistant force is present to prevent motion of the accessory relative to the golf club while golf is being played.