



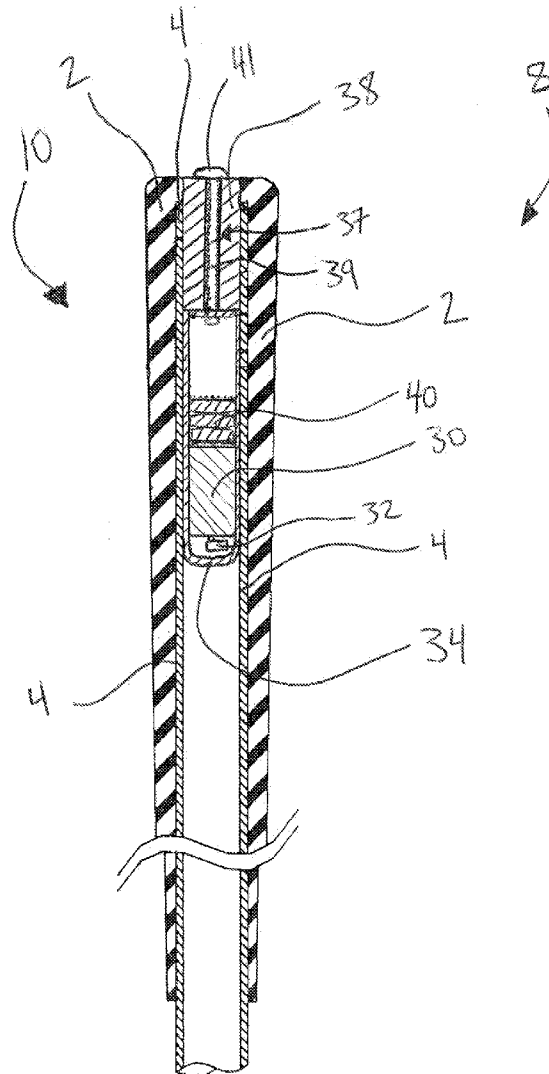
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(19) **United States**(12) **Patent Application Publication**
Luttrull(10) **Pub. No.: US 2015/0065263 A1**(43) **Pub. Date: Mar. 5, 2015**(54) **GOLF SWING TRAINING AID AND METHOD
OF USE THEREOF**(71) Applicant: **David Luttrull**, Phoenix, AZ (US)(72) Inventor: **David Luttrull**, Phoenix, AZ (US)(21) Appl. No.: **14/472,102**(22) Filed: **Aug. 28, 2014****Related U.S. Application Data**(60) Provisional application No. 61/871,451, filed on Aug.
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(57)

ABSTRACT

A golf swing training aid is provided. The golf swing training aid device may include a vibration element configured on a golf club, the vibration element being in functional communication with an interior of the golf club, the vibration element being configured to switch between an active state and an inactive state. The golf swing training aid may further have a power source and a control in functional communication with the power source and the vibration element. Upon operation of the control, the control functionally couples the power source to the vibration element to transition the vibration element between the active and inactive states, wherein in the active state, the vibration element provides vibrational input to a golfer's hands positioned on a grip of the club.



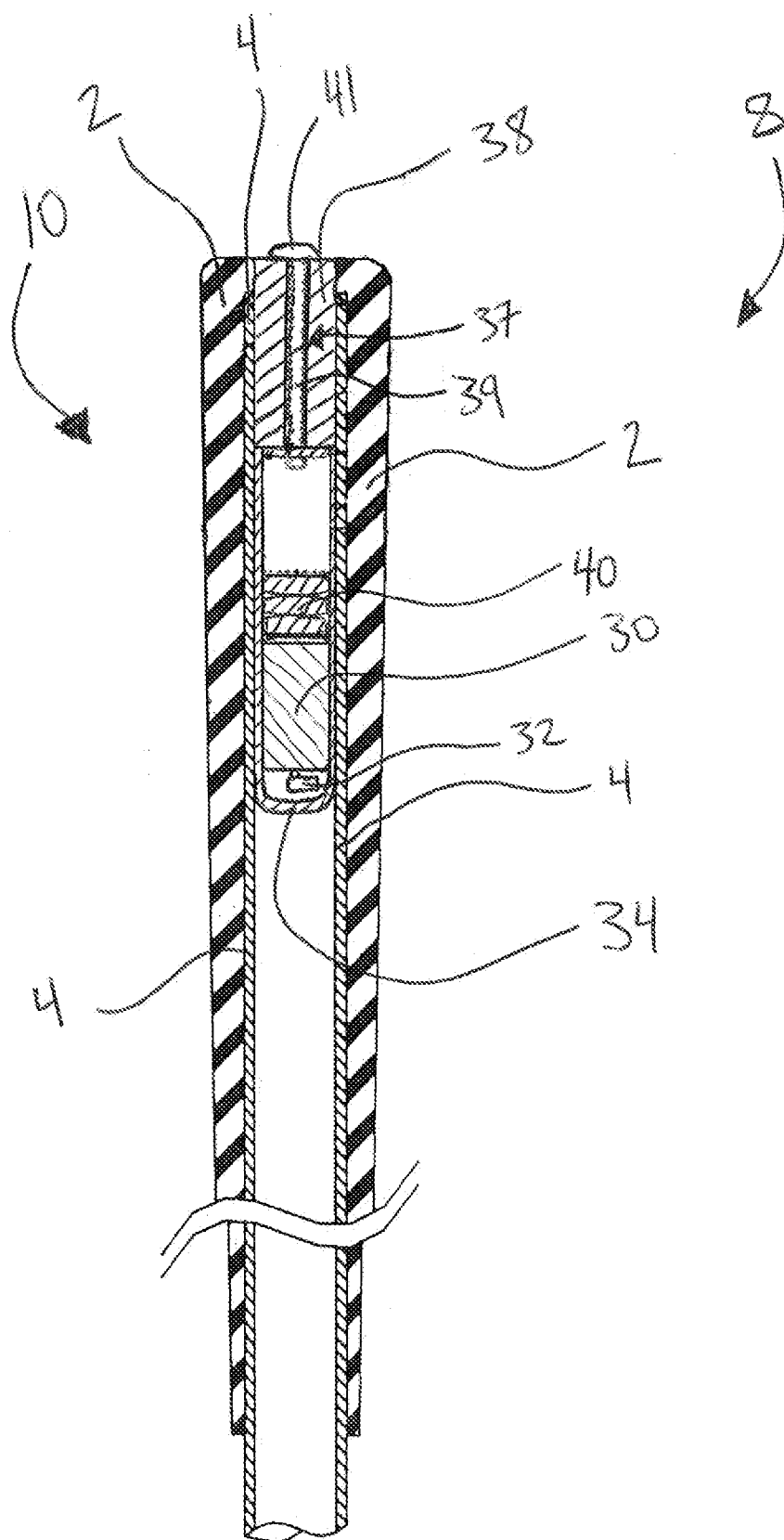


FIG. 1

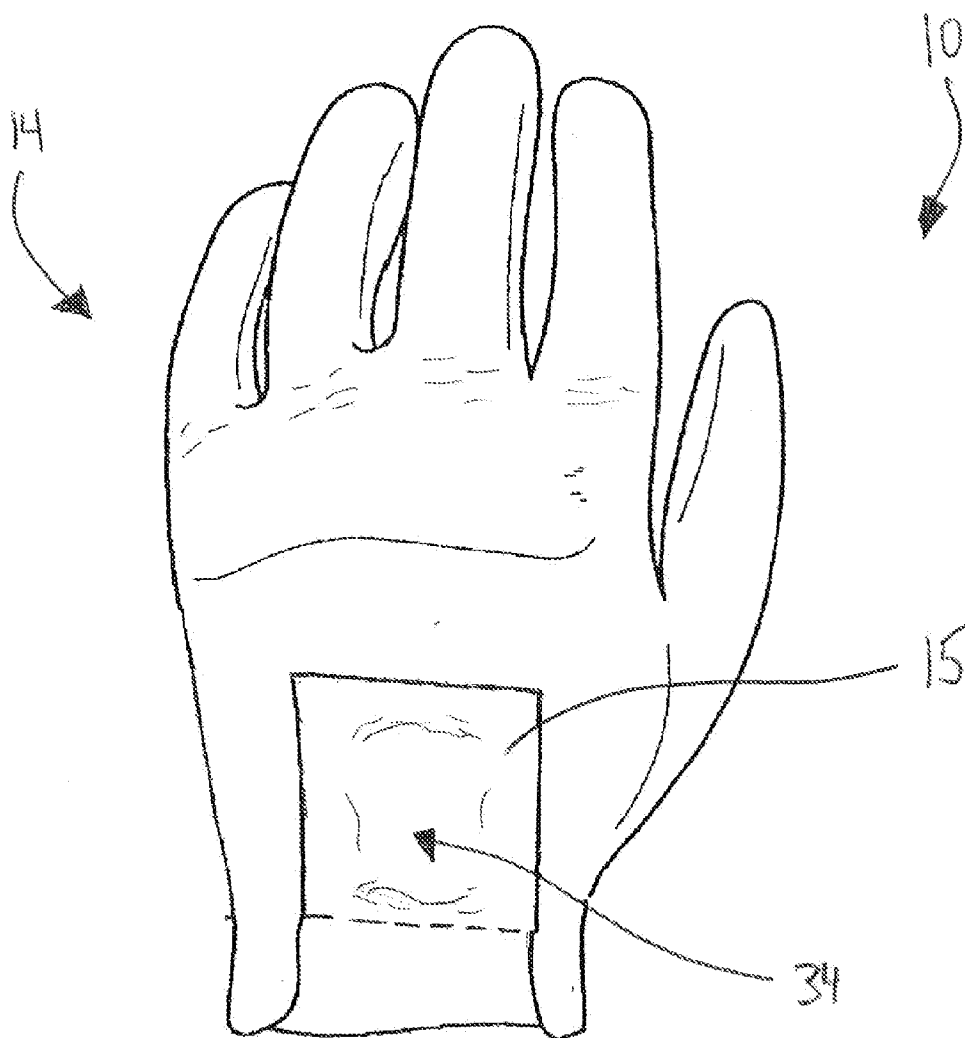


FIG. 2

FIG. 3

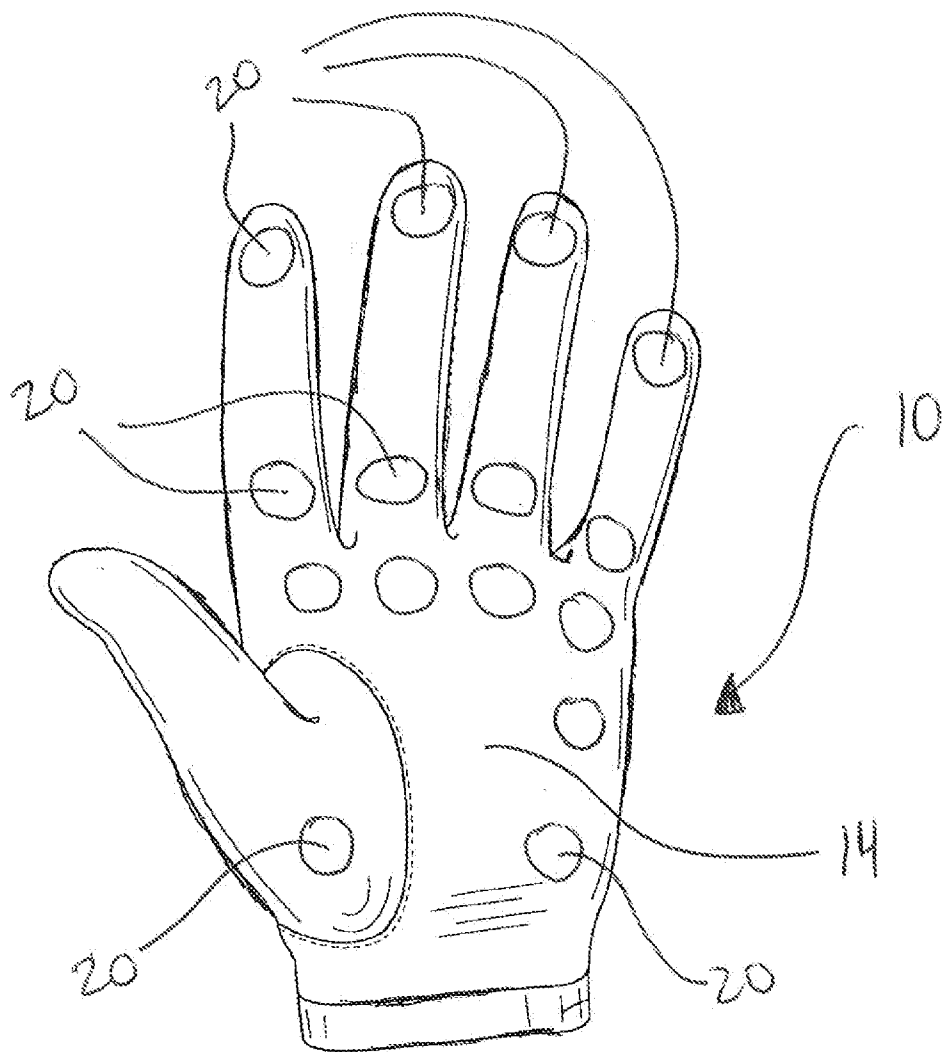


FIG. 4

GOLF SWING TRAINING AID AND METHOD OF USE THEREOF

CROSS REFERENCE TO RELATED APPLICATION[S]

[0001] This application claims priority to U.S. Provisional Patent Application entitled “GOLF SWING TRAINING AID AND METHOD OF USE THEREOF,” Ser. No. 61/871,451, filed Aug. 29, 2013, now pending, the disclosure of which is hereby incorporated entirely herein by reference.

BACKGROUND

[0002] 1. Technical Field

[0003] The following relates generally to golf equipment, and in particular to a golf swing training device that aids a golfer in achieving the proper grip of a handle of a golf club.

[0004] 2. State of the Art

[0005] With so many physical distractions on the golf course, including sand traps, water hazards, deep rough, and wind, just to name a few, and all the other mental details that go into playing the sport of golf effectively, the only thing the golfer truly has control of is the physical connection (i.e., grip) to the handle of the golf club. And, although at first glance the art of gripping the handle may seem simple and even routine, there is much more to it than meets the eye. Indeed, because a golfer's hands are the link between the golfer and the golf club, the golfer's grip on the handle is paramount to achieving a high-quality, repetitive golf swing that produces consistent results. The configuration of the hands and fingers is only one aspect of the grip. The grip pressure and the grip pressure consistency through the stroke or swing all affect the proper release for the club and allow the club face to maintain the same orientation through the motion as the original set-up position.

[0006] Professional golfers and instructors alike will tell you that golf begins with a good grip. Holding the handle of the golf club correctly gives the golfer a feel for the club and is the source of everything that follows in the golf swing. Without achieving the proper grip of the handle, a golfer may never be able master the finer techniques of the golf swing, because the variables in the swing that are compounded by an incorrect grip of the handle will never allow the golfer to do so.

[0007] Many theories have been introduced and much instruction has been developed to help golfers achieve a proper grip on the handle, including proper hand and finger placement, as well as grip tension and/or pressure, both in a static grip and a dynamic grip. For example, the primary goal of the hands in a static grip is to grip the handle so that the hands and fingers are in the proper placement with respect to one another on the handle and to apply the correct grip pressure on the handle. Thereafter, in a dynamic grip, the golfer swings the club and attempts to make the proper swing according to the shot being executed, while also attempting to square the club face to the golf ball at the point of contact. To achieve this goal, a golfer attempts to grip the handle tightly enough to prevent it from slipping out of the golfer's hands during the swing and also lightly enough to not cause the golfer to execute a poor golf shot. Indeed, too tight of a grip on the handle may cause the golfer to execute a bad swing, which more often than not results in a poor shot. Moreover, too tight of a grip on the handle may diminish the potential power generated by the golfer. It is therefore the goal to correctly

hold the handle properly with the hands and fingers, as well as keep a constant, light grip pressure to the handle which does not change through the swing or putting motion.

[0008] Yet, even when a golfer understands these principles, putting them into action on the course or on the driving range is a tall order. How much grip strength and grip pressure is appropriate for each individual golfer and each individual type of golf shot is as varied as the individual golfer himself/herself.

[0009] Accordingly, there is a need in the golf industry for a product and method of use thereof that can assist the individual golfer in learning and repeating the proper grip of the handle of the golf club for any number of golf shots.

SUMMARY

[0010] The following relates to golf equipment, and in particular to a golf swing training device that aids a golfer in achieving the proper grip of a handle of a golf club.

[0011] A first general aspect relates to a golf swing training device, the training device comprising a vibration element configured on a golf club, the vibration element being in functional communication with an interior of the golf club, the vibration element being configured to switch between an active state and an inactive state, a power source, and a control in functional communication with the power source and the vibration element, wherein operation of the control functionally couples the power source to the vibration element to transition the vibration element between the active and inactive states, wherein in the active state, the vibration element provides vibrational input to a golfer's hands positioned on a grip of the club.

[0012] Another general aspect relates to wherein the vibration element is configured to be releasably and repeatedly coupled to the interior of the golf club.

[0013] Another general aspect relates to wherein the vibration element is configured to be hidden from view.

[0014] Another general aspect relates to wherein the power source is a stackable battery configuration, a single battery configuration, a rechargeable battery configuration, and/or a disposable battery configuration.

[0015] Another general aspect relates to wherein the vibration element is configured to functionally engage the interior of the shaft of the golf club in a friction fit arrangement.

[0016] Another general aspect relates to wherein the vibration element is configured to be a part of a positioning mechanism that may be configured to house the vibration mechanism and the battery within the interior of the golf club shaft.

[0017] Another general aspect relates to wherein the positioning mechanism includes a flexible stopper that is configured to engage the interior surfaces of the golf club and thereby securely position the positioning mechanism within the interior of the golf club at the distal end of the shaft near the grip.

[0018] Another general aspect relates to a golf swing training device, the training device comprising a vibration element configured on a backside of a golf glove, the vibration element being configured to switch between an active state and an inactive state, a power source, and a control in functional communication with the power source and the vibration element, wherein operation of the control functionally couples the power source to the vibration element to transition the vibration element between the active and inactive states,

wherein in the active state, the vibration element provides vibrational input to a golfer's hands positioned in the golf glove.

[0019] Another general aspect relates to a method of swinging a golf club, the method comprising coupling a vibration element to a golf club, activating the vibration element to provide vibrational stimulus to a golfer's hands that are gripping a grip of the golf club, and swinging the golf club to strike a golf ball.

[0020] The foregoing and other features, advantages, and construction of the present disclosure will be more readily apparent and fully appreciated from the following more detailed description of the particular embodiments, taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] Some of the embodiments will be described in detail, with reference to the following figures, wherein like designations denote like members.

[0022] FIG. 1 is a cross-sectional view of an embodiment of a golf swing training aid device in accordance with the present disclosure.

[0023] FIG. 2 is a back view of an embodiment of a golf swing training aid in accordance with the present disclosure.

[0024] FIG. 3 is a cross-sectional view of an embodiment of a golf swing training aid device in accordance with the present disclosure.

[0025] FIG. 4 is a front view of an embodiment of a golf swing training aid in accordance with the present disclosure.

DETAILED DESCRIPTION OF EMBODIMENTS

[0026] A detailed description of the hereinafter described embodiments of the disclosed apparatus and method are presented herein by way of exemplification and not limitation with reference to the Figures listed above. Although certain embodiments are shown and described in detail, it should be understood that various changes and modifications may be made without departing from the scope of the appended claims. The scope of the present disclosure will in no way be limited to the number of constituting components, the materials thereof, the shapes thereof, the relative arrangement thereof, etc., and are disclosed simply as an example of embodiments of the present disclosure.

[0027] As a preface to the detailed description, it should be noted that, as used in this specification and the appended claims, the singular forms "a", "an" and "the" include plural referents, unless the context clearly dictates otherwise.

[0028] Referring to the drawings, FIG. 1 depicts an embodiment of a golf swing training device 10. Embodiments of the training device 10 may comprise various structural components that complement one another to provide the unique functionality and performance of the training device 10, the structure and function of which will be described in greater detail herein. For example, embodiments of the training device 10 may comprise a vibration element 30, a power source 40, and a control switch 41 configured in the handle of a golf club 8. The handle of the golf club may comprise the grip of the golf club and the underlying shaft region.

[0029] Embodiments of the training device 10 may comprise a vibration element 30. The vibration element 30 may be configured to be in functional communication with the power source 40 via the control switch 41 (ON/OFF switch), such that upon operation of the control switch 41, the power source

40 can provide power to the vibration element 30 to cause the vibration element 30 to function according to its intended purpose. In other words, upon activation of the vibration element 30 from its inactive state to its active state by the switch 41, the vibration element 30 may provide vibrational movement, motion, agitation, or other similar repetitive movement to the handle of the golf club 8.

[0030] Embodiments of the training device 10 may include the vibration element 30 being configured within a hollow 5 of the shaft 4 of the golf club 8, as depicted in FIG. 1, so as to be out of sight of the golfer and hidden from view. In addition, with the vibration element 30 positioned within the shaft 4, the vibration element 30 does not interfere with the normal operation of the golf club or putter. With the vibration element 30 positioned within the hollow 5 of the shaft 4, the vibration element 30 may be in functional communication with the shaft 4 of the golf club 8, so that under the condition that the vibration element 30 is in an active state, the vibrational movement generated by the vibration element 30 may travel from the vibration element 30 to the shaft 4 and/or the grip 2 and onto the hand(s) of the golfer to indicate to the golfer that the vibration element 30 has been triggered and/or is active. Thus, the golfer can sense or feel the vibration of the vibration element 30 when active. When in the inactive state, the vibration element 30 does not vibrate so that the golfer does not feel the vibration sensation.

[0031] Embodiments of the training device 10 may be utilized by a golfer to benefit the golfer's grip on the handle of the club 8. In most cases, the handle of the club 8 will comprise the grip 2 of the club, the grip 2 being comprised of rubber-type material that is placed on the club 8 around the exterior of the shaft 4 at the distal end of the club 8 away from the club head. The grip 2 may allow the golfer to achieve a better grip on the handle of the golf club 8 to manipulate the golf club 8 during a golf swing or during a golf putting stroke.

[0032] Activating the vibration element 30 within the golf club 8 can be used to train a golfer to apply the correct grip pressure to the handle or grip 2 of a golf club 8 (i.e., driver, long iron, short iron, or putter). For example, the vibration element 30 that is positioned in the club 8 proximate the grip 2 may serve to accentuate the senses in the golfer's hands that are positioned on the grip 2. The vibration element 30 may also serve to accentuate the sensory input in the golfer's brain received from the golfer's hands, which helps focus the golfer's mind. For example, before swinging the golf club 8 or before using the putter, a golfer may manually activate the vibration element 30 by operation of the switch 41. In this way, the vibration element 30 can provide vibrational input to the handle or grip 2 that can be sensed by the golfer's hands and processed by the golfer's mind both before and during the golf swing or putting stroke.

[0033] Such vibrational effects from the vibration element 30 may serve, among other things, to relax the golfer's hands, to massage the golfer's hands, or to continuously remind the golfer's hands and brain by sensory stimulation of the hands to maintain the correct grip pressure during the swing or putt. For example, such vibrational effects, or massaging effects, may allow the golfer to relax the golfer's muscles and hands on the handle or grip 2 of the golf club 8 to allow the golfer to apply the correct amount of grip pressure to the handle or grip 2 prior to the swing. Such vibrational effects may also serve to remind the golfer to maintain a constant and consistent grip pressure on the handle or grip 2 during the golf swing or putting stroke. Indeed, such vibrational effects from the

vibration element **30** may allow the golfer's muscles to relax and not grip the handle or grip **2** as tightly as might otherwise be the case. Further to the above, because of the sensory stimulus that the vibrational effects and massaging effects from the vibration element **30** provide to the golfer's hands, the golfer can more actively feel the physical and functional interaction between the grip **2** and the golfer's hands than might otherwise be possible without the vibrational effects. Again, this sensory stimulus can help to remind the golfer to apply the correct grip pressure on the handle prior to the swing or putting stroke. This sensory stimulus can also help to remind the golfer to apply consistent and continuous grip pressure on the handle during the swing. In other words, because the golfer can sense the vibrational and massaging effects in his/her hands throughout both the static and dynamic grips of the grip **2**, the golfer's mind and hands are able to more acutely focus on the application of proper pre-swing grip pressure, as well as on sustaining constant and consistent pressure on the handle or grip **2** during the swing or stroke, despite other distractions around the golfer or on the golf course. Such acute focus benefits the golfer in the execution of any golf shot, but may be more beneficial to the golfer during the putting stroke.

[0034] Embodiments of the training device **10** may include the vibration element **30** being positioned within the interior of the shaft **4** in a friction fit configuration. Embodiments of the training device **10** may include the vibration element **30** being configured within a module **34** that is configured to be inserted within the interior of the shaft **4** in a friction fit configuration. Embodiments of the training device **10** may include the module **34** being configured to be inserted within the interior of the shaft **4** and held in place by a positioning mechanism **38**. The module **34** may include the vibration element **30**, the power source **40**, and the control **42**. The module **34** may further comprise a housing, in which the vibration element **30**, the power source **40**, and the control **42** may be placed. Advantages of the module **34** being positioned within hollow **5** of the shaft **4** proximate the grip **2** of the club **8** may be that the weight of the vibration element **30**, the power source **40**, and/or the module **34** itself, or the combined weights thereof, may be negligible to the golfer during the golfer's swing, being that these components are positioned underneath (i.e., within the shaft **4** under the hands) or at least near the golfer's hands. In this way, the golfer's swing is not affected, or at least is very minimally affected, even to a negligible degree, due to the weight of the vibration element **30**, the power source **40**, and/or the module **34**, or the combined weights thereof.

[0035] The vibration element **30** may be any vibration element, now known or later developed, that provides vibration, shaking, shuddering, pulsating, or other similar movement to the degree that it can be felt by the golfer upon activation of the vibration element **30**. For example, the vibration element **30** may be a vibration motor #312-105 manufactured by Precision Microdrives. The vibration element **30** may further comprise an interior motor and a counterweight **32** coupled thereto. The counterweight **32** may be coupled to the drive shaft of the motor, such that as the motor rotates, it drives the counterweight **32**. The counterweight **32** may be configured on the drive shaft to have its weight offset from axial center of the drive shaft, such that when the counterweight **32** rotates, the counterweight produces the vibration, shaking, shuddering, pulsating, or other similar movement about the axial center. However, those of ordinary skill in the art will under-

stand that other brands and similar devices may be incorporated to achieve a vibration, shaking, shuddering, pulsating, or other similar movement in like degree.

[0036] Embodiments of the training device **10** may include the positioning mechanism **38** being a flexible stopper that is configured to have a diameter or outer circumference size that is slightly less than the diameter of the shaft **4** of the club **8**. In this way, the positioning mechanism **38** may be initially inserted within the distal regions of the shaft **4** near the top of the golf club handle. And, because the shaft **4** generally tapers as the shaft **4** runs from the handle down to the club head, the positioning mechanism **38** should come to rest against the interior of the shaft **4**. Yet, the positioning mechanism **38** may be configured to incorporate an adjustment member **39** that may functionally engage a through bore **37** in the positioning mechanism **38** that causes the positioning mechanism **38** to expand in circumferential size as the adjustment member **39** is advanced into the through bore **37**. By so doing, the positioning mechanism **38** may engage the interior surfaces of the hollow shaft **4** and thereby securely couple to the interior of the shaft **4** at the distal end of the shaft **4** near the grip **2**. Moreover, the adjustment member **39** may be configured to also engage the module **34** in an upper region of the module **34**. Thus, with the positioning mechanism **38** secured to the interior of the shaft **4** and the adjustment member **39** secured to the module **34**, the vibration element **30** may be secured within the interior of the shaft **4** via the module **34**, and thus prevented from axially advancing down the shaft **4**.

[0037] Embodiments of the training device **10** may include the positioning mechanism **38** being configured to be repeatedly and releasably coupled to the module **34**, such that the positioning mechanism **38** and the module **34** may be detached from one another or reattached to each other as often as determined by the golfer/user. Embodiments of the training device **10** may include the positioning mechanism **38** being fixedly coupled to the module **34**, such that the adjustment member **39** has no need to engage the module **34** to retain the module **34** in its proper position within the shaft **4**. Instead, an upper surface of the module **34** may be fixedly coupled to the positioning mechanism **38**, such that under the condition the positioning mechanism **38** is secured to the interior of the shaft **4**, so too is the module **34** thereby.

[0038] Embodiments of the training device **10** may include the module **34** having one or more openings, such as a flap or door, wherein the components that are configured therein may be removed, replaced, or repaired, as needed. Embodiments of the module **34** may include the module **34** being hinged on a side thereof so that the module **34** may be laid open for access to the components housed therein.

[0039] Embodiments of the training device **10** may include a weight reception portion (not depicted) that may be configured to receive weighted portions (not depicted) that may be coupled to the module **34** or to the vibration element **30** to provide additional weight to the club **8** to customize the weight, feel, and customized configuration of the club **8** to the golfer's individual liking and/or preference.

[0040] Embodiments of the training device **10** may include one or more vibration elements **30** being configured on the club **8**. Embodiments of the training device **10** may include one or more modules **34** being configured on the club **8**. For example, one vibration element **30** or module **34** may be configured on an interior region of the shaft **4**, and another vibration element **30** or module **34** may be configured on an exterior region of the shaft, such as, for example, but not

limited thereto, on the exterior of the grip 2, on the exterior of the shaft 4, or near the club head. One or more vibration elements 30 or modules 34 may be functionally coupled to the club 8, as described herein, at the same or various locations on the club 8 to produce a customized weight distribution and customized vibrational sensation that an individual golfer may prefer.

[0041] Embodiments of the training device 10 may comprise a power source 40. The power source 40 may be a battery or other stored-energy source. The power source 40 may be a stackable battery configuration, a single battery configuration, a rechargeable battery configuration, and/or a disposable battery configuration. The power source 40 may be configured to be in functional communication with the vibration element 30 and the control 41, as herein described, to provide power to these various components, as needed.

[0042] Embodiments of the training device 10 comprise the module 34, including, but not limited thereto, the vibration element 30, the power source 40 and the switch 41 being manufactured with the club 8. Alternatively, embodiments of the training device 10 comprise the module 34, including, but not limited to, the vibration element 30, the power source 40 and the switch 41 being configured to be introduced onto a pre-existing club after manufacture, such that the training device 10 may be an after-market product.

[0043] With a club 8 equipped with the remaining components of the device 10, the golfer may utilize the equipped club 8 to train the golfer's hands to effectuate a better swing or putting stroke. A golf club comprising an embodiment of the device 10 may be provided, as described herein. The golfer may then activate the device 10 with the control switch 41, such that the club handle begins to vibrate from the vibration motion resulting from the vibration element 30 being placed in its active state by the switch 41. With the handle of the club vibrating, the golfer may grip the handle of the club (i.e., the grip region of the club). With the hands in the proper position on the grip of the club and with the vibration element 30 sending vibrational effects to the golfer's hands, as described herein, the golfer can swing the club to execute a golf shot. And, with the vibration element 30 providing vibration to the handle, the golfer is able to apply the proper amount of grip pressure both before and during the swing because of the relaxing effects emanating from the vibrational motion, as discussed herein.

[0044] With reference now to FIG. 2, embodiments of the training device 10 may further comprise the vibration element 30 or module 34 being configured on the back surface of a golf glove 14 to provide vibrational effects directly to the golfer's hands. In this way, a golfer may wear the golf glove 14 having the module 34 configured thereon and receive the same, or similar, vibrational stimulus as that described above with regard to the golf club 8 equipped with the device 10. Indeed, embodiments of the training device 10 utilizing the glove 14 may be similar in function to the training device 10 combined into the shaft 4 of the golf club 8. In other words, the function of the training device 10 as described above with respect to the golf club 8 may also be adapted to function in the same or similar to the glove 14.

[0045] Embodiments of the training device 10 may include the vibration element 30, power source 40, the control 41, and/or the module 34 being releasably coupled to the glove 14 by means such as hook and loop fasteners, pockets, sleeves, pouches, straps, belts, hooks, elastic band, buttons or other similar means that might hold these components in place

during operation by the golfer. As exemplarily depicted in FIG. 2, the module 34 may be positioned within, or under, a cover 15 configured on the back of the glove 14. Yet, embodiments of the training device 10 may include the vibration element 30, power source 40, the control 41, and/or the module 34 being fixedly coupled to the glove 14 by means such as stitching, adhesive, or other permanent fastening means. What's important is that the vibration element 30 and/or module 34 can provide vibration effects in the active state to the golfer's hands both prior to and during the golf swing or putting stroke. Embodiments of the training device 10 further include the module 34 being positioned on the glove 14 at any point on the glove 14 that is out of the way of the normal operation of the glove 14 during a golf swing or putting stroke.

[0046] Furthermore, embodiments of the training device 10 may include a combination of the vibration element 30 and/or module 34 being placed on the glove 14, as described, as well as being configured in the handle of the golf club 8, as described, to provide a combined vibrational effect to the hands of the golfer.

[0047] With reference now to FIG. 3, additional embodiments ancillary to the embodiments described above may include the training device 10 comprising a sensor 20 and a control unit 50. The sensor 20 may be any sensor, now known or later developed, that is capable of sensing and measuring pressure that is applied to the sensor 20 by exterior forces, such as a golfer gripping the handle or grip 2 of the golf club 8.

[0048] For example, embodiments of the training device 10 may comprise a tactile sensor 20 that can be configured on the exterior of the grip 2, such that the tactile sensor 20 may come into direct contact with the hands of the golfer. The tactile sensor 20 may be coupled to the grip 2 by adhesive, stitching, tape, glue, or other adhesive means. Moreover, the tactile sensor 20 may be formed integrally with the grip 2, such that the tactile sensor 20 is virtually indistinguishable from the grip 2. Further, the tactile sensor 20 may be configured to be wrapped around the grip 2 and secured thereto. The tactile sensor 20 may be configured to be removable from the grip 2. In certain embodiments, the tactile sensor 20 may be configured to be repeatedly and releasably coupled to the grip 2. The tactile sensor 20 may be configured to be adjustable on the grip 2 in various locations on the grip 2. Indeed, the configuration of the tactile sensor 20 on the grip 2 may be customizable, for example, but not limited thereto, to the needs and style of the individual golfer, to the particular brand of golf club, or to the type of golf shot being executed.

[0049] Embodiments of the training device 10 may include the tactile sensor 20 being configured between the grip 2 and the shaft 4 of the golf club 8 (not depicted). The tactile sensor 20 may be coupled to the exterior of the shaft 4 but interior to the grip 2, such that the tactile sensor 20 resides between the shaft 4 and the grip 2. The tactile sensor 20 may be coupled to the shaft 4 by adhesive, tape, glue, or other adhesive means. Moreover, the tactile sensor 20 may be configured to be wrapped around the shaft 4 and secured thereto. The tactile sensor 20 may be configured to be removable from the shaft 4 once the grip 2 has been removed from the shaft 4 that covers the tactile sensor 20. In certain embodiments, the tactile sensor 20 may be configured to be repeatedly and releasably coupled to the shaft 4 under the grip 2. The tactile sensor 20 may be configured to be adjustable on the shaft 4 in various locations on the shaft 4 under the grip 2. Indeed, the

configuration of the tactile sensor **20** on the shaft **4** under the grip **2** may be customizable to the needs and style of the individual golfer.

[0050] Embodiments of the training device **10** may include a plurality of tactile sensors **20** positioned in any number of positions on the grip **2**, on the exterior of the grip **2**, or between the grip **2** and the shaft **4**. In this way, multiple force measurements at multiple locations may be measured by the plurality of tactile sensors **20** to provide more detailed feedback of the golfer's grip on the grip **2**. For example, a plurality of tactile sensors **20** may be positioned on the grip **2** where it might be optimal to place each of the golfer's palms and/or each of the golfer's individual fingers. In this way, pressure from various locations on the golfer's hands may be measured with respect to the handle or grip **2** of the golf club **8**.

[0051] Embodiments of the training device **10** may include the tactile sensor **20** incorporating a resistive-based sensor that is configured to measure the resistance of a conductive elastomer or foam between two points. Thus, as pressure is applied to the elastomer, the resistive capacity of the elastomer changes, thus producing a measurable variable that corresponds to the amount of pressure applied. In the resistive-based sensor, ultra-thin and flexible printed circuits may be utilized which are designed to bend under applied force and which can be easily integrated into force measurement applications. For example, in a piezoresistive device, resistance is inversely proportional to applied force.

[0052] Embodiments of the training device **10** may include the tactile sensor **20** incorporating a conductive-based sensor that is configured to measure the capacitance between two parallel plates. For example, as pressure is applied to one of the two plates, the distance between the plates theoretically decreases, thus changing the capacitance and providing a measurable variable that can correspond to the amount of pressure applied. Generally, the two plates are separated by a dielectric medium that gives the capacitance-based sensor its force-to-capacitance characteristics.

[0053] Embodiments of the training device **10** may include the tactile sensor **20** incorporating a pressure indicating film that releases an indicator in a quantity corresponding to the degree of measured pressure from the golfer's grip on the grip **2**. In this way, a degree of pressure map may be produced to indicate where the most pressure or force is exerted on the grip **2** by the golfer. In embodiments where the tactile sensor **20** is the pressure indicating film, the film may be replaced for each sampling of the golfer's grip.

[0054] Embodiments of the training device **10** may comprise a control unit **50**. The control unit **50** may comprise a processing center that has the capability of, at least, receiving and measuring signals from the sensor **20**, instructing the activation and deactivation of the vibration element **30**, comparing measured values from the sensor **20** with pre-stored values, and storing measured values from the sensor **20**. Embodiments of the control unit **50** may comprise a computer system, including, but not limited to, a processor (CPU), an internal storage unit, random access memory (RAM), accompanying software, and other alternative inputs, including for example, a micro USB drive and/or a flash drive. The computer system embodied by the control unit **50** herein described is configured to control the operational aspects of the training device **10**. For example, the software may be a computer program that is developed and configured to operate the training device **10** according to its intended operation, as described herein.

[0055] The control unit **50** may further comprise communication means for communicating with external components. For example, embodiments of the control unit **50** may comprise a communication means for establishing the connection between the training device **10** and an external smart-phone, tablet, computer, or other electronic device to which the training device **10** may download and/or transmit the information stored in the control unit **50**. These communication means may be data transmission wires, such as a network cord, a USB cord, a micro USB cord, or other similar physical connection means known in the art.

[0056] The communication means may also be configured to conduct the operations of the training device **10**, such as drawing power from the power source **40**, storing the force detected by the sensor **20**, directing the activation, duration, and deactivation of the vibration element **30**, and other necessary operations. The communication means may form a physical part of the control unit **50** or may be exterior thereto so long as the communication means can be in functional communication with some or all of the components of the training device **10**, including the control unit **50**. The power source **40** may also be a wired power source that receives power from a DC or AC electric power source exterior to the training device **10** including, the exterior power source being such components as a wall outlet, a PC, tablet, or other electronic device from which the power source **40** may receive and thereafter provide power.

[0057] The communication means may further comprise components that allow the training device **10** to connect to and transmit data and signals over a wireless network. The components of the communication means may include, but are not limited to, a circuit board, an antenna, a processor, a memory, an operating system, an analog-to-digital converter, a digital-to-analog converter, an RF component, a SIM card, a digital signal processor (DSP), and an RF amplifier. The control unit **50** may further comprise a control that activates the communication means to establish the communicative connection over the wireless network between the training device **10** and another electronic device connected to the network. The communication means may further comprise components that allow the training device **10** to connect to the internet, whether via a cellular tower provided by a cellular telephone company or via a wireless router connected to a wired internet connection from an internet service provider. The communication means may permit the training device **10** to transfer data between the golf club **8** and other electronic devices connected to the internet.

[0058] The communication means may further comprise components that allow the training device **10** to connect to and transmit data and signals between another wireless device that is capable of transmitting data over a wireless network, such as by utilizing Bluetooth® technology, or other short-distance, data-exchange technology. The components may include, but are not limited to, short-range transceivers that send and receive low-power radio waves within the ISM radio-frequency band to facilitate transmission of data between the communication means and the other wireless devices, such as a golfer's smartphone, tablet, or wireless-enabled device. Operating the control may activate the communication means to establish the communicative connection between the training device **10** and another wireless enabled device, such that the training device **10** can communicate with the wireless enabled device, as determined by the user of the training device **10**.

[0059] The communication means may further comprise components, such as an accelerometer and/or gyroscope, that allow the training device 10 to be calibrated and set such that the training device 10 may activate upon the golfer taking a swing of the golf club 8 to strike the golf ball. Once activated, the pressure applied by the golfer to the handle or grip 2 can be measured by the sensors 20 and the measurements from the sensor 20, and/or sensors 20, can be transmitted and stored in the control unit 50 and/or transmitted to an external computer via one of a wired connection, wireless connection, or other short-distance, data-exchange technology. In this way, the training device 10 may be activated only when needed, thus conserving the power source 40, and real-time feedback of the golfer's swing can be gathered and stored within the training device 10 or transmitted to an external storage device, such as a computer hard drive.

[0060] Embodiments of the training device 10 comprise the control unit 50, including the communication means and the processing center, in any of the configurations described above, forming part of the module 34 to be inserted within the shaft 4 of the club 8.

[0061] Embodiments of the training device 10 may be utilized by a golfer to measure the pressure or force exerted on the handle or grip 2 by the golfer's hands at any point before, during, or after the golfer's swing, or during the entire act of swinging, as determined by the golfer and the configuration of the training device 10. Embodiments of the training device 10 may include the training device 10 being configured to measure and record the pressure and/or force exerted on the grip 2 by the golfer's hands by one or more sensors 20. In this way, the golfer may gather a better understanding of the grip pressure being applied by the golfer to the grip 2 of the golf club 8 during the golfer's swing. The golfer may use this information to alter, amend, correct, or otherwise change the positioning of his/her hands to advantageously benefit the golfer's swing and the corresponding results therefrom.

[0062] Embodiments of the training device 10 may include the training device 10 being configured to store a predetermined pressure or force value and thereafter use one or more sensors 20 to measure the force exerted by the golfer during the golfer's swing to determine if the measured force from one or more of the sensors 20 exceeds the predetermined pressure or force value and to activate the vibration element 30 should one or more of the measured forces exceed the predetermined value. In this way, when the vibration element 30 activates the golfer can determine at what point, or if at all, during the golfer's swing the golfer's grip on the grip 2, at any or all of the one or more sensors 20, exceeds the recommended pressure or force that should be exerted on the grip 2 during a golf swing of the type being executed. Embodiments of the training device 10 include the predetermined force being adjustable by the golfer for various types of golf shots, including drives, chips, putts, draws, fades, etc. Thus, by using training device 10 in this way and by not triggering the activation of the vibration element 30, the golfer can be trained not to exceed a recommended, preprogrammed, and/or customizable grip strength on many different types of golf shots.

[0063] With reference now to FIG. 4, embodiments of the training device 10 may further comprise the sensor 20 being configured on a point on the palm surface of a golf glove 14 to measure the pressure or force exerted on the sensor by the golfer placing his/her hand on the club 8 and executing golf swing. Moreover, embodiments of the training device may

further comprise one or more sensors 20 being configured on various points on the inside of the palm and hand of the golf glove 14, as depicted. Additional variations of the locations of the sensors 20 may be utilized to measure pressure and force between the golfer's hand and the grip 2, given that the golfer's hand is inside the glove 14 configured with the sensors thereon. Embodiments of the training device 10 may include the sensors 20 being releasably coupled to the glove 14 by means such as hook and loop fasteners, pockets, sleeves, pouches, or other receptacle-like embodiments that might hold the sensor 20 in place during operation. Embodiments of the training device 10 may include the sensors 20 being fixedly coupled to the glove 14 by means such as stitching, adhesive, or other permanent fastening means.

[0064] Embodiments of the training device 10 may further comprise the various other components of the training device 10 being configured on the back side (not depicted) of the glove 14, such that the vibration element 30, power source 40, the control unit 50 are configured on the glove 14 but out of the way of the functional aspects of the glove 14, such as its interaction with the grip 2. These various components may be gathered together in the module 34, such that the module 34 need only be coupled to the back side of the glove, or to another portion of the golfer's body that does not interfere with the golfer's swing or with the interaction between the glove 14 and the grip 2. Embodiments of the training device 10 may include the vibration element 30, power source 40, the control unit 50, and/or the module 34 being releasably coupled to the glove 14 or to the golfer's clothing or body by means such as hook and loop fasteners, pockets, sleeves, pouches, straps, belts, hooks, elastic band, or other similar means that might hold these components in place during operation. Embodiments of the training device 10 may include the vibration element 30, power source 40, the control unit 50, and/or the module 34 being fixedly coupled to the glove 14 by means such as stitching, adhesive, or other permanent fastening means.

[0065] Embodiments of the training device 10 utilizing the glove 14 may be similar in function to the training device 10 combined into the shaft 4 of the golf club 8. In other words, the function of the training device 10 as described above may also be adapted to function in the same or similar way but with the sensors 20 deployed on the palm-side of the glove 14 instead of in relation to the club 8 itself. Furthermore, embodiments of the training device 10 may include a combination of the sensors 20 being placed on the glove 14 as well as proximate the grip 2 to take a combined or collective reading from the glove 14 and from the grip 2 of the pressure and force exerted by a golfer on the grip 2 of the club 8 during a golf swing.

[0066] The components defining the above-described training device 10 may be formed of any of many different types of materials or combinations thereof that can readily be formed into shaped objects provided that the components selected are consistent with the intended operation of a device of the type disclosed herein. For example, and not limited thereto, the components may be formed of: rubbers (synthetic and/or natural) and/or other like materials; glasses (such as fiber-glass) carbon-fiber, aramid-fiber, any combination thereof, and/or other like materials; polymers such as thermoplastics (such as ABS, Fluoropolymers, Polyacetal, Polyamide; Polycarbonate, Polyethylene, Polysulfone, and/or the like), thermosets (such as Epoxy, Phenolic Resin, Polyimide, Polyurethane, Silicone, and/or the like), any combination thereof,

and/or other like materials; composites and/or other like materials; metals, such as zinc, magnesium, titanium, copper, iron, steel, carbon steel, alloy steel, tool steel, stainless steel, aluminum, any combination thereof, and/or other like materials; alloys, such as aluminum alloy, titanium alloy, magnesium alloy, copper alloy, any combination thereof, and/or other like materials; any other suitable material; and/or any combination thereof.

[0067] Furthermore, the components defining the above-described training device **10** may be purchased pre-manufactured or manufactured separately and then assembled together. However, any or all of the components may be manufactured simultaneously and integrally joined with one another. Manufacture of these components separately or simultaneously may involve extrusion, pultrusion, vacuum forming, injection molding, blow molding, resin transfer molding, casting, forging, cold rolling, milling, drilling, reaming, turning, grinding, stamping, cutting, bending, welding, soldering, hardening, riveting, punching, plating, and/or the like. If any of the components are manufactured separately, they may then be coupled with one another in any manner, such as with adhesive, a weld, a fastener (e.g. a bolt, a nut, a screw, a nail, a rivet, a pin, and/or the like), wiring, any combination thereof, and/or the like for example, depending on, among other considerations, the particular material forming the components. Other possible steps might include sand blasting, polishing, powder coating, zinc plating, anodizing, hard anodizing, and/or painting the components for example.

[0068] While this disclosure has been described in conjunction with the specific embodiments outlined above, it is evident that many alternatives, modifications and variations will be apparent to those skilled in the art. Accordingly, the preferred embodiments of the present disclosure as set forth above are intended to be illustrative, not limiting. Various changes may be made without departing from the spirit and scope of the present disclosure, as required by the following claims. The claims provide the scope of the coverage of the present disclosure and should not be limited to the specific examples provided herein.

What is claimed is:

1. A golf swing training device, the training device comprising:

a vibration element configured on a golf club, the vibration element being in functional communication with a shaft of the golf club, the vibration element being configured to switch between an active state and an inactive state;

a power source; and

a control in functional communication with the power source and the vibration element, wherein operation of the control functionally couples the power source to the vibration element to transition the vibration element between the active and inactive states,

wherein in the active state, the vibration element provides vibrational input to the golf club and to a golfer's hands positioned on a grip of the club.

2. A golf swing training device, the training device comprising:

a vibration element configured on a backside of a golf glove, the vibration element being configured to switch between an active state and an inactive state;

a power source; and

a control in functional communication with the power source and the vibration element, wherein operation of the control functionally couples the power source to the vibration element to transition the vibration element between the active and inactive states,

wherein in the active state, the vibration element provides vibrational input to a golfer's hands positioned in the golf glove.

3. A method of swinging a golf club, the method comprising:

coupling a vibration element to a golf club;

activating the vibration element to provide vibrational stimulus to a golfer's hands gripping a grip of the golf club; and

swinging the golf club to strike a golf ball.

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