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Sanchez et al.

(54) **GOLF CLUB HAVING AN ADJUSTABLE WEIGHT ASSEMBLY**

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

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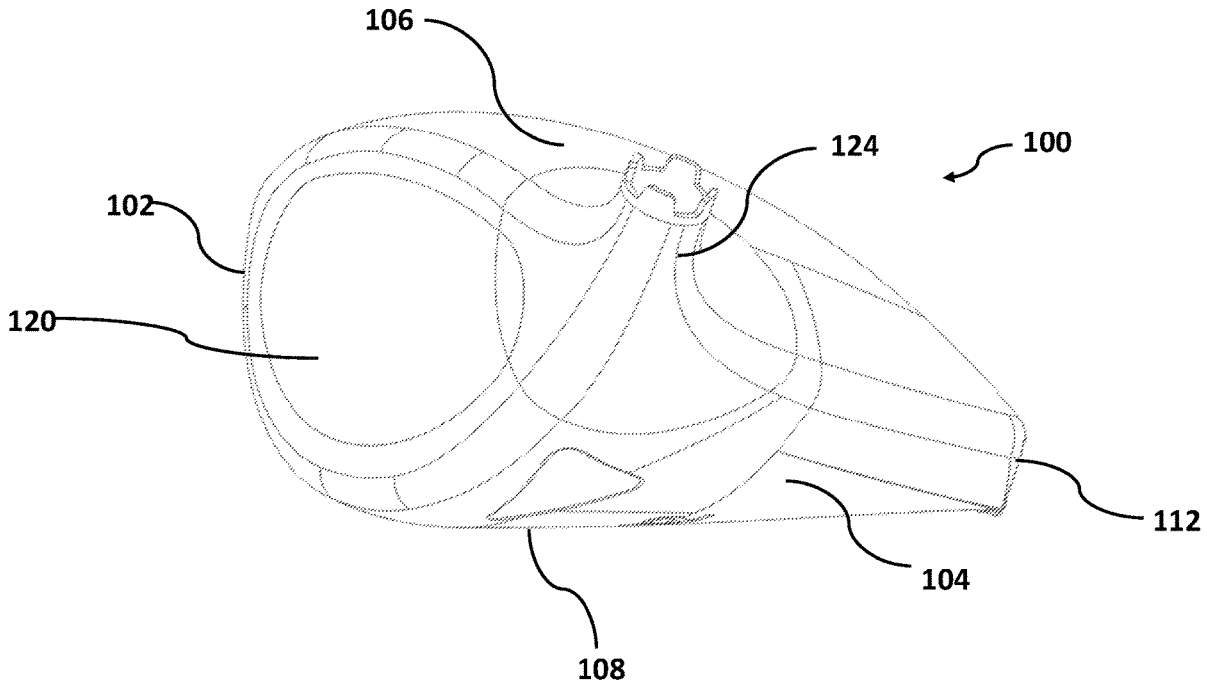
(52) **U.S. Cl.**

CPC ***A63B 53/06*** (2013.01); ***A63B 53/08*** (2013.01); *A63B 2053/0491* (2013.01)

(57) **ABSTRACT**

The present invention relates to a golf club head having an adjustable weight assembly. More specifically, the adjustable weight assembly utilizes a weight member that's secured via a fastener along various positions within an elongate channel.



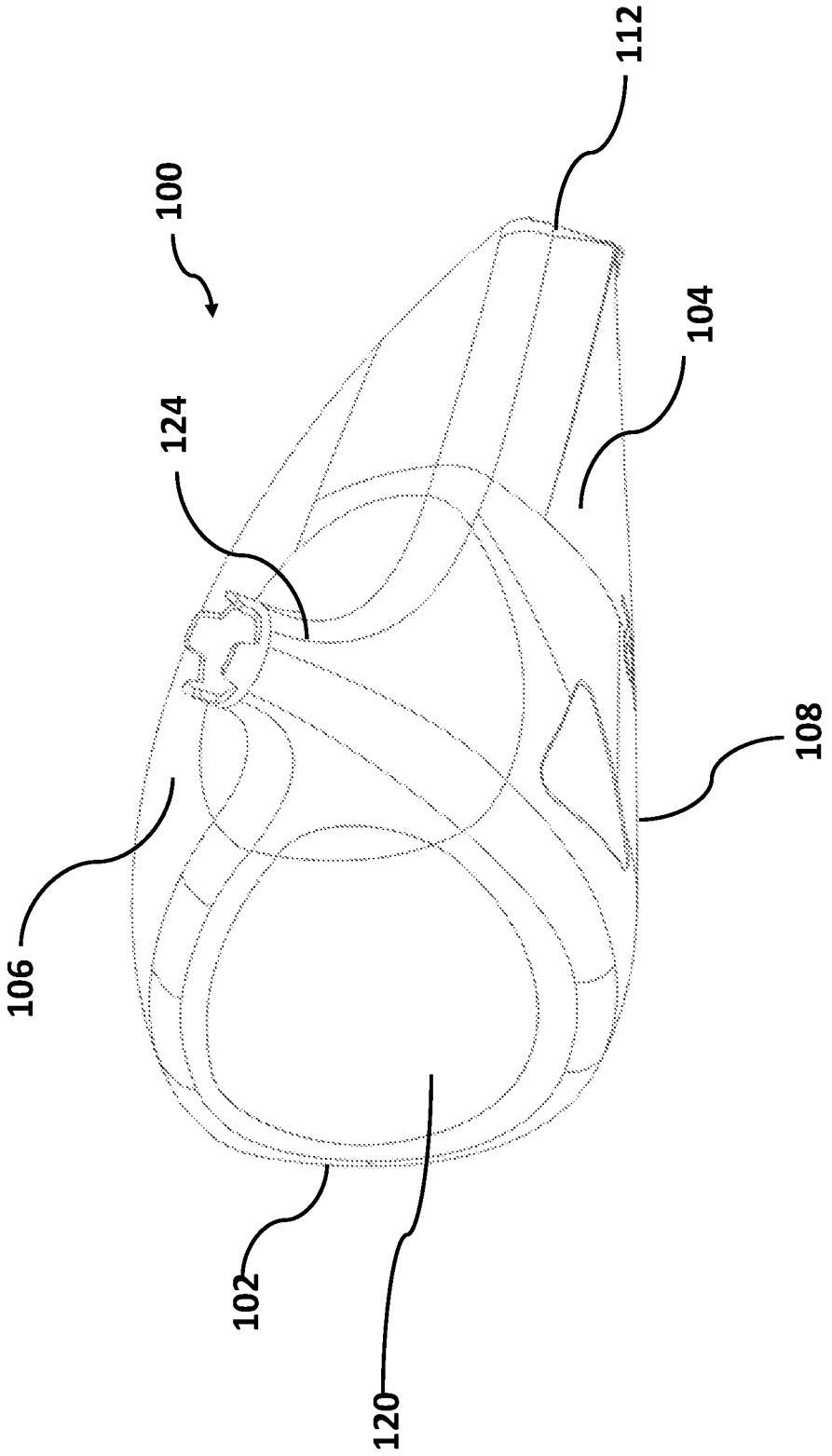


FIG. 1

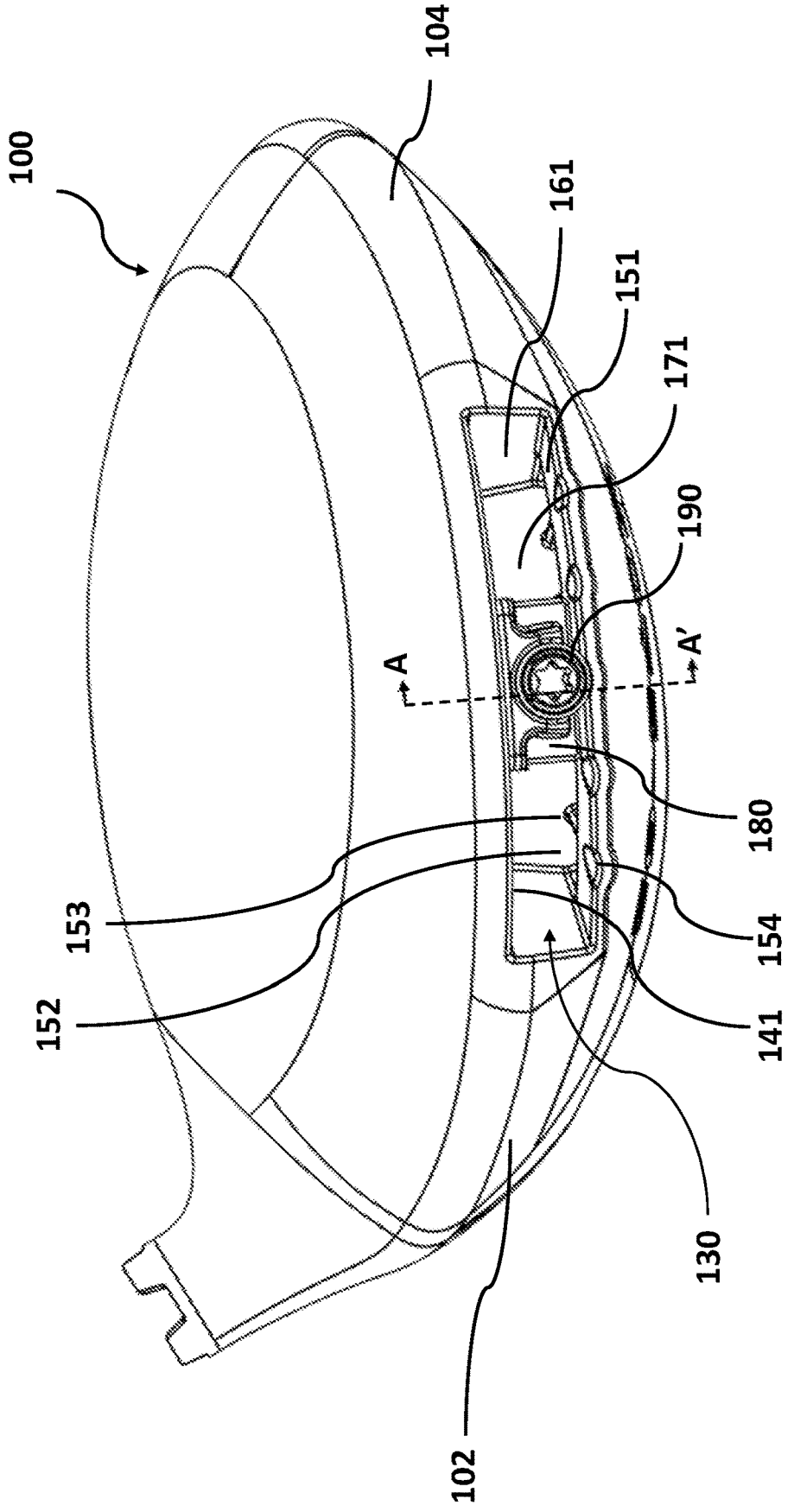


FIG. 2

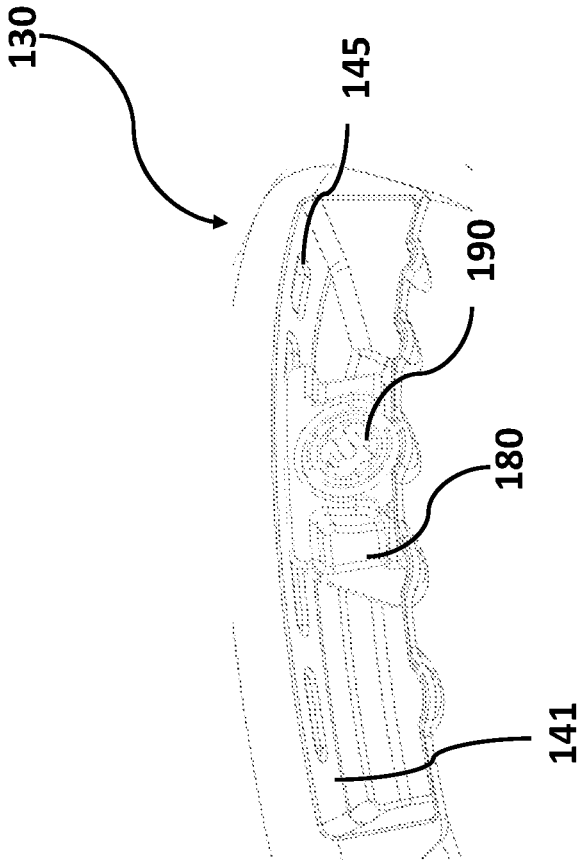


FIG. 3

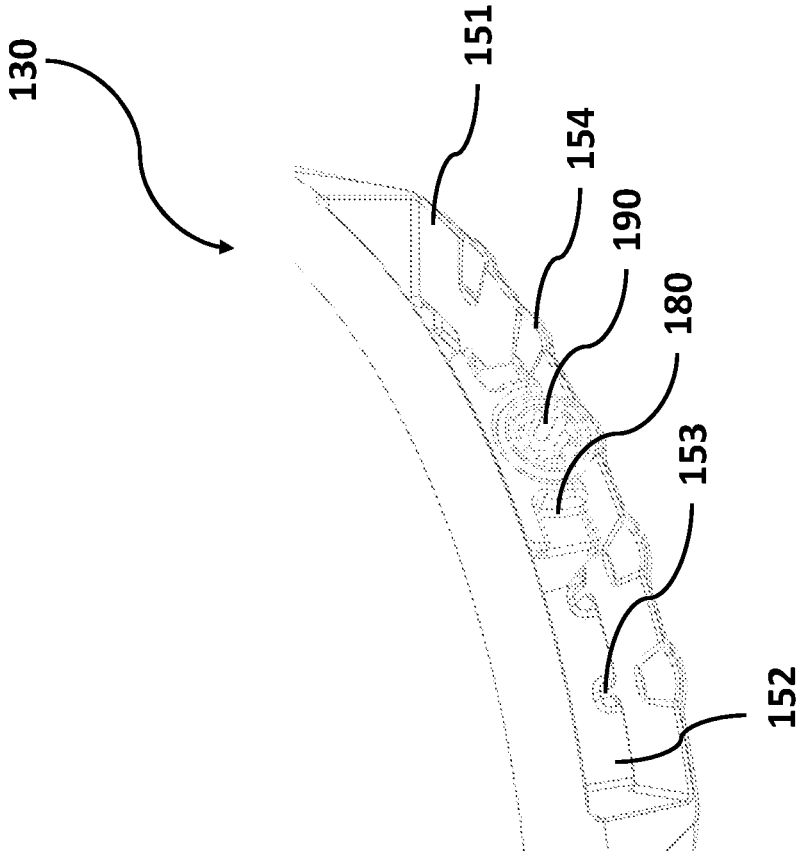


FIG. 4

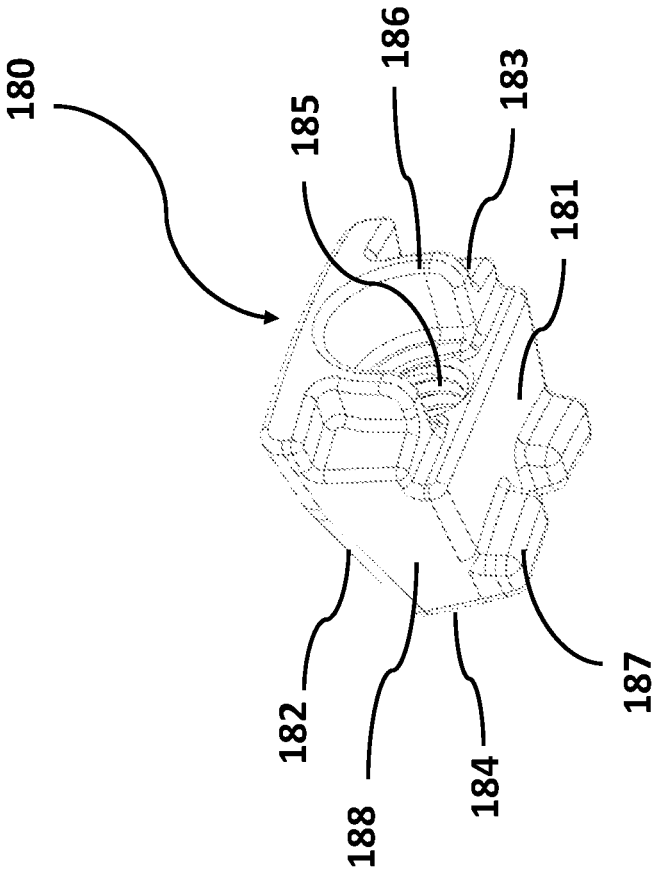


FIG. 5

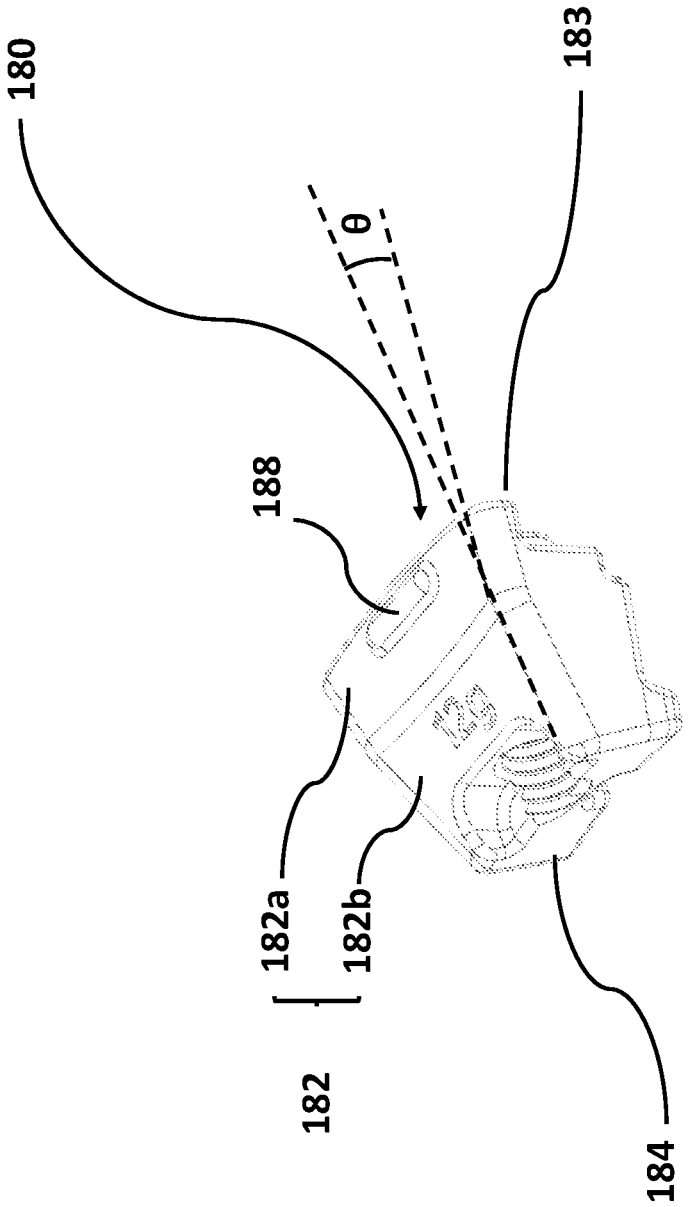


FIG. 6

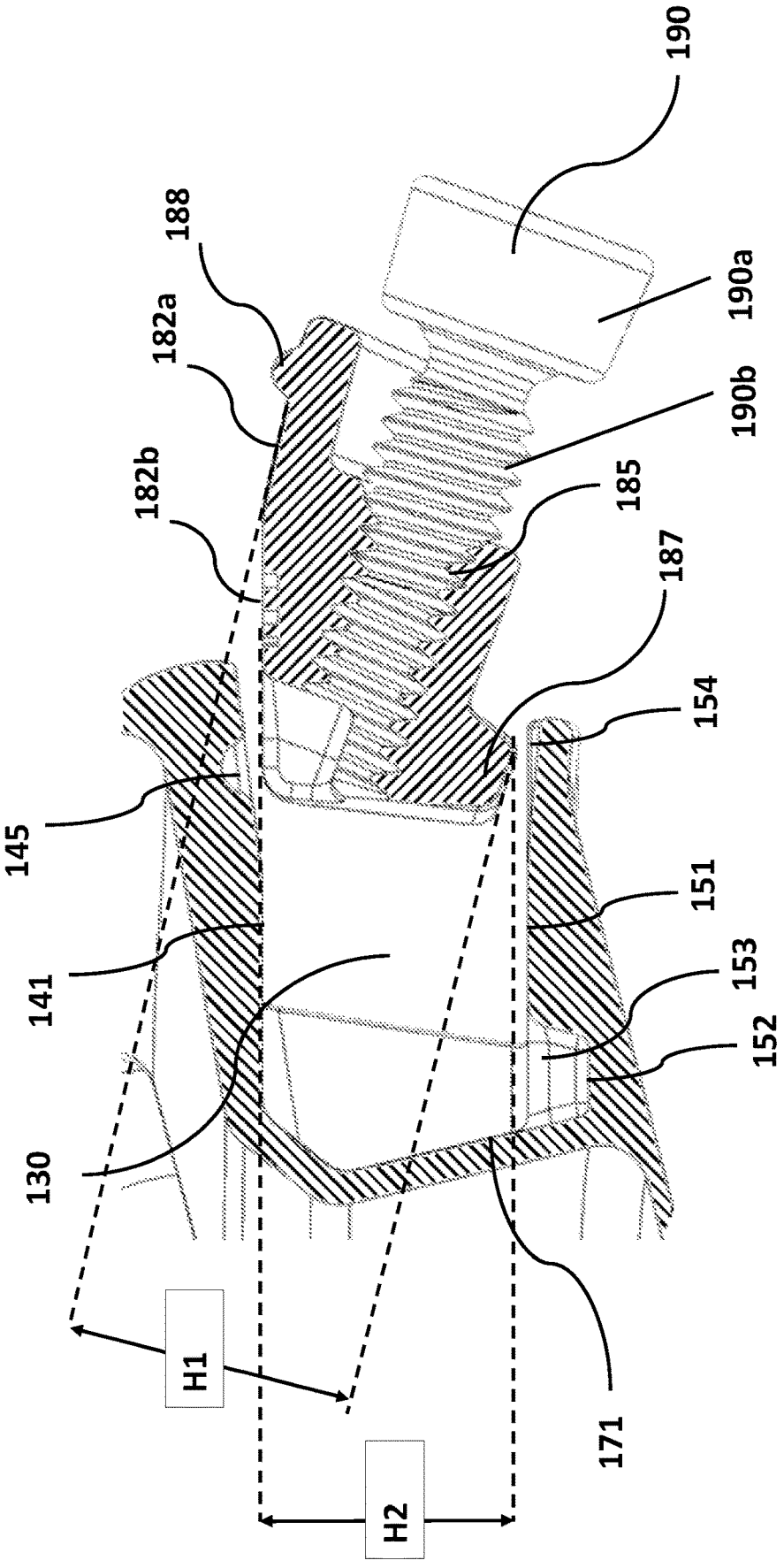

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FIG. 7

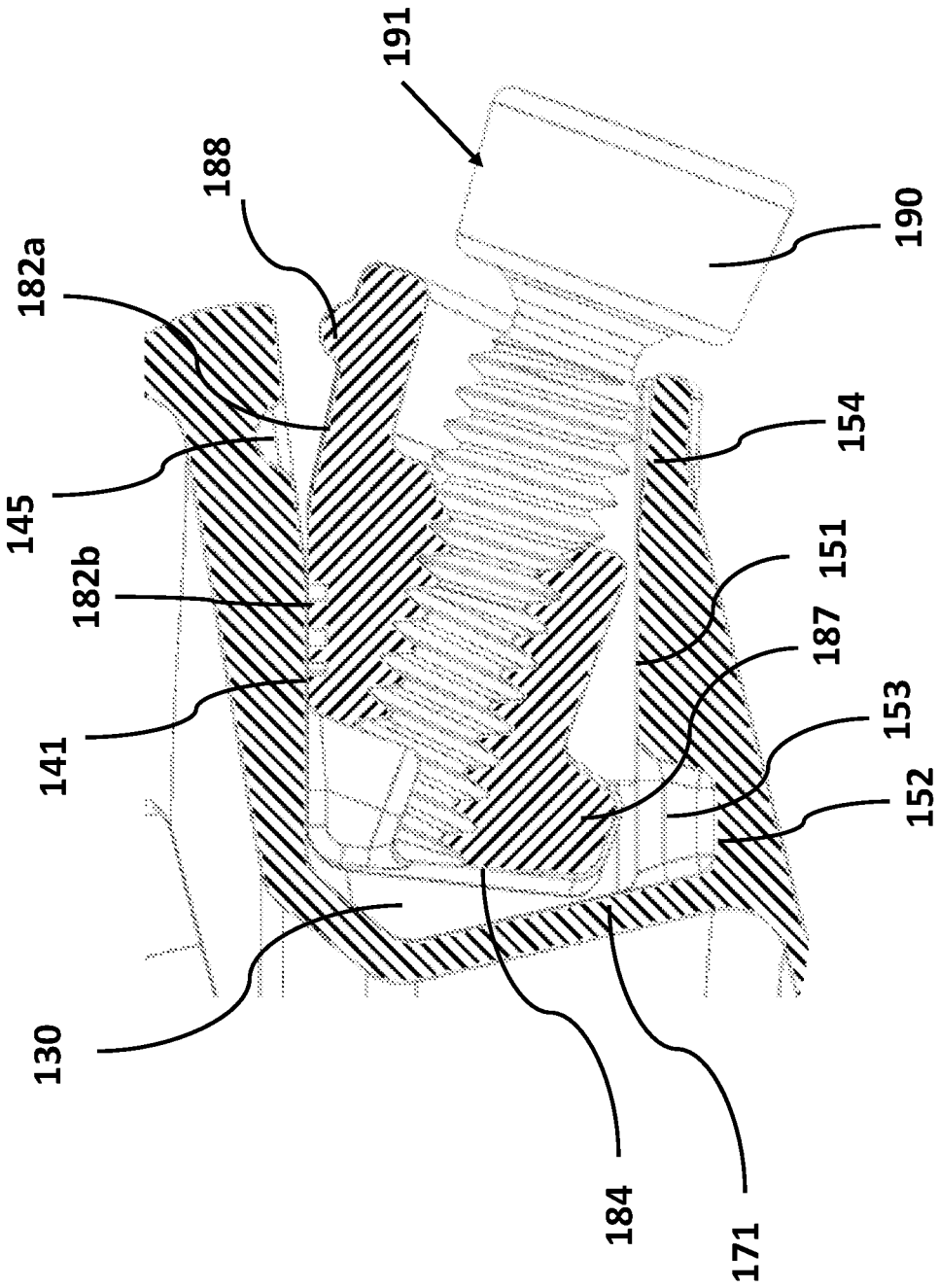

FIG. 8

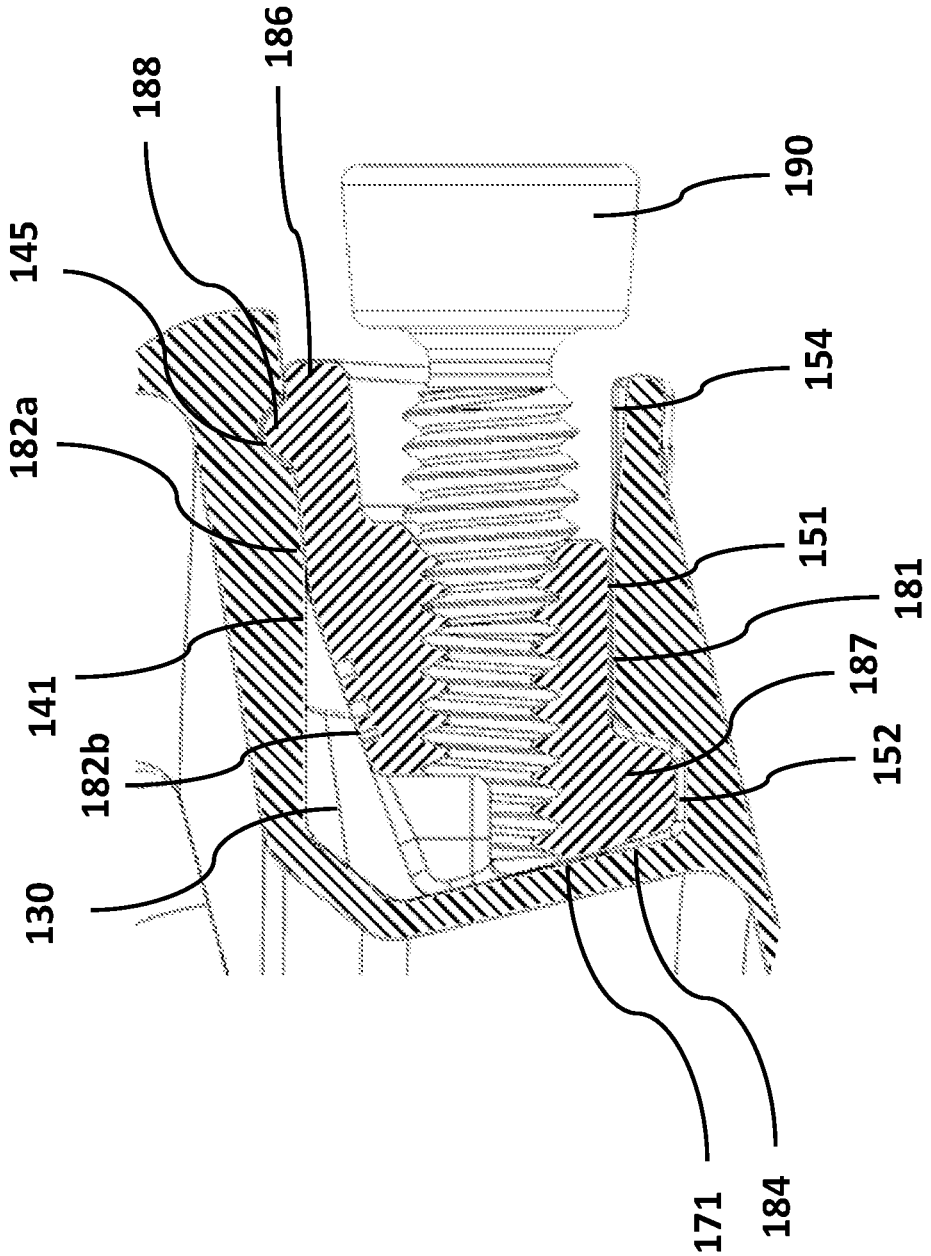

FIG. 9

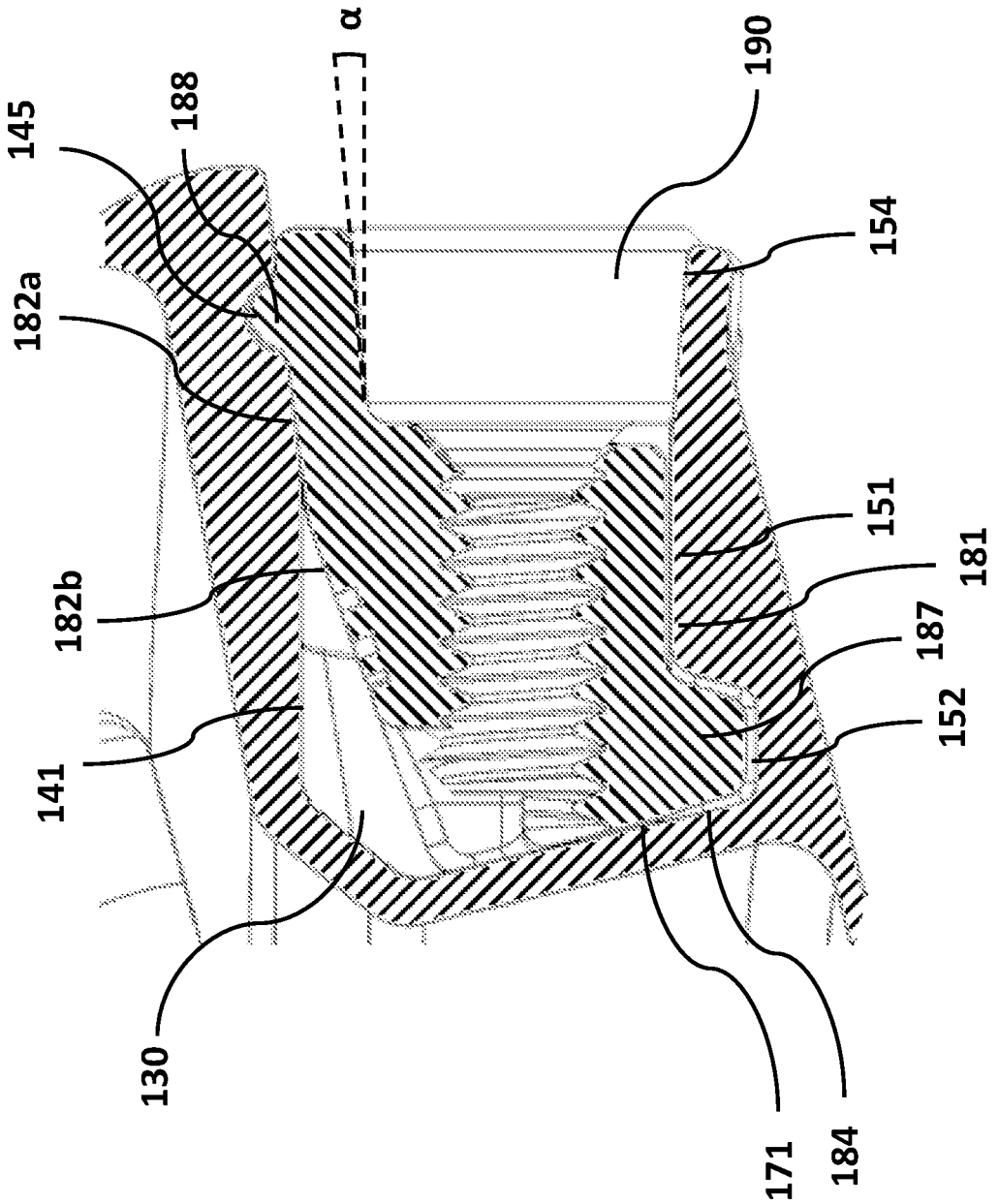

FIG. 10

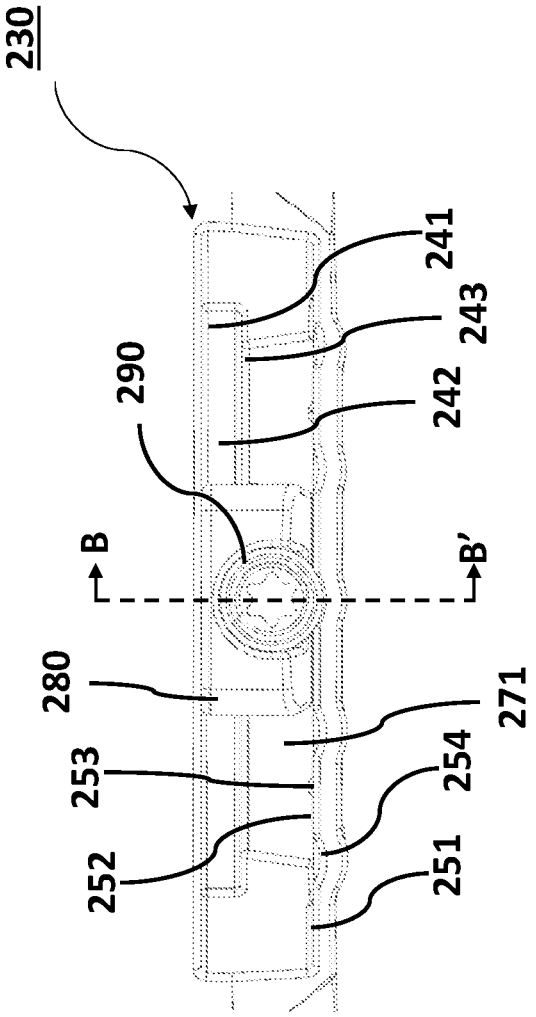

FIG. 11

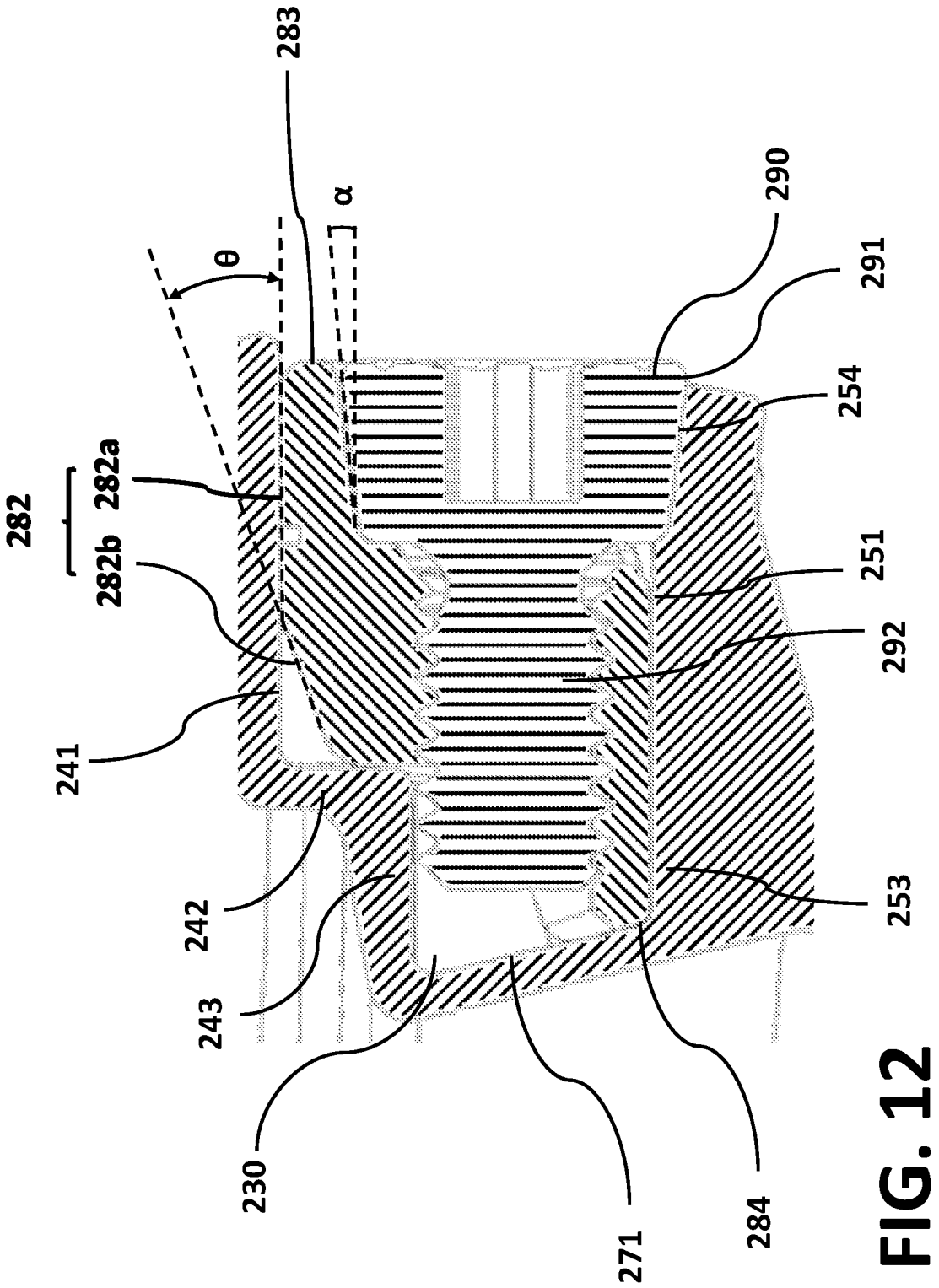
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FIG. 12

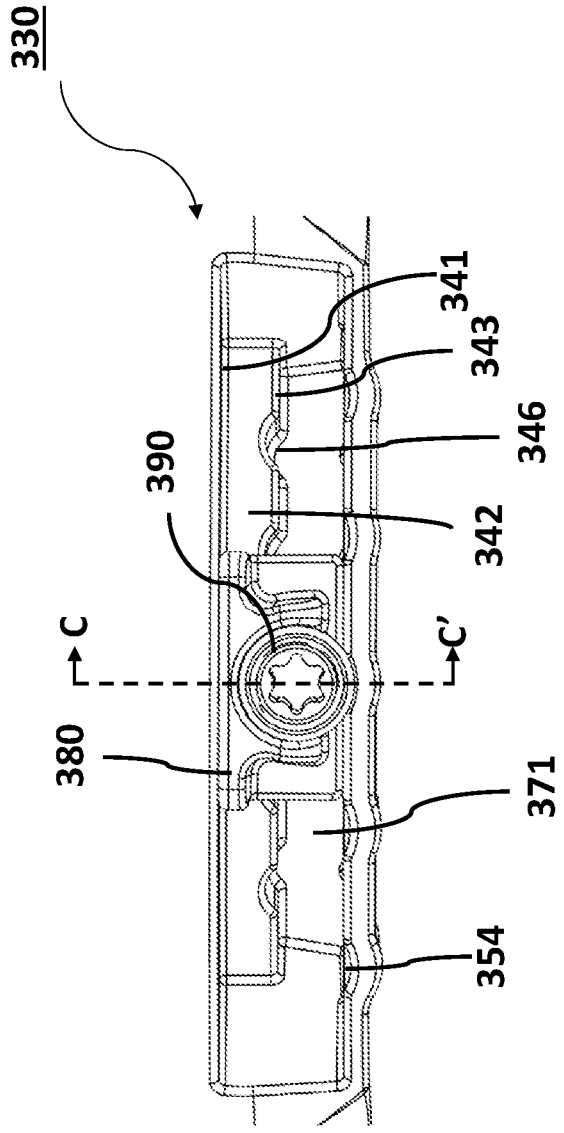

FIG. 13

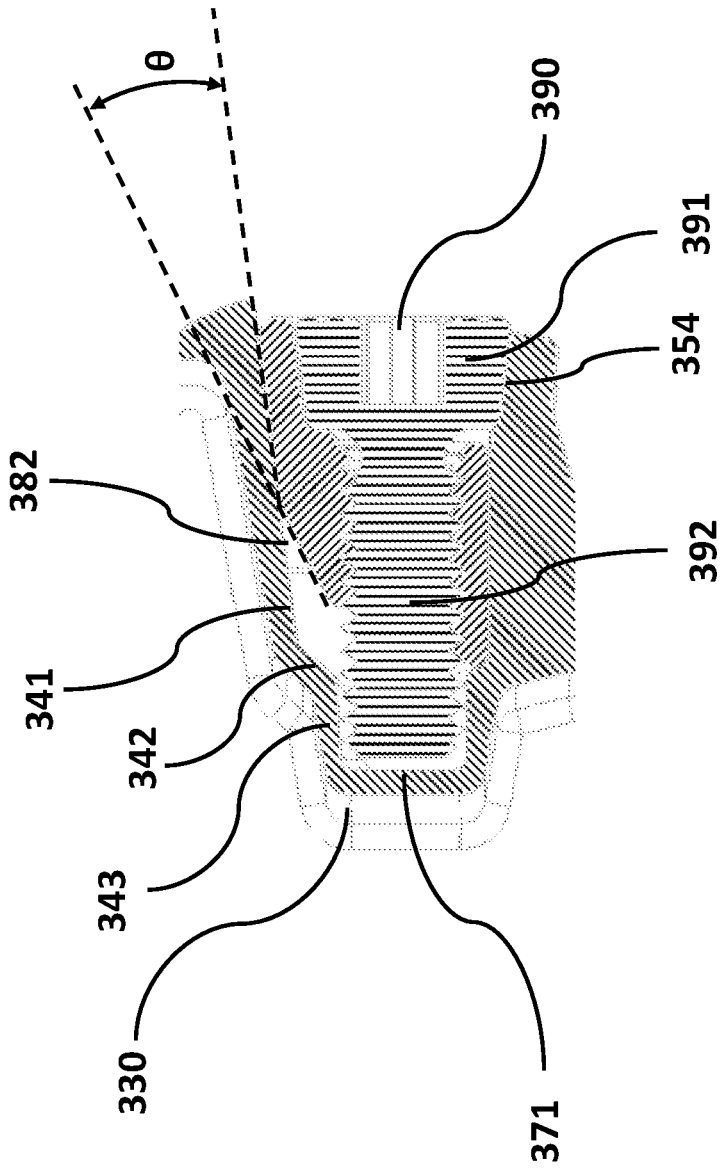

FIG. 14

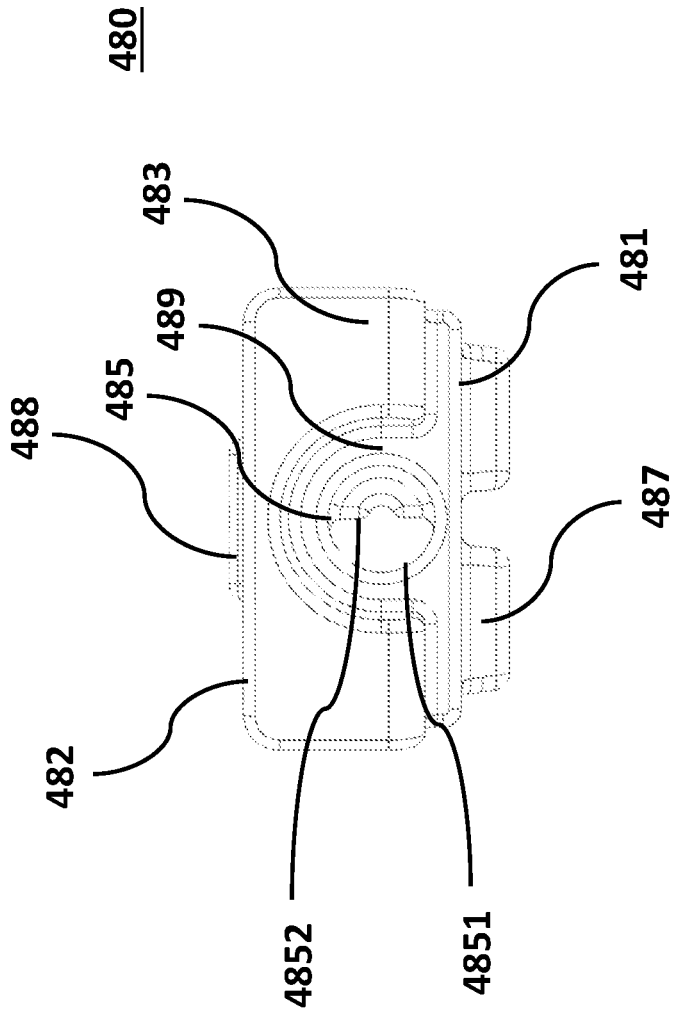

FIG. 15

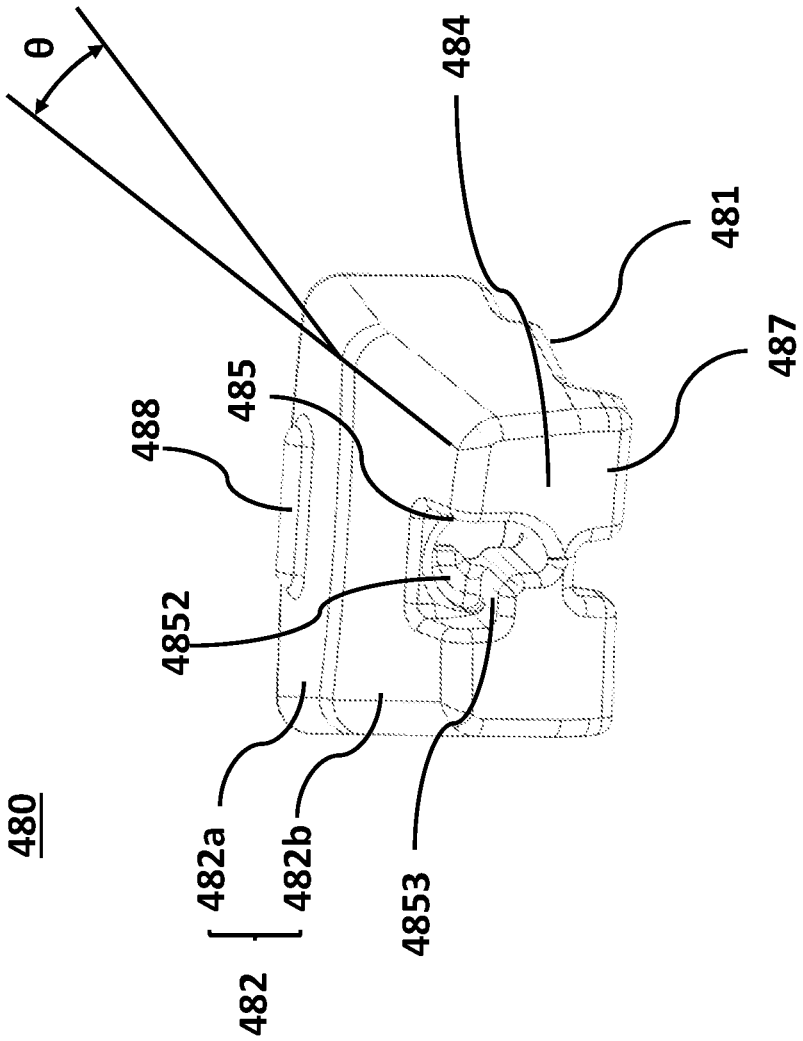

FIG. 16

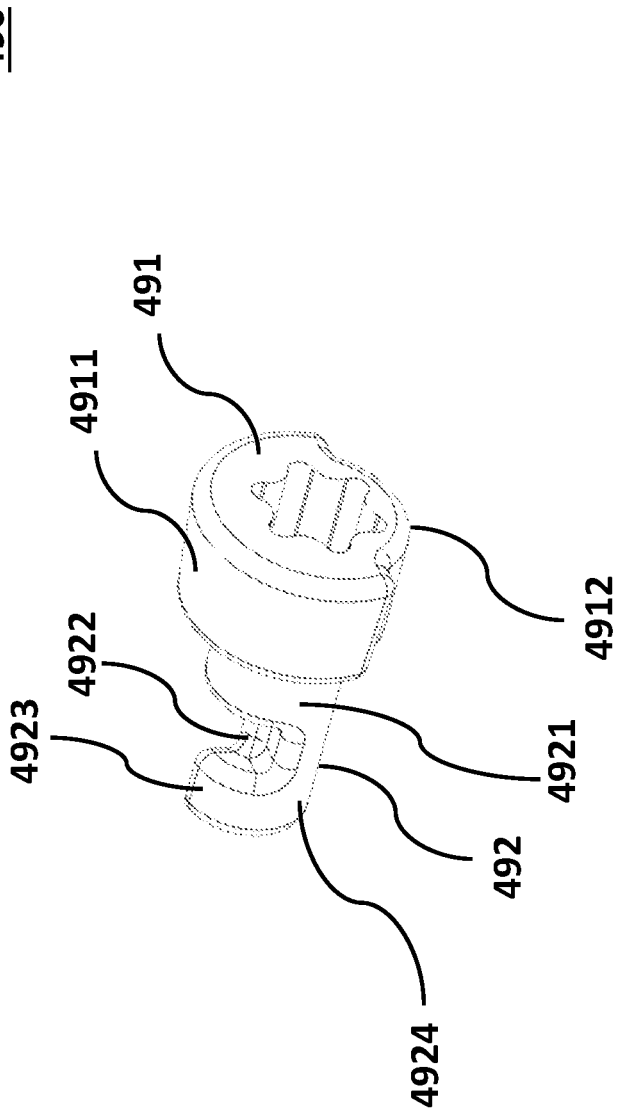

FIG. 17

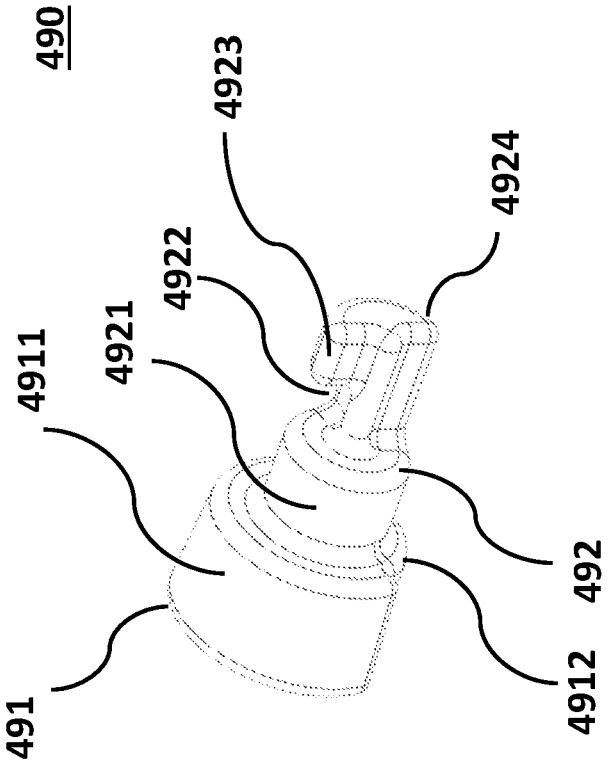

FIG. 18

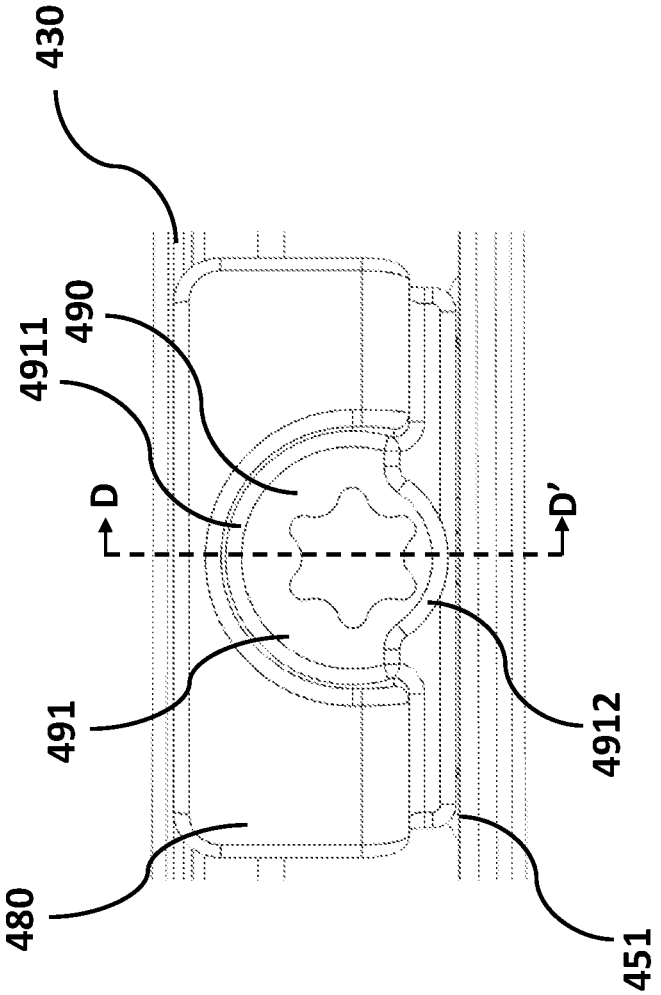

FIG. 19

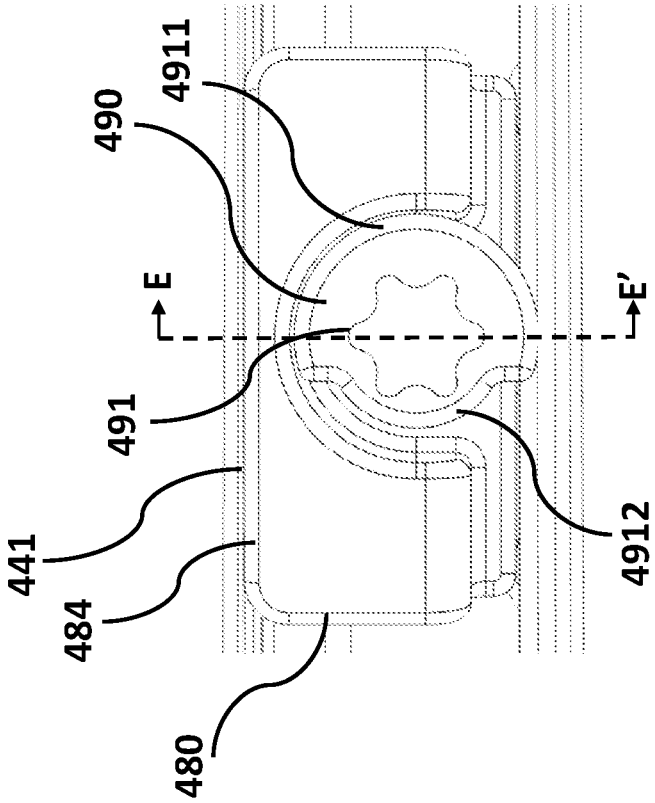

FIG. 20

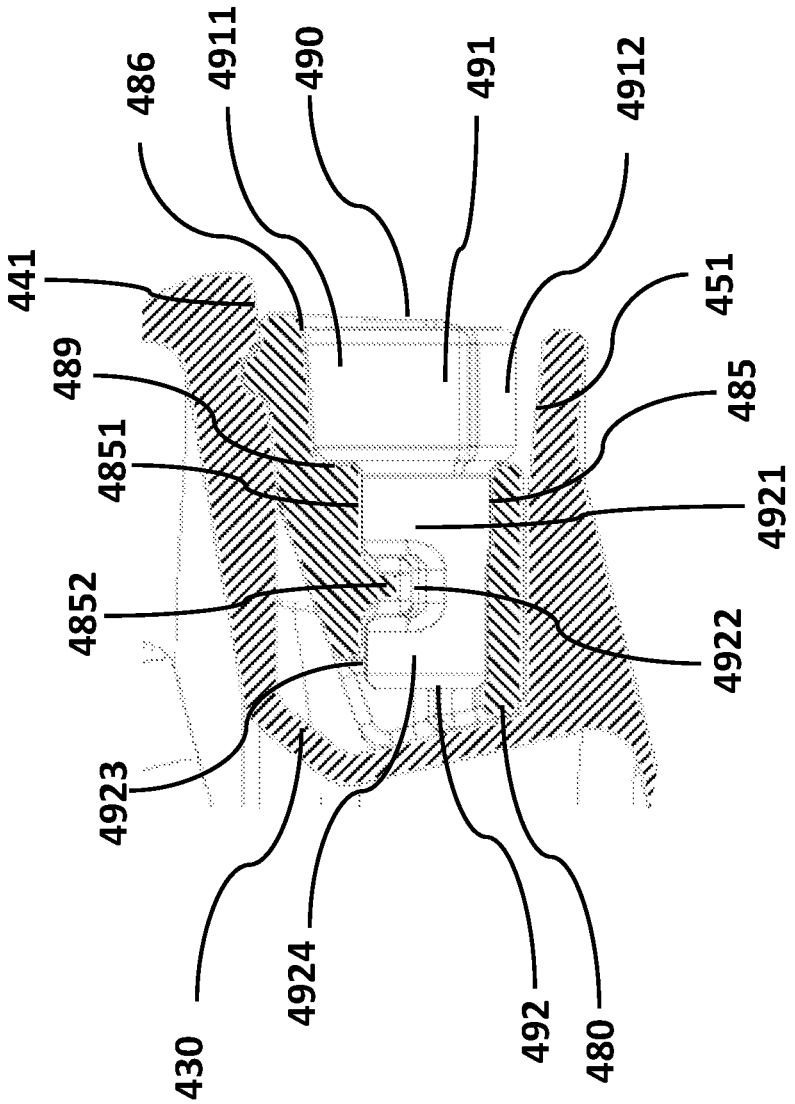
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FIG. 21

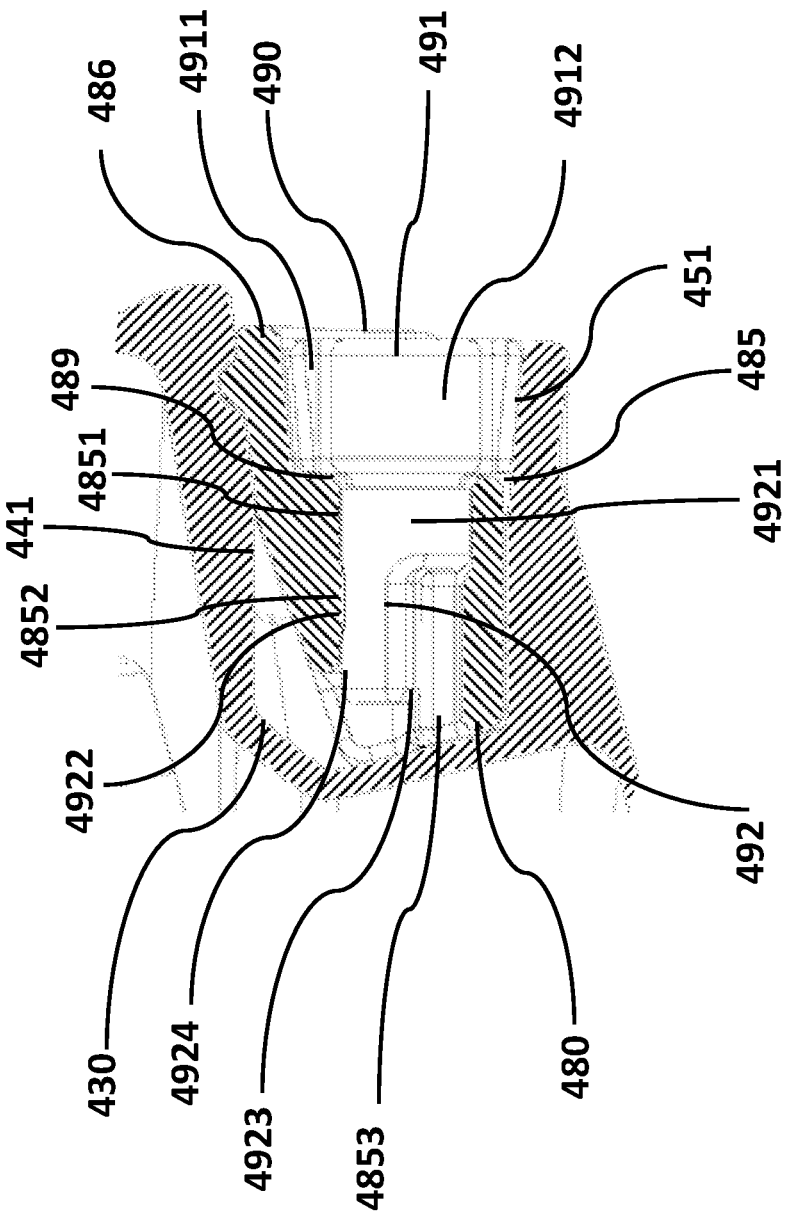
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FIG. 22

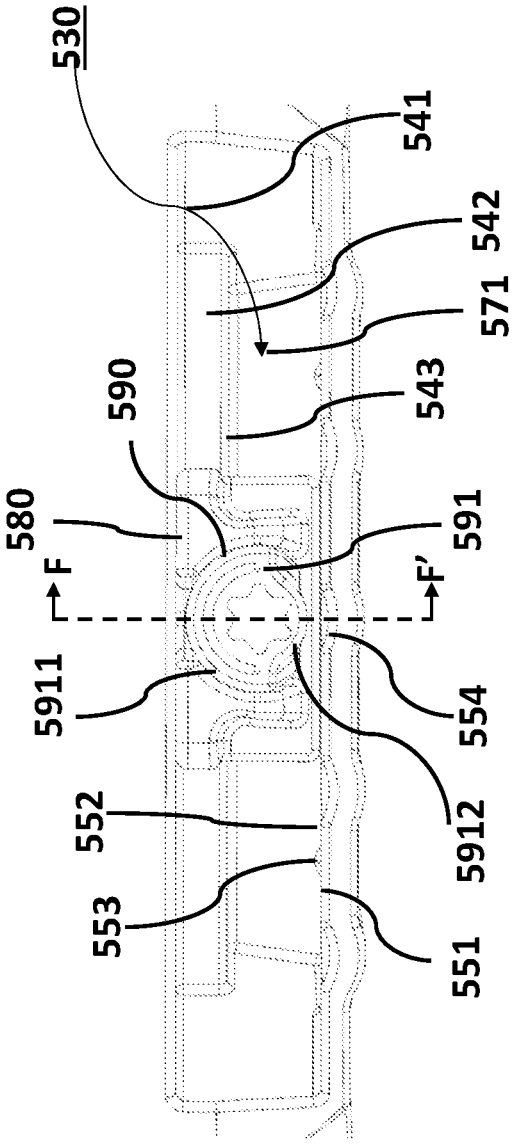

FIG. 23

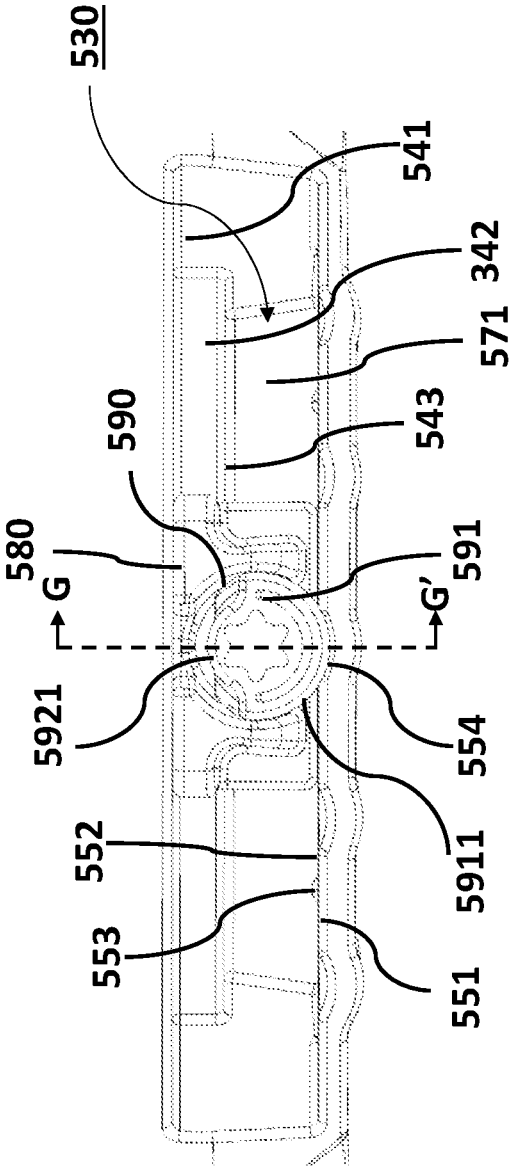

FIG. 24

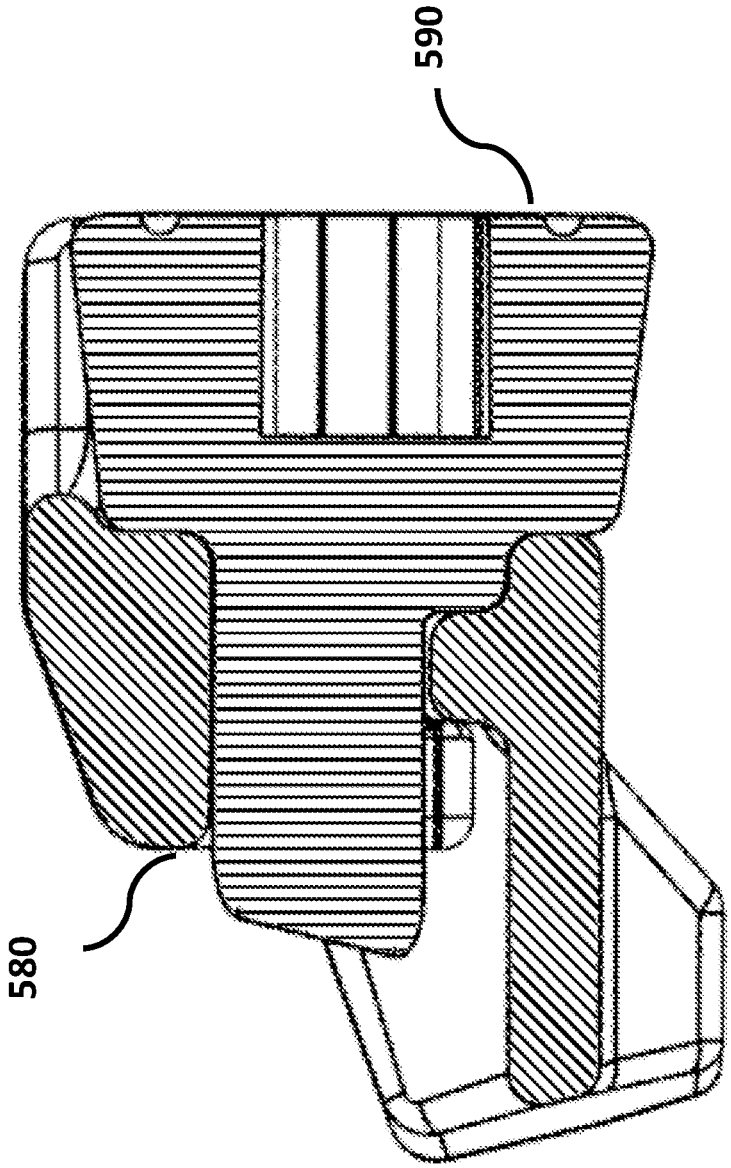

FIG. 25

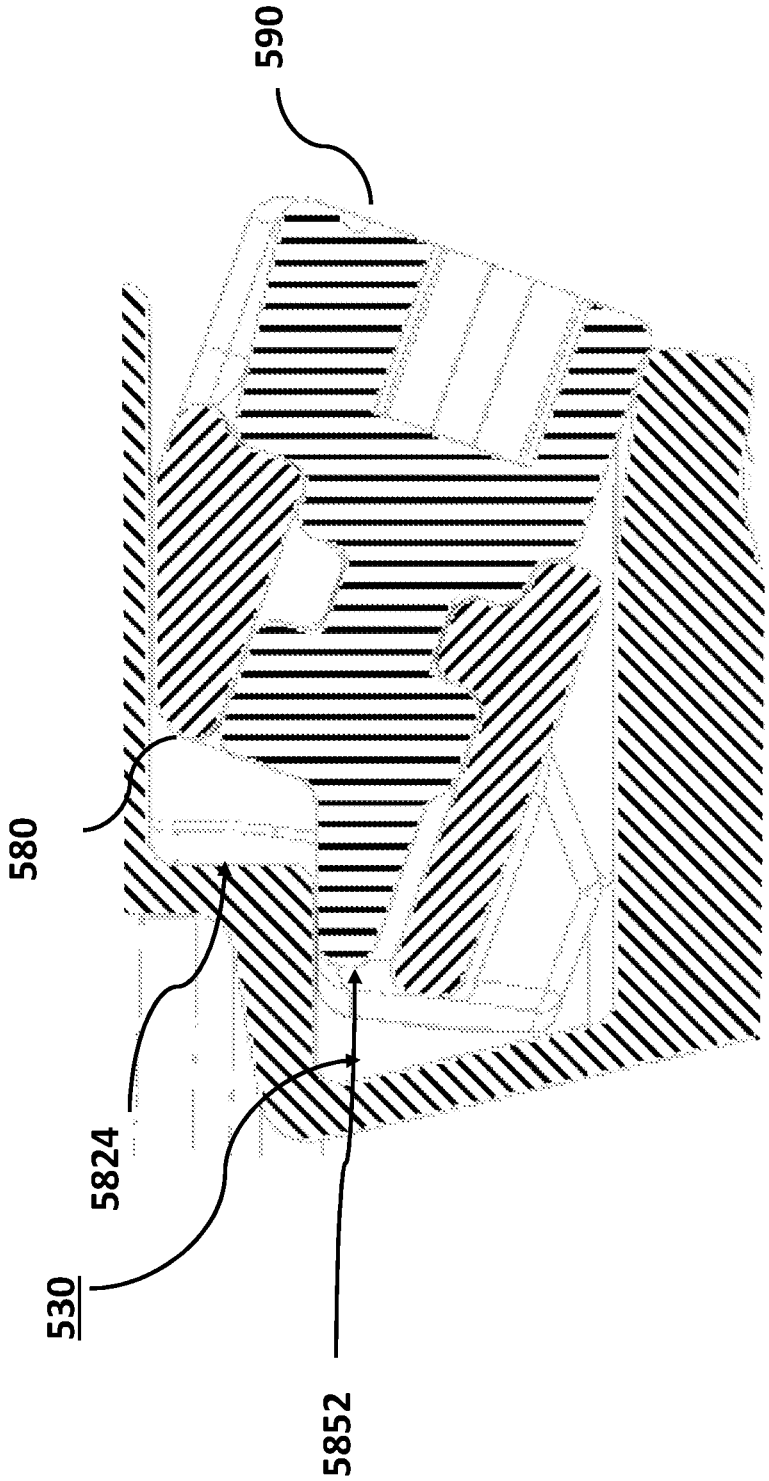

FIG. 26

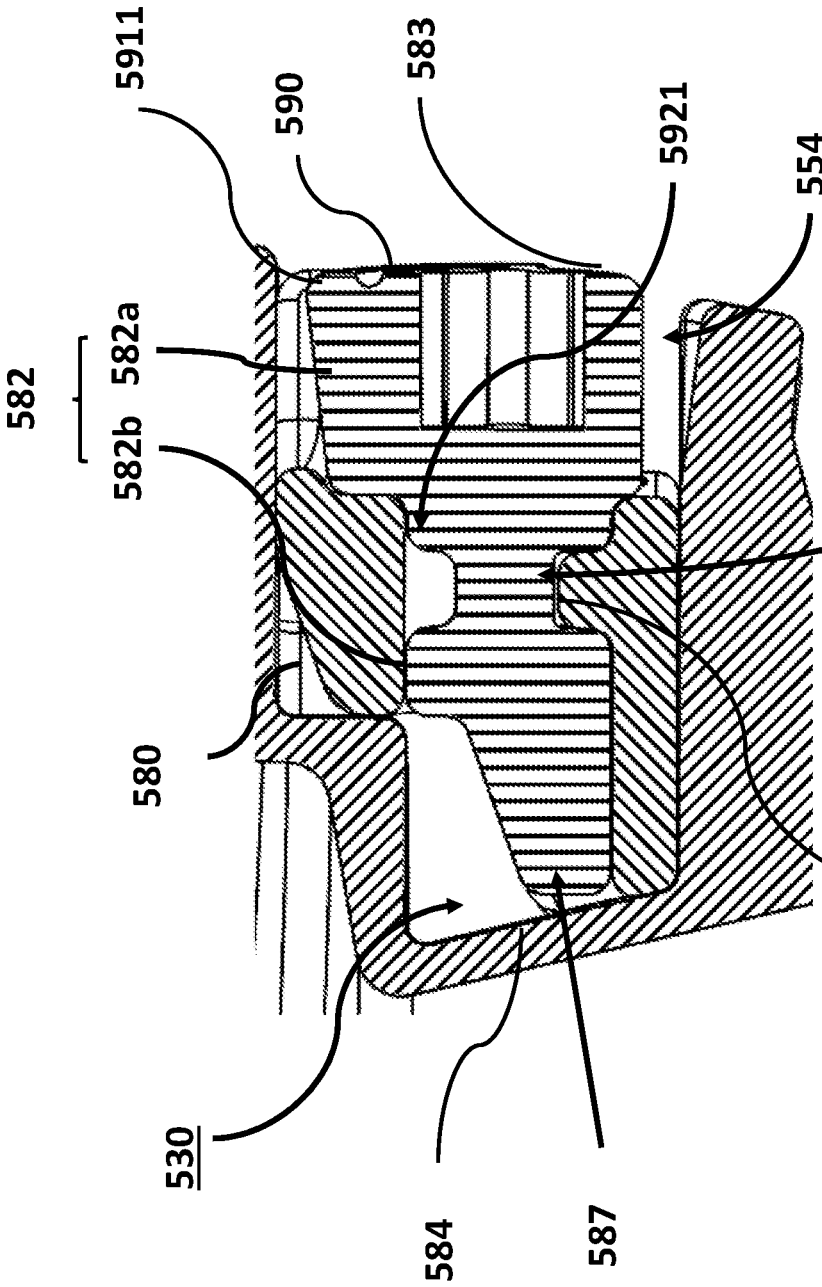

FIG. 27

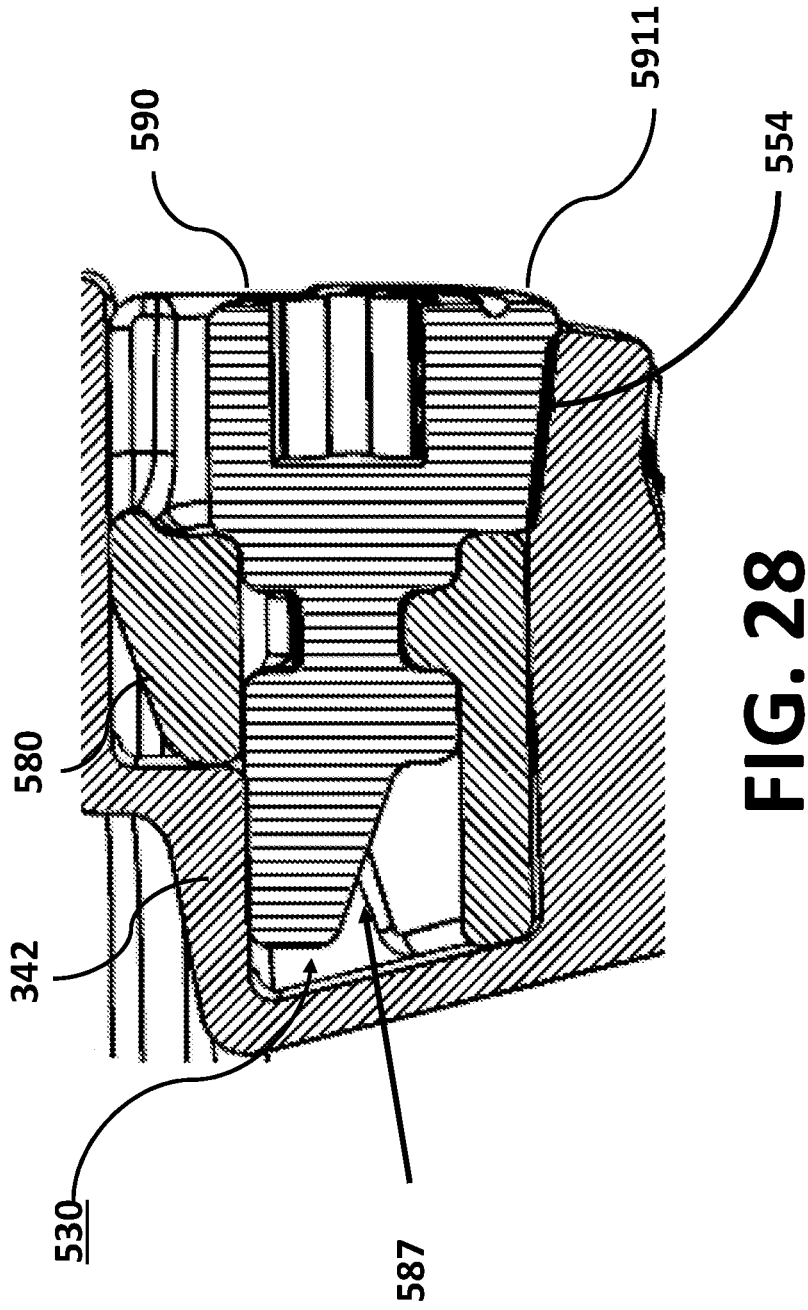

FIG. 28

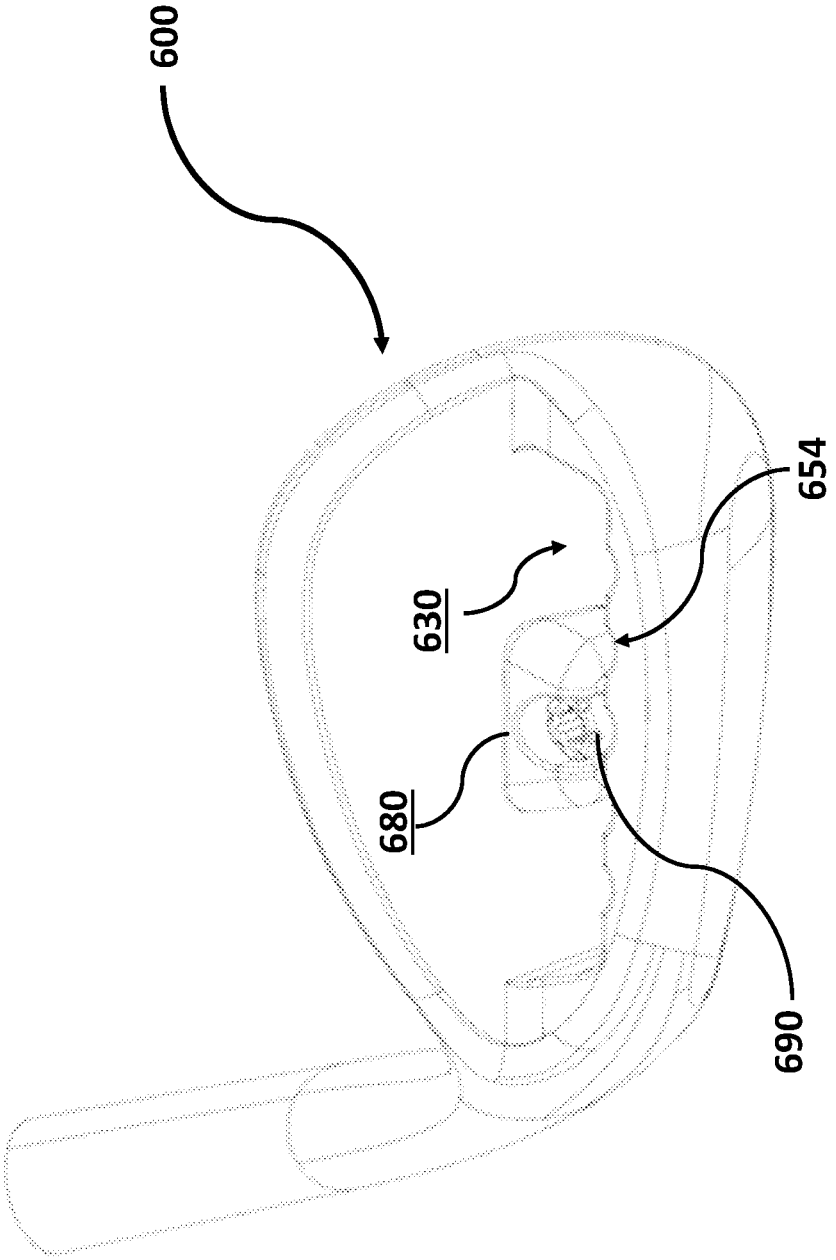

FIG. 29

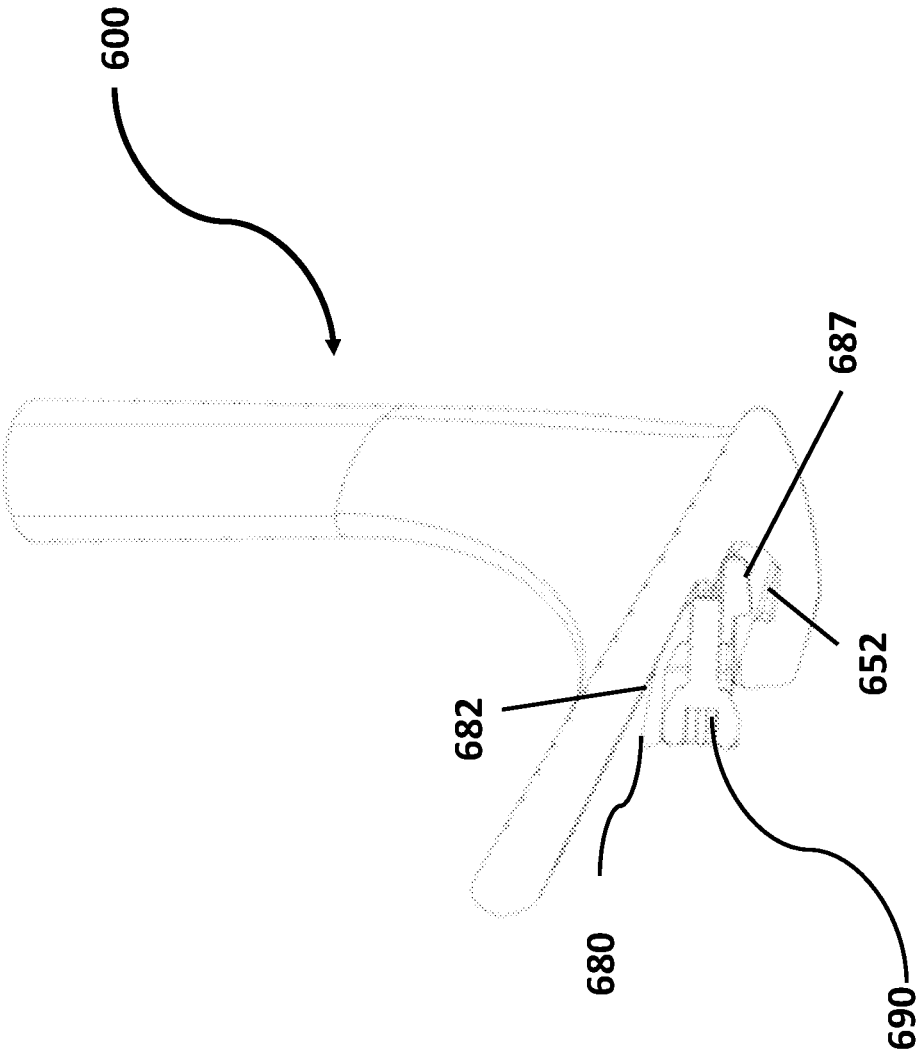

FIG. 30

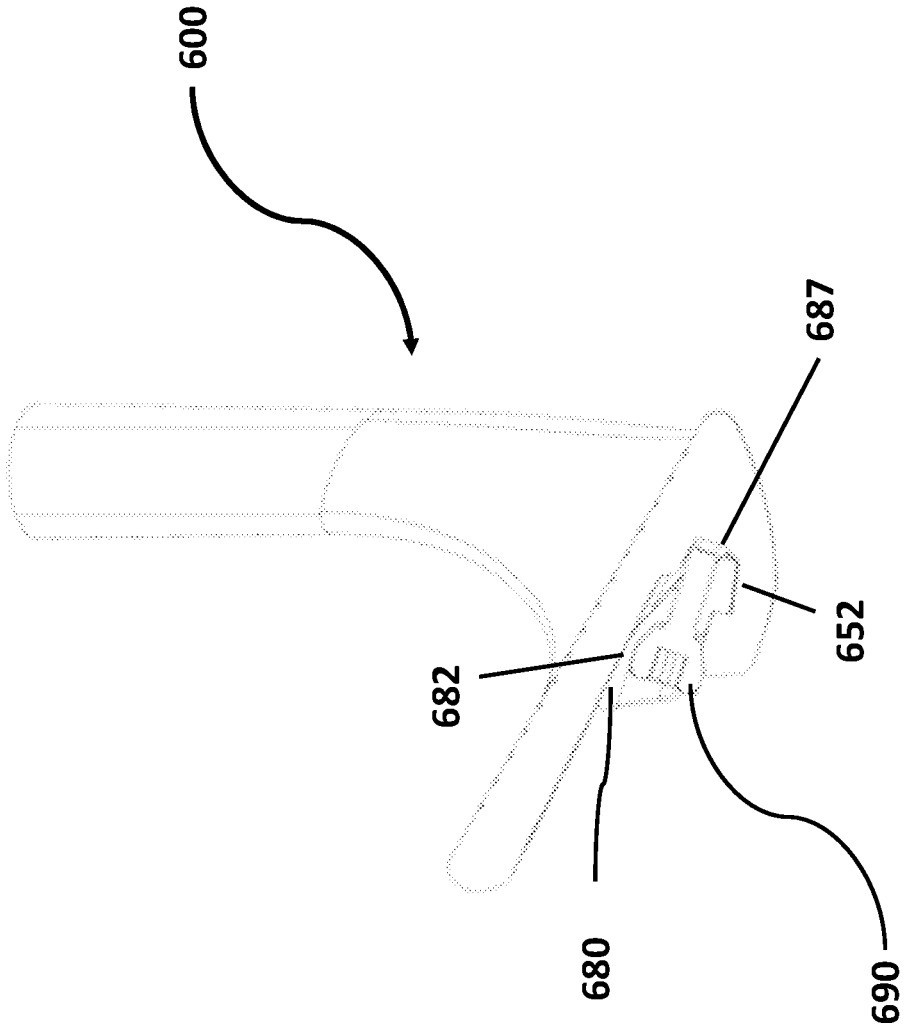

FIG. 31

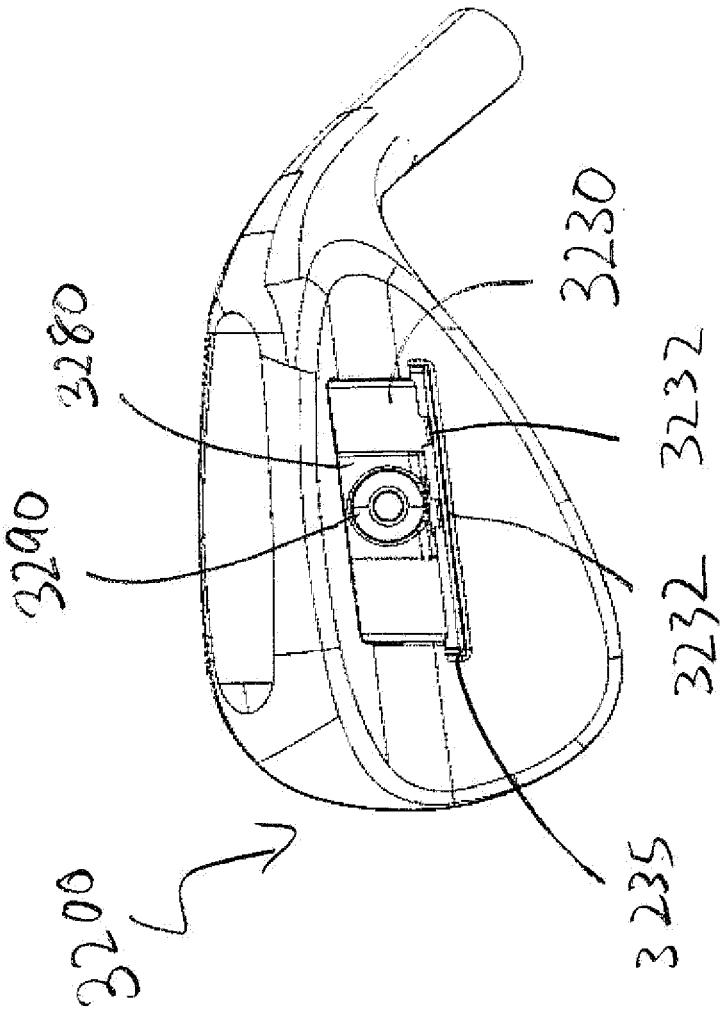

FIG. 32

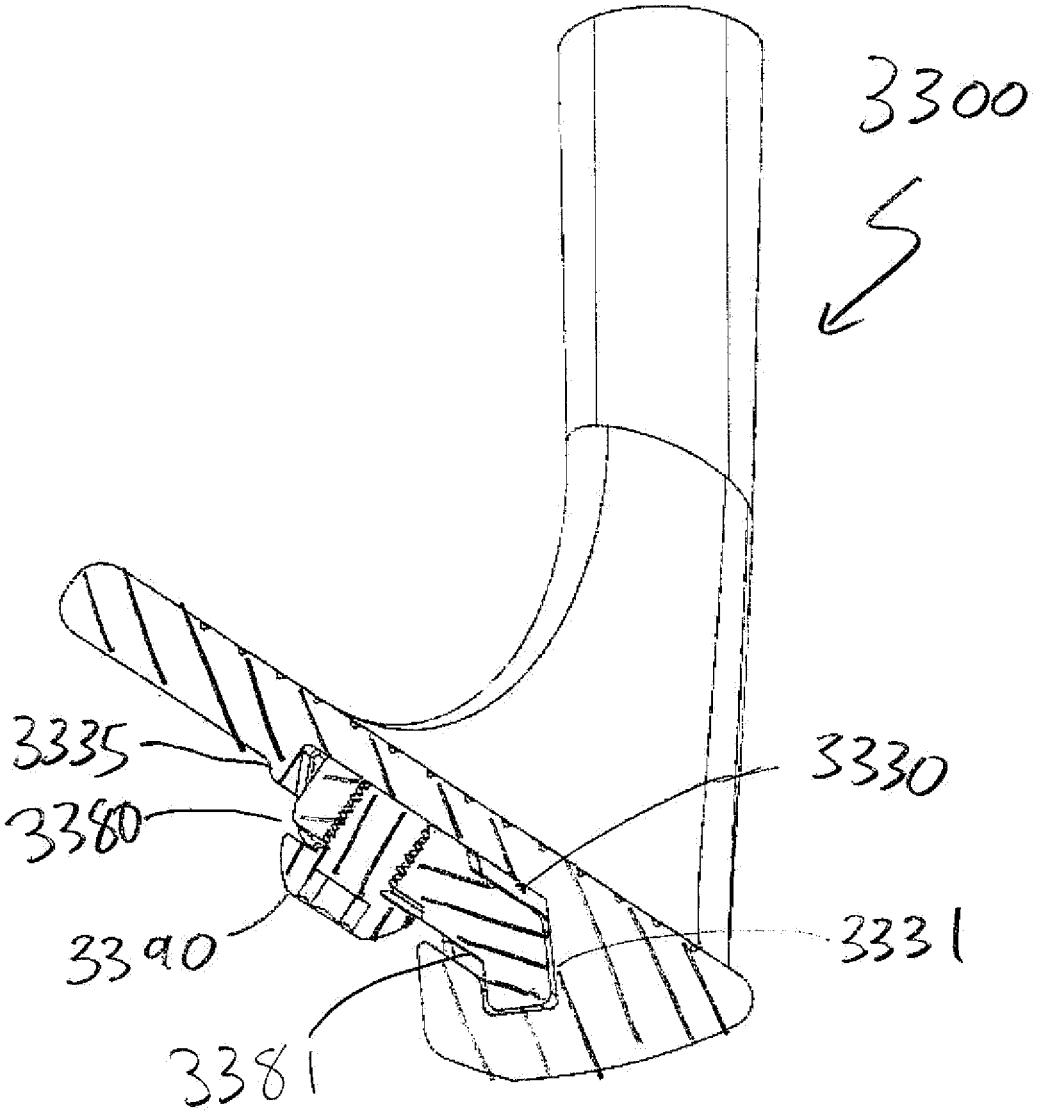

FIG. 33

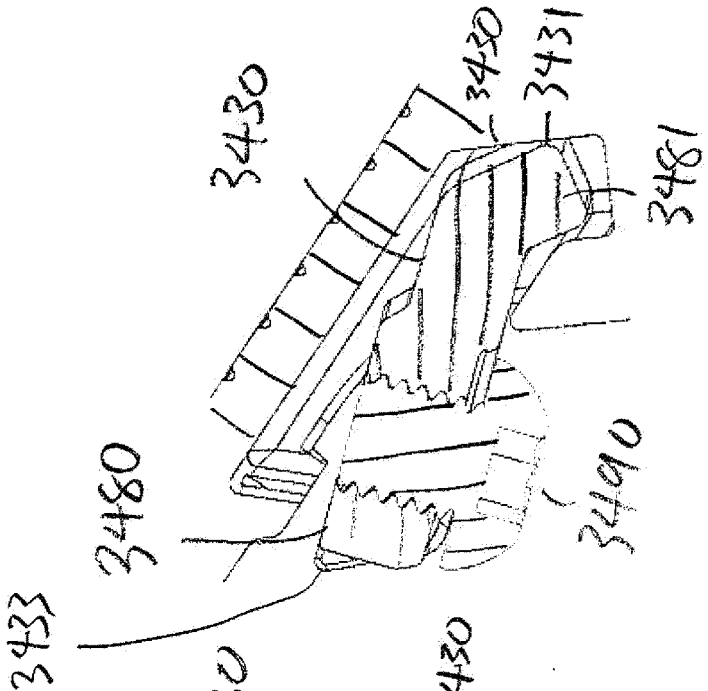

FIG. 34c

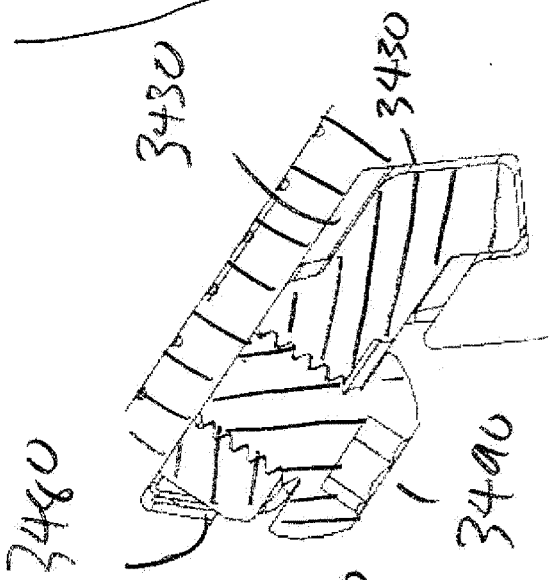

FIG. 34b

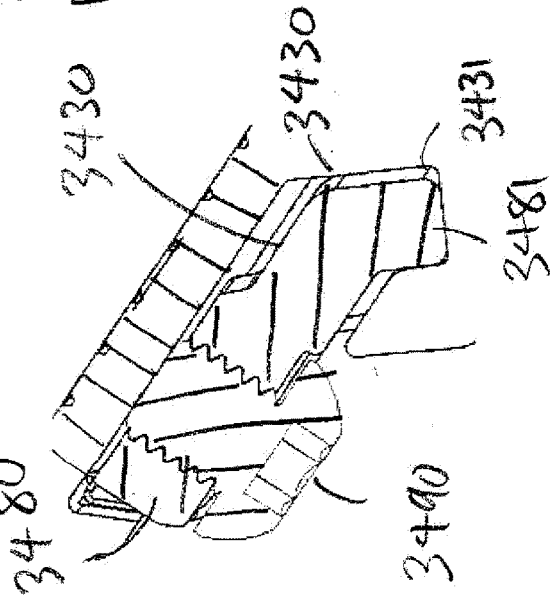

FIG. 34a

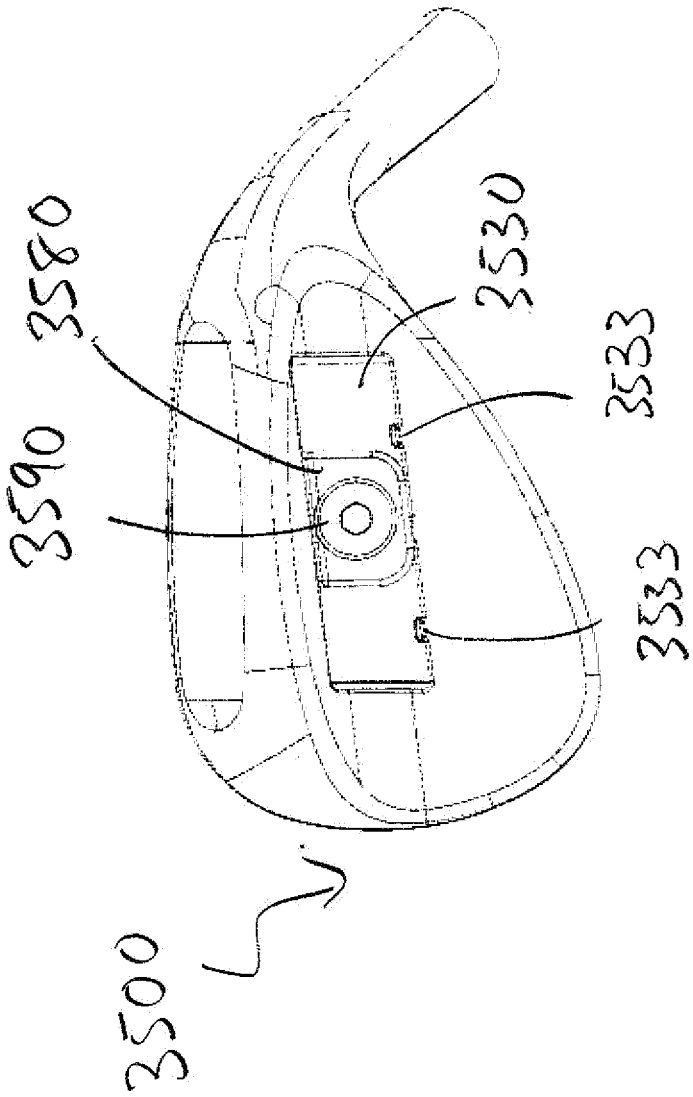

FIG. 35

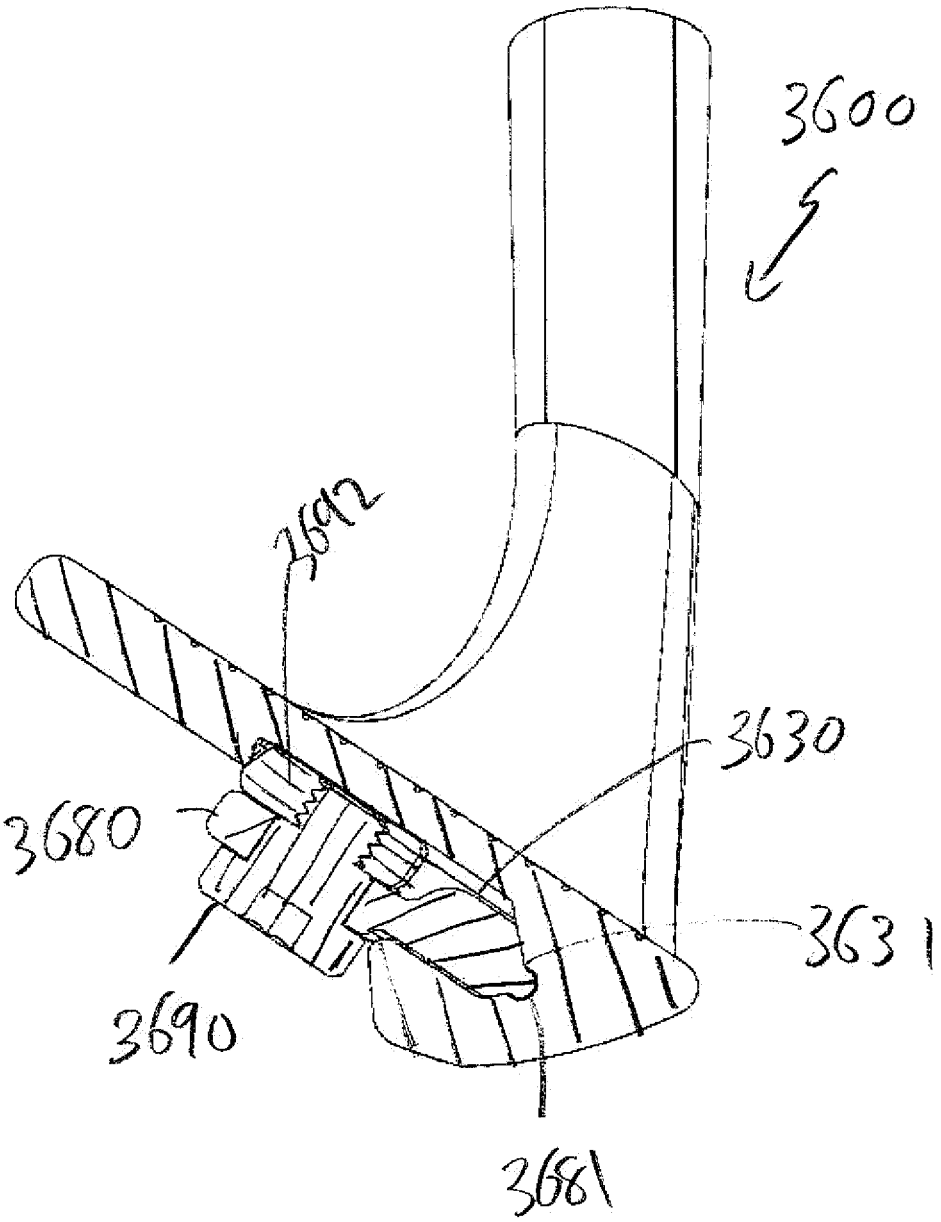

FIG. 36

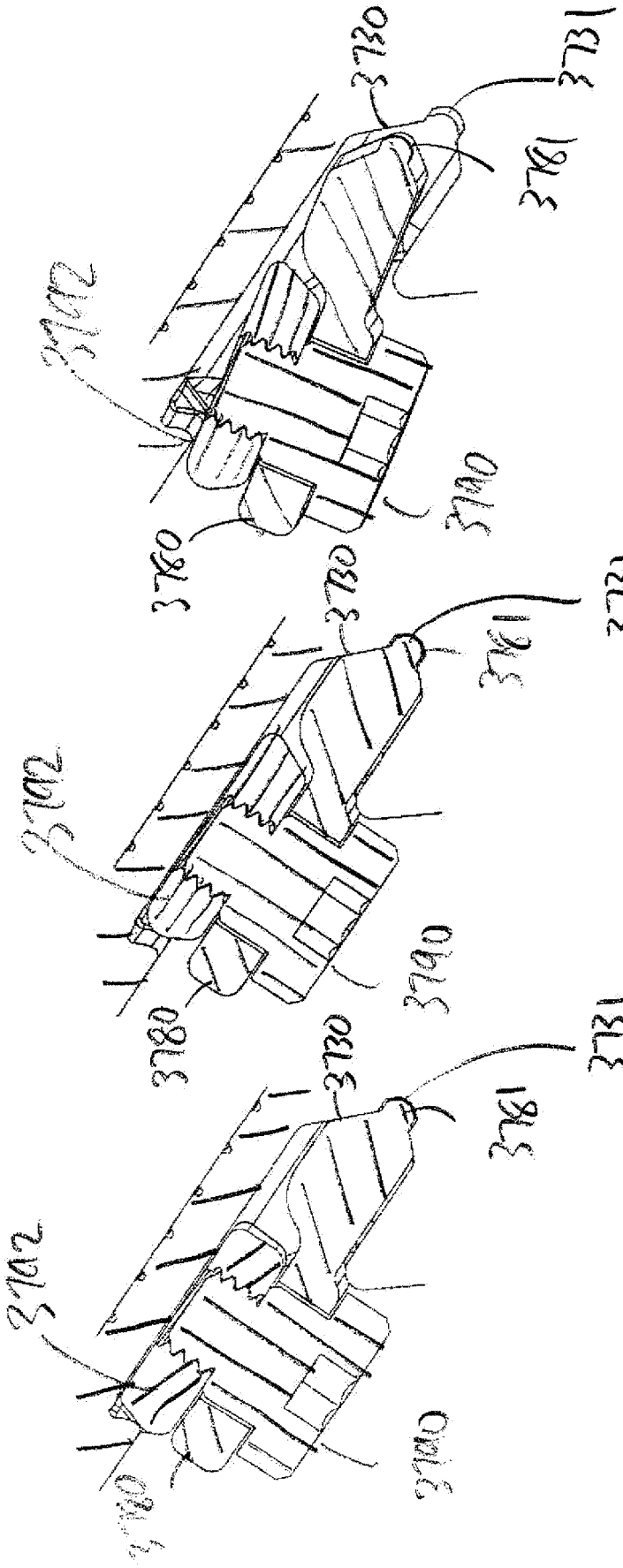

FIG. 37A

FIG. 37B

FIG. 37C

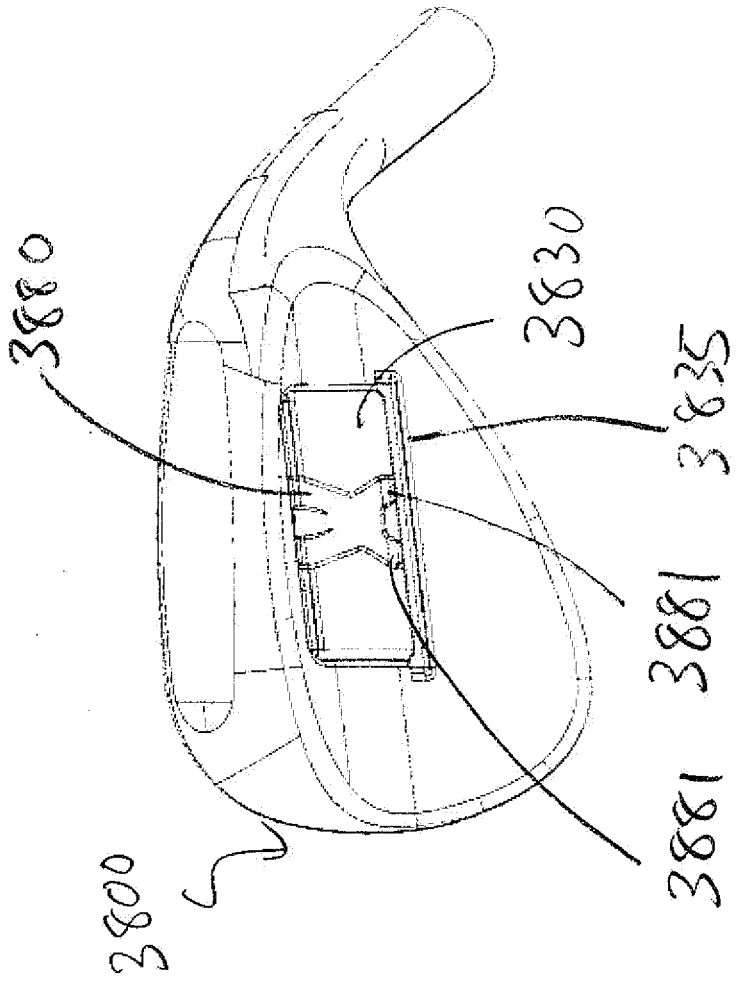

FIG. 38

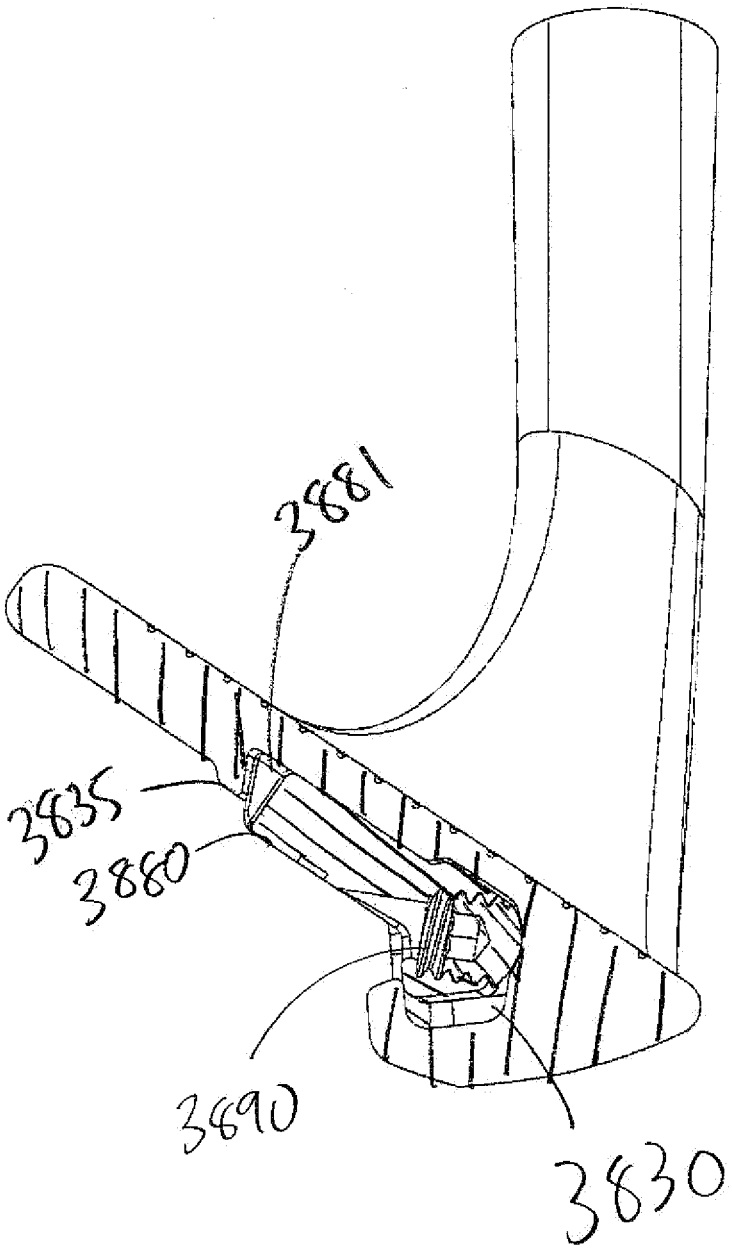

FIG. 39

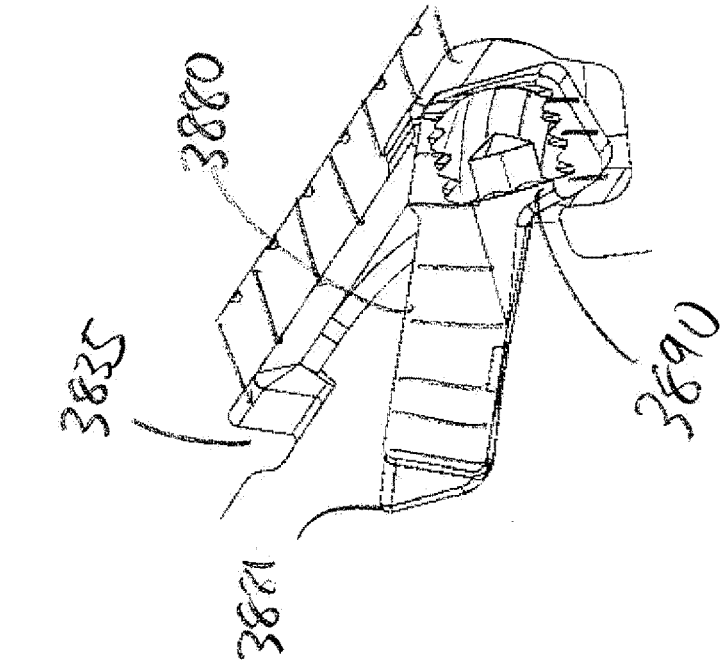

FIG. 40c

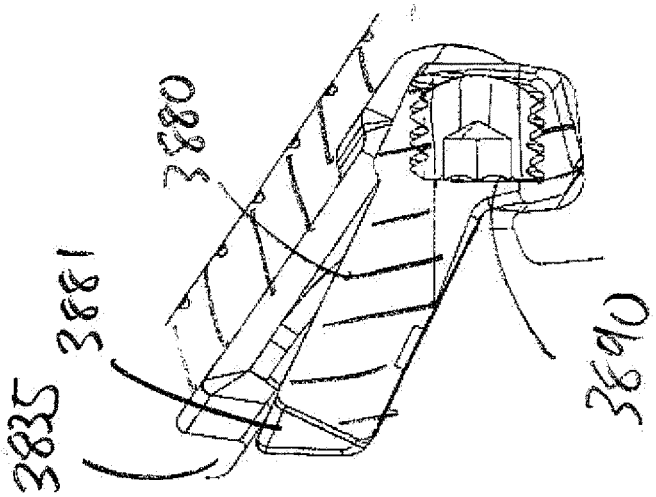

FIG. 40b

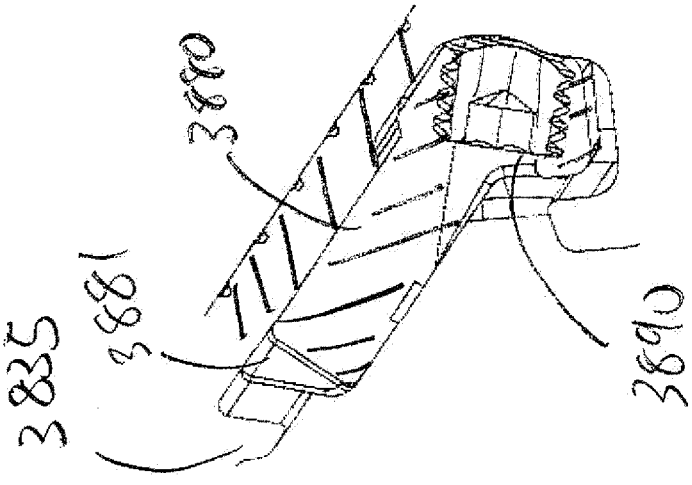

FIG. 40a

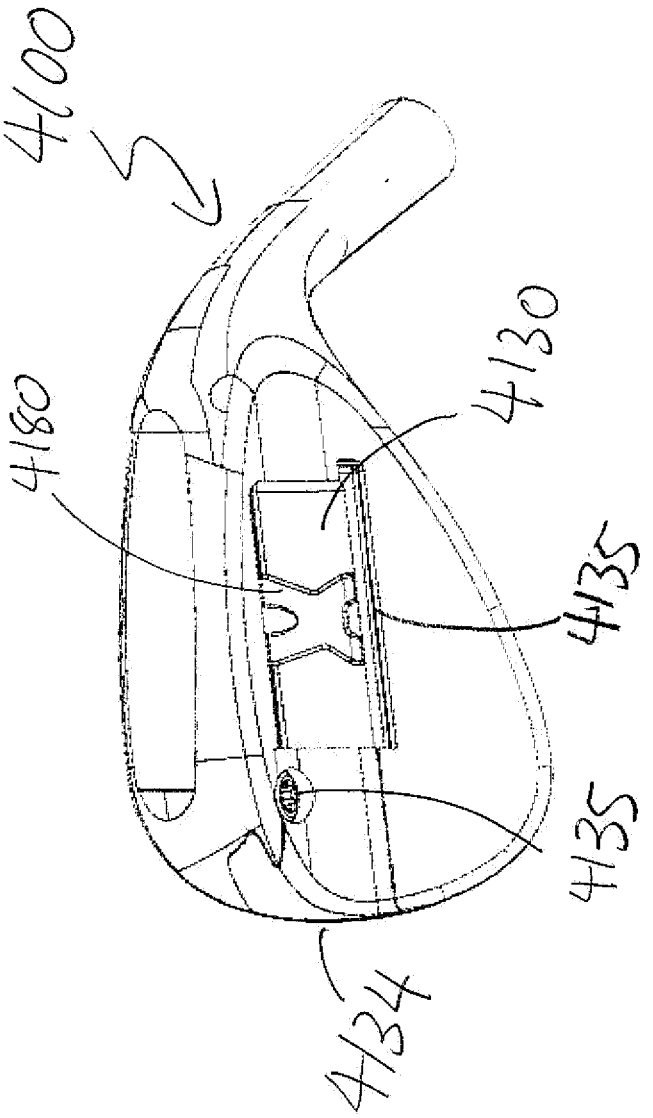

FIG. 41

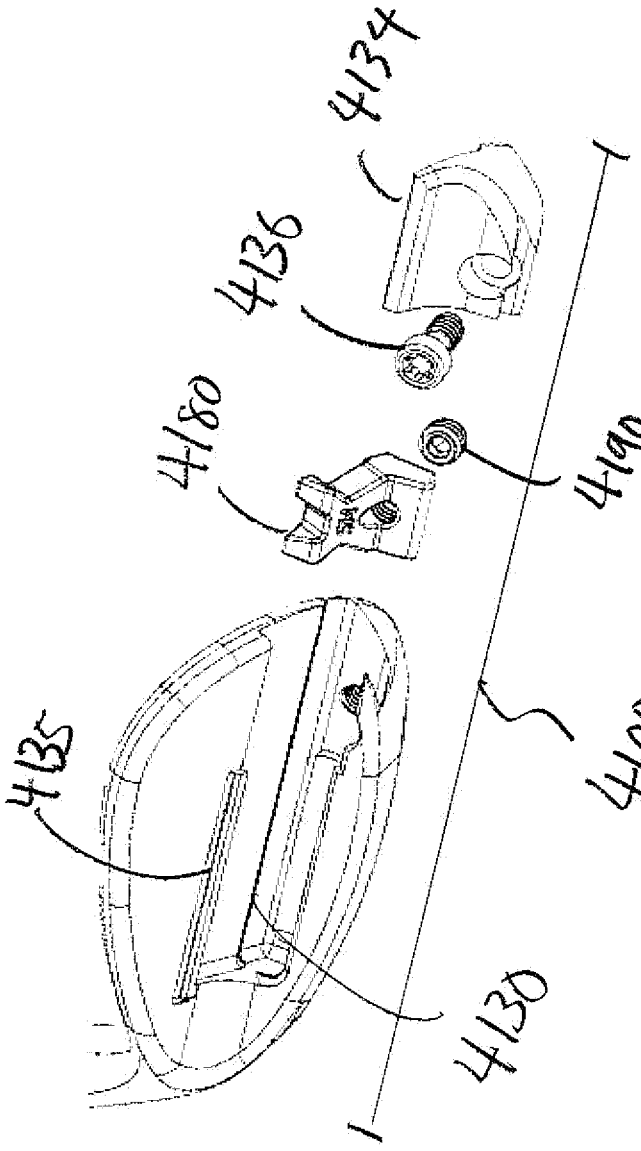

FIG. 42

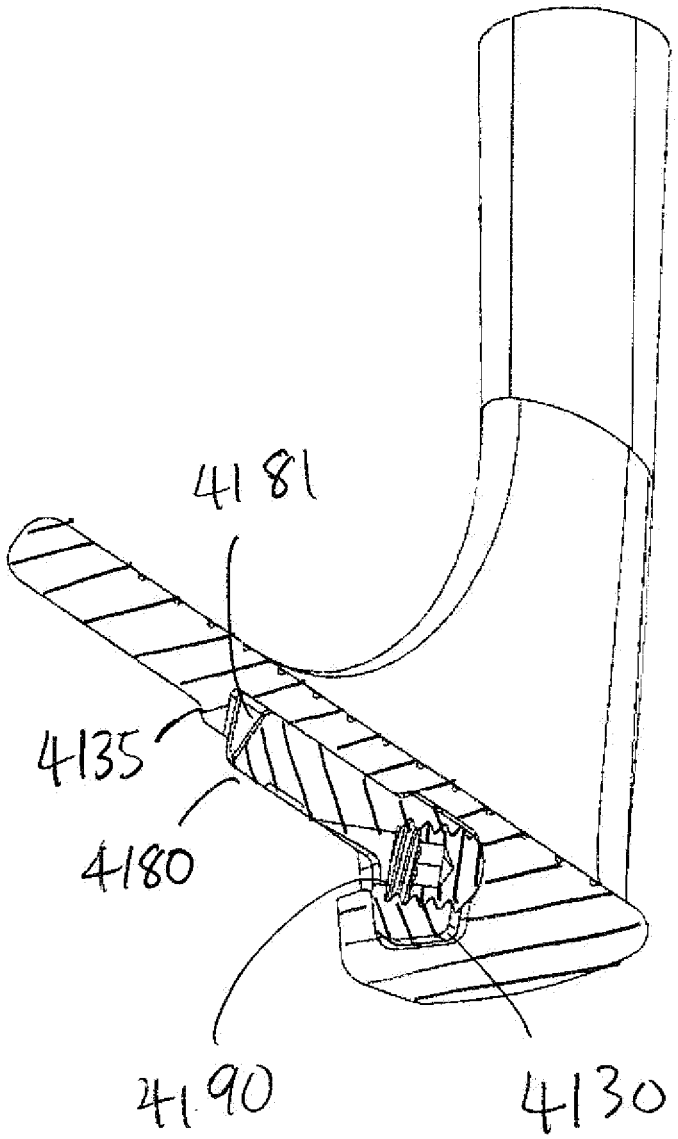

FIG. 43

GOLF CLUB HAVING AN ADJUSTABLE WEIGHT ASSEMBLY

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] The current application is a Continuation-In-Part (CIP) of U.S. patent application Ser. No. 17/863,328, filed on Jul. 12, 2022, the disclosure of which is incorporated by reference in its entirety.

FIELD OF THE INVENTION

[0002] The present invention relates generally to a golf club head, and more specifically, to a golf club head having an adjustable weight assembly.

BACKGROUND OF THE INVENTION

[0003] It is no surprise that over time golf clubs have evolved and improved. However, golf club improvements are limited by the rules of golf. Golf club bodies are subjected to volumetric limitations and golf club faces are subjected to "speed limits" based on characteristic time (CT) and coefficient of restitution (COR). Golf clubs are even subjected to limitations on "forgiveness" in terms of various moments of inertias (MOIs) measured about the center of gravity (CG) of the golf club head.

[0004] While the limitations on golf club seem substantial, there are still areas that are ripe for the picking. One such area is CG adjustability. By shaving mass from various areas of a golf club head, mass may be discretionarily concentrated in positions that afford the greatest performance benefits. Adjusting the CG location within a golf club head can result in the modification of all sorts of different aspects of the golf club. For example, adjusting the location and amount of discretionary weight within the golf club head can have a marked impact on launch angle, MOI, ball speed, spin, swing weight and the like.

[0005] Therefore, what is needed is an adjustable weight assembly that allows for discretionary mass to be adjusted in a simple and secure manner.

BRIEF SUMMARY OF THE INVENTION

[0006] In some aspects, the techniques described herein relate to a golf club head including: a striking face portion located at a frontal portion of said golf club head; and a body portion attached to the rear of said striking face portion; wherein said body portion incorporates a weight adjustment portion further including; an elongate channel further including a plurality of scalloped depressions along a lower wall of said elongate channel, a weight member having a fastener receiving aperture, and a fastener further including a fastener head and a threaded shaft, wherein said fastener head is adapted to engage at least one of said plurality of scalloped depression to secure said weight member within said elongate channel.

[0007] In some aspects, the techniques described herein relate to a golf club head including: a striking face portion located at a frontal portion of said golf club head; and a body portion attached to the rear of said striking face portion; wherein said body portion incorporates a weight adjustment portion further including; an elongate channel, a weight member having a fastener receiving aperture further including; an outer upper surface, and an inner upper surface, wherein said outer upper surface and said inner upper surface create an angle θ of between about 0° and about 45°, and a fastener.

[0008] In some aspects, the techniques described herein relate to a golf club head including: a striking face portion located at a frontal portion of said golf club head; and a body portion attached to the rear of said striking face portion; wherein said body portion incorporates a weight adjustment portion further including; an elongate channel, a weight member further including; a fastener receiving aperture, a locking edge located at a terminal end of said fastener receiving aperture, and a seating wall located adjacent to said locking edge, and a fastener further including; a fastener head having a maximum radius portion and a reduced radius portion, and a shaft having a locking portion located at a terminal end of said shaft and a groove adjacent to said locking portion, wherein said locking edge is adapted to engage said locking portion and said seating wall is adapted to engage said groove to secure said weight member within said elongate channel.

[0009] In another aspect of the present invention is a golf club head including: a striking face portion located at a frontal portion of said golf club head; and a body portion attached to the rear of said striking face portion; wherein said body portion incorporates a weight adjustment portion further including; an elongate channel having a toe opening, further comprising a lower undercut and a retention rail, a weight member further comprising a lower protrusion and a fastener receiving aperture, a fastener adapted to directly engage the fastener receiving aperture, wherein a tightening of the fastener shifts a location of the weight member within the elongate channel to engage a retention rail to secure the weight member to the golf club head.

[0010] In another aspect of the present invention is a golf club head including: a striking face portion located at a frontal portion of said golf club head; and a body portion attached to the rear of said striking face portion; wherein said body portion incorporates a weight adjustment portion further including; an elongate channel having a toe opening, further comprising a lower undercut and a retention rail, a weight member further comprising a lower protrusion and a fastener receiving aperture, a fastener adapted to directly engage the fastener receiving aperture, wherein the weight adjustment portion can be configured to be in either one of an unlocked configuration or a locked configuration, wherein when the weight adjustment portion is in the unlocked configuration, the weight member is not engaged with the retention rail, and wherein when the weight adjustment portion is in the locked configuration, the weight member is engaged with the retention rail.

[0011] In another aspect of the present invention is a golf club head including: a striking face portion located at a frontal portion of said golf club head; and a body portion attached to the rear of said striking face portion; wherein said body portion incorporates a weight adjustment portion further including; an elongate channel having a toe opening, further comprising a lower undercut and a retention rail, a weight member further comprising a lower protrusion and a fastener receiving aperture, a fastener adapted to directly engage the fastener receiving aperture, a toe cap, adapted to close the toe opening, and a screw, adapted to secure the toe cap to the body portion.

[0012] These and other features, aspects and advantages of the present invention will become better understood with reference to the following drawings, description and claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] The foregoing and other features and advantages of the invention will be apparent from the following description of the invention as illustrated in the accompanying drawings. The accompanying drawings, which are incorporated herein and form a part of the specification, further serve to explain the principles of the invention and to enable a person skilled in the pertinent art to make and use the invention.

[0014] FIG. **1** of the accompanying drawings shows a frontal perspective view of a golf club head **100** in accordance with an embodiment of the present invention;

[0015] FIG. **2** of the accompanying drawings shows a rear perspective view of the golf club head **100** in accordance with an embodiment of the present invention;

[0016] FIG. **3** of the accompanying drawings shows an enlarged perspective view of an elongate channel **130** in accordance with an embodiment of the present invention;

[0017] FIG. **4** of the accompanying drawings shows an alternative enlarged perspective view of an elongate channel **130** in accordance with an embodiment of the present invention;

[0018] FIG. **5** of the accompanying drawings shows an enlarged perspective view of a weight member **180** in accordance with an embodiment of the present invention;

[0019] FIG. **6** of the accompanying drawings shows another enlarged perspective view of a weight member **180** in accordance with an embodiment of the present invention from a different angle;

[0020] FIG. **7** of the accompanying drawings shows a cross-sectional view of the adjustable weighting assembly before insertion in accordance with an embodiment of the present invention;

[0021] FIG. **8** of the accompanying drawings shows a cross-sectional view of the adjustable weighting assembly midway through insertion in accordance with an embodiment of the present invention;

[0022] FIG. **9** of the accompanying drawings shows a cross-sectional view of the adjustable weighting assembly fully inserted but in an unlocked orientation in accordance with an embodiment of the present invention;

[0023] FIG. **10** of the accompanying drawings shows a cross-sectional view of the adjustable weighting assembly in a locked orientation in accordance with an embodiment of the present invention;

[0024] FIG. **11** of the accompanying drawings shows an enlarged perspective view of an elongate channel **230** in accordance with an alternative embodiment of the present invention;

[0025] FIG. **12** of the accompanying drawings shows a cross-sectional view of an adjustable weight assembly in accordance with an alternative embodiment of the present invention;

[0026] FIG. **13** of the accompanying drawings shows an enlarged perspective view of an elongate channel **330** in accordance with an alternative embodiment of the present invention;

[0027] FIG. **14** of the accompanying drawings shows a cross-sectional view of an adjustable weight assembly in accordance with an alternative embodiment of the present invention;

[0028] FIG. **15** of the accompanying drawings shows a rear view of a weight member **480** in accordance with an alternative embodiment of the present invention;

[0029] FIG. **16** of the accompanying drawings shows a perspective view of a weight member **480** in accordance with an alternative embodiment of the present invention;

[0030] FIG. **17** of the accompanying drawings shows a perspective view of a fastener **490** in accordance with an alternative embodiment of the present invention;

[0031] FIG. **18** of the accompanying drawings shows a perspective view of a fastener **490** from a different angle in accordance with an alternative embodiment of the present invention;

[0032] FIG. **19** of the accompanying drawings shows a rear view of an adjustable weight assembly in an unlocked orientation in accordance with an alternative embodiment of the present invention;

[0033] FIG. **20** of the accompanying drawings shows a rear view of an adjustable weight assembly in a partially locked orientation in accordance with an alternative embodiment of the present invention;

[0034] FIG. **21** of the accompanying drawings shows a cross-sectional view of an adjustable weight assembly in an unlocked orientation in accordance with an alternative embodiment of the present invention;

[0035] FIG. **22** of the accompanying drawings shows a cross-sectional view of an adjustable weight assembly in a locked orientation in accordance with an alternative embodiment of the present invention;

[0036] FIG. **23** of the accompanying drawings shows a rear view of an adjustable weight assembly in an unlocked orientation in accordance with a further alternative embodiment of the present invention;

[0037] FIG. **24** of the accompanying drawings shows a rear view of an adjustable weight assembly in a locked orientation in accordance with a further alternative embodiment of the present invention;

[0038] FIG. **25** of the accompanying drawings shows a cross-sectional view of a weight member and a fastener both in accordance with a further alternative embodiment of the present invention;

[0039] FIG. **26** of the accompanying drawings shows a cross-sectional view of an adjustable weight assembly while being installed in accordance with a further alternative embodiment of the present invention;

[0040] FIG. **27** of the accompanying drawings shows a cross-sectional view of an adjustable weight assembly in an installed but unlocked orientation in accordance with a further alternative embodiment of the present invention;

[0041] FIG. **28** of the accompanying drawings shows a cross-sectional view of an adjustable weight assembly in an installed and locked orientation in accordance with a further alternative embodiment of the present invention;

[0042] FIG. **29** of the accompanying drawings shows an iron type golf club head having an adjustable weight assembly in accordance with a further alternative embodiment of the present invention;

[0043] FIG. **30** of the accompanying drawings shows a cut apart sectional view of an iron type golf club head in an

uninstalled orientation in accordance with a further alternative embodiment of the present invention;

[0044] FIG. **31** of the accompanying drawing shows a cut apart sectional view of an iron type golf club head in an installed locked orientation in accordance with a further alternative embodiment of the present invention;

[0045] FIG. **32** of the accompanying drawings shows a rear perspective view of a golf club head in accordance with a further alternative embodiment of the present invention;

[0046] FIG. **33** of the accompanying drawings shows a cross-sectional view of a golf club head in accordance with a further alternative embodiment of the present invention;

[0047] FIG. **34***a* of the accompanying drawings shows an enlarged cross-sectional view of a weight member in a fully engaged orientation in accordance with a further alternative embodiment of the present invention;

[0048] FIG. **34***b* of the accompanying drawings shows an enlarged cross-sectional view of a weight member in a partially engaged orientation in accordance with a further alternative embodiment of the present invention;

[0049] FIG. **34***c* of the accompanying drawings shows an enlarged cross-sectional view of a weight member in a fully disengaged orientation in accordance with a further alternative embodiment of the present invention;

[0050] FIG. **35** of the accompanying drawings shows a rear perspective view of a golf club head in accordance with a further alternative embodiment of the present invention;

[0051] FIG. **36** of the accompanying drawings shows a cross-sectional view of a golf club head in accordance with a further alternative embodiment of the present invention;

[0052] FIG. **37***a* of the accompanying drawings shows an enlarged cross-sectional view of a weight member in a fully engaged orientation in accordance with a further alternative embodiment of the present invention;

[0053] FIG. **37***b* of the accompanying drawings shows an enlarged cross-sectional view of a weight member in a partially engaged orientation in accordance with a further alternative embodiment of the present invention;

[0054] FIG. **37***c* of the accompanying drawings shows an enlarged cross-sectional view of a weight member in a fully disengaged orientation in accordance with a further alternative embodiment of the present invention;

[0055] FIG. **38** of the accompanying drawings shows a rear perspective view of a golf club head in accordance with a further alternative embodiment of the present invention;

[0056] FIG. **39** of the accompanying drawings shows a cross-sectional view of a golf club head in accordance with a further alternative embodiment of the present invention;

[0057] FIG. **40***a* of the accompanying drawings shows an enlarged cross-sectional view of a weight member in a fully engaged orientation in accordance with a further alternative embodiment of the present invention;

[0058] FIG. **40***b* of the accompanying drawings shows an enlarged cross-sectional view of a weight member in a partially engaged orientation in accordance with a further alternative embodiment of the present invention;

[0059] FIG. **40***c* of the accompanying drawings shows an enlarged cross-sectional view of a weight member in a fully disengaged orientation in accordance with a further alternative embodiment of the present invention;

[0060] FIG. **41** of the accompanying drawings shows a rear perspective view of a golf club head in accordance with a further alternative embodiment of the present invention;

[0061] FIG. **42** of the accompanying drawings shows an exploded rear perspective view of a golf club head in accordance with a further alternative embodiment of the present invention; and

[0062] FIG. **43** of the accompanying drawings shows a cross-sectional view of a golf club head in accordance with a further alternative embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0063] The following detailed description describes the best currently contemplated modes of carrying out the invention. The description is not to be taken in a limiting sense, but is made merely for the purpose of illustrating the general principles of the invention, since the scope of the invention is best defined by the appended claims.

[0064] Various inventive features are described below and each can be used independently of one another or in combination with other features. However, any single inventive feature may not address any or all of the problems discussed above or may only address one of the problems discussed above. Further, one or more of the problems discussed above may not be fully addressed by any of the features described below.

[0065] 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.

[0066] It should be understood, of course, that the foregoing relates to exemplary embodiments of the present invention and that modifications may be made without departing from the spirit and scope of the invention as set forth in the following claims. and scope of the invention as set forth in the following claims.

[0067] FIG. **1** of the accompanying drawings shows a frontal perspective view of a golf club head **100** in accordance with an embodiment of the present invention. In this perspective view shown in FIG. **1**, the golf club head **100** may not look very different than other golf club heads, but the subsequent figures and discussion thereof will show the unique features of this golf club head **100** allow it to achieve unique performance properties consistent with the present invention. What FIG. **1** does show is a golf club head **100** having a striking face **120**, a crown **106**, a sole **108** opposite the crown **106**, a heel **104**, a toe **102** opposite the heel **104**, a hosel **124** proximate the heel for coupling the golf club head **100** to a shaft (not shown), and a skirt **112** joining the crown **106** and the sole **108** and extending from the heel **104** proximate the striking face **120** to the toe **102** proximate the striking face **120**. Besides the striking face **120**, the combination of the crown **106**, the sole **108**, the heel **104**, the toe **102** combine to create a body portion of a golf club head **100**.

[0068] FIG. **2** of the accompanying drawings shows a rear perspective view of the golf club head **100**. In this perspective view, an elongate channel **130** is defined within the golf club head **100**. According to the present embodiment, the elongate channel **130** is defined within the skirt **112** proxi-

mate the rear of the golf club head **100**, though it is within the scope and content of the present invention for the elongate channel **130** to be formed at other positions on the golf club head **100** or even on an iron-type golf club head.

[0069] A weight member **180** is housed within the elongate channel **130**, and the weight member **180** is secured at least partially by a fastener **190** as will be described below in detail. It is worth noting at this time that according to the present embodiment, the threads (not shown) of the fastener **190** mate only with the weight member **180** and not with the golf club head **100**. Several additional features are shown within the elongate channel **130**. Specifically, several of the surfaces that define the elongate channel **130** are illustrated in FIG. **2**, though these features and more will be more clearly shown and described below. The elongate channel **130** is defined by an upper wall **141**, a lower wall **151** opposite the upper wall **141**, side walls **161** formed proximate the heel **104** and the toe **102**, and a base wall **171** being a closest wall to the striking face **120**.

[0070] The elongate channel **130** may include a plurality of lower recesses **152** defined within the lower wall **151** proximate the base wall **171**. The plurality of lower recesses **152** may be separated by a plurality of ribs **153**. A plurality of scalloped depressions **154** may be formed on the lower wall **151**. The structure and function of these features will be more apparent when examined more closely hereinbelow.

[0071] Referring now to FIG. **3**, a perspective view of the elongate channel **130** is provided. FIG. **3** is taken from a lower perspective thus affording a clearer view of the upper wall **141**. Visible from this perspective are a plurality of upper depressions **145** configured to receive a corresponding upper protrusion (see FIG. **6**) formed on the weight member **180** to facilitate alignment of the weight member **180** within the elongate channel **130**.

[0072] Referring now to FIG. **4**, another perspective view of the elongate channel **130** is provided. The perspective view of FIG. **4** is slightly elevated so as to better illustrate the lower wall **151**. As shown in FIG. **4**, each of the scalloped depressions **154** are aligned with plurality of ribs **153** in between the plurality of lower recesses **152**. The scalloped depressions **154**, the lower recesses **152**, and the ribs **153** collectively aid in securely positioning the weight member **180** in discrete positions along the elongate channel **130**. In the present embodiment, five discrete positions are defined along the elongate channel **130** and the weight member **180** is shown positioned in the middle-most position. In the present embodiment, the position of the weight member **180** is maintained by one of the scalloped depressions **154**, three of the ribs **153**, and one of the upper depressions **145** (see FIG. **3**).

[0073] Referring now to FIG. **5**, an external frontal perspective view of a weight member **180** according to an embodiment of the present invention is provided. FIG. **5** is taken from a lower perspective thus affording a clearer view of the bottom of the weight member **180**. Weight member **180** includes a lower surface **181**, an upper surface **182**, a front surface **183**, and a rear surface **184**. A fastener receiving aperture **185** is defined through the front surface **183** and the rear surface **184** for receiving a fastener (not shown). A fastener receiving aperture **185** is partially surrounded by a head wall **186** proximate the front surface **183**. One or more lower protrusions **187** are defined at the interface between the rear surface **184** and the lower surface **181**. Upper protrusion **188** extend from the upper surface **182** to the front surface **183**.

[0074] Referring now to FIG. **6**, an elevated perspective view of a weight member **180** according to another embodiment of the present invention is provided. The elevated perspective of FIG. **6** affords a clear view of the top of the weight member **180**. Another unique feature that is shown in FIG. **6** is the duel faceted nature of the upper surface **182**. Specifically, the upper surface **182** includes an outer upper surface **182***a* proximate the front surface **183** and an inner upper surface **182***b* proximate the rear surface **184**. The outer upper surface **182***a* and the inner upper surface **182***b* define an angle θ. Preferably the angle θ is between 0° and 45°, more preferably the angle θ is between 10° and 40°, most preferably the angle θ is between about 15° and about 35°. An upper protrusion **188** is formed on the outer upper surface **182***a*. The upper protrusion **188** is dimensioned to mate with the upper depression **145** (shown in FIG. **3**) to aid in securing and aligning the weight member **180** within the elongate channel **130**.

[0075] Cross-sectional views of weight member **180** shown in FIGS. **7-10** illustrate the manner in which the weight member **180** is received within the elongate channel **130**. Each of FIGS. **7-10** is a cross-sectional view is taken along the line A-A' in FIG. **2**. The fastener **190** is shown whole rather than sectioned to better illustrate the manner in which the weight member **180** is secured within the elongate channel **130**. The line A-A' is perpendicular to the length dimension of the elongate channel **130** and offset in a heelward direction from the center of the fastener **190** so as to pass through a scalloped depression **154** and a lower recesses **152**.

[0076] Referring now to FIG. **7**, prior to insertion within the elongate channel **130**, the weight member **180** is angled such that that inner upper surface **182***b* is roughly parallel to the upper wall **141** and the fastener **190** is partially secured within the fastener receiving aperture **185**. As shown in FIG. **7**, the angled orientation of the weight member **180** allows for the one or more lower protrusions **187** to clear the lower wall **151** of the elongate channel **130**. FIG. **7** also shows two identifiable heights H**1** and **112** of the weight member **180**, both of which work in conjunction with one another to allow the weight member **180** to be secured within the elongate channel **130**. The first height H**1** is measured between the outer upper surface **182***a* and the lowest portion of the lower protrusion **187**, along an axis that is parallel to the fastener **190**. A second height H**2** is measured between the inner upper surface **182***b* and the lowest portion of the lower protrusion **187**, but this time along the depth axis of the elongate channel **130**, resulting in a second height **112** that is smaller than the first height H**1**. It is noted that that the first height H**1** and the second height H**2** are offset by the angle θ (shown in FIG. **6**), which accounts for the rotational insertion and locking of the weight member **180** within the elongate channel **130** as described in detail below.

[0077] It is worth noting here that the fastener **190** may further be comprised of a fastener head **190***a* and a threaded shaft **190***b*, with the fastener head **190***a* adapted to engage the scalloped depressions **154** when the fastener **190** is fully engaged in a locked position.

[0078] Referring now to FIG. **8**, the weight member **180** and the partially secured fastener **190** are inserted into the elongate channel **130** until the one or more lower protrusions

187 are proximate the lower recesses 152. For the purposes of this discussion, when the weight member 180 is partially inserted as shown in FIG. 8, the weight member 180 may be in an unlocked configuration. In this partially inserted unlocked configuration the weight member 180 is inserted into the elongate channel 130 and the inner upper surface 182*b* is generally parallel to the upper wall 141. In this partially inserted unlocked configuration, the weight member 180 may be freely moved along the various positions within the elongate channel 130 so that weight member 180 may be aligned with any of the discrete positions defined along the elongate channel 130.

[0079] Referring now to FIG. 9, the weight member 180 and the partially secured fastener 190 are tilted inward until the lower protrusions 187 are engaged with one of the plurality of lower recesses 152, causing the upper protrusion 188 is received within the upper depression 145. In this rotated position, the rear surface 184 is in contact with the base wall 171, the outer upper surface 182*a* is in contact with the upper wall 141, and the lower surface 181 is in contact with the lower wall 151. Finally, from this cross-sectional view, it can be seen that the head wall 186 and the scalloped depression 154 define a cavity that is dimensioned to receive the head of the fastener 190.

[0080] Referring now to FIG. 10, the fastener 190 is fully inserted to lock the weight member 180 in place. As shown in FIG. 10, the fastener 190 has a tapered head geometry to help engage the taper walls of the fastener receiving aperture 185. The taper angle α of the tapered head corresponds to a taper angle of the upper wall 141 and a taper angle of the scalloped depression 154. These corresponding taper angles are critical to locking the weight member 180 in position within the elongate channel 130. Preferably the taper angle α of the tapered head 191 is between about equal to the taper angle of the scalloped depression 154 and the taper angle θ of the upper wall 141 and about 10° greater than the taper angle of the scalloped depression 154 and the taper angle θ of the upper wall 141. As the fastener 190 is tightened, the outer upper surface 182*a* is driven toward to the upper wall 141 while the lower protrusions 187 are driven toward the lower recesses 152, thereby further rotating the weight member 180 until the one or more lower protrusions 187 are locked within the lower recesses 152 and the upper protrusion 188 is locked within the upper depression 145.

[0081] For the purposes of this discussion, when the weight member 180 and fastener 190 are inserted as shown in FIG. 10, the weight member 180 may be described as being in a locked configuration. In the locked configuration the weight member 180 is inserted into the elongate channel 130 and the outer upper surface 182*a* is generally parallel to the upper wall 141. In the locked configuration, the weight member 180 is securely fixed within the elongate channel 130.

[0082] It is worth noting at this time that it is also within the scope and content of the present invention for the weight member 180 to be inserted and rotated into position within the elongate channel 130 as shown in FIGS. 7-9 without partially inserting the fastener 190. In such a case, the fastener 190 may be inserted entirely after the weight member is inserted and rotated into position within the elongate channel 130.

[0083] FIGS. 11-12 show a weighting assembly in accordance with another embodiment of the present invention wherein a weight member 280 is secured within an elongate weight channel 230 by a fastener 290. The elongate weight channel 230 and the weight member 280 fundamentally function in a way very similar to those describe above in the discussion relating to FIGS. 1-10, but the current weight assembly has added risers 242 and shelfs 243. More specifically, the upper wall 241 may include a riser 242 extending down from the upper wall 241, and a shelf 243 extending from the riser 242 to the base wall 271. The lower wall 251 is substantially the same as lower wall 151, including a plurality of scalloped depressions 254 and a plurality of lower recesses 252, which may be separated by a plurality of ribs 253.

[0084] FIG. 12 shows a sectional view taken along a line B-B' in FIG. 11 passing through a center of the fastener 290. Looking first at the weight member 280, several notable features are apparent from this sectional view. Specifically, the upper surface 282 includes an outer upper surface 282*a* proximate the front surface 283 and an inner upper surface 282*b* proximate the rear surface 284. The outer upper surface 182*a* and the inner upper surface 182*b* define an angle θ. Preferably the angle θ is between 0° and 45°, more preferably the angle θ is between 10° and 40°, most preferably the angle θ is between about 15° and about 35°. The angle θ between the outer upper surface 182*a* and the inner upper surface 182*b* allows for the same rotation based insertion technique illustrated above in FIGS. 7-10. It is noted that the weight member 280 includes lower protrusions, though the lower protrusions are not visible through the rib 253 from this sectional view.

[0085] The orientation of the riser 242 and the shelf 243 are shown much more clearly in FIG. 12. According to an embodiment of the present invention, the riser 242 may extend downward from the upper wall 241 and the shelf 243 extends rearward from the riser 242 so as to join the upper wall 241 and the base wall 271. The riser 242 and the shelf 243 afford further contact surfaces for securing the weight member 280 within the elongate channel 230. The shaft 292 of the fastener 290 contacts the shelf 243 and the upper portion of the rear surface 284 of the weight member 280 contacts the riser 242 when the weight member is locked within the elongate weight channel 230. These additional points of contact between the weight member 280 and the elongate channel 230 thus further ensuring a secure fit between the weight member 280 and the elongate channel 230.

[0086] When fully seated and secured within the elongate channel 230, the weight member 280 and the fastener 290 contact numerous portions of the elongate channel 230. When the weight member 280 is rotated into the elongate channel 230 such that the lower protrusions (not shown) are received within the lower recesses (not shown), the fastener 290 is tightened to secure the weight member 280 within the elongate channel 230. As shown in FIG. 12, the rear surface 284 contacts not only the rear wall 271, but also the riser 242. When the weight member 280 is fully seated and secured within the elongate channel 230, the lower portion of the rear surface 284 may contact the rear wall 271 and the rear surface 284 may contact the riser 242. Further, when the weight member 280 is fully seated and secured within the elongate channel 230, the shaft 292 of the fastener 290 may contact the shelf 243. Finally, as described above, when the weight member 280 is fully seated and secured within the elongate channel 230, the head 291 of the fastener 290 is contacted by the scalloped shape depression 254 which

drives the outer upper surface **282***a* toward the upper wall **241**, further locking the weight member **280** in place. While the present embodiment does not include an upper protrusion or a corresponding upper depression, their inclusion is within the scope and content of the present invention.

[0087] FIGS. **13** and **14** of the accompanying drawings shows a rear view and cross-sectional view of a weight member **380** in accordance with a further alternative embodiment of the present invention.

[0088] FIG. **13** shows an enhanced rear view of the elongate channel **330** wherein the elongate channel **330** is similar to those described above but includes a further modified upper wall **341**. In detail, the upper wall **341** may include a riser **342** extending down from the upper wall **341**, and a shelf **343** extending from the riser **342** to the base wall **371**.

[0089] FIG. **14** shows a sectional view taken along a line C-C' in FIG. **13** passing through a center of the fastener **390**. From this perspective the riser **342** and the shelf **343** joining the upper wall **341** and the base wall **371** are clearly illustrated. While the structure of the elongate channel **330** is similar to the elongate channel **230**, two notable differences are apparent from this sectional view. First, the shaft **392** of the fastener **390** contacts a cutout **346** defined on the shelf **343** when the weight member is locked within the elongate channel **330**. This additional point of contact between the weight member **380** and the elongate channel **330** thus further ensuring a secure fit between the weight member **380** and the elongate channel **330**. Second, the upper rear surface **382** does not contact the riser **342**. While it is within the scope and content of the present invention for the upper rear surface **382** and the riser **342** to contact each other when the weight member **380** is fully inserted and secured within the elongate channel **330**, the weight member **380** may be sufficiently secured within the elongate channel **330** even without this additional point of contact.

[0090] The plurality of cutouts **346** correspond to discrete seating locations of the weight member **380**. According to an embodiment of the present invention, although not aligned linearly, each of the plurality of cutouts **346** corresponds with one of the plurality of scalloped depressions **354** such that for any given position the head **391** of the fastener **390** contacts a scalloped depression **354** and the shaft **392** of the fastener **390** contacts the corresponding cutout **346**. In other words, the elongate channel **330** differs from elongate channel **230** in that a plurality of cutouts **346** are defined in the riser **342** and the shelf **343**, and the shelf **343** and the riser **342** are dimensioned such that the riser **342** does not contact the weight member **380** when the weight member **380** is fully inserted and secured within the elongate channel **330**. The cutouts **346** offer an additional means of aligning a weight member within the elongate channel **330** and also offer additional support in preventing the weight member from moving within the elongate channel **330** during impact with a golf ball.

[0091] FIGS. **15-22** show a weight member **480** and a fastener **490** according to yet another embodiment of the present invention. The weight member **480** is similar to the above weight members with a few notable differences. In fact, with the exception of the fastener receiving hole **485** and a corresponding fastener **490**, the weight member **480** may be dimensioned to fit within any of the elongate channels described above.

[0092] Referring to FIGS. **15** and **16**, a frontal and rear view of weight member **480** is provided. The weight member **480** includes a lower surface **481**, an upper surface **482**, a front surface **483**, and a rear surface **484**. A fastener receiving hole **485** is defined through the front surface **483** and the rear surface **484** for receiving a fastener (not shown). A first abutment surface **489** is located around a periphery of the fastener receiving hole **485**, partially recessed from the front surface **483**. One or more lower protrusions **487** are defined at the interface between the rear surface **484** and the lower surface **481**. The fastener receiving hole **485** is neither threaded nor cylindrical, but rather is keyed so as to receive a keyed fastener therein as described below. The sectional shape of the fastener receiving hole **485** is variable along a depth direction from the front surface **483** toward the rear surface **484**. From this perspective, the front portion **4851** of the fastener receiving hole **485** is visible. The front portion **4851** is generally cylindrical in shape and functions to align the fastener within the fastener receiving hole **485**. Moving inward from the front portion **4851**, the fastener receiving hole **485** includes a seating wall **4852** that extends a partial width of the fastener receiving hole **485** and sets a maximum insertion depth for the fastener. While the seating wall **4852** is situated toward the right or toe-side of the fastener receiving hole **485**, the present invention is not limited in this regard. It is within the scope and content of the present invention for the seating wall **4852** to be positioned anywhere within the fastener receiving hole **485** so long as the seating wall **4852** only extends a partial width of the fastener receiving hole **485**.

[0093] Referring now to FIG. **16**, a rear perspective view of the weight member **480** sheds additional light on the structure of the weight member **480**, specifically that of the fastener receiving hole **485**. From this perspective, the rear of the seating wall **4852** is visible. Moving inward (toward the rear surface **484**) from the seating wall **4852**, the fastener receiving hole **485** includes a locking ledge **4853**. The locking ledge **4853** is located behind the seating wall **4852** in the depth direction from the front surface **483** toward the rear surface **484**. The locking ledge **4853** between the uppermost and lowermost extents of the fastener receiving hole **485**. Alternatively, it can be said that a height of the locking ledge **4853** measured in an upper surface **481** lower surface **482** direction is less than a diameter of the fastener receiving hole **485**.

[0094] The elevated perspective of FIG. **16** affords a clear view of the dual faceted nature of the upper surface **482**. Specifically, the upper surface **482** includes an outer upper surface **482***a* proximate the front surface **483** and an inner upper surface **482***b* proximate the rear surface **484**. The outer upper surface **482***a* and the inner upper surface **482***b* define an angle θ. Preferably the angle θ is between 0° and 45°, more preferably the angle θ is between 10° and 40°, most preferably the angle θ is between about 15° and about 35°. An upper protrusion **488** is formed on the outer upper surface **482***a*.

[0095] Referring now to FIGS. **17** and **18**, two perspective views of the fastener **490** that begin to show how the fastener **490** functions to lock the weight member **480** within an elongate channel. The fastener **490** and the fastener receiving hole **485** are designed to lock the weight member **480** within the elongate channel **430** with only a quarter of a turn (90° rotation) of the fastener **490**.

[0096] FIG. **17** is a frontal overhead perspective view of the fastener **490**. As shown in FIG. **17**, the fastener **490** includes a head **491** and a shaft **492**. The head **491** has a cam surface including a maximum radius portion **4911** and a reduced radius portion **4912** having a radius less than that of the maximum radius portion **4911**. The shaft **492** includes an alignment portion **4921**, a groove **4922**, a locking portion **4923**, and an abutment surface **4924**.

[0097] FIG. **18** shows a rear overhead perspective view of the fastener **490**. FIG. **18** shows the same features as FIG. **17**, but more clearly shows how the key-like structure of the fastener **490**. Specifically, from this perspective it is easy to see how the shaft **492** is generally cylindrical and how the groove **4922** and the locking portion **4923** are essentially carved from the generally cylindric shape shaft **492**.

[0098] FIGS. **19-20** show the weight member **480** positioned within an elongate channel **430** in an unlocked configuration and a locked configuration.

[0099] Referring now to FIG. **19**, a frontal view of the weight member **480** is shown within the elongate channel **430** in an unlocked configuration. In the unlocked configuration, the weight member **480** may be freely moved between each of the discrete weight locations. From this perspective, it is clear the role that the head **491** plays when the weight member **480** is in the unlocked configuration. As shown in FIG. **19**, in the unlocked configuration, the maximum radius portion **4911** is positioned away from the lower wall **451** of the elongate channel **430** and the reduced radius portion **4912** is positioned proximate the lower wall **451**.

[0100] Referring now to FIG. **20**, a frontal view of the weight member **480** is shown within the elongate channel **430** in the partially locked configuration. In the partially locked configuration, the fastener **490** is rotated 90° relative to its position in the unlocked configuration and the weight member **480** is securely fastened within one of the discrete weight locations defined by the positions of the lower recesses (not shown). From this perspective, it is clear the role that the head **491** plays in transitioning from the unlocked configuration to the partially locked configuration. As shown in FIG. **20**, in the partially locked configuration, the maximum radius portion **4911** no engages the lower wall **451** while the reduced radius portion **4912** is positioned away from the lower wall **451**. By rotating the fastener **490** such that the maximum radius portion **4911** of the fastener **490** contacts the lower wall **451**, the upper surface **484** of the weight member **480** is driven up toward the upper wall **441** of the elongate channel **430** thus locking the weight member **480** in place.

[0101] FIGS. **21** and **22** show sectional views of the weight member **480** positioned within the elongate channel **430** in the unlocked and locked configurations.

[0102] Referring to FIG. **21**, a sectional view taken along the sectional line D-D' of FIG. **19** of the weight member **480** in an unlocked configuration is provided. It is noted that the fastener is shown whole rather than in section for clarity. From this perspective, the asymmetry and lock and key like nature of the fastener **490** and the fastener receiving hole **485** are on full display.

[0103] As shown in FIG. **21**, the fastener **490** is fully inserted within the fastener receiving hole **485** such that the head **491** is abutting the first abutment surface **489** and the alignment portion **4921** is fitted within the generally cylindrical front portion **4851** and abutting the seating wall **4852**.

[0104] The head **491** of the fastener **490** is surrounded on the top and sides by the head wall **486** and on the bottom by the lower wall **451**. The maximum radius portion **4911** of the head **491** is in contact with the head wall **486** and the reduced radius portion **4912** of the head **491** is spaced apart from the lower wall **451**.

[0105] The seating wall **4852** of the shaft **492** is positioned proximate the seating wall **4852** and the locking portion **4923** is positioned proximate the locking ledge (not shown). The abutment surface **4924** is positioned proximate a side surface of the fastener receiving hole **485**.

[0106] As described above, in this configuration the fastener **490** may be freely inserted and removed from the fastener receiving hole **485** and the weight member **480** may be removed from the elongate channel **430** or adjusted within the elongate channel **430**.

[0107] As shown in FIG. **22**, the fastener **490** has been rotated 90° in a clockwise direction and is now in the locked configuration. The head **491** of the fastener **490** is surrounded on the top and sides by the head wall **486** and on the bottom by the lower wall **451**.

[0108] In transitioning from the unlocked configuration to the locked configuration, the fastener **490** has not moved in a longitudinal direction as the alignment portion **4921** remains centered within the frontal portion **4851**.

[0109] However, by rotating the fastener **490** into the locked configuration, several key features are now apparent. First of all, the maximum radius portion **4911** of the head **491** is now in contact with both the lower wall **451** and the head wall **486**. This drives the weight member **480** up so as to contact the upper wall **441** and prevents vertical movement of the weight member **480**. Similarly the groove **4922** now surrounds the seating wall **4852** which prevents longitudinal translation of the fastener **490** within the fastener receiving hole **485**. The locking portion **4923** is also driven into contact the locking ledge **4853**, which prevents the fastener **490** from moving vertically within the fastener receiving hole **485**.

[0110] FIGS. **23** through **28** show a weight member **580** and a fastener **590** according to yet another embodiment of the present invention.

[0111] Referring to FIG. **23**, an enhanced view of an elongate channel **530** is provided. A weight member **580** is positioned within the elongate channel **530** and a fastener **590** is in an unlocked configuration. In this configuration the weight member **580** may be moved along a length of the elongate channel **530**. The elongate channel **530** includes an upper wall **541** having a riser **542** extending down from the upper wall **541** and a shelf **543** extending from the riser **542** to the base wall **571**. The lower wall **551** includes a plurality of scalloped depressions **554** and a plurality of lower recesses **552**, which may be separated by a plurality of ribs **553**.

[0112] Fastener **590** is similar to fastener **490**. Fastener **590** includes a fastener head **591** having a maximum radius portion **5911** and a reduced radius portion **5912** having a radius less than that of the maximum radius portion **5911**. Fastener **590** also may be transitioned from an unlocked state to a locked state with only a half of a turn (180°).

[0113] FIG. **24** shows the weight member **580** in a locked configuration with the fastener **590** rotated a half turn (180°) elative to FIG. **23**. From this perspective, the only differences between the locked and unlocked configuration is the relative positioning of the fastener **590**, though additional

features will be apparent upon closer examination. Notably from this perspective is that the maximum radius portion **5911** of the head **591** is proximate one of the scalloped depressions **554**. As described above in detail, when the maximum radius portion **5911** contacts the scalloped depression **554** is drives the weight member **580** into the upper wall **541**, thus locking the weight member **580** in place.

[0114] FIGS. **25-28** show various sectional views that further detail the interaction of the fastener **590**, the weight member **580**, and the elongate channel **530**.

[0115] Referring now to FIG. **25**, a sectional view of the weight member **580** and the fastener **590** is provided prior to being installed in the elongate channel **530**. In this view, when the fastener **590** is midway between a locked configuration and an unlocked configuration, we can see the interface between the components better. However, to see how the weighting apparatus fits in within the channel, FIG. **26-28** have been provided below.

[0116] Referring now to FIG. **26**, the fastener **590** is positioned with the elongate channel **530** angularly aligned with the locking protrusion **5852** so that the fastener **590** may be freely inserted into the fastener receiving hole **585** until the alignment portion **5921** contacts the abutment surface **5824** of the locking protrusion **5852**. When in the insertion configuration, the position of the fastener **590** is angularly offset from the position of the fastener **590** when in the locked configuration and unlocked configuration. Preferably when in the insertion configuration, the fastener **590** is rotated outside of the range of motion between the locked configuration and the locked configuration. Most preferably, the fastener may be rotated half of a turn (180°) between in a first direction to transition from the unlocked configuration to the locked configuration, and the fastener may be rotated less than half of a turn in a second direction opposite the first direction to transition from the unlocked configuration to the insertion configuration.

[0117] Referring now to FIG. **27**, a modified sectional view taken along the line F-F' in FIG. **23** is provided. As shown in FIG. **27**, the fastener **590** is positioned in the unlocked configuration within the weight member **580** while the weight member **580** is rotated so as to be moved within the elongate channel **530**. Several features allow for the insertion of the weight member **580** and the fastener **590** to be inserted and removed from the elongate channel **530**, and to be freely moved between the discrete weight positions. First, the upper surface **582** includes an outer upper surface **582***a* proximate the front surface **583** and a inner upper surface **582***b* proximate the rear surface **584**. The outer upper surface **582***a* and the inner upper surface **582***b* define an angle θ. Preferably the angle θ is between 0° and 45°, more preferably the angle θ is between 10° and 40°, most preferably the angle θ is between about 15° and about 35°. The angle θ between the outer upper surface **582***a* and the inner upper surface **582***b* allows for the same rotation based insertion technique illustrated above in FIGS. **7-10**. Second, the reduced radius portion **5912** is oriented distal the upper surface **582** and proximate a scalloped depression **554**. The combination of the angle θ between the outer upper surface **582***a* and the inner upper surface **582***b*, the reduced radius portion **5912**, and the scalloped depression **554** allow for the lower protrusions **587** to pass through the constricted entry point, even though the lower protrusions are not visible through the rib **253** from this sectional view.

[0118] Several unique features of the present invention are apparent from this sectional view. In the unlocked configuration, the fastener **590** is fully seated within the weight member **580** and the maximum radius portion **5911** of the head **591** is positioned proximate the upper wall **541**. The alignment portion **5921** contacts the entire internal perimeter of the fastener receiving hole **585** to align the fastener **590** with the fastener receiving hole **585**.

[0119] Referring now to FIG. **28**, a modified sectional view taken along line G-G' in FIG. **24** is provided. As shown in FIG. **28**, the fastener is now positioned in the locked configuration with the weight member **580** and the fastener **590** are now secured within each of the desired locations. The maximum radius portion **5911** of the fastener **590** is now fitted within the recessed scalloped depressions **554** to lock the weight member **580** within the elongate channel **530** to facilitate engagement of the weight member **580** in the elongate channel **530**. In this locked configuration, the lower protrusion **587** is now rotated upwards towards the riser **342** to prevent the weight member **580** and fastener **590** combination from tilting up and potentially being removed.

[0120] FIGS. **29** through **31** of the accompanying drawings shows an iron type golf club head **600** in accordance with an alternative embodiment of the present invention. In this embodiment of the present invention, a similar type of rotatable locking mechanism is used to secure a weight member **680** via a fastener **690** along the rear surface of the golf club head **600** itself.

[0121] In the rear perspective view of the golf club head **600** shown in FIG. **29**, we can see that the weight member **680** and the fastener **690** secure work in conjunction to be secured in an elongate channel **630** that has a plurality of scalloped depressions **654** adapted to receive the head of the fastener **690** for retention. The details of the retention mechanism will be shown in more detail via the sectional views in FIGS. **30** and **31**, but it utilizes a similar rotational attachment mechanism described in previous embodiment but adapted in an iron type chassis.

[0122] In the sectional view of the golf club head **600** shown in FIG. **30**, the weight member **680** and fastener **690** are in an unlocked position with the lower protrusion **687** disengaged from the lower recess **652** to allow for insertion. The same dual angled upper surface **682** that was previously discussion will facilitate the insertion of the weight member **680** and the fastener **690** into the elongate channel **630**.

[0123] FIG. **3**I of the accompanying drawings shows golf club head **600** wherein the weight member **680** and the fastener **690** are now in a fully inserted locked position within the elongate channel **630**. In this fully inserted and locked position, we can see that the lower protrusion **687** is not fully engaged within the lower recess **652** while the upper surface **682** works in conjunction with a fully inserted fastener **690** within the weight member **680** to fully secure the weight adjustment feature within the elongate channel **630** without departing from the scope and content of the present invention.

[0124] FIG. **32** of the accompanying drawings shows a rear perspective view of a golf club head **3200** in accordance with an alternative embodiment of the present invention. In this alternative embodiment of the present invention, the golf club head **3200** has a weight adjustment portion that further comprises of recessed elongate channel **3230** that is adapted to receive a weight member **3280** that is secured to the recessed elongate channel **3230** via a fastener **3290**. In

this rear perspective view of the golf club head **3200** shown in FIG. **32**, it can be seen that the elongate channel **3230** is located along a rear surface of an iron type golf club head **3200** and the weight member **3280** can be moved along various locations within the recessed elongate channel **3230**.

[0125] The recessed elongate channel **3230** shown here has a retention rail **3235** further comprising at least one insertion cutout **3232** adapted to engage an insertion tab **3433** (shown in FIG. **34***c*) in the weight member **3280** during insertion. More specifically, in FIG. **32**, the recessed elongate channel **3230** has two insertion cutout **3232** without departing from the scope and content of the present invention.

[0126] FIG. **33** of the accompanying drawings shows a cross-sectional view of a golf club head **3300** taken along the central location of the golf club head **3300** to illustrate the relationship between the recessed elongate channel **3330**, the weight member **3380** and the fastener **3390**. In this cross-sectional view of the golf club head **3300**, the weight member **3330** has a lower protrusion **3381** that is shaped to engage a lower undercut **3331** in the recessed elongate channel **3330** to help retain the weight member **3380** within the elongate channel **3230**. In this cross-sectional view shown in FIG. **33**, we can see that the movement of the weight member **3320** as the fastener **3390** will move the lower protrusion **3381** rearward away from the striking face direction within the lower undercut **3331** to achieve the retention. Alternatively speaking, it can be said that the lower protrusion **3381** contacts an internal rear surface of said lower undercut **3331** to achieve said retention. The weight member **3380** will have a fastener receiving aperture adapted to receive the fastener **3390**. In a fully engaged state, the weight member **3380** is being pushed away from the striking face via the fastener **3390**, allowing it to engage the retention rail **3335** for secure retention.

[0127] In order to illustrate the actual retention mechanism, FIGS. **34***a*, **34***b*, and **34***c* are added to provide three enlarged cross-sectional views of the weight member **3480** in a fully installed position, a partially installed position, and a fully disengaged position. FIG. **34***a* shows the weight member **3480** in a fully installed position. In this fully installed position, the lower protrusion **3481** of the weight member **3480** is pushed rearward against the lower undercut **3431** of the recessed elongate channel **3430** when the fastener **3490** is tightened and the bottoming out of the fastener pushes the entirety of the weight member **3480** rearward.

[0128] In FIG. **34***b*, we can see that the weight member **3480** is in a partially installed position. In this position, we can see that when the fastener **3490** has not fully bottomed out, the weight member **3480** has a lot of room to wiggle loose and even potentially be slidably adjusted to different portions along the recessed elongate channel **3430**. Finally, FIG. **34***c* of the accompanying drawings shows the weight member **3480** being in a fully disengaged position wherein the weight member **3480** is fully removed from the recessed elongate channel **3430** and the lower protrusion **3481** of the weight member **3480** can rotate away from the lower undercut **3431** of the recessed elongate channel **3430** to facilitate the removal. In this cross-sectional view shown in FIG. **34***c*, the insertion tabs **3433** is shown, and the weight member **3480** can only be removed when the insertion tabs **3433** is aligned with the insertion cutouts **3232** (shown in FIG. **32**).

[0129] It can be seen here that an upper portion of the weight member **3480** rotates clockwise into the striking face portion of the golf club head to facilitate the engagement and installation of the weight member **3480** within the elongate channel **3430**, allowing the lower protrusion **3481** to rotate into the lower undercut **3431**. Conversely, the upper portion of the weight member **3480** rotates counter clockwise away from the striking face portion of the golf club head to facilitate the disengagement and removal of the weight member **3480** from the elongate channel **3430**, allowing the lower protrusion **3481** to rotate out of the lower undercut **3431**.

[0130] FIGS. **35** through **37** of the accompanying drawings shows another embodiment of the present invention similar to what is described above in FIGS. **32** through **34**, but with an additional retaining nut **3692** (shown in FIG. **36**) to help retain the fastener **3590** to the weight member **3580**. FIG. **35** of the accompanying drawings shows a rear perspective view of a golf club head **3500** in accordance with an even further alternative embodiment of the present invention. Similar to above, the golf club head **3500** has a weight adjustment portion that further comprises of a fastener **3590** that engages a threaded weight member **3580** to secure the weight member **3580** within a recessed elongate channel **3530**. The recessed elongate channel **3530** has at least one insertion indicators **3533** adapted to engage insertion tabs to help identify location of insertion.

[0131] FIG. **36** of the accompanying shows a cross-sectional view of a golf club head **3600** in accordance with this alternative embodiment of the present invention. In this cross-sectional view shown in FIG. **36** we can see that this embodiment of the present invention differs slightly from the previous embodiment shown in FIG. **33** in two major ways. First off, the golf club head **3600** shown here adds an additional retaining nut **3692** located internally on the other side of the weight member **3680** to help retain the fastener **3690** such that the fastener **3690** does not fall out during the loosening of the fastener **3690**. Secondly, the cross-sectional view of the golf club head **3600** shown in FIG. **36**, despite using a similar rotation type of insertion movement, has a slightly different shape and geometry for the lower protrusion **3681** to mate with the lower undercut **3631**. In this embodiment of the present invention shown in FIG. **36**, the dimensions of both the lower protrusion **3681** on the weight member **3680** and the corresponding lower undercut **3631** in the recessed elongate channel **3630** are both reduced to make the insertion of the weight member **3680** simpler.

[0132] FIGS. **37***a*, **37***b*, and **37***c* of the accompanying drawings show three enlarged cross-sectional views of the weight member **3780** in a fully installed position, a partially installed position, and a fully disengaged position respectively. FIG. **37***a* shows the weight member **3780** in a fully installed position with the fastener **3790** engaging the retaining nut **3792** to secure the fastener **3790** to the weight member **3780** if it was accidentally loosened too much. In this fully engaged position, a cutout within the retaining nut **3792** engages at least one of the insertion indicators **3533** (shown in FIG. **35**) via rotation to secure the weight member **3780** to the recessed elongate channel **3730**. In this enlarged cross-sectional view shown in FIG. **37***a*, the lower protrusion **3781** fully engages the lower undercut **3731** in this fully installed position to secure the weight member **3780** within the recessed elongate channel **3730**.

[0133] FIG. **37***b* of the accompanying drawings shows the weight member **3780** being partially disengaged to allow for an adjustment of the location of the weight member **3780** within the recessed elongate channel **3730**. In this partially disengaged position shown in FIG. **37***b*, we can see that with the retaining nut **3792** being rotated out of position, the weight member **3780** is free to move along various positions in the track. Finally, in FIG. **37***c*, the enlarged cross-sectional view of the weight member **3780** is shown in a fully disengaged position, allowing the entirety of the weight to be rotated out of its location within the recessed elongate channel **3730** for removal.

[0134] FIGS. **38**, **39**, **40***a*, **40***b*, and **40***c* all illustrate a golf club head **3800** in accordance with another further alternative embodiment of the present invention. Because of the similarities of this embodiment with earlier embodiments, FIGS. **38**, **39**, **40***a*, **40***b*, and **40***c* will be described as a collective here. FIG. **38** shows a rear perspective view of a golf club head **3800** in accordance with an exemplary embodiment of the present invention with a weight member **3880** in the shape of an "X", wherein the "X" shaped weight member **3880** has two retention tabs **3881** that is adapted to engage a retention rail **3835** to help secure the weight member **3880** within the recessed elongate channel **3830**. The relationship of the retention can be shown more clearly in the cross-sectional view of the golf club head **3800** shown in FIG. **39**, where we can see one of the retention tabs **3881** engaging the retention rail **3835** to facilitate the retention once the fastener **3890** moves the weight member **3880** upward when the threads are fully engaged.

[0135] Finally, FIGS. **40***a*, **40***b*, and **40***c* of the present invention shows enlarged cross-sectional views of the weight member **3880** in a fully engaged, partially engaged, and a fully disengaged location respectively. In the fully engaged view shown in FIG. **40***a*, we can see that the retention tabs **3881** of the "X" shaped weight member **3880** engages the retention rail **3835** as the fastener pushes the weight member **3880** upwards into the retention rail **3835**. In the partially disengaged enlarged cross-sectional view shown in FIG. **40***b*, we can see that the retention tab **3881** can be retracted out of the retention rail **3835** when the fastener **3890** is loosened. Finally, in the fully disengaged view shown in FIG. **40***c*, we can see that for complete removal, the weight can be rotated away from the striking face portion of the golf club head **3800** for full removal.

[0136] FIGS. **41**, **42**, and **43** of the accompanying drawings shows a rear view, a cross-sectional view, and an exploded view respectively, of a golf club head **4100** in accordance with an even further alternative embodiment of the present invention. Similar to the previous embodiment, FIG. **41** shows the weight member **4180** being secured in a recessed elongate channel **4130** of a golf club head **4100** via a fastener **4190** while pushing the legs of the weight member **4180** upwards towards a retention rail **4135**, it adds an additional feature to make the installation and removal of the weight member **4180** easier. In this embodiment of the present invention, a toe cap **4134** is added to the toe end of the golf club head **4100** that can be removably attached to the golf club head **4100** via a screw **4136** to open up a terminal end of the recessed elongate channel **4130**.

[0137] FIG. **42** of the accompanying drawings provided an exploded view of the golf club head **4100** allowing the toe cap **4134** and its retention screw **4136** to be shown more clearly. In this exploded view shown in FIG. **42**, we can see that the weight member **4180** can be slidably inserted into the recessed elongate channel **4130** via a toe opening of the golf club head **4100**. Once the weight member **4180** is slidably inserted, it's location can be determined via the fastener **4190** that pushes the weight member **4180** higher within the recessed elongate channel so the weight member **4180** engages the in retention rail **4135**. The additional component of the **4134** toe cap and the screw **4136** helps close the toe opening to prevent the weight member **4180** from falling out.

[0138] In the cross-sectional view of the golf club head **4100** shown in FIG. **43**, we can see the interface of the weight **4180** with the recessed elongate channel **4130**. This cross-sectional view looks very similar to the cross-sectional view of golf club head **4800** shown in FIG. **39**, as the weighting components are very similar.

[0139] It should be noted that most of the embodiments discussed here aims to create a releasable hosel hole cover, however, all of these embodiments may include glue to make the hosel hole cover stay within the hosel hole, removing the ability to remove the hosel hoe cover without departing from the scope and content of the present invention.

[0140] Other than in the operating example, or unless otherwise expressly specified, all of the numerical ranges, amounts, values and percentages such as those for amounts of materials, moment of inertias, center of gravity locations, loft, draft angles, various performance ratios, and others in the aforementioned portions of the specification may be read as if prefaced by the word "about" even though the term "about" may not expressly appear in the value, amount, or range. Accordingly, unless indicated to the contrary, the numerical parameters set forth in the above 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.

[0141] 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.

[0142] It should be understood, of course, that the foregoing relates to exemplary embodiments of the present invention and that modifications may be made without departing from the spirit and scope of the invention as set forth in the following claims

What is claimed is:

1. A golf club head comprising:

a striking face portion located at a frontal portion of said golf club head, and

a body portion attached to a rear of said striking face portion;

wherein said body portion incorporates a weight adjustment portion further comprising;

an elongate channel further comprising a lower undercut and a retention rail,

a weight member further comprising a lower protrusion and a fastener receiving aperture, and

a fastener adapted to directly engage said fastener receiving aperture,

wherein a tightening of said fastener shifts a location of said weight member within said elongate channel to engage said retention rail to secure said weight member to said golf club head.

2. The golf club head of claim **1**, wherein said weight adjustment portion can be configured to be in either one of an unlocked configuration or a locked configuration,

wherein when said weight adjustment portion is in said unlocked configuration, said weight member is not engaged with said retention rail, and

wherein when said weight adjustment portion is in said locked configuration, said weight member is engaged with said retention rail.

3. The golf club head of claim **2**, wherein said tightening of said fastener shifts said weight member rearward within said elongate channel.

4. The golf club head of claim **2**, wherein said tightening of said fastener shifts said weight member upward within said elongate channel.

5. The golf club head of claim **2**, wherein when said weight adjustment portion is in said locked configuration, said lower protrusion of said weight member contacts an internal rear surface of said lower undercut.

6. The golf club head of claim **2**, wherein an upper portion of said weight member rotates into said striking face portion of said golf club head to insert said weight member into said elongate channel.

7. The golf club head of claim **6**, wherein said upper portion of said weight member rotates away from said striking face portion of said golf club head to remove said weight member from said elongate channel.

8. The golf club head of claim **7**, further comprising a retaining nut, wherein said retaining nut engages said fastener to sandwich said weight member.

9. A golf club head comprising:

a striking face portion located at a frontal portion of said golf club head, and

a body portion attached to a rear of said striking face portion;

wherein said body portion incorporates a weight adjustment portion further comprising;

an elongate channel further comprising a lower undercut and a retention rail,

a weight member further comprising a lower protrusion and a fastener receiving aperture, and

a fastener adapted to directly engage said fastener receiving aperture,

wherein said weight adjustment portion can be configured to be in either one of an unlocked configuration or a locked configuration,

wherein when said weight adjustment portion is in said unlocked configuration, said weight member is not engaged with said retention rail, and

wherein when said weight adjustment portion is in said locked configuration, said weight member is engaged with said retention rail.

10. The golf club head of claim **9**, wherein a tightening of said fastener shifts said weight member rearward within said elongate channel.

11. The golf club head of claim **10**, wherein when said weight adjustment portion is in said locked configuration, said lower protrusion of said weight member contacts an internal rear surface of said lower undercut.

12. The golf club head of claim **9**, wherein a tightening of said fastener shifts said weight member upward within said elongate channel.

13. The golf club head of claim **12**, wherein an upper portion of said weight member rotates into said striking face portion of said golf club head to insert said weight member into said elongate channel.

14. The golf club head of claim **9**, wherein an upper portion of said weight member rotates into said striking face portion of said golf club head to insert said weight member into said elongate channel.

15. The golf club head of claim **14**, wherein said weight member further comprises an insertion tab at said upper portion of said weight member,

wherein said insertion tabs mate with an insertion cutout to allow said weight member to rotate into said elongate channel.

16. A golf club head comprising:

a striking face portion located at a frontal portion of said golf club head, and

a body portion attached to a rear of said striking face portion;

wherein said body portion incorporates a weight adjustment portion further comprising;

an elongate channel having a toe opening, further comprising a lower undercut and a retention rail,

a weight member further comprising a lower protrusion and a fastener receiving aperture,

a fastener adapted to directly engage said fastener receiving aperture,

a toe cap, adapted to close said toe opening, and

a screw, adapted to secure said toe cap to said body portion.

17. The golf club head of claim **16**, wherein a tightening of said fastener shifts a location of said weight member within said elongate channel to engage said retention rail to secure said weight member to said golf club head.

18. The golf club head of claim **17**, wherein said weight adjustment portion can be configured to be in either one of an unlocked configuration or a locked configuration,

wherein when said weight adjustment portion is in said unlocked configuration, said weight member is not engaged with said retention rail, and

wherein when said weight adjustment portion is in said locked configuration, said weight member is engaged with said retention rail.

19. The golf club head of claim **18**, wherein said tightening of said fastener shifts said weight member upward within said elongate channel.

20. The golf club head of claim **19**, wherein an upper portion of said weight member rotates into said striking face portion of said golf club head to insert said weight member into said elongate channel.

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