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Hebreo et al.

(10) **Patent No.: US 10,137,342 B2**
(45) **Date of Patent: Nov. 27, 2018**

(54) **GOLF CLUB HAVING REMOVEABLE WEIGHT**

(71) Applicant: **Acushnet Company**, Fairhaven, MA (US)

(72) Inventors: **Jonathan Hebreo**, San Diego, CA (US); **Andrew McCarthy**, Carlsbad, CA (US); **Noah de la Cruz**, San Diego, CA (US); **Grant M. Martens**, Carlsbad, CA (US)

(73) Assignee: **Acushnet Company**, Fairhaven, MA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 9 days.

(21) Appl. No.: **15/393,746**

(22) Filed: **Dec. 29, 2016**

(65) **Prior Publication Data**

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Related U.S. Application Data

(63) Continuation-in-part of application No. 15/339,797, filed on Oct. 31, 2016.

(51) **Int. Cl.**

A63B 53/06	(2015.01)
A63B 53/04	(2015.01)
A63B 60/52	(2015.01)

(52) **U.S. Cl.**

CPC ***A63B 53/06*** (2013.01); ***A63B 53/0466*** (2013.01); ***A63B 60/52*** (2015.10); *A63B 2053/0408* (2013.01); *A63B 2053/0433* (2013.01); *A63B 2053/0491* (2013.01); *A63B 2053/0495* (2013.01)

(58) **Field of Classification Search**

CPC A63B 2053/0491; A63B 2053/0433; A63B 2053/0495; A63B 53/06

USPC 473/334–339, 341

See application file for complete search history.

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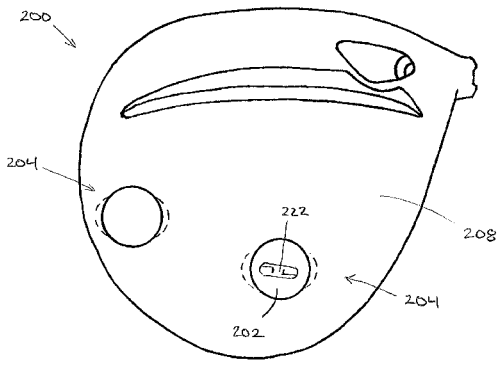
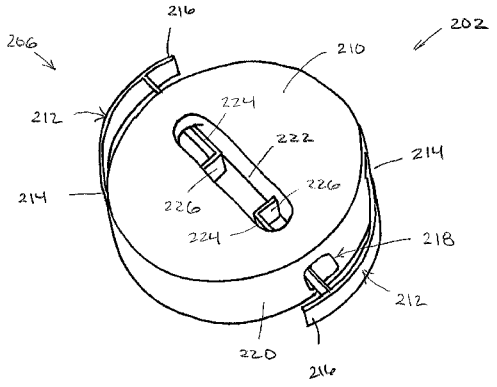
(74) *Attorney, Agent, or Firm* — Michael J. Mancuso

(57) **ABSTRACT**

A golf club head includes a club head body and a weight member that is secured to the body in a weight mount. The weight member is constructed to utilize lateral forces to couple to the head body to minimize the structure required to retain the weight member. The weight member includes a spring feature that is movably coupled to a weight body so that it is movable between a first configuration and a second configuration. In the second configuration a portion of the spring feature extends outward from a side wall of the weight body. The weight mount includes an undercut and the spring feature extends into the undercut and is partially flexed by the abutment of the spring feature and a perimeter wall of weight mount when the weight member is disposed in the weight mount.

16 Claims, 18 Drawing Sheets





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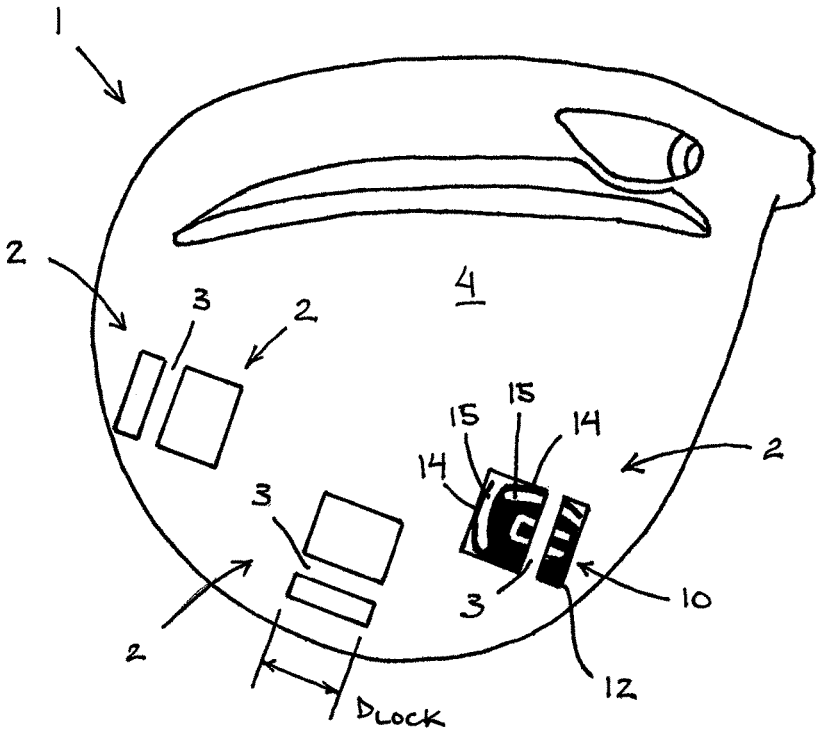


FIG. 1

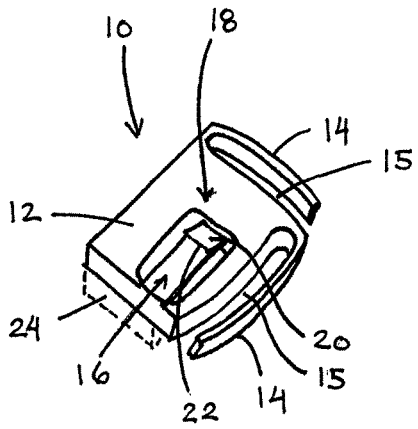


FIG. 3

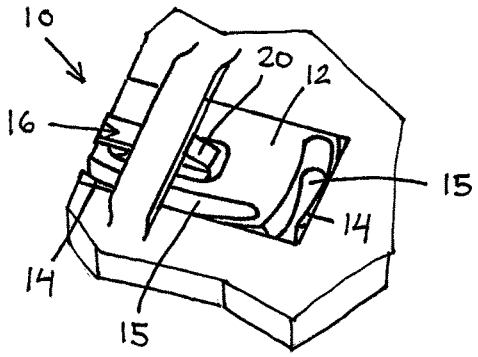
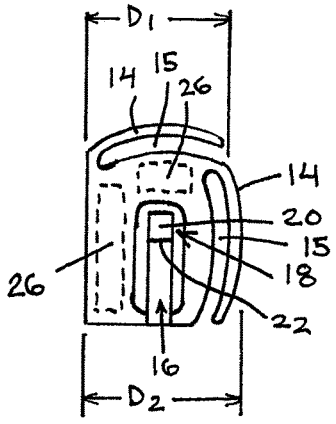


FIG. 2



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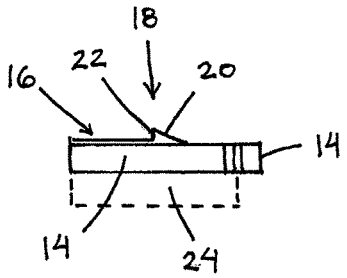

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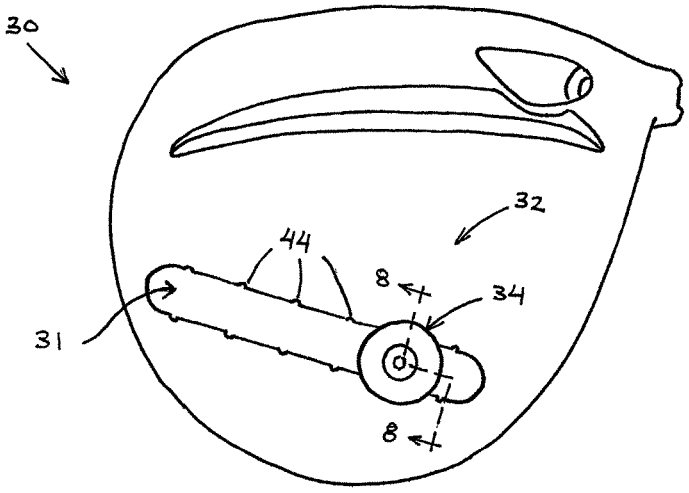

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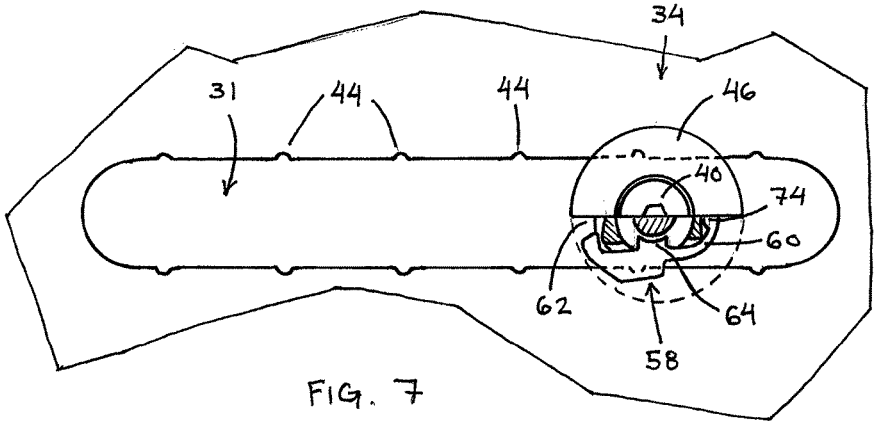

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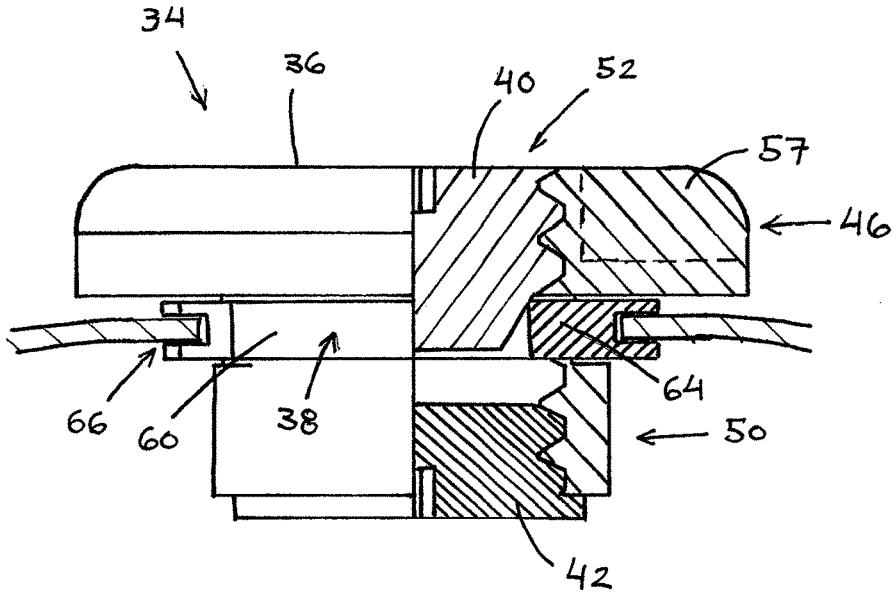
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FIG. 8

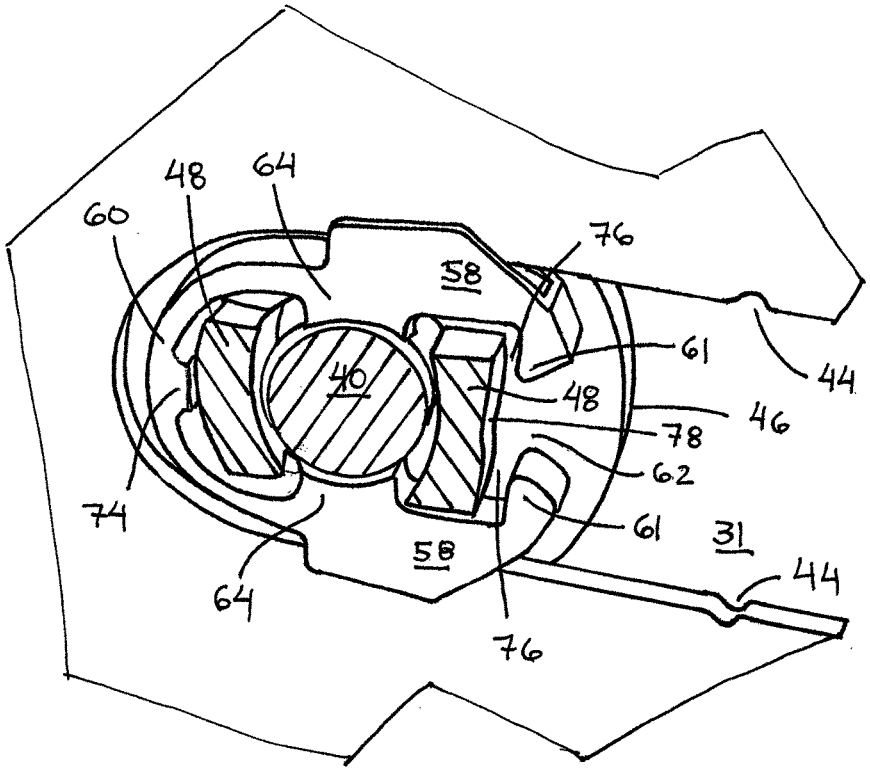
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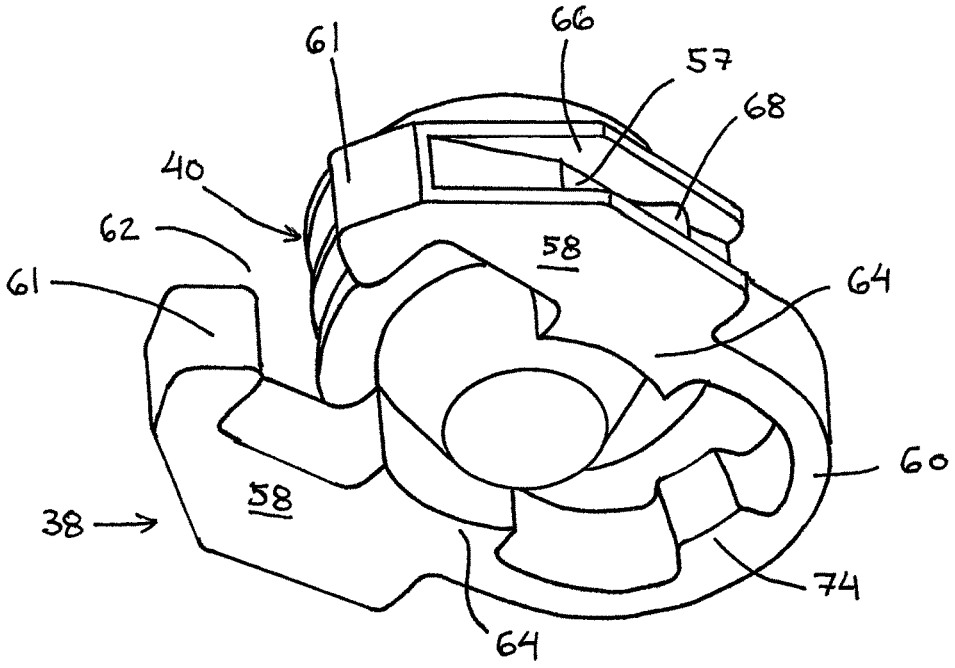
FIG. 9



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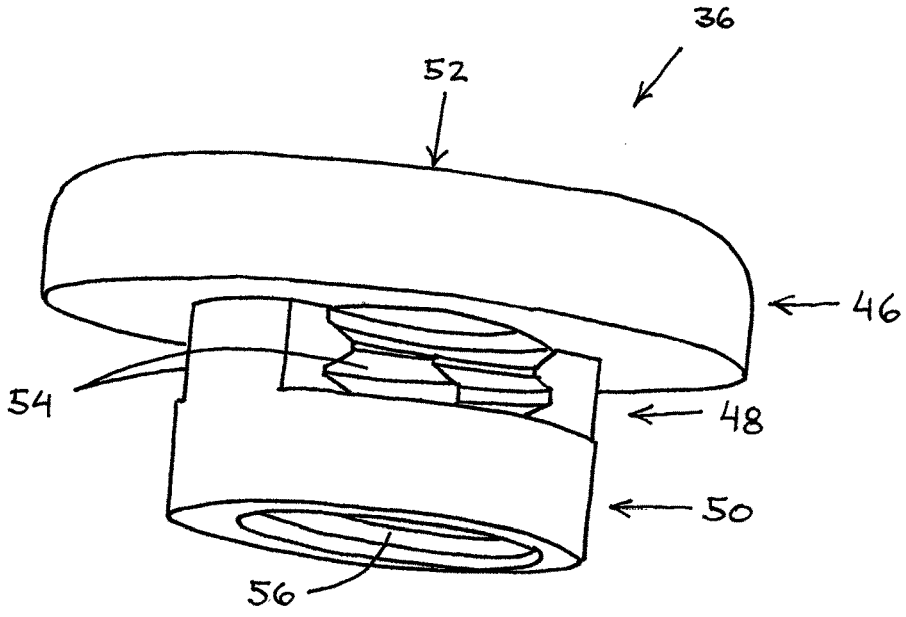

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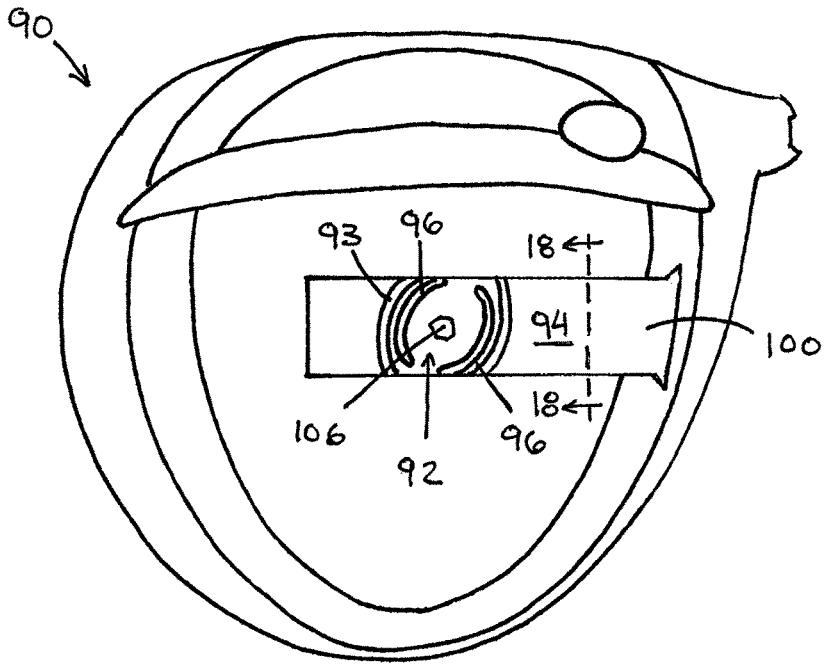

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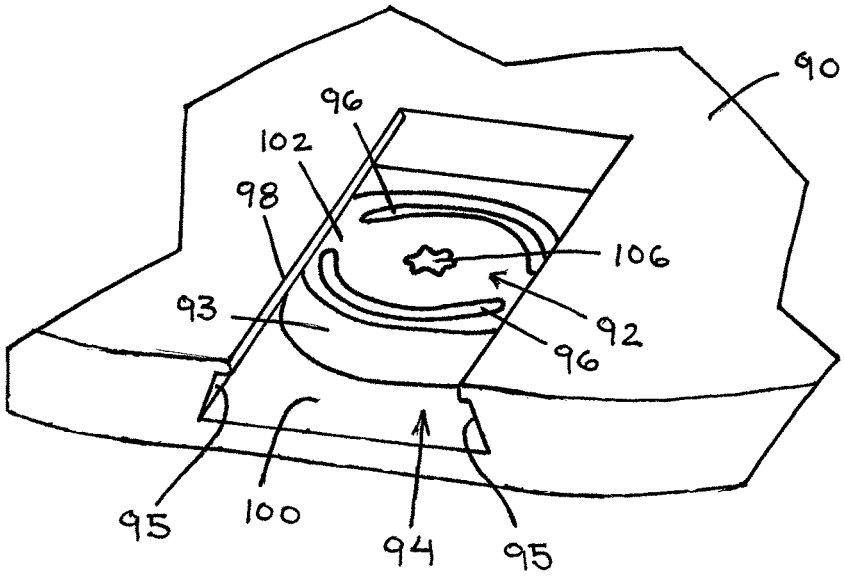

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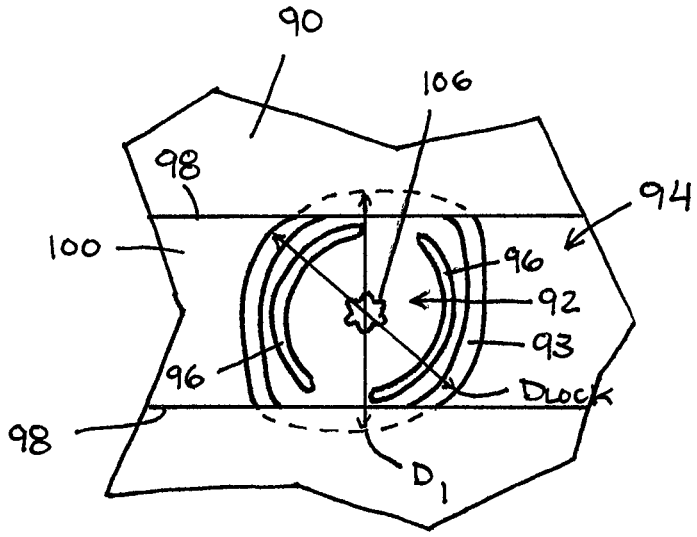
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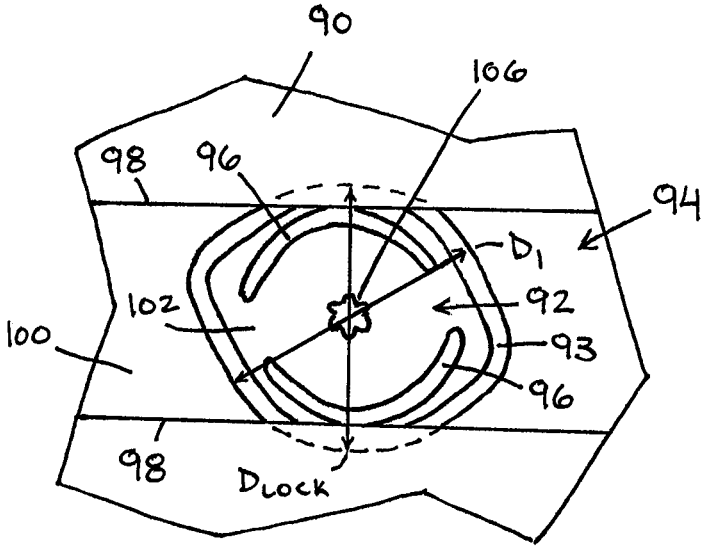
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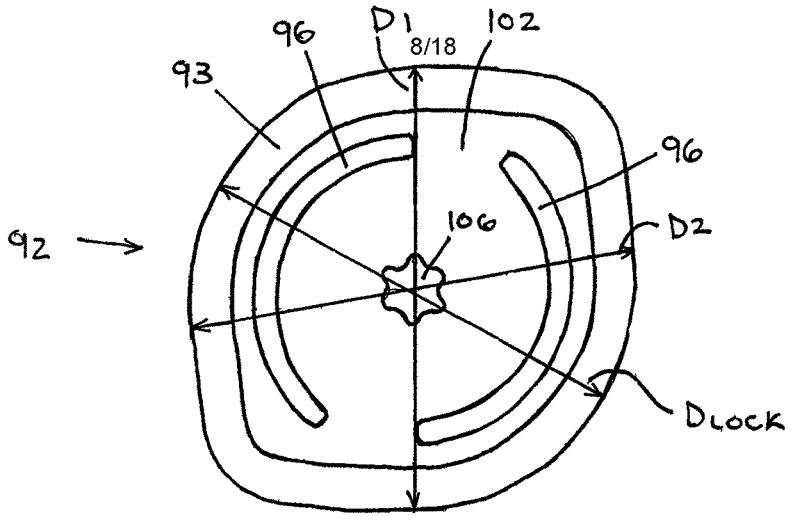

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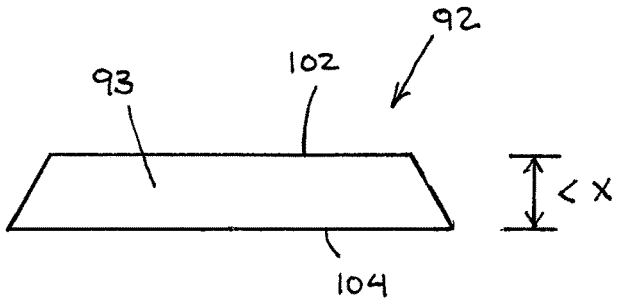

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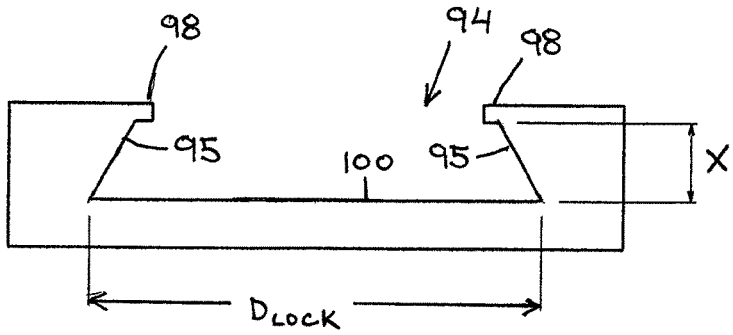

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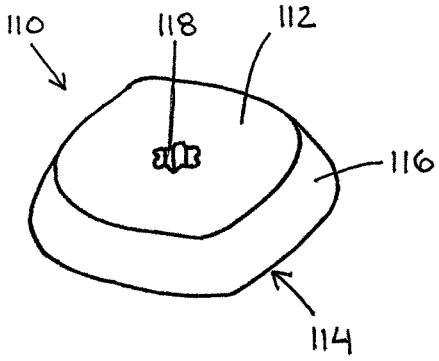

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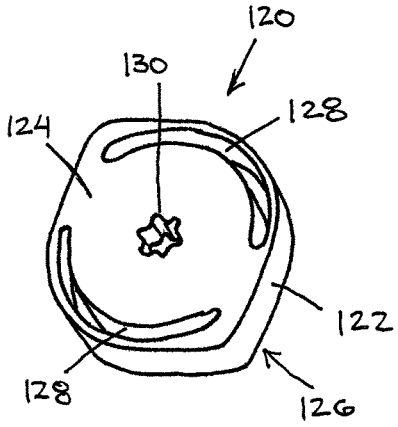

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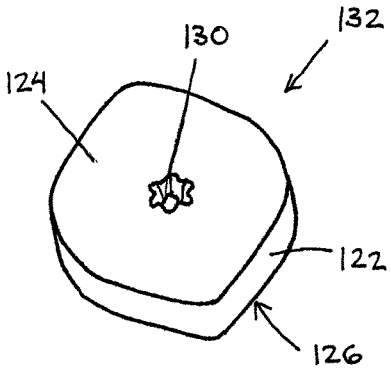

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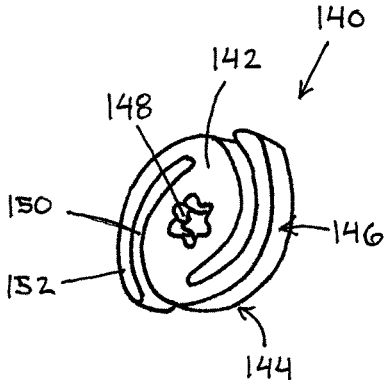
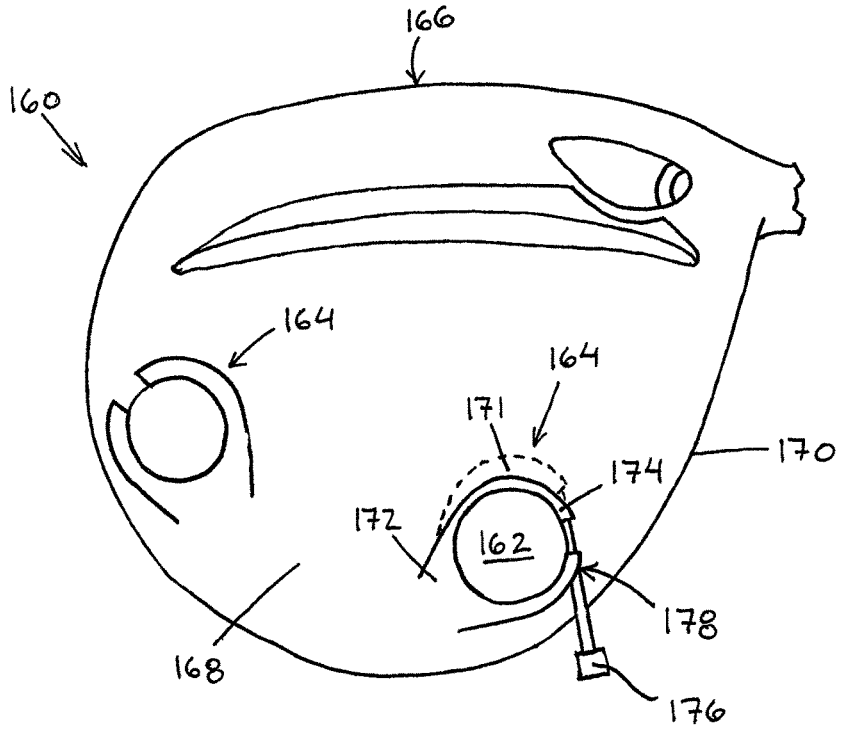


FIG. 22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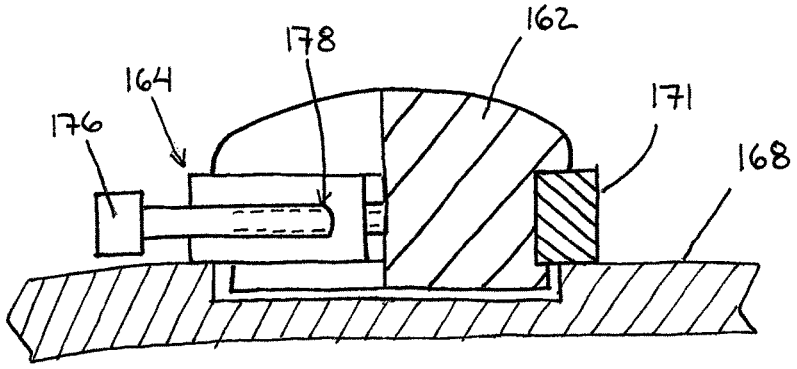
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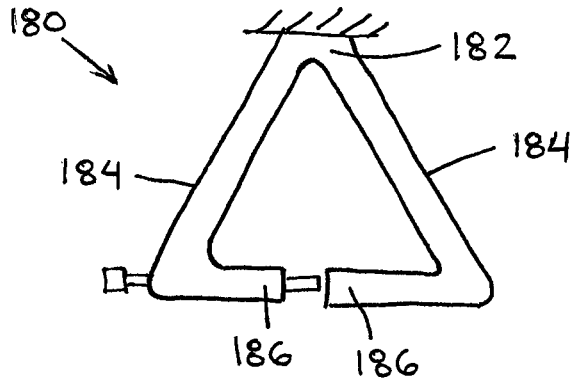

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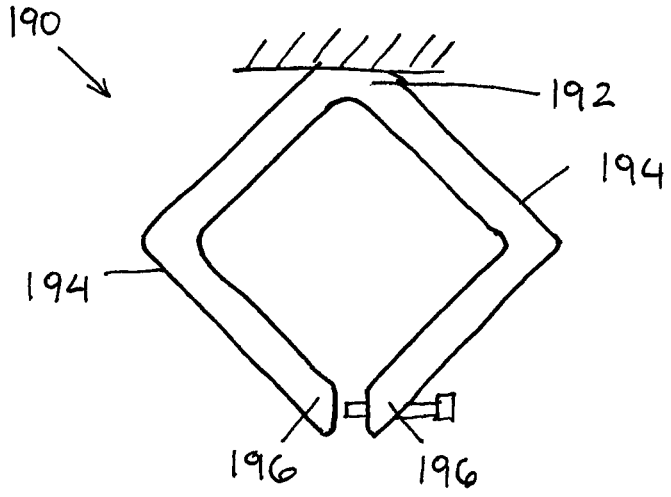

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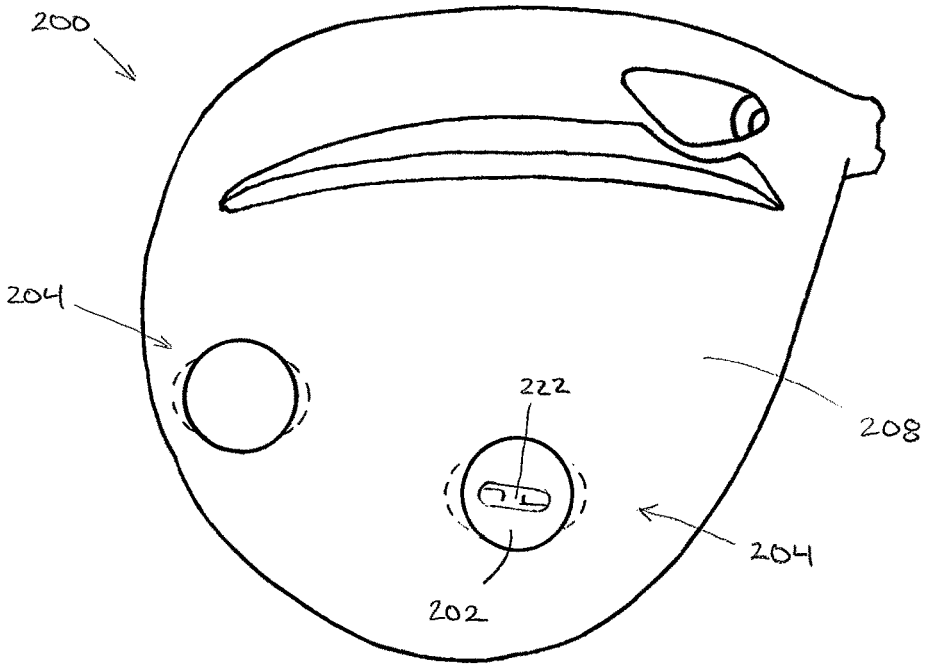
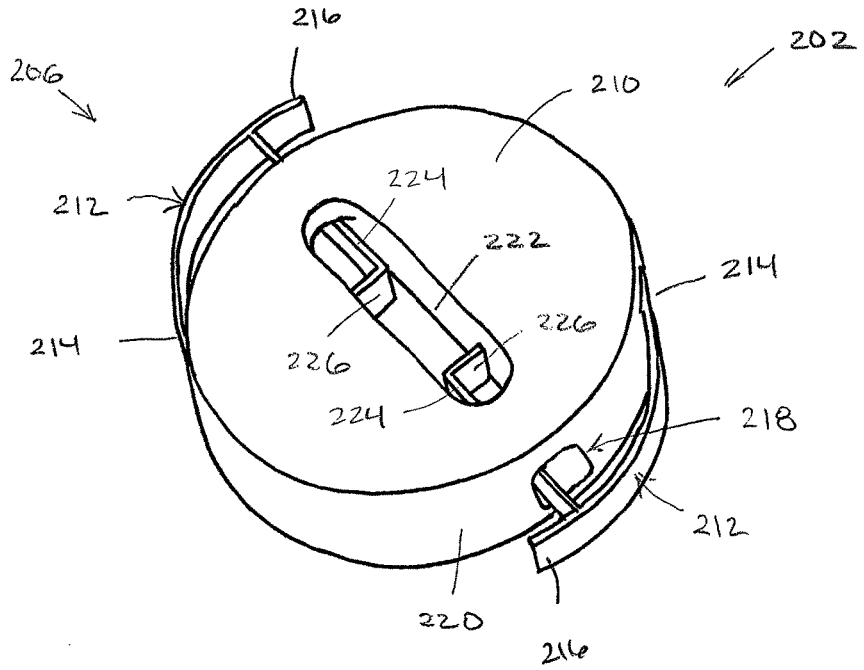


Fig. 27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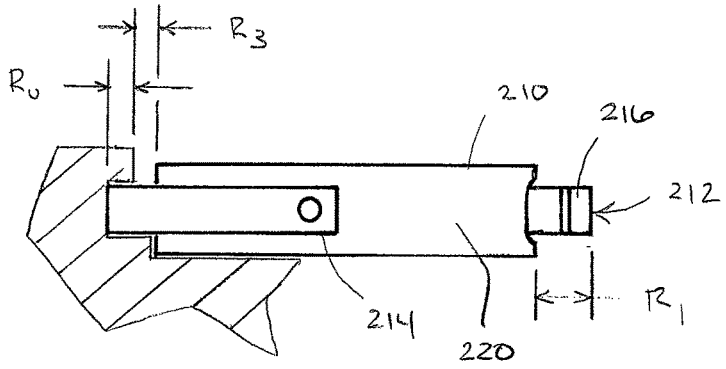
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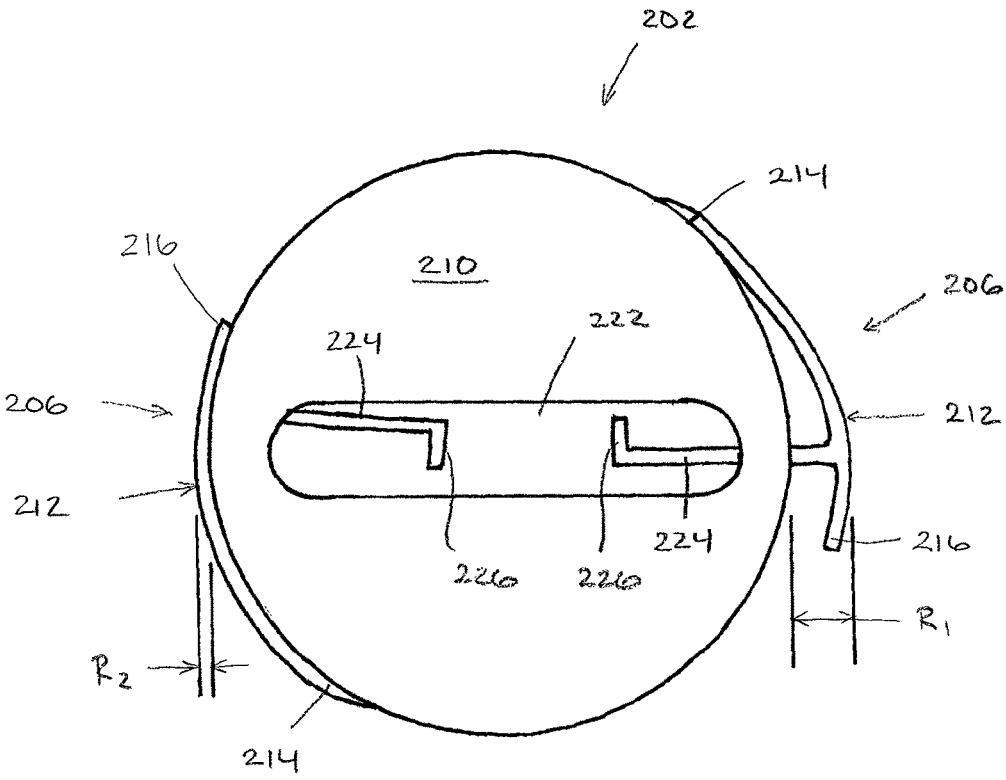
FIG. 29



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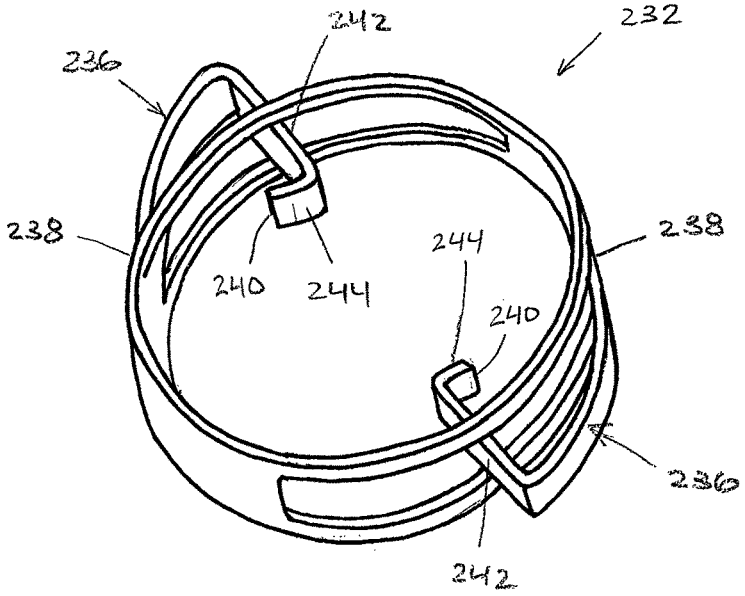
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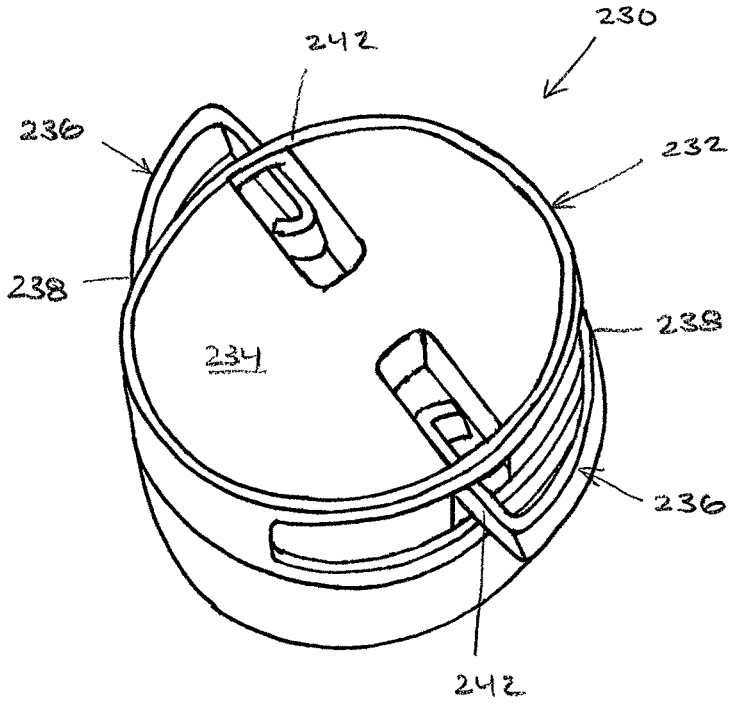
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FIG. 32

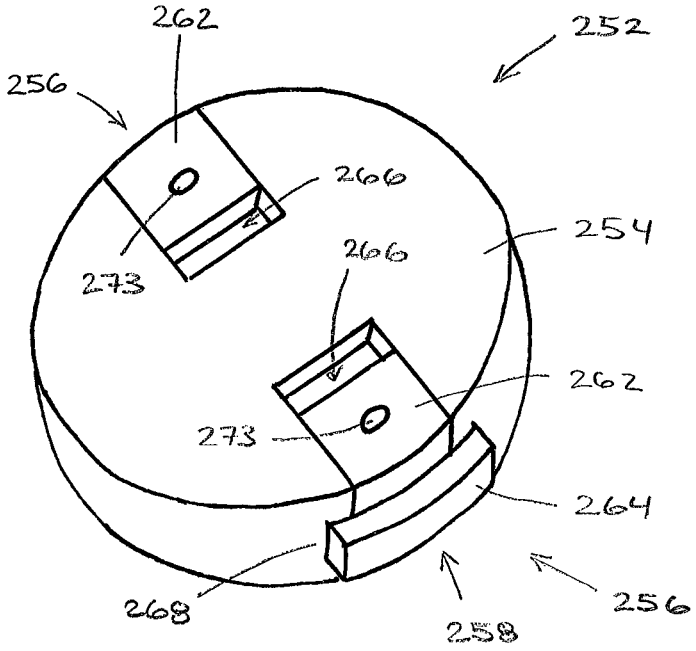
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FIG. 33

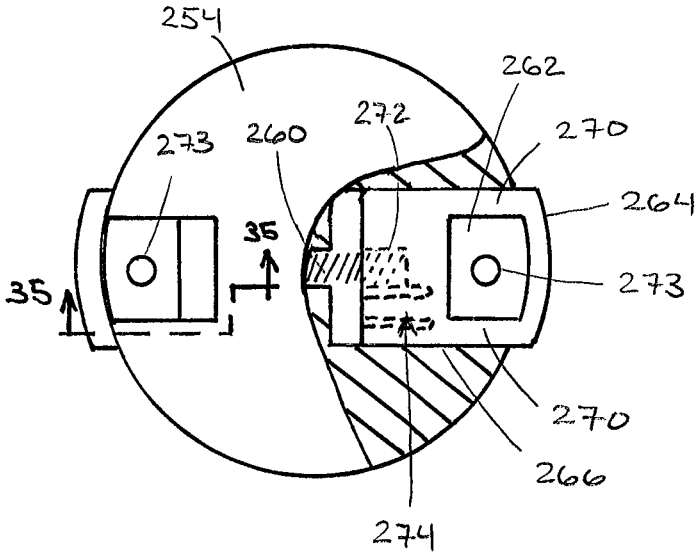
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FIG. 34

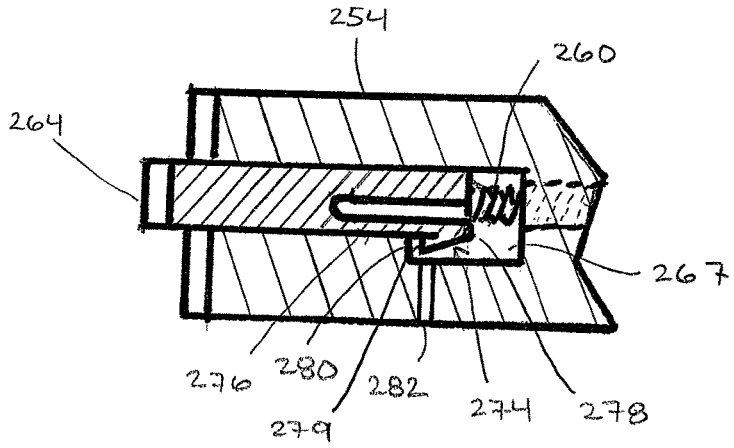
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FIG. 35

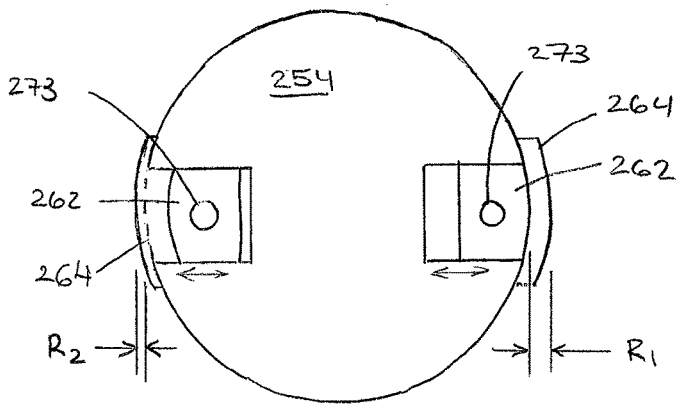
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FIG. 36

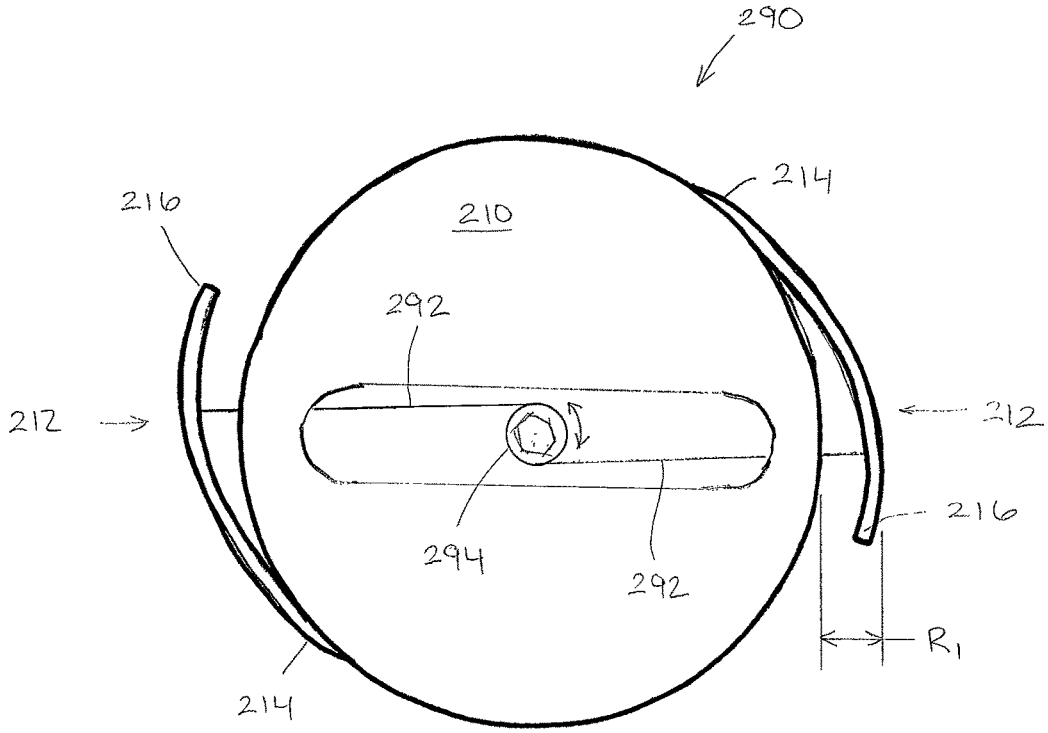

FIG. 37

GOLF CLUB HAVING REMOVEABLE WEIGHT

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation-in-part of U.S. patent application Ser. No. 15/339,797, filed Oct. 31, 2016, currently pending, the disclosure of which is hereby incorporated by reference in its entirety.

FIELD OF THE INVENTION

The invention relates to golf clubs, and more particularly, to golf club heads having a removable weight.

BACKGROUND OF THE INVENTION

The trend of lengthening golf courses to increase their difficulty has resulted in a high percentage of amateur golfers constantly searching for ways to achieve more distance from their golf shots. The golf industry has responded by providing golf clubs specifically designed with distance and accuracy in mind. The size of wood-type golf club heads has generally been increased while multi-material construction and reduced wall thicknesses have been included to provide more mass available for selective placement through the head. The discretionary mass placement has allowed the club to possess a higher moment of inertia (MOI), which translates to a greater ability to resist twisting during off-center ball impacts and less of a distance penalty for those off-center ball impacts.

Various methods are used to selectively locate mass throughout golf club heads, including thickening portions of the body casting itself or strategically adding a separate weight element during the manufacture of the club head. An example, shown in U.S. Pat. No. 7,186,190, discloses a golf club head comprising a number of moveable weights attached to the body of the club head. The club head includes a number of threaded ports into which the moveable weights are screwed. Though the mass characteristics of the golf club may be manipulated by rearranging the moveable weights, the cylindrical shape of the weights and the receiving features within the golf club body necessarily moves a significant portion of the mass toward the center of the club head, which may not maximize the peripheral weight of the club head or the MOI.

Alternative approaches for selectively locating mass in a club head utilize the incorporation of composite structures of multiple materials. These composite structures often utilize two, three, or more materials, including various metallic and non-metallic materials that have different physical properties including different densities. An example of this type of multi-material head is shown in U.S. Pat. No. 5,720,674. The club head comprises an arcuate portion of high-density material bonded to a recess in the back-skirt. Because the different materials included in the club head must be coupled, for example by welding, swaging, or using bonding agents such as epoxy, they may be subject to delamination or corrosion over time. This component delamination or corrosion results in decreased performance in the golf club head and can lead to club head failure.

Though many methods of optimizing the mass properties of golf club heads exist, there remains a need in the art for a golf club head comprising at least a removable weight having secure attachment and a low-profile so that the weight does not protrude into the center of the club head and negatively affect the location of the center of gravity.

SUMMARY OF THE INVENTION

The present invention is directed to a golf club head having at least one weight mount and at least one movable or removable weight member.

In an embodiment, a golf club head includes a club head body, a weight mount, and a weight member. The club head body includes a hollow construction defined by a face defining a ball-striking surface, a sole, a crown, and a skirt. The sole extends aftward from a lower edge of the face, the crown extends aftward from an upper edge of the face, and the skirt extends between the sole and the crown around a perimeter of the body. The weight mount disposed on at least one of the sole, the crown, and the skirt, wherein the weight mount defines a perimeter wall and a portion of the perimeter wall defines an undercut having an undercut depth R_u. The weight member includes a weight body defining a side wall and a spring feature. At least a portion of the spring feature is movably coupled to the weight body so that it is movable between a first configuration and a second configuration. In the first configuration a portion of the spring feature extends outward from a side wall of the weight body by a first distance R_1, and in the second configuration a portion of the spring feature extends outward from a side wall of the weight body by a second distance R_2. The undercut depth R_u is less than the first distance R_1 and greater than the second distance R_2 so that the spring feature abuts the undercut of the perimeter wall of the weight mount, and the spring feature is at least partially flexed by the abutment of the spring feature with the perimeter wall when the weight member is installed in the weight mount.

In another embodiment, a golf club head includes a club head body, a weight mount, and a weight member. The club head body has a hollow construction defined by a face defining a ball-striking surface, a sole, a crown, and a skirt. The sole extends aftward from a lower edge of the face, the crown extends aftward from an upper edge of the face, and the skirt extends between the sole and the crown around a perimeter of the body. The weight mount is disposed on at least one of the sole, the crown, and the skirt. The weight mount defines a perimeter wall, and a portion of the perimeter wall defines an undercut having an undercut depth R_u. The weight member includes a weight body defining a side wall and a spring feature. At least a portion of the spring feature is movably coupled to the weight body so that it is movable between a first configuration and a second configuration. In the first configuration a portion of the spring feature extends outward from a side wall of the weight body by a first distance R_1, and in the second configuration a portion of the spring feature extends outward from a side wall of the weight body by a second distance R_2. The undercut depth R_u is less than the first distance R_1 and greater than the second distance R_2 so that the spring feature abuts the undercut of the perimeter wall of the weight mount. The spring feature is a cantilevered arm that includes a fixed end and a cantilevered end, and the fixed end is coupled to the weight body. The weight body includes a diametric bore that receives a portion of the cantilevered arm and the weight body includes a slot that intersects the diametric bore so that at least a portion of the cantilevered arm is exposed when the weight member is installed in a weight mount. The spring feature is at least partially flexed by the abutment of the spring feature with the perimeter wall when the weight member is installed in the weight mount.

In another embodiment, a golf club head includes a club head body, a weight mount, and a weight member. The club head body has a hollow construction defined by a face defining a ball-striking surface, a sole, a crown, and a skirt. The sole extends aftward from a lower edge of the face, and the crown extends aftward from an upper edge of the face. The skirt extends between the sole and the crown around a perimeter of the body. The weight mount is disposed on at least one of the sole, the crown, and the skirt. The weight mount defines a perimeter wall, and a portion of the perimeter wall defines an undercut having an undercut depth R_u. The weight member includes a weight body defining a side wall and a spring feature, and at least a portion of the spring feature is movably coupled to the weight body so that it is movable between a first configuration and a second configuration. In the first configuration a portion of the spring feature extends outward from a side wall of the weight body by a first distance R_1, and in the second configuration a portion of the spring feature extends outward from a side wall of the weight body by a second distance R_2. The undercut depth R_u is less than the first distance R_1 and greater than the second distance R_2 so that the spring feature abuts the undercut of the perimeter wall of the weight mount when the weight member is installed in the weight mount. The spring feature is a slide member that slides in the weight body between the first configuration and the second configuration. The weight body includes a radial slot and side walls of the radial slot include grooves, and the slide member is disposed in the slot and portions of the slide member extend into the grooves. In the second configuration an outer edge of the slide member is closer to flush with the weight body than the first configuration. The spring feature is at least partially flexed by the abutment of the spring feature with the perimeter wall when the weight member is installed in the weight mount.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a bottom view of a golf club head including a weight member in accordance with the present invention;

FIG. **2** is a perspective view of a portion of a golf club head of FIG. **1**;

FIG. **3** is a perspective view of the weight member included in the golf club head of FIG. **1**;

FIG. **4** is a front view of the weight member that may be included in the golf club head of FIG. **1**;

FIG. **5** is a side view of the weight member of FIG. **4**;

FIG. **6** is a bottom view of a golf club including another weight member in accordance with the present invention;

FIG. **7** is a bottom view of a portion of the golf club head of FIG. **6**;

FIG. **8** is a partial cross-section of the golf club head of FIG. **6**, as shown by line **8-8**;

FIG. **9** is a perspective view showing a partial cross-section of a portion of the golf club head of FIG. **6**;

FIG. **10** is a perspective view of a portion of the weight member included in the golf club head of FIG. **6**;

FIG. **11** is a perspective view of a portion of the weight member included in the golf club head of FIG. **6**;

FIG. **12** is a bottom view of a golf club including another weight in accordance with the present invention;

FIG. **13** is a perspective view of a portion of the golf club head of FIG. **12**;

FIG. **14** is a bottom view of a portion of the golf club head of FIG. **12**, illustrating a weight member in an unlocked orientation;

FIG. **15** is a bottom view of a portion of the golf club head of FIG. **12**, illustrating a weight member in a locked orientation;

FIG. **16** is a bottom view of the weight member included in the golf club head of FIG. **12**;

FIG. **17** is a side view of the weight member included in the golf club head of FIG. **12**;

FIG. **18** is a cross-sectional view of the weight track of FIG. **12**, taken along line **18-18**.

FIG. **19** is a perspective view of an alternative embodiment of the weight of FIG. **17**;

FIG. **20** is a perspective view of another alternative embodiment of the weight of FIG. **17**;

FIG. **21** is a perspective view of another alternative embodiment of the weight of FIG. **17**;

FIG. **22** is a perspective view of another alternative embodiment of the weight of FIG. **17**;

FIG. **23** is a bottom view of a golf club head including another weight member in accordance with the present invention;

FIG. **24** is a partial cross-section view of the weight mount and weight member shown in FIG. **23**;

FIG. **25** is a bottom view of an alternative embodiment of the weight mount of FIG. **23**;

FIG. **26** is a bottom view of an alternative embodiment of the weight mount of FIG. **23**;

FIG. **27** is a bottom view of a golf club head including another weight member in accordance with the present invention;

FIG. **28** is a perspective view of the weight member illustrated in FIG. **27**

FIG. **29** is a partial cross-section view of a portion of the golf club head of FIG. **27**;

FIG. **30** is a top view of the weight member of FIG. **27**;

FIG. **31** is an alternative construction of the spring features for a weight member;

FIG. **32** is a weight construction including the spring features of FIG. **31**;

FIG. **33** is a perspective view of another weight member in accordance with the present invention;

FIG. **34** is a partial cross-section view of the weight member of FIG. **33**; and

FIG. **35** is a cross-sectional view of a portion of the weight member of FIG. **33**, as shown by line **35-35** illustrated in FIG. **34**;

FIG. **36** is a top view of the weight member of FIG. **33**; and

FIG. **37** is a top view of an alternative construction of the weight member of FIG. **27**.

DETAILED DESCRIPTION

Other than in the operating examples, or unless otherwise expressly specified, all of the numerical ranges, amounts, values and percentages such as those for amounts of materials, moments of inertias, center of gravity locations, loft and draft angles, and others in the following portion of the specification may be read as if prefaced by the word "about" even though the term "about" may not expressly appear with the value, amount, or range. Accordingly, unless indicated to the contrary, the numerical parameters set forth in the following specification and attached claims are approximations that may vary depending upon the desired properties sought to be obtained by the present invention. At the very least, and not as an attempt to limit the application of the doctrine of equivalents to the scope of the claims, each numerical parameter should at least be construed in light of

the number of reported significant digits and by applying ordinary rounding techniques.

Notwithstanding that the numerical ranges and parameters setting forth the broad scope of the invention are approximations, the numerical values set forth in the specific examples are reported as precisely as possible. Any numerical value, however, inherently contains certain errors necessarily resulting from the standard deviation found in their respective testing measurements. Furthermore, when numerical ranges of varying scope are set forth herein, it is contemplated that any combination of these values inclusive of the recited values may be used.

Many weight structures utilize attachment mechanisms that primarily utilize a force in the direction of an axis that is orthogonal to the outer contour of golf club head for attaching weight member to the golf club head. According to the present invention, weight members that primarily utilize forces that are generally directed parallel or tangential to the outer contour of the golf club head and lateral to the weight member are described. Utilizing attachment configurations that primarily interact with the surrounding structure of the golf club head in parallel or tangentially to the outer contour of the golf club head reduces the amount of structure that extends toward the interior of the golf club head that would otherwise be required to retain the weight member.

In an aspect of the present invention, an embodiment of a weight member **10**, having a low profile, includes a simple clip-in type attachment that does not require the use of a threaded fastener to couple the weight member **10** to the golf club head **1**. Golf club head **1** has a hollow bodied construction that includes a face, a sole **4**, a crown, a skirt, and a hosel that combine to define the hollow interior. As is well known in the art, the body may be formed by numerous methods and those methods may be used alone or in combination, and the club head body may include cast, stamped and/or forged components that are combined together. In an example, the head body may include a cast component including the sole, crown, skirt and hosel and a stamped face component that is welded to the cast component. In another example, the head body may include forged sole, crown, hosel, and face components that are welded together.

The face defines a ball-striking surface. The sole **4** extends aftward from a lower edge of the face. The crown extends from an upper edge of the face and the skirt extends between the sole **4** and crown and around the perimeter of the body. Golf club head **1** also includes a plurality of weight attachment structures, such as weight mounts **2**. Weight member **10** includes a body **12**, and three spring features. The spring features include two side wall spring features that are flexible arms **14** and a locking spring feature formed by a flexible locking arm **16** on another surface. Each flexible arm **14** is defined by an elongate aperture **15** that extends through the thickness of body **12** and that intersects the side wall of body **12**.

The side wall spring features and locking arm **16** combine to prevent relative movement between the weight cartridge and the golf club head in three orthogonal axes, e.g., the X, Y and Z axes, so that the weight member is fully constrained from translation when the weight member is installed in a weight mount. In particular, the dimensions of the weight mount **2** are selected so that the portions abutting the flexible arms are narrower than the free width of the weight member at the flexible arms. As a result of those dimensions, the flexible arms **14** and locking arm **16** are at least partially flexed laterally and act upon the surrounding structure of the weight mount **2** and are compressed to exert lateral force on the surrounding structure to prevent translation of the weight member **10** in every direction, i.e., in three orthogonal axes.

The weight member **10** also includes a locking mechanism that selectively locks the weight member **10** into the golf club head **1** at one of the weight mount **2**. The locking arm **16** may include a locking tooth **18** that prevents the weight member **10** from becoming dislodged and disengaging from the golf club head **1** during impact. In the illustrated embodiment, the locking arm **16** interacts with a locking feature on the weight mount **2**, such as a bridge member **3** that forms an undercut portion in weight mount **2**. Bridge member **3** extends across a portion of the weight member **10** when the weight member **10** is inserted into a weight mount **2**. Locking tooth **18** includes a tapered surface **20** that abuts and slides past bridge member **3** when the weight member **10** is inserted into a weight mount **2**. That contact forces locking arm **16** to flex so that the locking tooth **18** slips past bridge member **3**, which allows the weight member **10** to be fully inserted into the weight mount **2**. Bridge member **3** may also include a tapered abutment surface that gradually increases contact force between tooth **18** and bridge member **3**. The weight member **10** and weight mount **2** are dimensioned so that when the weight member **10** is fully inserted, the tapered surface **20** of locking tooth **18** passes the contacting portion of bridge member **3** and a ledge **22** of locking tooth **18** engages a portion of bridge member **3**. The engagement of the ledge **22** and bridge member **3** prevents the weight member **10** from disengaging the weight mount **2**, but the weight member **10** may be removed by displacing locking tooth **18** relative to bridge member **3** so that the locking tooth **18** is able to slip past bridge member **3** to allow weight member **10** to be retracted from weight mount **2**. It should be appreciated that the height of flexible arms **14** may differ from the overall thickness of the weight member **10**. For example, an extension portion, shown by dashed portion **24**, may be included to increase the volume of weight member **10**. Additionally, ledge **22** may be replaced with a second tapered surface that allows the weight member **10** to be removed without separately flexing locking arm **16** to disengage the locking tooth **18** from bridge member **3**. The taper of the second tapered surface is preferably steeper than tapered surface **20**.

Weight member **10** may be constructed from a single material or it may have a multi-material construction. For example, as shown in FIG. **4**, portions of the weight body **12**, shown by dashed portions **26**, may include recesses or may be constructed of a material having a different specific gravity than the remainder of the weight body to create an insert that is heavier or lighter relative to the weight body. In embodiments having a heavy or light insert, the insert may be joined with the weight body by many different methods, including mechanically fixing the insert to the weight body by threaded engagement, and/or fasteners. Alternatively, the materials may be coupled using metallurgical joining techniques, such as welding, swaging, forging the materials together, or co-casting.

Referring to FIGS. **6-11**, a golf club head **30** includes another weight system **32** that provides adjustability of the center of gravity of the golf club head and that is disposed on a body member. The weight system **32** includes weight member **34** and a weight mount in the form of slot **31** extending through at least a portion of the thickness of the body member. Weight member **34** is assembled from a weight body **36**, a spring clip **38**, a locking member **40**, and an optional weight slug **42**. Weight member **34** is installed in slot **31**, slides along edges of slot **31**, and is configured to naturally seat in detent recesses **44** that are included in the

edges of slot **31**. Preferably, weight member **34** provides an audible and/or tactile "click" when it seats in each of the detent recesses **44** included in slot **31**.

Weight body **36** provides the primary source for mass in weight member **34**, while providing a frame for supporting spring clip **38**. In particular, the weight body **36** includes an outer portion **46** that resides outside of slot **31** when weight member **34** is installed, a clip portion **48** that receives spring clip **38** and resides in slot **31** when weight member **34** is installed, and an inner portion **50** that is sized to extend through slot **31**. In the illustrated embodiment, outer portion **46** is a generally cylindrical portion of the weight body **36**. Preferably, the outer portion has an outer dimension that prevents it from being inserted into slot **31**, so that it limits the insertion of the weight body **36** into slot **31**. It should be appreciated that the outer portion **46** need not be cylindrical, and the shape and size of the outer portion **46** may be altered to alter the overall mass of the weight body **36** and weight member **34**. Outer portion **46** also includes a locking member mount **52**, such as a bore that receives locking member **40** and that extends into clip portion **48**. For example, locking member mount **52** may be a threaded bore that threads with a locking member **40** that includes a threaded portion. As a further alternative, outer portion **46** may have a multi-material construction so that the mass of weight body **36** may be altered, such as by replacing a portion of the outer portion **46** indicated by dashed area **57** with a component constructed of a material having a different specific gravity than the material of weight body **36**.

The clip portion **48** and inner portion **50** extend from outer portion **46**. Clip portion **48** is interposed between outer portion **46** and inner portion **50** of weight body **36** and provides a mounting structure for spring clip **38** on weight body **36**. In particular, clip portion **48** includes slots **54** on opposite sides of the weight body **36**. Spring clip **38** is disposed on weight body in clip portion **48** so that a portion spring clip **38** resides in slots **54**. The configuration of slots **54** results in outer portion **46** and inner portion **50** creating shoulders that straddle spring clip **38** and retain it in the direction of a longitudinal axis of weight body **36**. Slots **54** extend through the side wall of the clip portion **48** so that a portion of the spring clip **38** intersects the bore that forms the locking member mount **52** when spring clip **38** is installed on weight body **36**.

Inner portion **50** extends away from outer portion **46** and clip portion **48** and is sized so that it may extend through slot **31**. In the illustrated embodiment, inner portion **50** is generally an annular cylindrical body that has an outer diameter that is smaller than the width of the opening of slot **31**. It should be appreciated that inner portion **50** may include parts that have an outer dimension that is greater than the opening of slot **31**, as long as some part of inner portion **50** has an outer dimension that allows it to be inserted into a portion of slot **31**. It should also be appreciated that inner portion **50** need not be cylindrical, but may alternatively have a polygonal shape, such as a square or rectangle, or another curved shape. Inner portion **50** may also include a mounting feature for weight slug **42**, which may be used to increase the mass of weight member **34**. For example, inner portion **50** may include a mount **56** that allows a selected weight slug **42** to be coupled to weight body **36**. Mount **56** may be a threaded bore and weight slug **42** may be a threaded weight member that is selected from a plurality of weight slugs **42** having different masses and threaded into mount **56**.

Spring clip **38** generally includes two arms **58** that are able to flex toward and away from each other. The arms **58** are coupled by a flexure **60** and terminate at terminal ends **61** that are spaced from each other to define a gap **62**. Spring clip **38** also includes locking tabs **64** that extend inward from arms **58**. Locking tabs **64** extend through the side wall of clip portion **48** so that they intersect a portion of the bore that forms locking member mount **52**.

Each of arms **58** defines an outer channel **66**, that is at least partially defined by an outer engagement surface **67**, and that receives a portion of the side wall of slot **31**. A detent projection **68** is disposed in each outer channel **66** that is shaped and sized to complement the shape and size of the detent recesses **44** included in slot **31**. The detent projection **68** is a portion of outer engagement surface **67** that locally extends outward. Spring clip **38** and slot **31** are shaped so that spring clip **38** is biased outward when it is installed in slot **31**. As a result, spring clip **38** remains in contact with the edges of slot **31** and creates the force that causes the detent projections **68** to click into the detent recesses **44**.

The sizes of the channels **66** and detent projections **68** are selected so that there is minimal clearance between those features and the complementary portions of the slot **31**. That minimal clearance allows the weight member **34** to move along slot **31** while preventing additional movement relative to the walls of slot **31**. As a further alternative, the edges of slot **31**, including detent recesses **44** may be beveled, and the detent projections **68** may be tapered so that when the projections engage the recesses, the weight member **34** is drawn further into slot **31** and against the wall of golf club head **30**. Spring clip **38** is constructed so that arms **58** may be spread apart from one another so that clip portion **48** of weight body **36** may be inserted through gap **62** and locking tabs **64** located in slots **54**.

Locking member **40** is included to selectively provide support to spring clip **38** to limit inward motion of the locking tabs **64** when the weight member **34** is positioned at a detent location. Locking member **40** is a tapered screw that includes a threaded portion **70** and a tapered tip portion **72**. Threaded portion **70** couples with the threaded bore included in outer portion **46** of weight body **36** and allows a user to advance and retract locking member **40** relative to weight body **36**. The tapered tip portion **72** extends into clip portion **48** of weight body **36** and is configured to selectively abut an inner surface of locking tabs **64**, thereby preventing arms **58** of spring clip **38** from flexing inward toward each other when the weight member **34** is located at a detent. Locking member **40** may also be used to increase the force between the spring clip **38** and the walls of slot **31** by advancing the locking member **40** further into weight body **36** after contact is established between locking tabs **64** and the tapered tip portion **72**. Preferably, the locking member **40** is dimensioned so that it requires between ¼ and ½ of a turn of the locking member to disengage the spring clip **38** enough to allow the weight member **34** to slide along slot **31**.

In general, the weight member **34** is slid in slot **31** by a user grasping outer portion **46** of weight body **36** and sliding the weight member **34**. However, because spring clip **38** is configured to slide against the walls of slot **31** the spring clip **38** may shift in clip portion **48** relative to weight body **36**. That shift may cause the spring clip **38** to interact with the side walls of clip portion **48** and locking member **40** which can cause the arms **58** of spring clip **38** to be pushed outward, or spring clip **38** to twist relative to slot **31**, thereby increasing the friction between the spring clip **38** and the slot wall and further hindering the ability to slide the weight member in slot **31**. Accordingly, features that prevent the relative motion between the spring clip **38** and the other components, and/or features that prevent the arms **58** of

spring clip **38** from spreading due to the relative motion are included in the construction of weight member **34**. For example, spring clip **38** may include a spacer **74** that is incorporated into flexure **60** that limits both the space between spring clip **38** and clip portion **48** of weight body **36** and the relative motion between the two components. Additionally, spring clip **38** may be shaped to limit a gap **76** between clip portion **48** and the terminal ends **61** of arms **58**, and the surface of clip portion **48** closest to terminal ends **61** may include a concavity **78** so that contact between concavity **78** and terminal ends **61** draws arms **58** together. Still further, the width of locking tabs **64** may be selected to closely clear the width of the portions of slots **54** that receive tabs **64** so that the amount of clearance between the locking tabs **64** and slots **54** dictates the range of motion of the spring clip **38** relative to the weight body **36**.

In general, slot **31** is only required to be an elongate opening in a wall of the golf club head that includes detent features to interact with weight member **34**. It is generally desirable to close the slot so that the interior of the golf club head is not exposed, so a slot cover may be installed to close the interior volume of the golf club head. The cover may be a thin-walled trough or tray that may be glued inside the golf club head to cover the slot and to seal the inner cavity of the golf club head from air, water or other debris.

In another embodiment, shown in FIGS. **12-18**, a golf club head **90** includes a weight member **92** that utilizes spring features and a cam shape to lock the weight member **92** into a desired location in a weight mount that is formed by a shallow track **94**. The weight member **92** may be rotated in the track **94** between a first, unlocked orientation, shown in FIG. **14**, in which a side wall **93** of the weight member **92** is spaced from the side wall of the track **94**, and a second, locked orientation, shown in FIG. **15**. When the weight member **92** is in the locked orientation, the cam shape results in the side wall **93** of the weight member **92** abutting the side wall **95** of the track **94** and creating an outward, lateral force between track **94** and weight member **92**.

Weight member **92** is generally a monolithic weight body that is shaped so that it functions as a cam in track **94**, and includes an outer surface **102**, an inner surface **104**, and side wall **93** extends between outer surface **102** and inner surface **104**. In particular, the side wall **93** of weight member **92** is curved and non-circular so that the outer dimension varies with the angular orientation of the weight member **92**. In an example, weight member **92** has an oculiform shape, i.e., is shaped like an eye, so that the overall outer dimension taken through a centroid of the weight member varies between a minimum overall outer dimension D_1 of 28.5 mm and a maximum overall outer dimension D_2 of 30.0 mm. The side wall **93** of the weight member **92** is beveled at an angle in a range of 20° to 40°, and more preferably at an angle of about 30° and the weight member **92** has a thickness of about 4.8 mm. Weight member **92** also includes slots **96** that are generally semi-circular elongate apertures spaced from the side wall **93** so that the side wall **93** forms a spring feature. Preferably, the slot has a width of between about 1.5 mm and about 3.0 mm, and is spaced from the side wall **93** by a distance of about 1.5 mm at outer surface **102** of weight member **92**.

Track **94** is generally formed by angled, or beveled, side walls **95** that form undercuts on the sides of the weight mount. The side walls **95** of the track **94**, which are preferably parallel to the side wall **93** of weight member **92**, are beveled at an angle about equal to the angle of the side wall of the weight member, in particular at an angle of about 30° relative to a bottom wall support surface **104** of track **94**. The contact between the beveled side walls during rotation of the weight member **92** relative to track **94** causes weight member **92** to be drawn into the track **94** so that inner surface **104** is forced against support surface **100** of track. The outermost edges of track **94** include ledges **98** that form overhanging shoulders that are spaced from support surface **100** of track **94** by a distance that is greater than the thickness of weight member **92** to provide a gap so that weight member **92** may slide in track **94**. Preferably, the distance is greater than the thickness of weight member **92** by about 0.01 inch to about 0.05 inch. The width of the track is selected to allow both locking and sliding of the weight member **92**. In particular, the width of the track **94** at each elevation above the support surface **100** is selected to be between a minimum and a maximum outer dimension of the weight member at each corresponding elevation from support surface **100**. Additionally, support surface **100** has a value D_{Lock} that is between the minimum overall outer dimension D_1 and the maximum overall outer dimension D_2 of inner surface **104** of weight member **92** so that the weight member may be locked in place by rotation and cam action.

A tool engagement feature **106** is included in the body of weight member **92** for locking weight member **92** in track. In particular, tool engagement feature **106** is a feature that receives a portion of a tool, such as a screw driver or torque wrench, so that the tool may be used to rotate weight member **92** in track **94**.

Alternative embodiments of a weight member utilizing a cam shape to lock the weight member in place in a shallow track are illustrated in FIGS. **19-22**, all of which may have a generally oculiform in shape. Referring to FIG. **19**, a weight member **110** is similar to the weight member of FIGS. **12-17**, but does not include the spring features formed by slots. Weight member **110** generally includes an outer surface **112**, an inner surface **114**, a side wall **116**, and a tool engagement feature **118**. Weight member **110** is shaped to cam against walls of a weight track having beveled side walls, such as weight track **94**. The side wall **116** of weight member **110** is beveled to match the side walls of a complementary track and the weight member **110** locks in the track in the same manner as weight member **92** described above.

Referring to FIG. **20**, a weight member **120** including a square side wall **122** will be described. Weight member **120** includes side wall **122** that extends between an outer surface **124** and an inner surface **126** and is generally square in relation to those surfaces, i.e., generally extends from those surfaces at a 90° angle. The side wall of the weight member may be square or beveled. Generally, a square side wall provides only lateral locking force, while a beveled side wall provides both vertical and lateral forces to restrict motion of the weight member relative to the track. As a result, the depth of the track may be selected to prevent relative motion of the weight member relative to the track in a direction orthogonal to the cam force especially for weights having square side walls.

Weight member **120** also includes optional spring features to further lock the weight member into place in the locked position of the cam motion. In particular, slots **128** extend through the body of weight member **120** between outer surface **124** and inner surface **126** near side wall **122**. The proximity of slots **128** to side wall **122** results in a portion of the side wall **122** functioning as a spring. Similar to previous embodiments, weight member **120** includes a tool engagement feature **130**. As described above, the spring features may be used to increase the cam force between the weight member and the track if needed. However, in some embodiments, that additional spring force is not required,

and a weight member **132**, shown in FIG. **21**, has a construction identical to weight member **120** without the slots forming the spring features, and because of the otherwise identical construction it will not be described further in detail.

In another embodiment, a weight member **140** includes an alternative construction for spring features and is illustrated in FIG. **22**. Weight member **140** includes an outer surface **142**, an inner surface **144**, a side wall **146** and a tool engagement feature **148**. The construction of weight member **140** is similar to the construction of weight member **120** with an alternative spring feature. In particular, weight member **140** includes slots **150** that intersect side wall **146**, so that side wall **146** is discontinuous and so that portions of the body of weight member **140** form cantilevered arms **152** that are configured to flex and to provide spring features. All other aspects of the construction of weight member **140** are similar to those described above and will not be further described.

In another embodiment, a golf club head **160** includes a weight member **162** that is captured by a spring clamp **164** that forms a locking portion of a weight mount. Golf club head **160** generally is a hollow body defined by a face **166**, a sole **168**, a crown, and a skirt **170** that extends between the crown and sole **168**, and is preferably manufactured by standard methods. The golf club head **160** includes at least one mount that accepts and retains the weight member **162**, and preferably includes a plurality of weight mounts.

The spring clamp **164** is configured to be in a naturally clamped configuration, which may be described as an "always-on" configuration. By activating the spring clamp **164** with a tool, the clamp opens and releases the captured weight member **162**. A portion of the spring clamp **164** is fixed to a portion of the golf club head **160** and another portion of the spring clamp **164** forms a free end. The spring clamp **164** is preferably integrated into the construction of the golf club head **160**, such as by casting the spring clamp **164** into the construction of the body. Alternatively, the spring clamp **164** may be constructed as a separate component and fixed on a portion of the golf club head body, such as by welding or mechanical fasteners.

The spring clamp **164** is affixed at the opening of a mount built into the golf club head **160** to form the locking portion of the weight mount. Spring clamp **164** is generally formed by at least one flexible arm **171** that includes a fixed end **172** and a free end **174**. In the illustrated embodiment, the fixed end **172** is fixedly coupled to a portion of sole **168** and at least one free end **174** extends cantilevered from fixed end **172**. Spring clamp **164** is configured as a C-clamp with a spring integrated into the construction of the flexible arm **171** to keep the clamp "on," or closed shut, but it should be appreciated that a separate spring may be incorporated into the spring clamp, such as by incorporating a torsion spring.

A tool **176** is used to open the clamp to permit weight member **162** to be installed in, or removed from, the mount. In the illustrated embodiment, tool **176** is threaded into a threaded bore **178** included at a portion of spring clamp **164** near free end **174** of flexible arm **171**. An end of tool **176** extends out of threaded bore **178** and abuts free end **174** so that threading tool **176** further into the threaded bore **178** forces the flexible arm to flex outward to open the spring clamp. Unthreading and removing tool **176** from the threaded bore **178** allows the flexible arm **171** to return to its natural position, thereby returning the spring clamp to the natural clamped configuration. Although a threaded tool is illustrated, the tool may be used to open the clamp by different mechanisms. For example, the tool may be configured to act as a lever, push-action, pinch, cam, etc. Additionally, it should be appreciated that more than one arm of the spring clamp may be constructed to be flexible during use. For example, both arms of the illustrated spring clamp **164** may flex when tool **176** is threaded into the threaded bore **178**.

Referring to FIGS. **25** and **26**, the spring clamp may have many alternative shapes that provide different advantages. For example, a spring clamp may have a polygonal shape to complement a polygonal weight member and that shape prevents rotation of the weight member in the spring clamp. Referring first to FIG. **25**, a spring clamp **180** includes a fixed portion **182** and flexible arms **184** that terminate at free ends **186**. Spring clamp **180** has a generally triangular shape that receives a triangular weight member. In another embodiment, shown in FIG. **26**, a spring clamp **190** includes a fixed portion **192**, and flexible arms **194** that terminate at free ends **196**. Spring clamp **190** has a generally rhomboid shape that receives a complementary weight member. It should be appreciated that the spring clamp may have many alternative shapes to complement the shape of an accompanying weight member.

Another embodiment of a weight is illustrated in FIGS. **27-30**. Similar to previous embodiments, a weight may be constructed with at least one spring feature that is movable between a first configuration and a second configuration to allow the weight to be inserted and removed from a weight mount in a golf club head. Golf club head **200** includes a weight member **202** that is disposed in a weight mount **204** and held in place by lateral force applied to the weight mount **204** by spring features **206**. Similar to previous embodiments, golf club head **200** has a hollow bodied construction that includes a face, a sole **208**, a crown, a skirt, and a hosel that combine to define the hollow interior. The golf club head body may be constructed as described above with respect to the other embodiments, such as by forging and/or casting. Weight mount **204** generally has an outer opening that is exposed externally to the golf club head and that allows a user to insert a weight member **202** into the weight mount **204**.

Weight member **202** includes a body **210**, and a plurality of spring features **206**, in the form of flexible arms **212**. The spring features are constructed so that at least a portion of each spring feature is movable between a first configuration in which a portion of the spring feature extends away from a side wall of body **210** by a first dimension R_1, and a second configuration in which a portion of the spring feature is movable to a position in which it extends away from a side wall of body **210** by a second dimension R_2 that is less than first dimension R_1. The weight mount **204** is constructed so that it includes an opening that is sized to allow weight member **202** to pass through the opening when the spring features **206** are in the second configuration. Preferably, the opening in the weight mount is sized so that there is a gap between an outer dimension of the body **210** and the opening that has a gap dimension R_3 that is larger than second dimension R_2, and more preferably larger than second dimension R_2 by less than 20%. It should, however be appreciated that embodiments of the weight member may be constructed that allow spring feature to be recessed into the side wall of the body of the weight member so that the gap dimension is not required to be greater than the second dimension R_2. After the weight member **202** is inserted into weight mount **204**, through the opening, the spring features move toward the first configuration into undercuts of the weight mount **204**. Each undercut has a depth R_u from the outer dimension of body **210** that is less than the first

dimension R_1 of the first configuration of the spring features so that when the spring feature extends into the undercut it places a lateral force upon the sidewall of the weight mount **204** and retains weight member **202** in the weight mount.

In the present embodiment, the body **210** is generally cylindrical so that it forms a disc. Body **210** includes a through hole **218** that extends generally diametrically through body **210**, and through a side wall **220** formed on body **210**. As illustrated, the through hole **218** may be positioned at a mid-point of the thickness of body **210**, but it should be understood that it may be closer to an outer end or closer to an inner end of body **210** to adjust the depth of the center of gravity of the weight member **202** relative to the weight mount **204**. A slot **222** is included in body **210** that extends partially through the thickness of body **210** and intersects through hole **218**.

Each flexible arm **212** includes a first end **214** that is fixed to body **210**, and a second end **216** that is spaced from first end **214** by a flexible body. The first ends **214** are preferably fixed to body **210** mechanically with fasteners, metallurgically such as by welding or brazing, or by using adhesive such as epoxy. Preferably, each of the flexible arms **212** is coupled to the body **210** at a location that is spaced approximately 45° from the opening of through hole **218**, and the flexible arms are preferably positioned so that they are spaced approximately 180° from each other. The flexible body is constructed so that it is bendable, which allows second end **216** to move radially relative to body **210**.

Each flexible arm **212** also includes a radial arm **224** that extends radially inward, and into through hole **218**, from a location on flexible arm **212** that is at or adjacent first end **214**. In the present embodiment, each of the flexible arms **212** has a radial arm **224** attached near the second end **216** so that the flexible arm **212** extends past the radial arm **224** and beyond the opening of the through hole **218**. The length of each radial arm **224** is selected so that a portion of each radial arm **224** intersects slot **222** so that the radial arm may be manipulated by a user. The end of each radial arm **224** furthest from flexible arm **212** may also be shaped to include a tool engagement feature **226**, such as by including a bent portion, that is bent at approximately 90°, that may be grasped by a tool.

In the illustrated embodiment, the tool engagement features **226** of radial arms **224** may be grasped and squeezed together by translating the bent portions towards each other to activate the spring features **206** and bend flexible arms **212** radially inward, and preferably in line, i.e., approximately flush, with the perimeter of the weight member **202**. After the flexible arms **212** are bent inward, the weight member **202** may be inserted into weight mount **204**. After insertion, the tool engagement features **226** may be released so that flexible arms **212** spring outward and abut against sidewalls of weight mount **204**, thereby locking the weight member **202** into the weight mount **202**. Similarly, by squeezing the tool engagement features **226** toward each other, the weight member **202** may be released and removed from weight mount **204**. As described above, the spring features **206** have a default configuration in which the flexible arms extend away from body **210** so that if the weight member **202** is located in a weight mount **204**, the spring features push against the side walls of the weight mount **204**.

The spring features are constructed so that at least a portion of each spring feature is movable between a first configuration in which a portion of the spring feature extends away from a side wall of body **210** by a first dimension R_1, and a second configuration in which a portion of the spring feature is movable to a position in which it extends away from a side wall of body **210** by a second dimension R_2 that is less than first dimension R_1. The weight mount **204** is constructed so that it includes an opening that is sized to allow weight member **202** to pass through the opening when the spring features **206** are in the second configuration. Preferably, the opening in the weight mount is sized so that there is a gap between an outer dimension of the body **210** and the opening that has a gap dimension R_3 that is larger than second dimension R_2, and more preferably larger than second dimension R_2 by less than 20%. In an embodiment, the first distance R_1 is between about 1.0 mm and about 4.0 mm and greater than the undercut depth, and the second distance R_2 is less than 1.0 mm. It should, however be appreciated that embodiments of the weight member may be constructed that allow spring feature to be recessed into the side wall of the body of the weight member so that the opening in the weight mount need only provide clearance for the size of the body. After the weight member **202** is inserted into weight mount **204**, through the opening, the spring features move toward the first configuration into undercuts of the weight mount **204**. Each undercut has a depth R_u from the outer dimension of body **210** that is less than the first dimension R_1 of the first configuration of the spring features so that when the spring feature extends into the undercut it places a lateral force upon the sidewall of the weight mount **204** and retains weight member **202** in the weight mount.

The body may be constructed from any material, but is preferably constructed from a metallic material, which is selected to provide the weight member with a preselected overall mass. The body and weight mount are shaped to complement each other, and any shape may be selected. Additionally, portions of the weight member may be coated, such as with a polymer material, so that there is a soft material disposed between the weight member and the weight mount.

Referring to FIG. **37**, an alternative construction of weight member **202** is provided in which the radially arms are replaced by an actuator that utilizes tension members to move the spring features between the first configuration and the second configuration. As illustrated, a weight member **290** is constructed similar to weight member **202** and has similar components which are assigned identical part numbers and will not be described in further detail. In the present embodiment, a tension member **292** extends from each of the flexible arms **212** to an actuator **294**. Actuator **294** is a component that is rotatably coupled to body **210**. The tension members **292** are preferably flexible members such as wire or cable that coils around actuator **294** when actuator **294** is rotated in a first direction and uncoils from actuator **294** when it is rotated in a second direction. Additionally, the flexibility and spring behavior of the arms may be utilized to uncoil the tension members from actuator by releasing the actuator. It should be appreciated that the actuator **294** may be cylindrical or it may be shaped as a cam, such as by shaping it as a nautilus, to alter the amount of rotation required to retract the flexible arms.

In another embodiment, illustrated in FIGS. **31** and **32** is a weight member **230** that may be substituted for weight member **202** in golf club head **200**. Weight member **230** includes a spring body **232** and a body **234**. In general, the spring body **232** is a generally tubular, cylindrical member that includes integrated spring features **236**, and that is disposed on and attached to a first portion of body **234** having a first diameter that is smaller than a second portion having a second diameter. The spring body **232** may be

attached to body **234** by mechanical, metallurgical or adhesive mechanisms. The construction provides the advantages of providing fewer parts and simplifying the assembly of the weight member.

Spring body **232** is constructed from a tubular member. Portions of the wall of the tubular member may be cut to include slots that define cantilevered arms. Each of the cantilevered arms includes a first end **238** that is fixed, and a second end **240** that is spaced from first end **238** by the length of the cantilevered arm. The cantilevered arms are bent at first end **238** to form them into spring features **236**. In particular, the cantilevered arms are bent outward from the tubular body so that at least a portion extends away from body **234** to provide the outer spring surfaces of the weight member **230**. An additional inward bend is created at a location in each cantilevered arm spaced from first end **238** to create radial portions **242** of the cantilevered arms that extend radially inward. An additional bend may be created adjacent second end **240** to provide a tool engagement feature **244**, which may be a hooked end of the spring feature **236** at second end **240**.

Spring body **232** may be constructed from metallic material, such as titanium, or a polymeric material, such as polycarbonate. The spring body **232** is installed on body **234** to form weight member **230**. The two components may be temporarily coupled or permanently coupled. For example, spring body **232** may be slipped over a reduced diameter portion of body **234**.

Another embodiment of a weight member that may be substituted for weight member **202** in golf club head **200** is illustrated in FIGS. **33-36**. In particular, weight member **252** includes a body **254** and a pair of spring features **256**. Similar to previous embodiments, the spring features **256** may be moved relative to body **254** to reduce an outer dimension of the weight member **252**, thereby allowing the weight member **252** to be inserted into a weight mount included in the golf club head.

In the present embodiment, the spring features **256** are formed as spring-loaded slides that are biased to extend radially outward from body **254**. Similar to previous embodiments, the spring features are constructed so that at least a portion of each spring feature is movable between a first configuration and a second configuration and that change in configuration allows the weight member to be installed in a weight mount. In particular, a portion of the spring feature extends away from a side wall of body **254** by a first dimension R_1, and a second configuration in which a portion of the spring feature is movable to a position in which it extends away from a side wall of body **254** by a second dimension R_2 that is less than first dimension R_1. In the present embodiment, the tab portion **264** of the slide member **258** may be slid between the first configuration and the second configuration, as illustrated in FIG. **36**. As described above, the opening in the weight mount is sized so that there is a gap between an outer dimension of the body **254** and the opening that has a gap dimension that is larger than second dimension R_2 however in this embodiment the weight member is preferably constructed to allow the tab portion of slide member **258** to be fully recessed into the side wall of the body **254** of the weight member. After the weight member **252** is inserted into the weight mount, through the opening, the spring features are allowed to move toward the first configuration into undercuts of the weight mount, such as under the influence of a spring member **260**. Each undercut has a depth from the outer dimension of body **254** that is less than the first dimension R_1 of the first configuration of the spring features so that when the spring feature extends into the undercut it places a lateral force upon the sidewall of the weight mount **254** and retains weight member **252** in the weight mount.

Each spring feature **256** is constructed from a slide member **258** and the spring member **260** that applies a force on slide member **258** that forces the slide member radially outward with respect to body **254**. Slide member **258** includes a body portion **262** and a tab portion **264**. The body portion **262** is sized to slide within a slot **266** formed in body **254**. The sides of body portion **262** and slot **266** may be configured to restrict relative movement between the slide member **258** and body **254** to a radial direction, such as by including a tongue and groove interface. For example, lateral grooves **268** may be included in the side walls of slot **266** that create a portion of slot **266** having a width that varies through the thickness of body **254**. The sides of slide member **258** include tongues **270** that are sized to slide within grooves **268**.

The body portion **262** of the slide member **258** includes a bore **272** that receives a portion of spring member **260** that extends from body **254** into slot **266**. The spring member **260** is preferably partially compressed so that it forces slide member **258** to extend outward radially. It should be appreciated that the slide member **258** and body **254** may be configured to utilize a helical spring, as shown, or another spring configuration such as watch pin spring, a leaf spring, torsional spring or belville washers. A tool engagement feature **273** may be included on the body portion **262** of the slide member **258** that allows a user to activate the weight member by moving the slide members **258** relative to the body **254**. For example, the tool engagement feature may be a recess included on a portion of slide member **258** that is exposed externally when weight member **252** is installed in a weight mount of a golf club head. In the illustrated embodiment, each of the slide members **258** includes a recess so that a tool, such as a spanner wrench having two projections that are translatable toward and away from each other, may be used to translate the slide members **258** toward each other against the influence of the spring members **260**. Translating the slide members **258** toward each other reduces the outer dimension of the weight member **252** allowing it to be inserted and removed from a weight mount having an undercut construction, such as weight mount **204**.

The translation motion of the slide member **258** relative to body **254** is limited in an inward direction by body **254** and in an outward direction by a slide stop **274**. Slide stop **274** includes a cantilevered arm **276** and a locking tab **278**. Cantilevered arm **276** is preferably formed as part of the body portion **262** of slide member **258** and is configured to be bendable. Locking tab **278** is constructed so that it includes a ramped surface that allows the slide member **258** to be inserted into slot **266** while causing the cantilevered arm to bend during insertion. When slide member **258** is fully installed, locking tab **278** is received in a locking recess **267** included in slot **266**. Locking tab **278** also includes a locking shoulder **279** that opposes a shoulder **280** formed in a portion of slot **266** when slide member **258** is fully installed in body **254**. The opposing shoulders restrict the relative movement of slide member **258** and body **254** so that slide member **258** can not be removed from body **254** without bending cantilevered arm **276** to allow locking tab to slide through slot **266**. An access port **282** may be included in body **254** that exposes a portion of the slide stop through the body **254** to allow a tool to be inserted to contact a portion of slide stop **274** to bend cantilevered arm **276**, thereby allowing slide member **258** to be removed from body.

While it is apparent that the illustrative embodiments of the invention disclosed herein fulfill the objectives of the present invention, it is appreciated that numerous modifications and other embodiments may be devised by those skilled in the art. Additionally, feature(s) and/or element(s) from any embodiment may be used singly or in combination with other embodiment(s) and steps or elements from methods in accordance with the present invention can be executed or performed in any suitable order. Therefore, it will be understood that the appended claims are intended to cover all such modifications and embodiments, which would come within the spirit and scope of the present invention.

What is claimed is:

1. A golf club head including a weight member, comprising:

a club head body having a hollow construction defined by a face defining a ball-striking surface, a sole, a crown, and a skirt, wherein the sole extends aftward from a lower edge of the face, wherein the crown extends aftward from an upper edge of the face, and wherein the skirt extends between the sole and the crown around a perimeter of the body;

a weight mount disposed on at least one of the sole, the crown, and the skirt, wherein the weight mount defines a perimeter wall, wherein a portion of the perimeter wall defines an undercut having an undercut depth R_u; and

a weight member that includes a weight body defining a side wall, a bore, and a spring feature, wherein at least a portion of the spring feature is movably coupled to the weight body so that it is movable between a first configuration and a second configuration, wherein in the first configuration a portion of the spring feature extends outward from a side wall of the weight body by a first distance R_1, wherein in the second configuration a portion of the spring feature extends outward from a side wall of the weight body by a second distance R_2, wherein the spring feature is a cantilevered arm that includes a fixed end coupled to the weight body and a cantilevered end, wherein the bore of the weight body receives a portion of the cantilevered arm,

wherein the undercut depth R_u is less than the first distance R_1 and greater than the second distance R_2 so that the spring feature abuts the undercut of the perimeter wall of the weight mount, and wherein the spring feature is at least partially flexed by the abutment of the spring feature with the perimeter wall when the weight member is installed in the weight mount.

2. The golf club head of claim **1**, wherein the first distance R_1 is between about 1.0 mm and about 4.0 mm, and wherein the second distance R_2 is less than 1.0 mm.

3. The golf club head of claim **1**, wherein the weight body is cylindrical and the bore is a diametric bore that receives the portion of the cantilevered arm.

4. The golf club head of claim **3**, wherein the cantilevered end of the cantilevered arm extends into the diametric bore of the weight body.

5. The golf club head of claim **3**, wherein the cantilevered arm further comprises a radial arm that extends radially from a location on the cantilevered arm that is closer to the cantilevered end than the fixed end, and wherein the radial arm extends into the diametric bore.

6. The golf club head of claim **1**, wherein the cantilevered arm is formed by a slot cut in the sidewall of a tubular member.

7. The golf club head of claim **6**, wherein the weight body is a cylindrical member having a first portion having a first outer diameter and a second portion having a second outer diameter, wherein the first outer diameter is smaller than the second outer diameter, wherein the tubular member is coupled to the weight body on the first portion.

8. A golf club head including a weight member, comprising:

a club head body having a hollow construction defined by a face defining a ball-striking surface, a sole, a crown, and a skirt, wherein the sole extends aftward from a lower edge of the face, wherein the crown extends aftward from an upper edge of the face, and wherein the skirt extends between the sole and the crown around a perimeter of the body;

a weight mount disposed on at least one of the sole, the crown, and the skirt, wherein the weight mount defines a perimeter wall, wherein a portion of the perimeter wall defines an undercut having an undercut depth R_u; and

a weight member that includes a weight body defining a side wall and a spring feature, wherein at least a portion of the spring feature is movably coupled to the weight body so that it is movable between a first configuration and a second configuration, wherein in the first configuration a portion of the spring feature extends outward from a side wall of the weight body by a first distance R_1, wherein in the second configuration a portion of the spring feature extends outward from a side wall of the weight body by a second distance R_2,

wherein the undercut depth R_u is less than the first distance R_1 and greater than the second distance R_2 so that the spring feature abuts the undercut of the perimeter wall of the weight mount, wherein the spring feature is a cantilevered arm, wherein the cantilevered arm includes a fixed end and a cantilevered end, and the fixed end is coupled to the weight body, wherein the weight body includes a diametric bore that receives a portion of the cantilevered arm and the weight body includes a slot that intersects the diametric bore so that at least a portion of the cantilevered arm is exposed when the weight member is installed in a weight mount, and wherein the spring feature is at least partially flexed by the abutment of the spring feature with the perimeter wall when the weight member is installed in the weight mount.

9. The golf club head of claim **8**, wherein the cantilevered arm is constructed as a separate component and mechanically coupled to the weight body.

10. The golf club head of claim **8**, wherein the cantilevered arm is formed by a slot cut in the sidewall of a tubular member.

11. The golf club head of claim **10**, wherein the weight body is a cylindrical member having a first portion having a first outer diameter and a second portion having a second outer diameter, wherein the first outer diameter is smaller than the second outer diameter, wherein the tubular member is coupled to the weight body on the first portion.

12. The golf club head of claim **8**, wherein the first distance R_1 is between about 1.0 mm and about 4.0 mm, and wherein the second distance R_2 is less than 1.0 mm.

13. A golf club head including a weight member, comprising:

a club head body having a hollow construction defined by a face defining a ball-striking surface, a sole, a crown, and a skirt, wherein the sole extends aftward from a lower edge of the face, wherein the crown extends

aftward from an upper edge of the face, and wherein the skirt extends between the sole and the crown around a perimeter of the body;

a weight mount disposed on at least one of the sole, the crown, and the skirt, wherein the weight mount defines a perimeter wall, wherein a portion of the perimeter wall defines an undercut having an undercut depth R_u; and

a weight member that includes a weight body defining a side wall and a spring feature, wherein at least a portion the spring feature is movably coupled to the weight body so that it is movable between a first configuration and a second configuration, wherein in the first configuration a portion of the spring feature extends outward from a side wall of the weight body by a first distance R_1, wherein in the second configuration a portion of the spring feature extends outward from a side wall of the weight body by a second distance R_2, wherein the undercut depth R_u is less than the first distance R_1 and greater than the second distance R_2 so that the spring feature abuts the undercut of the perimeter wall of the weight mount when the weight member is installed in the weight mount, wherein the spring feature is a slide member that slides in the weight body between the first configuration and the second configuration, wherein the weight body includes a radial slot and side walls of the radial slot include grooves, wherein the slide member is disposed in the slot and portions of the slide member extend into the grooves, wherein in the second configuration an outer edge of the slide member is closer to flush with the weight body than the first configuration, and wherein the spring feature is at least partially flexed by the abutment of the spring feature with the perimeter wall when the weight member is installed in the weight mount.

14. The golf club head of claim **13**, wherein weight member comprises a slide stop, the slide stop comprising a cantilevered arm and a locking tab disposed in a recess formed in the radial slot.

15. The golf club head of claim **14**, wherein the weight body includes an access port that extends into the slot and that exposes a portion of the slide stop through the weight body.

16. The golf club head of claim **13**, wherein the slide member includes a tool engagement feature that is formed by a recess on a surface of the slide member that is exposed externally when the weight member is installed in the weight mount on the golf club head.

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