

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		
	Filing Date		
	First Named Inventor	Robert R. Parsons	
	Art Unit		
	Examiner Name		
	Attorney Docket Number	P-15-008-U02-US/30161	

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Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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Examiner Initial*	Cite No	Foreign Document Number ³	Country Code ²	Kind Code ⁴	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear	T ⁵
	1							<input type="checkbox"/>

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NON-PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T ⁵
	1	INTERNATIONAL SEARCH REPORT AND WRITTEN OPINION received in connection with corresponding application no. PCT/US2015/016666, on May 14, 2015 (8 pages).	<input type="checkbox"/>

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Examiner Signature		Date Considered	
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*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

¹ See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. ² Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). ³ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁴ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁵ Applicant is to place a check mark here if English language translation is attached.

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CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Jonathan B. Thielbar/	Date (YYYY-MM-DD)	2016-09-12
Name/Print	Jonathan B. Thielbar	Registration Number	70453

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Inventor(s): Robert. R. Parsons
Michael R. Nicolette
Bradley D. Schweigert

GOLF CLUB HEADS AND METHODS TO MANUFACTURE GOLF CLUB HEADS

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CROSS REFERENCE

[0002] This application is a continuation application of U.S. Non-Provisional Application Serial No. 15/043,090, filed February 12, 2016, which claims the benefit of U.S. Provisional Application No. 62/118,403, filed February 19, 2015, U.S. Provisional Application No. 62/159,856, filed May 11, 2015, U.S. Provisional Application No. 62/209,780, filed August 25, 2015, and U.S. Provisional Application No. 62/277,636, filed January 12, 2016. This application is also a continuation-in-part application of U.S. Application Serial No. 29/570,918, filed July 13, 2016, which is a divisional application of U.S. Application Serial No. 29/547,678, filed December 7, 2015, now U.S. Patent No. D764,610, which is a continuation-in-part application of U.S. Application Serial No. 29/540,066, filed September 21, 2015, now U.S. Patent No. D746,926, which is a continuation-in-part application of U.S. Application Serial No. 29/537,413, filed August 25, 2015. The disclosures of the referenced applications are incorporated herein by reference.

FIELD

[0003] The present disclosure generally relates to golf equipment, and more particularly, to golf club heads and methods to manufacturing golf club heads.

BACKGROUND

[0004] Various materials (e.g., steel-based materials, titanium-based materials, tungsten-based materials, etc.) may be used to manufacture golf club heads. By using multiple materials to manufacture golf club heads, the position of the center of gravity (CG) and/or the moment of inertia (MOI) of the golf club heads may be optimized to produce certain trajectory and spin rate of a golf ball.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] FIG. 1 depicts a front view of a golf club head according to an embodiment of the apparatus, methods, and articles of manufacture described herein.

[0006] FIG. 2 depicts a rear view of the example golf club head of FIG. 1.

[0007] FIG. 3 depicts a top view of the example golf club head of FIG. 1.

[0008] FIG. 4 depicts a bottom view of the example golf club head of FIG. 1.

[0009] FIG. 5 depicts a left view of the example golf club head of FIG. 1.

[0010] FIG. 6 depicts a right view of the example golf club head of FIG. 1.

[0011] FIG. 7 depicts a cross-sectional view of the example golf club head of FIG. 1 along line 7-7.

[0012] FIG. 8 depicts a cross-sectional view of the example golf club head of FIG. 1 along line 8-8.

[0013] FIG. 9 depicts a cross-sectional view of the example golf club head of FIG. 1 along line 9-9.

[0014] FIG. 10 depicts another rear view of the example golf club head of FIG. 1.

[0015] FIG. 11 depicts a top view of a weight portion associated with the example golf club head of FIG. 1.

[0016] FIG. 12 depicts a side view of a weight portion associated with the example golf club head of FIG. 1.

[0017] FIG. 13 depicts a side view of another weight portion associated with the example golf club head of FIG. 1.

[0018] FIG. 14 depicts a rear view of a body portion of the example golf club head of FIG. 1.

[0019] FIG. 15 depicts a cross-sectional view of a face portion of the example golf club head of FIG. 1.

[0020] FIG. 16 depicts a cross-sectional view of another face portion of the example golf club head of FIG. 1.

[0021] FIG. 17 depicts one manner in which the example golf club head described herein may be manufactured.

[0022] FIG. 18 depicts another cross-sectional view of the example golf club head of FIG. 4 along line 18-18.

[0023] FIG. 19 depicts a front view of a face portion of the example golf club head of FIG. 1.

[0024] FIG. 20 depicts a back view of the face portion of FIG. 19.

[0025] FIG. 21 depicts a cross-sectional view of an example channel of the face portion of FIG. 19.

[0026] FIG. 22 depicts a cross-sectional view of another example channel of the face portion of FIG. 19.

[0027] FIG. 23 depicts a cross-sectional view of yet another example channel of the face portion of FIG. 19.

[0028] FIG. 24 depicts a cross-sectional view of yet another example channel of the face portion of FIG. 19.

[0029] FIG. 25 depicts a back view of another example face portion of the example golf club head of FIG. 1.

[0030] FIG. 26 depicts a back view of yet another example face portion of the example golf club head of FIG. 1.

[0031] FIG. 27 depicts a back view of yet another example face portion of the example golf club head of FIG. 1.

[0032] FIG. 28 depicts a cross-sectional view of the example golf club head of FIG. 1.

[0033] FIG. 29 depicts another manner in which an example golf club head described herein may be manufactured.

[0034] FIG. 30 depicts yet another manner in which an example golf club head described herein may be manufactured.

[0035] FIG. 31 depicts a rear view of a golf club head according to an embodiment of the apparatus, methods, and articles of manufacture described herein.

[0036] FIG. 32 depicts a rear view of the golf club head of FIG. 31.

[0037] FIG. 33 depicts a front view of a golf club head according to an embodiment of the apparatus, methods, and articles of manufacture described herein.

[0038] FIG. 34 depicts a rear view of the example golf club head of FIG. 33.

[0039] FIG. 35 depicts a rear perspective view of the example golf club head of FIG. 33.

[0040] FIG. 36 depicts a rear view of the example golf club head of FIG. 33.

[0041] FIG. 37 depicts a cross-sectional view of the example golf club head of FIG. 33 along line 37-37 of FIG. 36.

[0042] FIG. 38 depicts a cross-sectional view of the example golf club head of FIG. 33 along line 38-38 of FIG. 36.

[0043] FIG. 39 depicts a cross-sectional view of the example golf club head of FIG. 33 along line 39-39 of FIG. 36.

[0044] FIG. 40 depicts a cross-sectional view of the example golf club head of FIG. 33 along line 40-40 of FIG. 36.

[0045] FIG. 41 depicts a cross-sectional view of the example golf club head of FIG. 33 along line 41-41 of FIG. 36.

[0046] FIG. 42 depicts a cross-sectional view of the example golf club head of FIG. 33 along line 42-42 of FIG. 36.

[0047] For simplicity and clarity of illustration, the drawing figures illustrate the general manner of construction, and descriptions and details of well-known features and techniques may be omitted to avoid unnecessarily obscuring the present disclosure. Additionally, elements in the drawing figures may not be depicted to scale. For example, the dimensions of some of the elements in the figures may be exaggerated relative to other elements to help improve understanding of embodiments of the present disclosure.

DESCRIPTION

[0048] In general, golf club heads and methods to manufacture golf club heads are described herein. The apparatus, methods, and articles of manufacture described herein are not limited in this regard.

[0049] In the example of FIGs. 1-14, a golf club head 100 may include a body portion 110 (FIG. 14), and two or more weight portions, generally shown as a first set of weight portions 120 (e.g., shown as weight portions 121, 122, 123, and 124) and a second set of weight portions 130 (e.g., shown as weight portions 131, 132, 133, 134, 135, 136, and 137). The body portion 110 may include a toe portion 140, a heel portion 150, a front portion 160, a back portion 170, a top portion 180, and a sole portion 190. The body portion 110 may be made of a first material whereas the first and second sets of weight portions 120 and 130, respectively, may be made of a second material. The first and second materials may be similar or different materials. For example, the body portion 110 may be partially or entirely made of a steel-based material (e.g., 17-4 PH stainless steel, Nitronic[®] 50 stainless steel, maraging steel or other types of stainless steel), a titanium-based material, an aluminum-based material (e.g., a high-strength aluminum alloy or a composite aluminum alloy coated with a high-strength alloy), any combination thereof, and/or other suitable types of materials. The first and second sets of weight portions 120 and 130, respectively, may be partially or entirely made of a high-density material such as a tungsten-based material or other suitable types of materials. Alternatively, the body portion 110 and/or the first and second sets of weight portions 120 and 130, respectively, may be partially or entirely made of a non-metal

material (e.g., composite, plastic, etc.). The apparatus, methods, and articles of manufacture are not limited in this regard.

[0050] The golf club head 100 may be an iron-type golf club head (e.g., a 1-iron, a 2-iron, a 3-iron, a 4-iron, a 5-iron, a 6-iron, a 7-iron, an 8-iron, a 9-iron, etc.) or a wedge-type golf club head (e.g., a pitching wedge, a lob wedge, a sand wedge, an n-degree wedge such as 44 degrees (°), 48°, 52°, 56°, 60°, etc.). Although FIGs. 1-10 may depict a particular type of club head, the apparatus, methods, and articles of manufacture described herein may be applicable to other types of club heads (e.g., a driver-type club head, a fairway wood-type club head, a hybrid-type club head, a putter-type club head, etc.). The apparatus, methods, and articles of manufacture described herein are not limited in this regard.

[0051] The toe portion 140 and the heel portion 150 may be on opposite ends of the body portion 110. The heel portion 150 may include a hosel portion 155 configured to receive a shaft (not shown) with a grip (not shown) on one end and the golf club head 100 on the opposite end of the shaft to form a golf club.

[0052] The front portion 160 may include a face portion 162 (e.g., a strike face). The face portion 162 may include a front surface 164 and a back surface 166. The front surface 164 may include one or more grooves 168 extending between the toe portion 140 and the heel portion 150. While the figures may depict a particular number of grooves, the apparatus, methods, and articles of manufacture described herein may include more or less grooves. The face portion 162 may be used to impact a golf ball (not shown). The face portion 162 may be an integral portion of the body portion 110. Alternatively, the face portion 162 may be a separate piece or an insert coupled to the body portion 110 via various manufacturing methods and/or processes (e.g., a bonding process such as adhesive, a welding

process such as laser welding, a brazing process, a soldering process, a fusing process, a mechanical locking or connecting method, any combination thereof, or other suitable types of manufacturing methods and/or processes). The face portion 162 may be associated with a loft plane that defines the loft angle of the golf club head 100. The loft angle may vary based on the type of golf club (e.g., a long iron, a middle iron, a short iron, a wedge, etc.). In one example, the loft angle may be between five degrees and seventy-five degrees. In another example, the loft angle may be between twenty degrees and sixty degrees. The apparatus, methods, and articles of manufacture described herein are not limited in this regard.

[0053] As illustrated in FIG. 14, the back portion 170 may include a back wall portion 1410 with one or more exterior weight ports along a periphery of the back portion 170, generally shown as a first set of exterior weight ports 1420 (e.g., shown as weight ports 1421, 1422, 1423, and 1424) and a second set of exterior weight ports 1430 (e.g., shown as weight ports 1431, 1432, 1433, 1434, 1435, 1436, and 1437). Each exterior weight port may be associated with a port diameter. In one example, the port diameter may be about 0.25 inch (6.35 millimeters). Any two adjacent exterior weight ports of the first set of exterior weight ports 1420 may be separated by less than the port diameter. In a similar manner, any two adjacent exterior weight ports of the second set of exterior weight ports 1430 may be separated by less than the port diameter. The first and second exterior weight ports 1420 and 1430 may be exterior weight ports configured to receive one or more weight portions. In particular, each weight portion of the first set 120 (e.g., shown as weight portions 121, 122, 123, and 124) may be disposed in a weight port located at or proximate to the toe portion 140 and/or the top portion 180 on the back portion 170. For example, the weight portion 121 may be partially or entirely disposed in the weight port 1421. In another example, the weight

portion 122 may be disposed in a weight port 1422 located in a transition region between the top portion 180 and the toe portion 140 (e.g., a top-and-toe transition region). Each weight portion of the second set 130 (e.g., shown as weight portions 131, 132, 133, 134, 135, 136, and 137) may be disposed in a weight port located at or proximate to the toe portion 140 and/or the sole portion 190 on the back portion 170. For example, the weight portion 135 may be partially or entirely disposed in the weight port 1435. In another example, the weight portion 136 may be disposed in a weight port 1436 located in a transition region between the sole portion 190 and the toe portion 140 (e.g., a sole-and-toe transition region). As described in detail below, the first and second sets of weight portions 120 and 130, respectively, may be coupled to the back portion 170 of the body portion 110 with various manufacturing methods and/or processes (e.g., a bonding process, a welding process, a brazing process, a mechanical locking method, any combination thereof, or other suitable manufacturing methods and/or processes).

[0054] Alternatively, the golf club head 100 may not include (i) the first set of weight portions 120, (ii) the second set of weight portions 130, or (iii) both the first and second sets of weight portions 120 and 130. In particular, the back portion 170 of the body portion 110 may not include weight ports at or proximate to the top portion 170 and/or the sole portion 190. For example, the mass of the first set of weight portions 120 (e.g., 3 grams) and/or the mass of the second set of weight portions 130 (e.g., 16.8 grams) may be integral part(s) the body portion 110 instead of separate weight portion(s). The apparatus, methods, and articles of manufacture described herein are not limited in this regard.

[0055] The first and second sets of weight portions 120 and 130, respectively, may have similar or different physical properties (e.g., color, shape, size, density, mass, volume, etc.).

As a result, the first and second sets of weight portions 120 and 130, respectively, may contribute to the ornamental design of the golf club head 100. In the illustrated example as shown in FIG. 11, each of the weight portions of the first and second sets 120 and 130, respectively, may have a cylindrical shape (e.g., a circular cross section). Alternatively, each of the weight portions of the first set 120 may have a first shape (e.g., a cylindrical shape) whereas each of the weight portions of the second set 130 may have a second shape (e.g., a cubical shape). In another example, the first set of weight portions 120 may include two or more weight portions with different shapes (e.g., the weight portion 121 may be a first shape whereas the weight portion 122 may be a second shape different from the first shape). Likewise, the second set of weight portions 130 may also include two or more weight portions with different shapes (e.g., the weight portion 131 may be a first shape whereas the weight portion 132 may be a second shape different from the first shape). Although the above examples may describe weight portions having a particular shape, the apparatus, methods, and articles of manufacture described herein may include weight portions of other suitable shapes (e.g., a portion of or a whole sphere, cube, cone, cylinder, pyramid, cuboidal, prism, frustum, or other suitable geometric shape). While the above examples and figures may depict multiple weight portions as a set of weight portions, each set of the first and second sets of weight portions 120 and 130, respectively, may be a single piece of weight portion. In one example, the first set of weight portions 120 may be a single piece of weight portion instead of a series of four separate weight portions. In another example, the second set of weight portions 130 may be a single piece of weight portion instead of a series of seven separate weight portions. The apparatus, methods, and articles of manufacture described herein are not limited in this regard.

[0056] Referring to FIGs. 12 and 13, for example, the first and second sets of weight portions 120 and 130, respectively, may include threads, generally shown as 1210 and 1310, respectively, to engage with correspondingly configured threads in the weight ports to secure in the weight ports of the back portion 170 (generally shown as 1420 and 1430 in FIG. 14). For example, each weight portion of the first and second sets of weight portions 120 and 130, respectively, may be a screw. The first and second sets of weight portions 120 and 130, respectively, may not be readily removable from the body portion 110 with or without a tool. Alternatively, the first and second sets of weight portions 120 and 130, respectively, may be readily removable (e.g., with a tool) so that a relatively heavier or lighter weight portion may replace one or more of the weight portions of the first and second sets 120 and 130, respectively. In another example, the first and second sets of weight portions 120 and 130, respectively, may be secured in the weight ports of the back portion 170 with epoxy or adhesive so that the first and second sets of weight portions 120 and 130, respectively, may not be readily removable. In yet another example, the first and second sets of weight portions 120 and 130, respectively, may be secured in the weight ports of the back portion 170 with both epoxy and threads so that the first and second sets of weight portions 120 and 130, respectively, may not be readily removable. The apparatus, methods, and articles of manufacture described herein are not limited in this regard.

[0057] As mentioned above, the first and second sets of weight portions 120 and 130, respectively, may be similar in some physical properties but different in other physical properties. As illustrated in FIGs. 11-13, for example, each of the weight portions of the first and second sets 120 and 130, respectively, may have a diameter 1110 of about 0.25 inch (6.35 millimeters) but the first and second sets of weight portions 120 and 130, respectively,

may be different in height. In particular, each of the weight portions of the first set 120 may be associated with a first height 1220 (FIG. 12), and each of the weight portion of the second set 130 may be associated with a second height 1320 (FIG. 13). The first height 1220 may be relatively shorter than the second height 1320. In one example, the first height 1220 may be about 0.125 inch (3.175 millimeters) whereas the second height 1320 may be about 0.3 inch (7.62 millimeters). In another example, the first height 1220 may be about 0.16 inch (4.064 millimeters) whereas the second height 1320 may be about 0.4 inch (10.16 millimeters). Alternatively, the first height 1220 may be equal to or greater than the second height 1320. The apparatus, methods, and articles of manufacture described herein are not limited in this regard.

[0058] Referring back to FIG. 10, for example, the golf club head 100 may be associated with a ground plane 1010, a horizontal midplane 1020, and a top plane 1030. In particular, the ground plane 1010 may be a tangential plane to the sole portion 190 of the golf club head 100 when the golf club head 100 is at an address position (e.g., the golf club head 100 is aligned to strike a golf ball). A top plane 1030 may be a tangential plane to the top portion of the 180 of the golf club head 100 when the golf club head 100 is at the address position. The ground and top planes 1010 and 1030, respectively, may be substantially parallel to each other. The horizontal midplane 1020 may be vertically halfway between the ground and top planes 1010 and 1030, respectively.

[0059] To provide optimal perimeter weighting for the golf club head 100, the first set of weight portions 120 (e.g., weight portions 121, 122, 123, and 124) may be configured to counter-balance the weight of the hosel 155. For example, as shown in FIG. 10, the first set of weight portions 120 (e.g., weight portions 121, 122, 123 and 124) may be located near the

periphery of the body portion 110 and extend from the top portion to a transition region 145 between the top portion 180 and the toe portion 140, and from the transition region 145 to the toe portion 140. In other words, the first set of weight portions 120 may be located on the golf club head 100 at a generally opposite location relative to the hosel 155. According to one example, at least a portion of the first set of weight portions 120 may be located near the periphery of the body portion 110 and extend through the transition region 145. According to another example, at least a portion of the first set of weight portions 120 may extend near the periphery of the body portion 110 and extend along a portion of the top portion 180. According to another example, at least a portion of the first set of weight portions 120 may extend near the periphery of the body portion 110 and extend along a portion of the toe portion 140. The first set of weight portions 120 may be above the horizontal midplane 1020 of the golf club head 100. At least a portion of the first set of weight portions 120 may be near the toe portion 140 to increase the moment of inertia of the golf club head 100 about a vertical axis of the golf club head 100 that extends through the center of gravity of the golf club head 100. Accordingly, the first set of weight portions 120 may be near the periphery of the body portion 110 and extend through the top portion 180, the toe portion 140 and/or the transition region 145 to counter-balance the weight of the hosel 155 and/or increase the moment of inertia of the golf club head 100. The locations of the first set of weight portions 120 (i.e., the locations of the first set of exterior weight ports 1420) and the physical properties and materials of construction of the weight portions of the first set of weight portions 120 may be determined to optimally affect the weight, weight distribution, center of gravity, moment of inertia characteristics, structural integrity and/or or other static and/or

dynamic characteristics of the golf club head 100. The apparatus, methods, and articles of manufacture described herein are not limited in this regard.

[0060] The second set of weight portions 130 (e.g., weight portions 131, 132, 133, 134, 135, 136, and 137) may be configured to place the center of gravity of the golf club head 100 at an optimal location and optimize the moment of inertia of the golf club head about a vertical axis that extends through the center of gravity of the golf club head 100. Referring to FIG. 10, all or a substantial portion of the second set of weight portions 130 may be generally near the sole portion 190. For example, the second set of weight portions 130 (e.g., weight portions 131, 132, 133, 134, 135, 136, and 137) may be near the periphery of the body portion 110 and extend from the sole portion 190 to the toe portion 140. As shown in the example of FIG. 10, the weight portions 131, 132, 133, and 134 may be located near the periphery of the body portion 110 and extend along the sole portion 190 to lower the center of gravity of the golf club head 100. The weight portions 135, 136 and 137 may be located near the periphery of the body portion 110 and extend from the sole portion 190 to the toe portion 140 through a transition region 147 between the sole portion 190 and the toe portion 140 to lower the center of gravity and increase the moment of inertia of the golf club head 100 about a vertical axis that extends through the center of gravity. To lower the center of gravity of the golf club head 100, all or a portion of the second set of weight portions 130 may be located closer to the sole portion 190 than to the horizontal midplane 1020. For example, the weight portions 131, 132, 133, 134, 135, and 136 may be closer to the sole portion 190 than to the horizontal midplane 1020. The locations of the second set of weight portions 130 (i.e., the locations of the second set of exterior weight ports 1430) and the physical properties and materials of construction of the weight portions of the second set of

weight portions 130 may be determined to optimally affect the weight, weight distribution, center of gravity, moment of inertia characteristics, structural integrity and/or other static and/or dynamic characteristics of the golf club head 100. The apparatus, methods, and articles of manufacture described herein are not limited in this regard.

[0061] Turning to FIGs. 7-9, for example, the first and second sets of weight portions 120 and 130, respectively, may be located away from the back surface 166 of the face portion 162 (e.g., not directly coupled to each other). That is, the first and second sets of weight portions 120 and 130, respectively, and the back surface 166 may be partially or entirely separated by an interior cavity 700 of the body portion 110. As shown in FIG. 14, for example, each exterior weight port of the first and second sets of exterior weight ports 1420 and 1430 may include an opening (e.g., generally shown as 720 and 730) and a port wall (e.g., generally shown as 725 and 735). The port walls 725 and 735 may be integral portions of the back wall portion 1410 (e.g., a section of the back wall portion 1410). Each of the openings 720 and 730 may be configured to receive a weight portion such as weight portions 121 and 135, respectively. The opening 720 may be located at one end of the weight port 1421, and the port wall 725 may be located or proximate to at an opposite end of the weight port 1421. In a similar manner, the opening 730 may be located at one end of the weight port 1435, and the port wall 735 may be located at or proximate to an opposite end of the weight port 1435. The port walls 725 and 735 may be separated from the face portion 162 (e.g., separated by the interior cavity 700). The port wall 725 may have a distance 726 from the back surface 166 of the face portion 162 as shown in FIG. 9. The port wall 735 may have a distance 736 from the back surface 166 of the face portion 162. The distances 726 and 736 may be determined to optimize the location of the center of gravity of the golf club head 100

when the first and second sets of weight ports 1420 and 1430, respectively, receive weight portions as described herein. According to one example, the distance 736 may be greater than the distance 726 so that the center of gravity of the golf club head 100 is moved toward the back portion 170. As a result, a width 740 of a portion of the interior cavity 700 below the horizontal midplane 1020 may be greater than a width 742 of the interior cavity 700 above the horizontal midplane 1020. The apparatus, methods, and articles of manufacture described herein are not limited in this regard.

[0062] As discussed herein, the center of gravity (CG) of the golf club head 100 may be relatively farther back away from the face portion 162 and relatively lower towards a ground plane (e.g., one shown as 1010 in FIG. 10) with all or a substantial portion of the second set of weight portions 130 being closer to the sole portion 190 than to the horizontal midplane 1020 and the first and second sets of weight portions 120 and 130, respectively being away from the back surface 166 than if the second set of weight portions 130 were directly coupled to the back surface 166. The locations of the first and second sets of weight ports 1420 and 1430 and the physical properties and materials of construction of the weight portions of the first and second sets of weight portions 120 and 130, respectively, may be determined to optimally affect the weight, weight distribution, center of gravity, moment of inertia characteristics, structural integrity and/or or other static and/or dynamic characteristics of the golf club head 100. The apparatus, methods, and articles of manufacture described herein are not limited in this regard.

[0063] While the figures may depict weight ports with a particular cross-section shape, the apparatus, methods, and articles of manufacture described herein may include weight ports with other suitable cross-section shapes. In one example, the weight ports of the first

and/or second sets of weight ports 1420 and 1430 may have U-like cross-section shape. In another example, the weight ports of the first and/or second set of weight ports 1420 and 1430 may have V-like cross-section shape. One or more of the weight ports associated with the first set of weight portions 120 may have a different cross-section shape than one or more weight ports associated with the second set of weight portions 130. For example, the weight port 1421 may have a U-like cross-section shape whereas the weight port 1435 may have a V-like cross-section shape. Further, two or more weight ports associated with the first set of weight portions 120 may have different cross-section shapes. In a similar manner, two or more weight ports associated with the second set of weight portions 130 may have different cross-section shapes. The apparatus, methods, and articles of manufacture described herein are not limited in this regard.

[0064] The first and second sets of weight portions 120 and 130, respectively, may be similar in mass (e.g., all of the weight portions of the first and second sets 120 and 130, respectively, weigh about the same). Alternatively, the first and second sets of weight portions 120 and 130, respectively, may be different in mass individually or as an entire set. In particular, each of the weight portions of the first set 120 (e.g., shown as 121, 122, 123, and 124) may have relatively less mass than any of the weight portions of the second set 130 (e.g., shown as 131, 132, 133, 134, 135, 136, and 137). For example, the second set of weight portions 130 may account for more than 50% of the total mass from exterior weight portions of the golf club head 100. As a result, the golf club head 100 may be configured to have at least 50% of the total mass from exterior weight portions disposed below the horizontal midplane 1020. The apparatus, methods, and articles of manufacture described herein are not limited in this regard.

[0065] In one example, the golf club head 100 may have a mass in the range of about 220 grams to about 330 grams based on the type of golf club (e.g., a 4-iron versus a lob wedge). The body portion 110 may have a mass in the range of about 200 grams to about 310 grams with the first and second sets of weight portions 120 and 130, respectively, having a mass of about 20 grams (e.g., a total mass from exterior weight portions). Each of the weight portions of the first set 120 may have a mass of about one gram (1.0 g) whereas each of the weight portions of the second set 130 may have a mass of about 2.4 grams. The sum of the mass of the first set of weight portions 120 may be about 3 grams whereas the sum of the mass of the first set of weight portions 130 may be about 16.8 grams. The total mass of the second set of weight portions 130 may weigh more than five times as much as the total mass of the first set of weight portions 120 (e.g., a total mass of the second set of weight portions 130 of about 16.8 grams versus a total mass of the first set of weight portions 120 of about 3 grams). The golf club head 100 may have a total mass of 19.8 grams from the first and second sets of weight portions 120 and 130, respectively (e.g., sum of 3 grams from the first set of weight portions 120 and 16.8 grams from the second set of weight portions 130). Accordingly, the first set of weight portions 120 may account for about 15% of the total mass from exterior weight portions of the golf club head 100 whereas the second set of weight portions 130 may be account for about 85% of the total mass from exterior weight portions of the golf club head 100. The apparatus, methods, and articles of manufacture described herein are not limited in this regard.

[0066] By coupling the first and second sets of weight portions 120 and 130, respectively, to the body portion 110 (e.g., securing the first and second sets of weight portions 120 and 130 in the weight ports on the back portion 170), the location of the center

of gravity (CG) and the moment of inertia (MOI) of the golf club head 100 may be optimized. In particular, as described herein, the first and second sets of weight portions 120 and 130, respectively, may lower the location of the CG towards the sole portion 190 and further back away from the face portion 162. Further, the MOI may be higher as measured about a vertical axis extending through the CG (e.g., perpendicular to the ground plane 1010). The MOI may also be higher as measured about a horizontal axis extending through the CG (e.g., extending towards the toe and heel portions 150 and 160, respectively, of the golf club head 100). As a result, the club head 100 may provide a relatively higher launch angle and a relatively lower spin rate than a golf club head without the first and second sets of weight portions 120 and 130, respectively. The apparatus, methods, and articles of manufacture described herein are not limited in this regard.

[0067] Alternatively, two or more weight portions in the same set may be different in mass. In one example, the weight portion 121 of the first set 120 may have a relatively lower mass than the weight portion 122 of the first set 120. In another example, the weight portion 131 of the second set 130 may have a relatively lower mass than the weight portion 135 of the second set 130. With relatively greater mass at the top-and-toe transition region and/or the sole-and-toe transition region, more weight may be distributed away from the center of gravity (CG) of the golf club head 100 to increase the moment of inertia (MOI) about the vertical axis through the CG.

[0068] Although the figures may depict the weight portions as separate and individual parts, each set of the first and second sets of weight portions 120 and 130, respectively, may be a single piece of weight portion. In one example, all of the weight portions of the first set 120 (e.g., shown as 121, 122, 123, and 124) may be combined into a single piece of weight

portion (e.g., a first weight portion). In a similar manner, all of the weight portions of the second set 130 (e.g., 131, 132, 133, 134, 135, 136, and 137) may be combined into a single piece of weight portion as well (e.g., a second weight portion). In this example, the golf club head 100 may have only two weight portions. While the figures may depict a particular number of weight portions, the apparatus, methods, and articles of manufacture described herein may include more or less number of weight portions. In one example, the first set of weight portions 120 may include two separate weight portions instead of three separate weight portions as shown in the figures. In another example, the second set of weight portions 130 may include five separate weight portions instead of seven separate weight portions as shown in the figures. Alternatively as mentioned above, the apparatus, methods, and articles of manufacture described herein may not include any separate weight portions (e.g., the body portion 110 may be manufactured to include the mass of the separate weight portions as integral part(s) of the body portion 110). The apparatus, methods, and articles of manufacture described herein are not limited in this regard.

[0069] Referring back to FIGs. 7-9, for example, the body portion 110 may be a hollow body including the interior cavity 700 extending between the front portion 160 and the back portion 170. Further, the interior cavity 700 may extend between the top portion 180 and the sole portion 190. The interior cavity 700 may be associated with a cavity height 750 (H_C), and the body portion 110 may be associated with a body height 850 (H_B). While the cavity height 750 and the body height 850 may vary between the toe and heel portions 140 and 150, the cavity height 750 may be at least 50% of a body height 850 ($H_C > 0.5 * H_B$). For example, the cavity height 750 may vary between 70 – 85% of the body height 850. With the cavity height 750 of the interior cavity 700 being greater than 50% of the body height 850,

the golf club head 100 may produce relatively more consistent feel, sound, and/or result when the golf club head 100 strikes a golf ball via the face portion 162 than a golf club head with a cavity height of less than 50% of the body height. The apparatus, methods, and articles of manufacture described herein are not limited in this regard.

[0070] In one example, the interior cavity 700 may be unfilled (i.e., empty space). The body portion 100 with the interior cavity 700 may weight about 100 grams less than the body portion 100 without the interior cavity 700. Alternatively, the interior cavity 700 may be partially or entirely filled with an elastic polymer or elastomer material (e.g., a viscoelastic urethane polymer material such as Sorbothane[®] material manufactured by Sorbothane, Inc., Kent, Ohio), a thermoplastic elastomer material (TPE), a thermoplastic polyurethane material (TPU), and/or other suitable types of materials to absorb shock, isolate vibration, and/or dampen noise. For example, at least 50% of the interior cavity 700 may be filled with a TPE material to absorb shock, isolate vibration, and/or dampen noise when the golf club head 100 strikes a golf ball via the face portion 162.

[0071] In another example, the interior cavity 700 may be partially or entirely filled with a polymer material such as an ethylene copolymer material to absorb shock, isolate vibration, and/or dampen noise when the golf club head 100 strikes a golf ball via the face portion 162. In particular, at least 50% of the interior cavity 700 may be filled with a high density ethylene copolymer ionomer, a fatty acid modified ethylene copolymer ionomer, a highly amorphous ethylene copolymer ionomer, an ionomer of ethylene acid acrylate terpolymer, an ethylene copolymer comprising a magnesium ionomer, an injection moldable ethylene copolymer that may be used in conventional injection molding equipment to create various shapes, an ethylene copolymer that can be used in conventional extrusion equipment to create

various shapes, and/or an ethylene copolymer having high compression and low resilience similar to thermoset polybutadiene rubbers. For example, the ethylene copolymer may include any of the ethylene copolymers associated with DuPont™ High-Performance Resin (HPF) family of materials (e.g., DuPont™ HPF AD1172, DuPont™ HPF AD1035, DuPont® HPF 1000 and DuPont™ HPF 2000), which are manufactured by E.I. du Pont de Nemours and Company of Wilmington, Delaware. The DuPont™ HPF family of ethylene copolymers are injection moldable and may be used with conventional injection molding equipment and molds, provide low compression, and provide high resilience. The apparatus, methods, and articles of manufacture described herein are not limited in this regard.

[0072] Turning to FIG. 15, for example, the face portion 162 may include a first thickness 1510 (T_1), and a second thickness 1520 (T_2). The first thickness 1510 may be a thickness of a section of the face portion 162 adjacent to a groove 168 whereas the second thickness 1520 may be a thickness of a section of the face portion 162 below the groove 168. For example, the first thickness 1510 may be a maximum distance between the front surface 164 and the back surface 166. The second thickness 1520 may be based on the groove 168. In particular, the groove 168 may have a groove depth 1525 (D_{groove}). The second thickness 1520 may be a maximum distance between the bottom of the groove 168 and the back surface 166. The sum of the second thickness 1520 and the groove depth 1525 may be substantially equal to the first thickness 1510 (e.g., $T_2 + D_{\text{groove}} = T_1$). Accordingly, the second thickness 1520 may be less than the first thickness 1510 (e.g., $T_2 < T_1$).

[0073] To lower and/or move the CG of the golf club head 100 further back, weight from the front portion 160 of the golf club head 100 may be removed by using a relatively thinner face portion 162. For example, the first thickness 1510 may be about 0.075 inch (1.905

millimeters) (e.g., $T_1 = 0.075$ inch). With the support of the back wall portion 1410 to form the interior cavity 700 and filling at least a portion of the interior cavity 700 with an elastic polymer material, the face portion 162 may be relatively thinner (e.g., $T_1 < 0.075$ inch) without degrading the structural integrity, sound, and/or feel of the golf club head 100. In one example, the first thickness 1510 may be less than or equal to 0.060 inch (1.524 millimeters) (e.g., $T_1 \leq 0.060$ inch). In another example, the first thickness 1510 may be less than or equal to 0.040 inch (1.016 millimeters) (e.g., $T_1 \leq 0.040$ inch). Based on the type of material(s) used to form the face portion 162 and/or the body portion 110, the face portion 162 may be even thinner with the first thickness 1510 being less than or equal to 0.030 inch (0.762 millimeters) (e.g., $T_1 \leq 0.030$ inch). The groove depth 1525 may be greater than or equal to the second thickness 1520 (e.g., $D_{\text{groove}} \geq T_2$). In one example, the groove depth 1525 may be about 0.020 inch (0.508 millimeters) (e.g., $D_{\text{groove}} = 0.020$ inch). Accordingly, the second thickness 1520 may be about 0.010 inch (0.254 millimeters) (e.g., $T_2 = 0.010$ inch). In another example, the groove depth 1525 may be about 0.015 inch (0.381 millimeters), and the second thickness 1520 may be about 0.015 inch (e.g., $D_{\text{groove}} = T_2 = 0.015$ inch). Alternatively, the groove depth 1525 may be less than the second thickness 1520 (e.g., $D_{\text{groove}} < T_2$). Without the support of the back wall portion 1410 and the elastic polymer material to fill in the interior cavity 700, a golf club head may not be able to withstand multiple impacts by a golf ball on a face portion. In contrast to the golf club head 100 as described herein, a golf club head with a relatively thin face portion but without the support of the back wall portion 1410 and the elastic polymer material to fill in the interior cavity 700 (e.g., a cavity-back golf club head) may produce unpleasant sound (e.g., a tinny

sound) and/or feel during impact with a golf ball. The apparatus, methods, and articles of manufacture described herein are not limited in this regard.

[0074] Based on manufacturing processes and methods used to form the golf club head 100, the face portion 162 may include additional material at or proximate to a periphery of the face portion 162. Accordingly, the face portion 162 may also include a third thickness 1530, and a chamfer portion 1540. The third thickness 1530 may be greater than either the first thickness 1510 or the second thickness 1520 (e.g., $T_3 > T_1 > T_2$). In particular, the face portion 162 may be coupled to the body portion 110 by a welding process. For example, the first thickness 1510 may be about 0.030 inch (0.762 millimeters), the second thickness 1520 may be about 0.015 inch (0.381 millimeters), and the third thickness 1530 may be about 0.050 inch (1.27 millimeters). Accordingly, the chamfer portion 1540 may accommodate some of the additional material when the face portion 162 is welded to the body portion 110.

[0075] As illustrated in FIG. 16, for example, the face portion 162 may include a reinforcement section, generally shown as 1605, below one or more grooves 168. In one example, the face portion 162 may include a reinforcement section 1605 below each groove. Alternatively, face portion 162 may include the reinforcement section 1605 below some grooves (e.g., every other groove) or below only one groove. The face portion 162 may include a first thickness 1610, a second thickness 1620, a third thickness 1630, and a chamfer portion 1640. The groove 168 may have a groove depth 1625. The reinforcement section 168 may define the second thickness 1620. The first and second thicknesses 1610 and 1620, respectively, may be substantially equal to each other (e.g., $T_1 = T_2$). In one example, the first and second thicknesses 1610 and 1620, respectively, may be about 0.030 inch (0.762 millimeters) (e.g., $T_1 = T_2 = 0.030$ inch). The groove depth 1625 may be about 0.015 inch

(0.381 millimeters), and the third thickness 1630 may be about 0.050 inch (1.27 millimeters). The groove 168 may also have a groove width. The width of the reinforcement section 1605 may be greater than or equal to the groove width. The apparatus, methods, and articles of manufacture described herein are not limited in this regard.

[0076] Alternatively, the face portion 162 may vary in thickness at and/or between the top portion 180 and the sole portion 190. In one example, the face portion 162 may be relatively thicker at or proximate to the top portion 180 than at or proximate to the sole portion 190 (e.g., thickness of the face portion 162 may taper from the top portion 180 towards the sole portion 190). In another example, the face portion 162 may be relatively thicker at or proximate to the sole portion 190 than at or proximate to the top portion 180 (e.g., thickness of the face portion 162 may taper from the sole portion 190 towards the top portion 180). In yet another example, the face portion 162 may be relatively thicker between the top portion 180 and the sole portion 190 than at or proximate to the top portion 180 and the sole portion 190 (e.g., thickness of the face portion 162 may have a bell-shaped contour). The apparatus, methods, and articles of manufacture described herein are not limited in this regard.

[0077] Different from other golf club head designs, the interior cavity 700 of the body portion 110 and the location of the first and second sets of weight portions 120 and 130, respectively, along the perimeter of the golf club head 100 may result in a golf ball traveling away from the face portion 162 at a relatively higher ball launch angle and a relatively lower spin rate. As a result, the golf ball may travel farther (i.e., greater total distance, which includes carry and roll distances).

[0078] FIG. 17 depicts one manner in which the example golf club head described herein may be manufactured. In the example of FIG. 17, the process 1700 may begin with providing two or more weight portions, generally shown as the first and second sets of weight portions 120 and 130, respectively (block 1710). The first and second sets of weight portions 120 and 130, respectively, may be made of a first material such as a tungsten-based material. In one example, the weight portions of the first and second sets 120 and 130, respectively, may be tungsten-alloy screws.

[0079] The process 1700 may provide a body portion 110 having the face portion 162, the interior cavity 700, and the back portion 170 with two or more exterior weight ports, generally shown as 1420 and 1430 (block 1720). The body portion 110 may be made of a second material, which is different than the first material. The body portion 110 may be manufacture using an investment casting process, a billet forging process, a stamping process, a computer numerically controlled (CNC) machining process, a die casting process, any combination thereof, or other suitable manufacturing processes. In one example, the body portion 110 may be made of 17-4 PH stainless steel using a casting process. In another example, the body portion 110 may be made of other suitable type of stainless steel (e.g., Nitronic[®] 50 stainless steel manufactured by AK Steel Corporation, West Chester, Ohio) using a forging process. By using Nitronic[®] 50 stainless steel to manufacture the body portion 110, the golf club head 100 may be relatively stronger and/or more resistant to corrosion than golf club heads made from other types of steel. Each weight port of the body portion 110 may include an opening and a port wall. For example, the weight port 1421 may include the opening 720 and the port wall 725 with the opening 720 and the port wall 725 being on opposite ends of each other. The interior cavity 700 may separate the port wall 725

of the weight port 1421 and the back surface 166 of the face portion 162. In a similar manner, the weight port 1835 may include the opening 730 and the port wall 735 with the opening 730 and the port wall 735 being on opposite ends of each other. The interior cavity 700 may separate the port wall 735 of the weight port 1435 and the back surface 166 of the face portion 162.

[0080] The process 1700 may couple each of the first and second sets of weight portions 120 and 130 into one of the two or more exterior weight ports (blocks 1730). In one example, the process 1700 may insert and secure the weight portion 121 in the exterior weight port 1421, and the weight portion 135 in the exterior weight portion 1435. The process 1700 may use various manufacturing methods and/or processes to secure the first and second sets of weight portions 120 and 130, respectively, in the exterior weight ports such as the weight ports 1421 and 1435 (e.g., epoxy, welding, brazing, mechanical lock(s), any combination thereof, etc.).

[0081] The process 1700 may partially or entirely fill the interior cavity 700 with an elastic polymer material (e.g., Sorbothane[®] material) or a polymer material (e.g., an ethylene copolymer material such as DuPont[™] HPF family of materials) (block 1740). In one example, at least 50% of the interior cavity 700 may be filled with the elastic polymer material. As mentioned above, the elastic polymer material may absorb shock, isolate vibration, and/or dampen noise in response to the golf club head 100 striking a golf ball. In addition or alternatively, the interior cavity 700 may be filled with a thermoplastic elastomer material and/or a thermoplastic polyurethane material. As illustrated in FIG. 18, for example, the golf club head 100 may include one or more weight ports (e.g., one shown as 1431 in FIG. 14) with a first opening 1830 and a second opening 1835. The second opening

1835 may be used to access the interior cavity 700. In one example, the process 1700 (FIG. 17) may fill the interior cavity 700 with an elastic polymer material by injecting the elastic polymer material into the interior cavity 700 from the first opening 1830 via the second opening 1835. The first and second openings 1830 and 1835, respectively, may be same or different in size and/or shape. While the above example may describe and depict a particular weight port with a second opening, any other weight ports of the golf club head 100 may include a second opening (e.g., the weight port 720). The apparatus, methods, and articles of manufacture described herein are not limited in this regard.

[0082] Referring back to FIG. 17, the example process 1700 is merely provided and described in conjunction with other figures as an example of one way to manufacture the golf club head 100. While a particular order of actions is illustrated in FIG. 17, these actions may be performed in other temporal sequences. For example, two or more actions depicted in FIG. 17 may be performed sequentially, concurrently, or simultaneously. In one example, blocks 1710, 1720, 1730, and/or 1740 may be performed simultaneously or concurrently. Although FIG. 17 depicts a particular number of blocks, the process may not perform one or more blocks. In one example, the interior cavity 700 may not be filled (i.e., block 1740 may not be performed). The apparatus, methods, and articles of manufacture described herein are not limited in this regard.

[0083] Referring back to FIGs. 1-14, the face portion 162 may include a non-smooth back surface to improve adhesion and/or mitigate delamination between the face portion 162 and the elastic polymer material used to fill the interior cavity 700 (e.g., FIG. 7). Various methods and/or processes such as an abrasive blasting process (e.g., a bead blasting process, a sand blasting process, other suitable blasting process, or any combination thereof) and/or a

milling (machining) process may be used to form the back surface 166 into a non-smooth surface. For example, the back surface 166 may have with a surface roughness (Ra) ranging from 0.5 to 250 μin (0.012 to 6.3 μm). The apparatus, methods, and articles of manufacture are not limited in this regard.

[0084] As illustrated in FIGs. 19-21, for example, a face portion 1900 may include the front surface 1910, and the back surface 2010. The front surface 1910 may include one or more grooves, generally shown as 1920, extending longitudinally across the front surface 1910 (e.g., extending between the toe portion 140 and the heel portion 150 of FIG. 1). The front surface 1910 may be used to impact a golf ball (not shown).

[0085] The back surface 2010 may also include one or more channels, generally shown as 2020. The channels 2020 may extend longitudinally across the back surface 2010. The channels 2020 may be parallel or substantially parallel to each other. The channels 2020 may engage with the elastic polymer material used to fill the interior cavity 700, and serve as a mechanical locking mechanism between the face portion 1900 and the elastic polymer material. In particular, a channel 2100 may include an opening 2110, a bottom section 2120, and two sidewalls, generally shown as 2130 and 2132. The bottom section 2120 may be parallel or substantially parallel to the back surface 2010. The two sidewalls 2130 and 2132 may be converging sidewalls (i.e., the two sidewalls 2130 and 2132 may not be parallel to each other). The bottom section 2120 and the sidewalls 2130 and 2132 may form two undercut portions, generally shown as 2140 and 2142. That is, a width 2115 at the opening 2110 may be less than a width 2125 of the bottom section 2120. A cross section of the channel 2100 may be symmetrical about an axis 2150. While FIG. 21 may depict flat or

substantially flat sidewalls, the two sidewalls 2130 and 2132 may be curved (e.g., convex relative to each other).

[0086] Instead of flat or substantially flat sidewalls as shown in FIG. 21, a channel may include other types of sidewalls. As illustrated in FIG. 22, for example, a channel 2200 may include an opening 2210, a bottom section 2220, and two sidewalls, generally shown as 2230 and 2232. The bottom section 2220 may be parallel or substantially parallel to the back surface 2010. The two sidewalls 2230 and 2232 may be stepped sidewalls. The bottom section 2220 and the sidewalls 2230 and 2232 may form two undercut portions, generally shown as 2240 and 2242. That is, a width 2215 at the opening 2210 may be less than a width 2225 of the bottom section 2220. A cross section of the channel 2200 may be symmetrical about an axis 2250.

[0087] Instead of being symmetrical as shown in FIGs. 21 and 22, a channel may be asymmetrical. As illustrated in FIG. 23, for another example, a channel 2300 may include an opening 2310, a bottom section 2320, and two sidewalls, generally shown as 2330 and 2332. The bottom section 2320 may be parallel or substantially parallel to the back surface 2010. The bottom section 2320 and the sidewall 2330 may form an undercut portion 2340.

[0088] Referring to FIG. 24, for example, a channel 2400 may include an opening 2410, a bottom section 2420, and two sidewalls, generally shown as 2430 and 2432. The bottom section 2420 may not be parallel or substantially parallel to the back surface 2010. The two sidewalls 2430 and 2432 may be parallel or substantially parallel to each other but one sidewall may be longer than the other sidewall. The bottom section 2420 and the sidewall 2432 may form an undercut portion 2440.

[0089] In the example as shown in FIG. 25, a face portion 2500 may include a back surface 2510 with one or more channels, generally shown as 2520, extending laterally across the back surface 2510 (e.g., extending between the top portion 180 and the sole portion 190 of FIG. 1). In another example as depicted in FIG. 26, a face portion 2600 may include a back surface 2610 with one or more channels, generally shown as 2620, extending diagonally across the back surface 2610. Alternatively, a face portion may include a combination of channels extending in different directions across a back surface of the face portion (e.g., extending longitudinally, laterally, and/or diagonally). Turning to FIG. 27, for yet another example, a face portion 2700 may include a back surface 2710 with one or more channels, generally shown as 2720, 2730, and 2740, extending in different directions across the back surface 2710. In particular, the face portion 2700 may include a plurality of channels 2720 extending longitudinally across the back surface 2710, a plurality of channels 2730 extending laterally across the back surface 2710, and a plurality of channels 2740 extending diagonally across the back surface 2710.

[0090] In addition or alternatively, the golf club head 100 may include a bonding agent to improve adhesion and/or mitigate delamination between the face portion 162 and the elastic polymer material used to fill the interior cavity 700 of the golf club head 100 (e.g., FIG. 7). Referring to FIG. 28, for example, the golf club head 100 may include the face portion 162, a bonding portion 2810, and an elastic polymer material 2820. In one example, the bonding portion 2810 may be low-viscosity, organic, solvent-based solutions and/or dispersions of polymers and other reactive chemicals such as MEGUMTM, ROBONDTM, and/or THIXONTM materials manufactured by the Dow Chemical Company, Auburn Hills, Michigan. In another example, the bonding portion 2810 may be LOCTITE[®] materials manufactured by Henkel

Corporation, Rocky Hill, Connecticut. The bonding portion 2810 may be applied to the back surface 166 to bond the elastic polymer material 2820 to the face portion 162 (e.g., extending between the back surface 166 and the elastic polymer material 2820). For example, the bonding portion 2810 may be applied when the interior cavity 700 is filled with the elastic polymer material 2820 via an injection-molding process. The apparatus, methods, and articles of manufacture are not limited in this regard.

[0091] FIG. 29 depicts one manner in which the interior cavity 700 of the golf club head 100 or any of the golf club heads described herein is partially or entirely filled with an elastic polymer material or an elastomer material. The process 2900 may begin with heating the golf club head 100 to a certain temperature (block 2910). In one example, the golf club head 100 may be heated to a temperature ranging between 150 °C to 250°C, which may depend on factors such as the vaporization temperature of the elastic polymer material to be injected in the interior cavity 700. The elastic polymer material may then be heated to a certain temperature (block 2920). The elastic polymer material may be a non-foaming and injection-moldable thermoplastic elastomer (TPE) material. Accordingly, the elastic polymer material may be heated to reach a liquid or a flowing state prior to being injected into the interior cavity 700. The temperature to which the elastic polymer material may be heated may depend on the type of elastic polymer material used to partially or fully fill the interior cavity 700. The heated elastic polymer material may be injected into the interior cavity 700 to partially or fully fill the interior cavity 700 (block 2930). The elastic polymer material may be injected into the interior cavity 700 from one or more of the weight ports described herein (e.g., one or more weight ports of the first and second sets of weight ports 1420 and 1430, respectively, shown in FIG. 14). One or more other weight ports may allow the air inside the

interior cavity 700 displaced by the elastic polymer material to vent from the interior cavity 700. In one example, the golf club head 100 may be oriented horizontally as shown in FIG. 14 during the injection molding process. The elastic polymer material may be injected into the interior cavity 700 from weight ports 1431 and 1432. The weight ports 1421, 1422 and/or 1423 may serve as air ports for venting the displaced air from the interior cavity 700. Thus, regardless of the orientation of the golf club head 100 during the injection molding process, the elastic polymer material may be injected into the interior cavity 700 from one or more lower positioned weight ports while one or more upper positioned weight ports may serve as air vents. The mold (i.e., the golf club head 100) may then be cooled passively (e.g., at room temperature) or actively so that the elastic polymer material reaches a solid state and adheres to the back surface 166 of the face portion 162. The elastic polymer material may directly adhere to the back surface 166 of the face portion 162. Alternatively, the elastic polymer material may adhere to the back surface 166 of the face portion 162 with the aid of the one or more structures on the back surface 166 and/or a bonding agent described herein (e.g., the bonding portion 2810 shown in FIG. 28). The apparatus, methods, and articles of manufacture described herein are not limited in this regard.

[0092] As discussed above, the elastic polymer material may be heated to a liquid state (i.e., non-foaming) and solidifies after being injection molded in the interior cavity 700. An elastic polymer material with a low modulus of elasticity may provide vibration and noise dampening for the face portion 162 when the face portion 162 impacts a golf ball. For example, an elastic polymer material that foams when heated may provide vibration and noise dampening. However, such a foaming elastic polymer material may not have sufficient rigidity to provide structural support to a relatively thin face portion because of possible

excessive deflection and/or compression of the elastic polymer material when absorbing the impact of a golf ball. In one example, the elastic polymer material that is injection molded in the interior cavity 700 may have a relatively high modulus of elasticity to provide structural support to the face portion 162 and yet elastically deflect to absorb the impact forces experienced by the face portion 162 when striking a golf ball. Thus, a non-foaming and injection moldable elastic polymer material with a relatively high modulus of elasticity may be used for partially or fully filling the interior cavity 700 to provide structural support and reinforcement for the face portion 162 in addition to providing vibration and noise dampening. That is, the non-foaming and injection moldable elastic polymer material may be a structural support portion for the face portion 162. The apparatus, methods, and articles of manufacture are not limited in this regard.

[0093] FIG. 30 depicts one manner in which a bonding agent as described herein may be applied to a golf club head prior to partially or fully injecting an elastic polymer in the interior cavity 700. In the example of FIG. 30, the process 3000 may begin with injecting a bonding agent on the back surface 166 of the face portion 162 (block 3010). The bonding agent may be injected on the back surface 166 prior to or after heating the golf club head as described above depending on the properties of the bonding agent. The bonding agent may be injected through one or more of the first set of weight ports 1420 and/or the second set of weight ports 1430. The bonding agent may be injected on the back surface 166 through several or all of the first set of weight ports 1420 and the second set of weight ports 1430. For example, an injection instrument such as a nozzle or a needle may be inserted into each weight port until the tip or outlet of the instrument is near the back surface 166. The bonding agent may then be injected on the back surface 166 from the outlet of the instrument.

Additionally, the instrument may be moved, rotated and/or swiveled while inside the interior cavity 700 so that the bonding agent is injected onto an area of the back surface 166 surrounding the instrument. For example, the outlet of the injection instrument may be moved in a circular pattern while inside a weight port to inject the bonding agent in a corresponding circular pattern on the back surface 166. Each of the first set of weight ports 1420 and the second set of weight ports 1430 may be utilized to inject a bonding agent on the back surface 166. However, utilizing all of first weight ports 1420 and/or the second set of weight ports 1430 may not be necessary. For example, using every other adjacent weight port may be sufficient to inject a bonding agent on the entire back surface 166. In another example, weight ports 1421, 1422 1431, 1433 and 1436 may be used to inject the bonding agent on the back surface 166. The apparatus, methods, and articles of manufacture are not limited in this regard.

[0094] The process 3000 may also include spreading the bonding agent on the back surface 166 (block 3020) after injection of the bonding agent onto the back surface 166 so that a generally uniform coating of the bonding agent is provided on the back surface 166. According to one example, the bonding agent may be spread on the back surface 166 by injecting air into the interior cavity 700 through one or more of the first set of weight ports 1420 and the second set of weight ports 1430. The air may be injected into the interior cavity 700 and on the back surface 166 by inserting an air nozzle into one or more of the first set of weight ports 1420 and the second set of weight ports 1430. According to one example, the air nozzle may be moved, rotated and/or swiveled at a certain distance from the back surface 166 so as to uniformly blow air onto the bonding agent to spread the bonding agent on the back surface 166 for a uniform coating or a substantially uniform coating of the bonding

agent on the back surface 166. The apparatus, methods, and articles of manufacture are not limited in this regard.

[0095] The process 3000 may include a single step of injecting and uniformly or substantially uniformly coating the back surface 166 with the bonding agent. In one example, the bonding agent may be injected on the back surface 166 by being converted into fine particles or droplets (i.e., atomized) and sprayed on the back surface 166. Accordingly, the back surface 166 may be uniformly or substantially uniformly coated with the bonding agent in one step. A substantially uniform coating of the back surface 166 with the bonding agent may be defined as a coating having slight non-uniformities due to the injection process or the manufacturing process. However, such slight non-uniformities may not affect the bonding of the filler material to the back surface 166 with the bonding agent as described herein. For example, spraying the bonding agent on the back surface 166 may result in overlapping regions of the bonding agent having a slightly greater coating thickness than other regions of the bonding agent on the back surface 166. The apparatus, methods, and articles of manufacture are not limited in this regard.

[0096] As described herein, any two or more of the weight portions may be configured as a single weight portion. In the example of FIGs. 31 and 32, a golf club head 3100 may include a body portion 3110 and two or more weight portions, generally shown as a first set of weight portions 3120 (e.g., shown as weight portions 3121, 3122, 3123, and 3124) and a second weight portion 3130. The body portion 3110 may include a toe portion 3140, a heel portion 3150, a front portion (not shown), a back portion 3170, a top portion 3180, and a sole portion 3190. The front portion may be similar in many respects to the front portion 160 of

the golf club head 100. Accordingly, details of the front portion of the golf club head 3100 are not provided.

[0097] The body portion 3110 may be made of a first material whereas the first set of weight portions 3120 and the second weight portion 3130 may be made of a second material. The first and second materials may be similar or different materials. For example, the body portion 3110 may be partially or entirely made of a steel-based material (e.g., 17-4 PH stainless steel, Nitronic[®] 50 stainless steel, maraging steel or other types of stainless steel), a titanium-based material, an aluminum-based material (e.g., a high-strength aluminum alloy or a composite aluminum alloy coated with a high-strength alloy), any combination thereof, and/or other suitable types of materials. The first set of weight portions 3120 and the second weight portion 3130 may be partially or entirely made of a high-density material such as a tungsten-based material or other suitable types of materials. Alternatively, the body portion 3110 and/or the first set of weight portions 3120 and the second weight portion 3130 may be partially or entirely made of a non-metal material (e.g., composite, plastic, etc.). The apparatus, methods, and articles of manufacture are not limited in this regard.

[0098] The golf club head 3100 may be an iron-type golf club head (e.g., a 1-iron, a 2-iron, a 3-iron, a 4-iron, a 5-iron, a 6-iron, a 7-iron, an 8-iron, a 9-iron, etc.) or a wedge-type golf club head (e.g., a pitching wedge, a lob wedge, a sand wedge, an n-degree wedge such as 44 degrees (°), 48°, 52°, 56°, 60°, etc.). Although FIGs. 31 and 32 may depict a particular type of club head, the apparatus, methods, and articles of manufacture described herein may be applicable to other types of club heads (e.g., a driver-type club head, a fairway wood-type club head, a hybrid-type club head, a putter-type club head, etc.). The apparatus, methods, and articles of manufacture described herein are not limited in this regard.

[0100] The toe portion 3140 and the heel portion 3150 may be on opposite ends of the body portion 3110. The heel portion 3150 may include a hosel portion 3155 configured to receive a shaft (not shown) with a grip (not shown) on one end and the golf club head 3100 on the opposite end of the shaft to form a golf club.

[0101] The back portion 3170 may include a back wall portion 3210 with one or more exterior weight ports along a periphery of the back portion 3170, generally shown as a first set of exterior weight ports 3220 (e.g., shown as weight ports 3221, 3222, 3223, and 3224) and a second weight port 3230. Each exterior weight port of the first set of weight ports 3220 may be associated with a port diameter. In one example, the port diameter may be about 0.25 inch (6.35 millimeters). Any two adjacent exterior weight ports of the first set of exterior weight ports 3220 may be separated by less than the port diameter. The first set of weight ports 3220 and the second weight port 3230 may be exterior weight ports configured to receive one or more weight portions.

[0102] Each weight portion of the first set of weight portions 3120 (e.g., shown as weight portions 3121, 3122, 3123, and 3124) may be disposed in a weight port of the first set of weight ports 3220 (e.g., shown as weight ports 3221, 3222, 3223, and 3224) located at or proximate to the toe portion 3140 and/or the top portion 3180 on the back portion 3170. For example, the weight portion 3121 may be partially or entirely disposed in the weight port 3221. In another example, the weight portion 3122 may be disposed in a weight port 3222 located in a transition region between the top portion 3180 and the toe portion 3140 (e.g., a top-and-toe transition region). The configuration of the first set of weight ports 3220 and the first set of weight portions 3120 is similar to many respects to the golf club head 100.

Accordingly, a detailed description of the configuration of the first set of weight ports 3220 and the first set of weight portions 3120 is not provided.

[0103] The second weight port 3230 may be a recess extending from the toe portion 3140 or a location proximate to the toe portion 3140 to the sole portion or a location proximate to the sole portion 3190 and through the transition region between the toe portion 3140 and the sole portion 3190. Accordingly, as shown in FIG. 31, the second weight port 3230 may resemble an L-shaped recess. The second weight portion 3130 may resemble the shape of the second weight port 3230 and may be configured to be disposed in the second weight port 3230. The second weight portion 3130 may be partially or fully disposed in the weight port 3230. The second weight portion 3130 may have any shape such as oval, rectangular, triangular, or any geometric or non-geometric shape. The second weight port 3230 may be shaped similar to the second weight portion 3130. However, portions of the second weight portion 3130 that are inserted in the second weight port 3230 may have similar shapes as the weight port 3230. As described in detail herein, any of the weight portions described herein, including the weight portions 3120 and the second weight portion 3130 may be coupled to the back portion 3170 of the body portion 3110 with various manufacturing methods and/or processes (e.g., a bonding process, a welding process, a brazing process, a mechanical locking method, any combination thereof, or other suitable manufacturing methods and/or processes).

[0104] The second weight portion 3130 may be configured to place the center of gravity of the golf club head 100 at an optimal location and optimize the moment of inertia of the golf club head about a vertical axis that extends through the center of gravity of the golf club head 3100. All or a substantial portion of the second weight portion 3130 may be generally

near the sole portion 3190. For example, the second weight portion 3130 may be near the periphery of the body portion 3110 and extend from the sole portion 3190 to the toe portion 3190. As shown in the example of FIG. 32, the second weight portion 3130 may be located near the periphery of the body portion 3110 and partially or substantially extend along the sole portion 3190 to lower the center of gravity of the golf club head 3100. A portion of the second weight portion 3130 may be located near the periphery of the body portion 3110 and extend from the sole portion 3190 to the toe portion 3140 through a transition region 3147 between the sole portion 3190 and the toe portion 3140 to lower the center of gravity and increase the moment of inertia of the golf club head 3100 about a vertical axis that extends through the center of gravity. To lower the center of gravity of the golf club head 3100, all or a portion of the second weight portion 3130 may be located closer to the sole portion 3190 than to a horizontal midplane 3260 of the golf club head 3100. The location of the second weight portion 3130 (i.e., the location of the weight port 3230) and the physical properties and materials of construction of the weight portions of the second weight port 3130 may be determined to optimally affect the weight, weight distribution, center of gravity, moment of inertia characteristics, structural integrity and/or or other static and/or dynamic characteristics of the golf club head 3100. The apparatus, methods, and articles of manufacture described herein are not limited in this regard.

[0105] The weight portions of the first set of weight portions 3120 may have similar or different physical properties (e.g., color, shape, size, density, mass, volume, etc.). In the illustrated example as shown in FIG. 32, each of the weight portions of the first set of weight portions 3120 may have a cylindrical shape (e.g., a circular cross section). Alternatively, each of the weight portions of the first set of weight portions 3120 may have different shapes.

Although the above examples may describe weight portions having a particular shape, the apparatus, methods, and articles of manufacture described herein may include weight portions of other suitable shapes (e.g., a portion of or a whole sphere, cube, cone, cylinder, pyramid, cuboidal, prism, frustum, or other suitable geometric shape). The apparatus, methods, and articles of manufacture described herein are not limited in this regard.

[0106] In the example of FIGs. 33-42, a golf club head 3300 may include a body portion 3310, and two or more weight portions, generally shown as a first set of weight portions 3320 (e.g., shown as weight portions 3321 and 3322) and a second set of weight portions 3330 (e.g., shown as weight portions 3331, 3332, 3333, 3334 and 3335). The body portion 3310 may include a toe portion 3340, a heel portion 3350, a front portion 3360, a back portion 3370, a top portion 3380, and a sole portion 3390. The heel portion 3350 may include a hosel portion 3355 configured to receive a shaft (not shown) with a grip (not shown) on one end and the golf club head 3300 on the opposite end of the shaft to form a golf club.

[0107] The body portion 3310 may be made of a first material whereas the first and second sets of weight portions 3320 and 3330, respectively, may be made of a second material. The first and second materials may be similar or different materials. The materials from which the golf club head 3300, weight portions 3320 and/or weight portions 3330 are constructed may be similar in many respects to any of the golf club heads and the weight portions described herein such as the golf club head 100. Accordingly, a detailed description of the materials of construction of the golf club head 3300, weight portions 3320 and/or weight 3330 are not described in detail. The apparatus, methods, and articles of manufacture are not limited in this regard.

[0108] The golf club head 3300 may be an iron-type golf club head (e.g., a 1-iron, a 2-iron, a 3-iron, a 4-iron, a 5-iron, a 6-iron, a 7-iron, an 8-iron, a 9-iron, etc.) or a wedge-type golf club head (e.g., a pitching wedge, a lob wedge, a sand wedge, an n-degree wedge such as 44 degrees (°), 48°, 52°, 56°, 60°, etc.). Although FIGs. 33-42 may depict a particular type of club head, the apparatus, methods, and articles of manufacture described herein may be applicable to other types of club heads (e.g., a driver-type club head, a fairway wood-type club head, a hybrid-type club head, a putter-type club head, etc.). The apparatus, methods, and articles of manufacture described herein are not limited in this regard.

[0109] The front portion 3360 may include a face portion 3362 (e.g., a strike face). The face portion 3362 may include a front surface 3364 and a back surface 3366 (shown in FIG. 37). The front surface 3364 may include one or more grooves 3368 extending between the toe portion 3340 and the heel portion 3350. While the figures may depict a particular number of grooves, the apparatus, methods, and articles of manufacture described herein may include more or less grooves. The face portion 3362 may be used to impact a golf ball (not shown). The face portion 3362 may be an integral portion of the body portion 3310. Alternatively, the face portion 3362 may be a separate piece or an insert coupled to the body portion 3310 via various manufacturing methods and/or processes (e.g., a bonding process such as adhesive, a welding process such as laser welding, a brazing process, a soldering process, a fusing process, a mechanical locking or connecting method, any combination thereof, or other suitable types of manufacturing methods and/or processes). The face portion 3362 may be associated with a loft plane that defines the loft angle of the golf club head 3300. The loft angle may vary based on the type of golf club (e.g., a long iron, a middle iron, a short iron, a wedge, etc.). In one example, the loft angle may be between five degrees

and seventy-five degrees. In another example, the loft angle may be between twenty degrees and sixty degrees. The apparatus, methods, and articles of manufacture described herein are not limited in this regard.

[0110] As illustrated in FIG. 36, the back portion 3370 may include a back wall portion 3510 with one or more exterior weight ports along a periphery of the back portion 3370, generally shown as a first set of exterior weight ports 3520 (e.g., shown as weight ports 3521 and 3522) and a second set of exterior weight ports 3530 (e.g., shown as weight ports 3531, 3532, 3533, 3534 and 3535). Each exterior weight port may be defined by an opening in the back wall portion 3510. Each exterior weight port may be associated with a port diameter. In one example, the port diameter may be about 0.25 inch (6.35 millimeters). The weight ports of the first set of exterior weight ports 3520 may be separated by less than the port diameter or the port diameter of any of the two adjacent weight ports of the first set of exterior weight ports 3520. In a similar manner, any two adjacent exterior weight ports of the second set of exterior weight ports 3530 may be separated by less than the port diameter or the port diameter of any of the two adjacent weight ports of the second set of exterior weight ports 3530. The first and second exterior weight ports 3520 and 3530, respectively, may be exterior weight ports configured to receive one or more weight portions. In particular, each weight portion of the first set of weight portions 3320 (e.g., shown as weight portions 3321 and 3322) may be disposed in a weight port located at or proximate to the toe portion 3340 and/or the top portion 3380 on the back portion 3370. For example, the weight portion 3321 may be partially or entirely disposed in the weight port 3521. In another example, the weight portion 3322 may be disposed in the weight port 3522 located in a transition region between the top portion 3380 and the toe portion 3340 (e.g., a top-and-toe

transition region). Each weight portion of the second set of weight portions 3330 (e.g., shown as weight portions 3331, 3332, 3333, 3334 and 3335) may be disposed in a weight port located at or proximate to the toe portion 3340 and/or the sole portion 3390 on the back portion 3370. For example, the weight portion 3333 may be partially or entirely disposed in the weight port 3533. In another example, the weight portion 3335 may be disposed in a weight port 3535 located in a transition region between the sole portion 3390 and the toe portion 3340 (e.g., a sole-and-toe transition region). In another example, any of the weight portions of the first set of weight portions 3320 and the second set of weight portions 3330 may be disposed in any of the weight ports of the first set of weight ports 3520 and the second set of weight ports 3530. As described in detail herein, the first and second sets of weight portions 3320 and 3330, respectively, may be coupled to the back portion 3370 of the body portion 3310 with various manufacturing methods and/or processes (e.g., a bonding process, a welding process, a brazing process, a mechanical locking method, any combination thereof, or other suitable manufacturing methods and/or processes).

[0111] Alternatively, the golf club head 3300 may not include (i) the first set of weight portions 3320, (ii) the second set of weight portions 3330, or (iii) both the first and second sets of weight portions 3320 and 3330. In particular, the back portion 3370 of the body portion 3310 may not include weight ports at or proximate to the top portion 3370 and/or the sole portion 3390. For example, the mass of the first set of weight portions 3320 (e.g., 3 grams) and/or the mass of the second set of weight portions 3330 (e.g., 16.8 grams) may be integral part(s) the body portion 3310 instead of separate weight portion(s). The apparatus, methods, and articles of manufacture described herein are not limited in this regard.

[0112] The first and second sets of weight portions 3320 and 3330, respectively, may have similar or different physical properties (e.g., color, shape, size, density, mass, volume, etc.). As a result, the first and second sets of weight portions 3320 and 3330, respectively, may contribute to the ornamental design of the golf club head 3300. The physical properties of the first and second sets of weight portions 3320 and 3330 may be similar in many respect to any of the weight portions described herein, such as the weight portions shown in the example of FIG. 11. Furthermore, the devices and/or methods by which the first and second set of weight portions 3320 and 3330 are coupled to the golf club head 3300 may be similar in many respect to any of the weight portions described herein, such as the weight portions shown in the example of FIGS. 12 and 13. Accordingly, a detailed description of the physical properties of the first and second sets of weight portions 3320 and 3330, and the devices and/or methods by which the first and second sets of weight portions 3320 and 3330 are coupled to the golf club head 3300 are not described in detail herein. The apparatus, methods, and articles of manufacture described herein are not limited in this regard.

[0113] As illustrated in FIG. 34, golf club head 3300 may be associated with a ground plane 4110, a horizontal midplane 4120, and a top plane 4130. In particular, the ground plane 4110 may be a plane that may be substantially parallel with the ground and be tangential to the sole portion 3390 of the golf club head 3300 when the golf club head 3300 is at an address position (e.g., the golf club head 3300 is aligned to strike a golf ball). A top plane 4130 may be a tangential plane to the top portion of the 3380 of the golf club head 3300 when the golf club head 3300 is at the address position. The ground and top planes 4110 and 4130, respectively, may be substantially parallel to each other. The horizontal

midplane 4120 may be located at half the vertical distance between the ground and top planes 4110 and 4130, respectively.

[0114] To provide optimal perimeter weighting for the golf club head 3300, the first set of weight portions 3320 (e.g., weight portions 3321 and 3322) may be configured to counter-balance the weight of the hosel 3355 and/or increase the moment of inertia of the golf club head 3300 about a vertical axis of the golf club head 3300 that extends through the center of gravity of the golf club head 3300. For example, as shown in FIG. 34, the first set of weight portions 3320 (e.g., weight portions 3321 and 3322) may be located near the periphery of the body portion 3310 and extend in a transition region 3345 between the top portion 3380 and the toe portion 3340. In another example, the first set of weight portions 3320 (e.g., weight portions 3321 and 3322) may be located near the periphery of the body portion 3310 and extend proximate to the toe portion 3340. The locations of the first set of weight portions 3320 (i.e., the locations of the first set of weight ports 3520) and the physical properties and materials of construction of the weight portions of the first set of weight portions 3320 may be determined to optimally affect the weight, weight distribution, center of gravity, moment of inertia characteristics, structural integrity and/or other static and/or dynamic characteristics of the golf club head 3300. The apparatus, methods, and articles of manufacture described herein are not limited in this regard.

[0115] The second set of weight portions 3330 (e.g., weight portions 3331, 3332, 3333, 3334 and 3335) may be configured to place the center of gravity of the golf club head 3300 at an optimal location and/or optimize the moment of inertia of the golf club head about a vertical axis that extends through the center of gravity of the golf club head 3300. Referring to FIG. 34, all or a substantial portion of the second set of weight portions 3330 may be near

the sole portion 3390. For example, the second set of weight portions 3330 (e.g., weight portions 3331, 3332, 3333, 3334 and 3335) may extend at or near the sole portion 3390 between the toe portion 3340 and the heel portion 3350 to lower the center of gravity of the golf club head 100. The weight portions 3334 and 3335 may be located closer to the toe portion 3340 than to the heel portion 3350 and/or at or near a transition region 3347 between the sole portion 3390 and the toe portion 3340 to increase the moment of inertia of the golf club head 3300 about a vertical axis that extends through the center of gravity. Some of the weight portions of the second set of weight portions 3330 may be located at the toe portion. To lower the center of gravity of the golf club head 3300, all or a portion of the second set of weight portions 3330 may be located closer to the sole portion 3390 than to the horizontal midplane 4120. The locations of the second set of weight portions 3330 (i.e., the locations of the second set of weight ports 3530) and the physical properties and materials of construction of the weight portions of the second set of weight portions 3330 may be determined to optimally affect the weight, weight distribution, center of gravity, moment of inertia characteristics, structural integrity and/or other static and/or dynamic characteristics of the golf club head 3300. The apparatus, methods, and articles of manufacture described herein are not limited in this regard.

[0116] Turning to FIG. 37, for example, the first and second sets of weight portions 3320 and 3330, respectively, may be located away from the back surface 3366 of the face portion 3362 (e.g., not directly coupled to each other). That is, the first and second sets of weight portions 3320 and 3330, respectively, and the back surface 3366 may be partially or entirely separated by an interior cavity 3800 of the body portion 3300. For example, each exterior weight port of the first and second sets of exterior weight ports 3320 and 3330 may include

an opening (e.g., generally shown as 3820 and 3830) and a port wall (e.g., generally shown as 3825 and 3835). The port walls 3825 and 3835 may be integral portions of the back wall portion 3510 (e.g., a section of the back wall portion 3510). Each of the openings 3820 and 3830 may be configured to receive a weight portion such as weight portions 3321 and 3335, respectively. The opening 3820 may be located at one end of the weight port 3521, and the port wall 3825 may be located or proximate to at an opposite end of the weight port 3521. In a similar manner, the opening 3830 may be located at one end of the weight port 3535, and the port wall 3835 may be located at or proximate to an opposite end of the weight port 3535. The port walls 3825 and 3835 may be separated from the face portion 3362 (e.g., separated by the interior cavity 3800). Each port wall of the first set of weight ports 3520, such as the port wall 3825 may have a distance 3826 from the back surface 3366 of the face portion 3362 as shown in FIG. 37. Each port wall of the second set of weight ports 3530, such as the port wall 3835 may have a distance 3836 from the back surface 3366 of the face portion 3362. The distances 3826 and 3836 may be determined to optimize the location of the center of gravity of the golf club head 3300 when the first and second sets of weight ports 3520 and 3530, respectively, receive weight portions as described herein. According to one example, the distance 3836 may be greater than the distance 3826 so that the center of gravity of the golf club head 3300 is moved toward the back portion 3370 and/or lowered toward the sole portion 3390. According to one example, the distance 3836 may be greater than the distance 3826 by a factor ranging from about 1.5 to about 4. In other words, the distance 3836 may be about 1.5 times to about 4 times greater than the distance 3826. As a result, a width 3840 (shown in FIG. 38) of a portion of the interior cavity 3800 below the horizontal midplane 4120 may be greater than a width 3842 of the interior cavity 3800 above the horizontal

midplane 4120. The apparatus, methods, and articles of manufacture described herein are not limited in this regard.

[0117] As discussed herein, the center of gravity (CG) of the golf club head 3300 may be relatively farther back from the face portion 3362 and relatively lower towards a ground plane (e.g., one shown as 4110 in FIG. 34) as compared to a golf club without a width 3840 of a portion of the interior cavity 3800 being greater than a width 3842 of the interior cavity 3800 as described herein, with all or a substantial portion of the second set of weight portions 3330 being closer to the sole portion 3390 than to the horizontal midplane 4120, and the first and second sets of weight portions 3320 and 3330, respectively, being away from the back surface 3366 than if the second set of weight portions 3330 were directly coupled to the back surface 3366. The locations of the first and second sets of weight ports 3520 and 3530 and the physical properties and materials of construction of the weight portions of the first and second sets of weight portions 3320 and 3330, respectively, may be determined to optimally affect the weight, weight distribution, center of gravity, moment of inertia characteristics, structural integrity and/or other static and/or dynamic characteristics of the golf club head 3300. The apparatus, methods, and articles of manufacture described herein are not limited in this regard.

[0118] While the figures may depict weight ports with a particular cross-section shape, the apparatus, methods, and articles of manufacture described herein may include weight ports with other suitable cross-section shapes. The weight ports of the first and/or second sets of weight ports 3520 and 3530 may have cross-sectional shapes that are similar to the cross-sectional shapes of any of the weight ports described herein. Accordingly, the detailed description of the cross-sectional shapes of the weight ports 3520 and 3530 are not described

in detail. The apparatus, methods, and articles of manufacture described herein are not limited in this regard.

[0119] The first and second sets of weight portions 3320 and 3330, respectively, may be similar in mass (e.g., all of the weight portions of the first and second sets 3320 and 3330, respectively, weigh about the same). Alternatively, the first and second sets of weight portions 3320 and 3330, respectively, may be different in mass individually or as an entire set. In particular, each of the weight portions of the first set 3320 (e.g., shown as 3321 and 3322) may have relatively less mass than any of the weight portions of the second set 3330 (e.g., shown as 3331, 3332, 3333, 3334 and 3335). For example, the second set of weight portions 3330 may account for more than 50% of the total mass from exterior weight portions of the golf club head 3300. As a result, the golf club head 3300 may be configured to have at least 50% of the total mass from exterior weight portions disposed below the horizontal midplane 4120. In one example, the total mass from exterior weight portions may be greater below the horizontal midplane 4120 than the total mass from exterior weight portions above the horizontal midplane 4120. The apparatus, methods, and articles of manufacture described herein are not limited in this regard.

[0120] In one example, the golf club head 3300 may have a mass in the range of about 220 grams to about 330 grams based on the type of golf club (e.g., a 4-iron versus a lob wedge). The body portion 3310 may have a mass in the range of about 200 grams to about 310 grams with the first and second sets of weight portions 3320 and 3330, respectively, having a mass of about 20 grams (e.g., a total mass from exterior weight portions). Each of the weight portions of the first set 3320 may have a mass of about one gram (1.0 g) whereas each of the weight portions of the second set 3330 may have a mass of about 2.4 grams. The

sum of the mass of the first set of weight portions 3320 may be about 3 grams whereas the sum of the mass of the first set of weight portions 3330 may be about 16.8 grams. The total mass of the second set of weight portions 3330 may weigh more than five times as much as the total mass of the first set of weight portions 3320 (e.g., a total mass of the second set of weight portions 3330 of about 16.8 grams versus a total mass of the first set of weight portions 3320 of about 3 grams). The golf club head 3300 may have a total mass of 19.8 grams from the first and second sets of weight portions 3320 and 3330, respectively (e.g., sum of 3 grams from the first set of weight portions 3320 and 16.8 grams from the second set of weight portions 3330). Accordingly, the first set of weight portions 3320 may account for about 15% of the total mass from exterior weight portions of the golf club head 3300 whereas the second set of weight portions 3330 may account for about 85% of the total mass from exterior weight portions of the golf club head 3300. The apparatus, methods, and articles of manufacture described herein are not limited in this regard.

[0121] By coupling the first and second sets of weight portions 3320 and 3330, respectively, to the body portion 3310 (e.g., securing the first and second sets of weight portions 3320 and 3330 in the weight ports on the back portion 3370), the location of the center of gravity (CG) and the moment of inertia (MOI) of the golf club head 3300 may be optimized. In particular, the first and second sets of weight portions 3320 and 3330, respectively, may lower the location of the CG towards the sole portion 3390 and further back away from the face portion 3362. Further, the MOI may be higher as measured about a vertical axis extending through the CG (e.g., perpendicular to the ground plane 4110). The MOI may also be higher as measured about a horizontal axis extending through the CG (e.g., extending towards the toe and heel portions 3350 and 3360, respectively, of the golf club

head 3300). As a result, the club head 3300 may provide a relatively higher launch angle and a relatively lower spin rate than a golf club head without the first and second sets of weight portions 3320 and 3330, respectively. The apparatus, methods, and articles of manufacture described herein are not limited in this regard.

[0122] Alternatively, two or more weight portions in the same set may be different in mass. In one example, the weight portion 3321 of the first set 3320 may have a relatively lower mass than the weight portion 3322 of the first set 3320. In another example, the weight portion 3331 of the second set 3330 may have a relatively lower mass than the weight portion 3335 of the second set 3330. With relatively greater mass at the top-and-toe transition region and/or the sole-and-toe transition region, more weight may be distributed away from the center of gravity (CG) of the golf club head 3300 to increase the moment of inertia (MOI) about the vertical axis through the CG.

[0123] Although the figures may depict the weight portions as separate and individual parts, each set of the first and second sets of weight portions 3320 and 3330, respectively, may be a single piece of weight portion. In one example, all of the weight portions of the first set 3320 (e.g., shown as 3321 and 3322) may be combined into a single piece of weight portion (e.g., a first weight portion). In a similar manner, all of the weight portions of the second set 3330 (e.g., 3331, 3332, 3333, 3334 and 3335) may be combined into a single piece of weight portion as well (e.g., a second weight portion) similar to the example of FIG. 32. While the figures may depict a particular number of weight portions, the apparatus, methods, and articles of manufacture described herein may include more or less number of weight portions. The apparatus, methods, and articles of manufacture described herein are not limited in this regard.

[0124] The body portion 3310 may be a hollow body including the interior cavity 3800 extending between the front portion 3360 and the back portion 3370. Further, the interior cavity 3800 may extend between the top portion 3380 and the sole portion 3390. The interior cavity 3800 may be associated with a cavity height 3850 (H_C), and the body portion 3310 may be associated with a body height 3950 (H_B). While the cavity height 3850 and the body height 3950 may vary between the toe and heel portions 3340 and 3350, and the top and sole portions 3370 and 3390, the cavity height 3850 may be at least 50% of a body height 3950 ($H_C > 0.5 * H_B$). For example, the cavity height 3850 may vary between 70% - 85% of the body height 3950. With the cavity height 3850 of the interior cavity 3800 being greater than 50% of the body height 3950, the golf club head 3300 may produce relatively more consistent feel, sound, and/or result when the golf club head 3300 strikes a golf ball via the face portion 3362 than a golf club head with a cavity height of less than 50% of the body height. The apparatus, methods, and articles of manufacture described herein are not limited in this regard.

[0125] The interior cavity 3800 may be associated with a cavity width 3840 (W_C), and the body portion 3310 may be associated with a body width 3990 (W_B). The cavity width 3840 and the body width 3990 may vary between the top portion 3380 and the sole portion 3390 and between the toe portion 3340 and the heel portion 3350. The cavity width 3840 may be at least 50% of a body width 3990 ($W_C > 0.5 * W_B$) at certain regions on the body portion 3310 between the top and sole portions 3370 and 3390 and between the toe and heel portions 3340 and 3350. According to another example, the cavity width 3840 may vary between about 40% - 60% of a body width 3990 at certain regions between the top and sole portions 3380 and 3390. According to another example, the cavity width 3840 may vary

between about 30% - 70% of a body width 3990 at certain regions between the top and sole portions 3380 and 3390. According to another example, the cavity width 3840 may vary between about 20% - 80% of a body width 3990 at certain regions between the top and sole portions 3380. For example, the cavity width 3840 may vary between about 20% - 80% of the body width 3990 at or below the horizontal midplane 4120. With the cavity width 3890 of the interior cavity 3800 that may vary between about 20% or more to about 80% or less of the body width 3990 at or below the horizontal midplane 4120, a substantial portion of the mass of the golf club head 3300 may be moved lower and farther back as compared to a golf club head with a cavity width of less than about 20% of the body width. Further, the golf club head 3300 may produce relatively more consistent feel, sound, and/or result when the golf club head 3300 strikes a golf ball via the face portion 3362 than a golf club head with a cavity width of less than about 20% of the body width. The apparatus, methods, and articles of manufacture described herein are not limited in this regard.

[0126] To provide an inner cavity 3800 having cavity a width 3840 that may vary between about 20% - 80% of a body width 3990 at or below the horizontal midplane 4120, to lower the CG of the golf club head 3300, and/or to move the CG of the golf club head 3300 farther back relative to the face portion 3360, the back portion 3370 may have a recessed portion 3410 (shown in FIGS. 35, 36 and 39) that may extend between a location near the horizontal midplane 4120 and a location at or near the top portion 3380. The recessed portion 3410 may be defined by an upper wall 3412 of the back portion 3370 and a ledge portion 3414. The upper wall 3412 of the back portion 3370 may extend from a location at or near the horizontal midplane 4120 to a location at or near the top portion 3380. The ledge portion 3414 may extend from the upper wall 3412 of the back portion 3370 to a lower wall

3416 of the back portion 3370. The lower wall 3416 of the back portion 3370 may extend from a location at or near the horizontal midplane 4120 to a location at or near the bottom portion 3380. The ledge portion 3414 may extend from the upper wall 3412 in a direction away from the face portion 3360. Accordingly, the ledge portion 3414 facilitates a transition from the upper wall 3412 to the lower wall 3416 by which the width of the body portion 3310 is substantially increased at or near the horizontal midplane 4120 as compared to the width of the body portion 3310 above the horizontal midplane. The ledge portion 3414 may have a ledge portion width 3418 (shown in FIG. 39) that is greater than an upper body width 3420 of the body portion 3310. In one example, the ledge portion width 3418 may be defined as a width of a surface on the back portion 3370 that extends between a plane 3413 generally defining the upper wall 3412 of the back portion 3370 and a plane 3417 generally defining the lower wall 3416 of the back portion 3370. The upper body width 3420 may be defined as a width of the body portion 3310 at or above the horizontal midplane 4120. According to one example, the ledge portion width 3418 may be wider than the upper body width 3420 by a factor of between about 0.5 to about 1.0. According to another example, the ledge portion width 3418 may be wider than the upper body width 3420 by a factor of about 1.5. According to another example, the ledge portion width 3418 may be wider than the upper body width 3420 by a factor of about 3.0. Accordingly, a golf club according to the examples described herein may have a ledge portion width 3418 that is wider than the upper body width 3420 by a factor of greater than or equal to about 0.5 to less than or equal to about 3.0. Accordingly, the body width 3990 at, near or below the horizontal midplane 4120 may be substantially greater than the upper body width 3420, which may provide for a cavity width 3840 that may be around 20% to 80% of the body width 3990 at, near or below the

horizontal midplane 4120. Further, the recessed portion 3410 allows the golf club head 3300 to generally have a greater mass below the horizontal midplane 4120 than above the horizontal plane 4120. In other words, the mass that is removed from the golf club head 3300 to define the recessed portion 3410 may be moved to aft or back portions of the body portion 3310 that are around and below the horizontal midplane 4120.

[0127] To generally maintain a cavity width 3840 that may be around 20% - 80% of the body width 3990, the cavity width 3840 may be greater near the sole portion 3390 or below the horizontal midplane 4120 than near the top portion 3380 or above the horizontal midplane 4120. According to one example, the cavity width 3840 may generally vary according to a variation in the body width 3990 at certain regions of the body portion 3310 between the top portion 3380 and the sole portion 3390 and between the toe portion 3340 and the heel portion 3350. For example, as shown in FIG. 40, the cavity width 3840 may generally vary according to the body width 3990 in certain regions of the body portion 3310 between the top portion 3380 and the sole portion 3390. The apparatus, methods, and articles of manufacture described herein are not limited in this regard.

[0128] In one example, the interior cavity 3800 may be unfilled (i.e., empty space). The body portion 3300 with the interior cavity 3800 may weight about 100 grams less than the body portion 3300 without the interior cavity 3800. Alternatively, the interior cavity 3800 may be partially or entirely filled with an elastic polymer or elastomer material (e.g., a viscoelastic urethane polymer material such as Sorbothane[®] material manufactured by Sorbothane, Inc., Kent, Ohio), a thermoplastic elastomer material (TPE), a thermoplastic polyurethane material (TPU), and/or other suitable types of materials to absorb shock, isolate vibration, and/or dampen noise. For example, at least 50% of the interior cavity 3800 may be

filled with a TPE material to absorb shock, isolate vibration, and/or dampen noise when the golf club head 3300 strikes a golf ball via the face portion 3362.

[0129] In another example, the interior cavity 3800 may be partially or entirely filled with a polymer material such as an ethylene copolymer material to absorb shock, isolate vibration, and/or dampen noise when the golf club head 3300 strikes a golf ball via the face portion 3362. In particular, at least 50% of the interior cavity 3800 may be filled with a high density ethylene copolymer ionomer, a fatty acid modified ethylene copolymer ionomer, a highly amorphous ethylene copolymer ionomer, an ionomer of ethylene acid acrylate terpolymer, an ethylene copolymer comprising a magnesium ionomer, an injection moldable ethylene copolymer that may be used in conventional injection molding equipment to create various shapes, an ethylene copolymer that can be used in conventional extrusion equipment to create various shapes, and/or an ethylene copolymer having high compression and low resilience similar to thermoset polybutadiene rubbers. For example, the ethylene copolymer may include any of the ethylene copolymers associated with DuPont™ High-Performance Resin (HPF) family of materials (e.g., DuPont™ HPF AD1172, DuPont™ HPF AD1035, DuPont® HPF 1000 and DuPont™ HPF 2000), which are manufactured by E.I. du Pont de Nemours and Company of Wilmington, Delaware. The DuPont™ HPF family of ethylene copolymers are injection moldable and may be used with conventional injection molding equipment and molds, provide low compression, and provide high resilience. The apparatus, methods, and articles of manufacture described herein are not limited in this regard.

[0130] As described herein, the cavity width 3840 may vary between about 20%-80% of a body width 3990 at or below the horizontal midplane 4120. According to one example, at least 50% of the elastic polymer or elastomer material partially or filling the interior cavity

3800 may be located below the horizontal midplane 4120 of the golf club head 3300.

Accordingly, the center of gravity of the golf club head 3300 may be further lowered and moved farther back as compared to a golf club head with a cavity width of less than about 20% of the body width and that is partially or fully filled with an elastic polymer or elastomer material. Further, the golf club head 3300 may produce relatively more consistent feel, sound, and/or result when the golf club head 3300 strikes a golf ball via the face portion 3362 as compared to a golf club head with a cavity width of less than about 20% of the body width that is partially or fully filled with an elastic polymer material.

[0131] The thickness of the face portion 3362 may vary between the top portion 3380 and the sole portion and between the toe portion 3340 and the heel portion as discussed in detail herein and shown in the examples of FIGs. 15 and 16. According, a detailed description of the variation in the thickness of the face portion 3362 is not provided. The apparatus, methods, and articles of manufacture described herein are not limited in this regard.

[0132] Different from other golf club head designs, the interior cavity 3800 of the body portion 3310 and the location of the first and second sets of weight portions 3320 and 3330, respectively, along the perimeter of the golf club head 3300 may result in a golf ball traveling away from the face portion 3362 at a relatively higher ball launch angle and a relatively lower spin rate. As a result, the golf ball may travel farther (i.e., greater total distance, which includes carry and roll distances).

[0133] The golf club head 3300 may be manufactured by any of the methods described herein and illustrated in FIG. 17. Accordingly, a detailed description of the method of manufacturing the golf club head 3300 is not provided.

[0134] As illustrated in FIGs. 37 and 41, for example, the golf club head 3300 may include one or more weight ports (e.g., one shown as weight ports 3521 and 3531) that may open to the to the cavity 3800. The weight port 3531 may include a first opening 3930 and a second opening 3935. The second opening 3935 may be used to access the interior cavity 3800. In one example, the process 1700 (FIG. 17) may fill the interior cavity 3800 with an elastic polymer material by injecting the elastic polymer material into the interior cavity 3800 from the first opening 3930 via the second opening 3935. The first and second openings 3930 and 3935, respectively, may be same or different in size and/or shape. The weight port 3521 may include a first opening 4030 and a second opening 4035. The second opening 4035 may be used to access the interior cavity 3800. In one example, the process 1700 (FIG. 17) may fill the interior cavity 3800 with an elastic polymer material by injecting the elastic polymer material into the interior cavity 3800 from the weight port 3531. As the elastic polymer fills the interior cavity 3800, the air inside the interior cavity 3800 that is displaced by the elastic polymer material may exit the interior cavity from the weight port 3521 through the second opening 4035 and then the first opening 4030. After the cavity is partially or fully filled with the elastic polymer material, the weight ports 3531 and 3521 may be closed by inserting and securing weight portions therein as described in detail herein. Alternatively, the elastic polymer material may be injected into the interior cavity 3800 from the weight port 3521. Accordingly, the weight port 3531 may function as an exit port for the displaced air inside the interior cavity 3800. While the above example may describe and depict particular weight ports with second openings, any other weight ports of the golf club head 4200 may include a second opening (e.g., the weight port 3532). The apparatus, methods, and articles of manufacture described herein are not limited in this regard.

[0135] While the above examples may described an iron-type or a wedge-type golf club head, the apparatus, methods, and articles of manufacture described herein may be applicable to other types of golf club heads.

[0136] The terms “and” and “or” may have both conjunctive and disjunctive meanings. The terms “a” and “an” are defined as one or more unless this disclosure indicates otherwise. The term “coupled” and any variation thereof refer to directly or indirectly connecting two or more elements chemically, mechanically, and/or otherwise. The phrase “removably connected” is defined such that two elements that are “removably connected” may be separated from each other without breaking or destroying the utility of either element.

[0137] The term “substantially” when used to describe a characteristic, parameter, property, or value of an element may represent deviations or variations that do not diminish the characteristic, parameter, property, or value that the element may be intended to provide. Deviations or variations in a characteristic, parameter, property, or value of an element may be based on, for example, tolerances, measurement errors, measurement accuracy limitations and other factors. The term “proximate” is synonymous with terms such as “adjacent,” “close,” “immediate,” “nearby,” “neighboring”, etc., and such terms may be used interchangeably as appearing in this disclosure.

[0138] The apparatus, methods, and articles of manufacture described herein may be implemented in a variety of embodiments, and the foregoing description of some of these embodiments does not necessarily represent a complete description of all possible embodiments. Instead, the description of the drawings, and the drawings themselves, disclose at least one embodiment, and may disclosure alternative embodiments.

[0139] As the rules of golf may change from time to time (e.g., new regulations may be adopted or old rules may be eliminated or modified by golf standard organizations and/or governing bodies such as the United States Golf Association (USGA), the Royal and Ancient Golf Club of St. Andrews (R&A), etc.), golf equipment related to the apparatus, methods, and articles of manufacture described herein may be conforming or non-conforming to the rules of golf at any particular time. Accordingly, golf equipment related to the apparatus, methods, and articles of manufacture described herein may be advertised, offered for sale, and/or sold as conforming or non-conforming golf equipment. The apparatus, methods, and articles of manufacture described herein are not limited in this regard.

[0140] Although certain example apparatus, methods, and articles of manufacture have been described herein, the scope of coverage of this disclosure is not limited thereto. On the contrary, this disclosure covers all apparatus, methods, and articles of articles of manufacture fairly falling within the scope of the appended claims either literally or under the doctrine of equivalents.

What is claimed is:

1. A golf club head comprising:

a hollow body portion having a face portion, a toe portion, a top portion, a sole portion, a back portion, and an interior cavity extending between the top and sole portions;

and

a plurality of exterior ports along a periphery of the back portion below a horizontal midplane of the golf club head,

wherein a width of the interior cavity below the horizontal midplane is greater than or equal to 20% of a width of the hollow body portion below the horizontal midplane and less than or equal to 80% of a width of the hollow body portion below the horizontal midplane,

and

wherein more than 50% of a mass of the body portion is located below the horizontal midplane of the golf club head.
2. A golf club head as defined in claim 1 further comprising at least one port above the horizontal midplane.
3. A golf club head as defined in claim 1, wherein each of the plurality of exterior ports is associated with a port diameter, and wherein at least two adjacent exterior ports are separated by less than the port diameter.
4. A golf club head as defined in claim 1, wherein the interior cavity is partially or entirely filled with an elastic polymer material.

5. A golf club head as defined in claim 1 further comprising a plurality of weight portions, wherein each port of the plurality of exterior ports is configured to receive a weight portion of the plurality of weight portions.

6. A golf club head as defined in claim 1, wherein at least one of the exterior ports is connected to the interior cavity, and wherein the interior cavity is partially or entirely filled with an elastic polymer material from the at least one exterior port.

7. A golf club head as defined in claim 1, wherein the face portion comprises a thickness of less than 1.5 millimeters (0.06 inch).

8. An iron-type golf club head comprising:
a hollow body portion having a face portion, a toe portion, a top portion, a sole portion, a back portion, and an interior cavity extending between the top and sole portions;
an elastic polymer material injection molded in the interior cavity through an opening on the back portion to structurally support the face portion during impact with a golf ball; and
a plurality of weight portions coupled the hollow body portion at a location below a horizontal midplane of the golf club head,
wherein at least 50% of the elastic polymer material in the interior cavity is below the horizontal midplane of the golf club head.

9. An iron-type golf club head as defined in claim 8 further comprising a bonding portion configured to bond the elastic polymer material to the face portion.

10. An iron-type golf club head as defined in claim 8, wherein the interior cavity comprises a cavity having at least 50% filled with a thermoplastic elastomer material.

11. An iron-type golf club head as defined in claim 8, wherein the interior cavity is configured to separate the face portion and the plurality of weight portions.

12. An iron-type golf club head as defined in claim 8, wherein the face portion comprises a thickness of less than or equal to 1.5 millimeters (0.06 inch).

13. An iron-type golf club head comprising:
a hollow body portion having a face portion, a toe portion, a top portion, a sole portion, a back portion, and an interior cavity extending between the top and sole portions, the back portion comprising:
an upper back wall portion above a horizontal midplane of the hollow body portion, a width of the hollow body portion above the horizontal midplane being defined by a distance between the upper back wall portion and the face portion;
a lower back wall portion below the horizontal midplane, a width of the hollow body portion below the horizontal midplane being defined by a distance between the lower back wall portion and the face portion; and

a ledge portion extending between the upper back wall portion and the lower back wall portion in a direction from the face portion to the back portion; and

a plurality of exterior ports along a periphery of the back portion below the horizontal midplane of the golf club head,

wherein the interior cavity is between the exterior ports and the face portion, and

wherein a width of the ledge portion is greater than a width of the hollow body portion above the horizontal midplane by a factor of greater than 1.0.

14. An iron-type golf club head as defined in claim 13, wherein a width of the ledge portion is greater than the width of the hollow body portion above the horizontal midplane by a factor of greater than 1.0 and less than 3.0.

15. An iron-type golf club head as defined in claim 13 further comprising a plurality of weight portions, wherein each port of the plurality of exterior ports is configured to receive a weight portion of the plurality of weight portions.

16. An iron-type golf club head as defined in claim 13, wherein the interior cavity comprises a cavity having at least 50% filled with a thermoplastic elastomer material.

17. An iron-type golf club head as defined in claim 13, wherein the interior cavity comprises a cavity having at least 50% filled with a thermoplastic elastomer material, and a bonding portion configured to bond the thermoplastic elastomer material to the face portion.

18. An iron-type golf club head as defined in claim 13, wherein the interior cavity is filled with a thermoplastic elastomer material, and wherein at least 50% of the thermoplastic elastomer material in the interior cavity is below the horizontal midplane of the golf club head.

19. An iron-type golf club head as defined in claim 13, wherein the face portion comprises a thickness of less than 1.5 millimeters (0.06 inch).

20. An iron-type golf club head as defined in claim 13 further comprising at least one port above the horizontal midplane.

ABSTRACT

Embodiments of golf club heads and methods to manufacture golf club heads are generally described herein. In one example, a golf club head may include a body portion with a toe portion, a heel portion, a top portion, a sole portion, a back portion, and a front portion. The golf club head may include an interior cavity. The interior cavity may be filled with an elastic polymer material. Other examples and embodiments may be described and claimed.

POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

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Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

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Assignee Name and Address: Parsons Xtreme Golf, LLC
15475 N. 84th St.
Scottsdale, Arizona 85260

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SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Signature	/Anne O'Moore/	Date	12-04-2014
Name	Anne O'Moore	Telephone	
Title	Manager		

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)**Title of
Invention****GOLF CLUB HEADS AND METHODS TO MANUFACTURE GOLF CLUB HEADS**

As the below named inventor, I hereby declare that:

This declaration
is directed to:

The attached application, or

United States application or PCT international application number _____
filed on _____

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

LEGAL NAME OF INVENTOR

Inventor: Robert R. Parsons Date (Optional) : _____Signature: 

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

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DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of
Invention

GOLF CLUB HEADS AND METHODS TO MANUFACTURE GOLF CLUB HEADS

As the below named inventor, I hereby declare that:

This declaration
is directed to:



The attached application, or



United States application or PCT international application number _____
filed on _____.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

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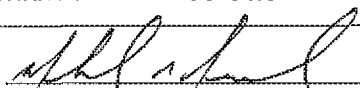
LEGAL NAME OF INVENTOR

Michael R. Nicolette

Inventor:

Date (Optional): _____

Signature:



Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

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Title of
Invention

GOLF CLUB HEADS AND METHODS TO MANUFACTURE GOLF CLUB HEADS

As the below named inventor, I hereby declare that:

This declaration
is directed to:



The attached application, or



United States application or PCT international application number _____

filed on _____

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

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LEGAL NAME OF INVENTOR

Inventor: Bradley D. Schweigert

Date (Optional): 1/29/14

Signature: 

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

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Electronic Patent Application Fee Transmittal

Application Number:

Filing Date:

Title of Invention:

GOLF CLUB HEADS AND METHODS TO MANUFACTURE GOLF CLUB HEADS

First Named Inventor/Applicant Name:

Robert R. Parsons

Filer:

Jonathan Burgess Thielbar/Rolanda Crawford

Attorney Docket Number:

P-15-008-U02-US/30161

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Utility application filing	1011	1	280	280
Utility Search Fee	1111	1	600	600
Utility Examination Fee	1311	1	720	720

Pages:

Claims:

Miscellaneous-Filing:

Petition:

Patent-Appeals-and-Interference:

00089

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				1600

Electronic Acknowledgement Receipt

EFS ID:	26895226
Application Number:	15263018
International Application Number:	
Confirmation Number:	6484
Title of Invention:	GOLF CLUB HEADS AND METHODS TO MANUFACTURE GOLF CLUB HEADS
First Named Inventor/Applicant Name:	Robert R. Parsons
Customer Number:	122021
Filer:	Jonathan Burgess Thielbar/Rolanda Crawford
Filer Authorized By:	Jonathan Burgess Thielbar
Attorney Docket Number:	P-15-008-U02-US/30161
Receipt Date:	12-SEP-2016
Filing Date:	
Time Stamp:	17:59:51
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	\$ 1600
RAM confirmation Number	5489
Deposit Account	502876
Authorized User	Thielbar, Jonathan

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Charge any Additional Fees required under 37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	222769-30161ADS.pdf	121854	no	10
			fd8e33cac08c7b36590b12cf2d049895efa303e		

Warnings:

Information:

This is not an USPTO supplied ADS fillable form

2	Drawings-only black and white line drawings	222769-30161Drwgs.pdf	1047653	no	20
			4e5c5d4ad6adeead294c4eeef8f5203ed99167e48		

Warnings:

Information:

3	Information Disclosure Statement (IDS) Form (SB08)	222769-30161IDS.pdf	103514	no	16
			4eb971d5a3c7ada890f9e29a001f987da1d21a34		

Warnings:

Information:

This is not an USPTO supplied IDS fillable form

4		222769-30161App.pdf	292781	yes	67
			189939357f256907c4837c3480ae2b47e804db6e		

Multipart Description/PDF files in .zip description

	Document Description	Start	End
	Specification	1	61
	Claims	62	66
	Abstract	67	67

Warnings:

Information:

5	Power of Attorney	PXGExecutedPOA.pdf	56756	no	2
			29efaa0c7fefcd1bfe16356c93349d6500553323		
Warnings:					
Information:					
6	Oath or Declaration filed	222769-30161RRPDec.pdf	157912	no	1
			ed3cec2be49a1ca3960e9032680cd7405e793baf		
Warnings:					
Information:					
7	Oath or Declaration filed	222769-30161MRNDec.pdf	157215	no	1
			e7e8cb1ac0ee1c7bf1bf2c799fb2beb727e43365		
Warnings:					
Information:					
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Warnings:					
Information:					
9	Fee Worksheet (SB06)	fee-info.pdf	35307	no	2
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Warnings:					
Information:					
Total Files Size (in bytes):			2129436		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	P-15-008-U02-US/30161
		Application Number	
Title of Invention	GOLF CLUB HEADS AND METHODS TO MANUFACTURE GOLF CLUB HEADS		
<p>The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.</p> <p>This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.</p>			

Secrecy Order 37 CFR 5.2:

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1					Remove
Legal Name					
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Robert	R.	Parsons		
Residence Information (Select One) <input checked="" type="radio"/> US Residency <input type="radio"/> Non US Residency <input type="radio"/> Active US Military Service					
City	Scottsdale	State/Province	AZ	Country of Residence	US
Mailing Address of Inventor:					
Address 1	15475 N. 84th St.				
Address 2					
City	Scottsdale	State/Province	AZ		
Postal Code	85260	Country i	US		
Inventor 2					Remove
Legal Name					
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Michael	R.	Nicolette		
Residence Information (Select One) <input checked="" type="radio"/> US Residency <input type="radio"/> Non US Residency <input type="radio"/> Active US Military Service					
City	Scottsdale	State/Province	AZ	Country of Residence	US
Mailing Address of Inventor:					
Address 1	15475 N. 84th St.				
Address 2					
City	Scottsdale	State/Province	AZ		
Postal Code	85260	Country i	US		
Inventor 3					Remove
Legal Name					
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Bradley	D.	Schweigert		
Residence Information (Select One) <input checked="" type="radio"/> US Residency <input type="radio"/> Non US Residency <input type="radio"/> Active US Military Service					

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	P-15-008-U02-US/30161		
		Application Number			
Title of Invention	GOLF CLUB HEADS AND METHODS TO MANUFACTURE GOLF CLUB HEADS				
City	Anthem	State/Province	AZ	Country of Residence	US
Mailing Address of Inventor:					
Address 1	15475 N. 84th St.				
Address 2					
City	Scottsdale	State/Province	AZ		
Postal Code	85260	Country	US		
All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button.					

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below. For further information see 37 CFR 1.33(a).			
<input type="checkbox"/> An Address is being provided for the correspondence Information of this application.			
Customer Number	122021		
Email Address	chpatent@loeb.com	Add Email	Remove Email

Application Information:

Title of the Invention	GOLF CLUB HEADS AND METHODS TO MANUFACTURE GOLF CLUB HEADS		
Attorney Docket Number	P-15-008-U02-US/30161	Small Entity Status Claimed	<input type="checkbox"/>
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	20	Suggested Figure for Publication (if any)	

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

<input type="checkbox"/> Request Early Publication (Fee required at time of Request 37 CFR 1.219)
<input type="checkbox"/> Request Not to Publish. I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application has not and will not be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

00096

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	P-15-008-U02-US/30161
		Application Number	
Title of Invention	GOLF CLUB HEADS AND METHODS TO MANUFACTURE GOLF CLUB HEADS		

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	<input checked="" type="radio"/> Customer Number	<input type="radio"/> US Patent Practitioner	<input type="radio"/> Limited Recognition (37 CFR 11.9)
Customer Number	122021		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.

When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Pending	Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
	Continuation of	15043090	2016-02-12
Prior Application Status	Expired	Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
15043090	Claims benefit of provisional	62118403	2015-02-19
Prior Application Status	Expired	Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
15043090	Claims benefit of provisional	62159856	2015-05-11
Prior Application Status	Expired	Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
15043090	Claims benefit of provisional	62209780	2015-08-25
Prior Application Status	Pending	Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
15043090	Claims benefit of provisional	62277636	2016-01-12

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	P-15-008-U02-US/30161
		Application Number	
Title of Invention	GOLF CLUB HEADS AND METHODS TO MANUFACTURE GOLF CLUB HEADS		

Prior Application Status	Pending				Remove
Application Number	Continuity Type		Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)	
	Continuation in part of		29570918	2016-07-13	
Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
29570918	Division of	29547678	2015-12-07	D764610	2016-08-23
Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
29547678	Continuation in part of	29540066	2015-09-21	D746926	2016-01-05
Prior Application Status	Abandoned				Remove
Application Number	Continuity Type		Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)	
29540066	Continuation in part of		29537413	2015-08-25	
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the Add button.					

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)ⁱ the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Application Number	Country ⁱ	Filing Date (YYYY-MM-DD)	Access Code ^j (if applicable)
Additional Foreign Priority Data may be generated within this form by selecting the Add button.			

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	P-15-008-U02-US/30161
		Application Number	
Title of Invention	GOLF CLUB HEADS AND METHODS TO MANUFACTURE GOLF CLUB HEADS		

This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.



NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	P-15-008-U02-US/30161
		Application Number	
Title of Invention	GOLF CLUB HEADS AND METHODS TO MANUFACTURE GOLF CLUB HEADS		

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	P-15-008-U02-US/30161
		Application Number	
Title of Invention	GOLF CLUB HEADS AND METHODS TO MANUFACTURE GOLF CLUB HEADS		

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

[Clear](#)

☒ Assignee
 ☐ Legal Representative under 35 U.S.C. 117
 ☐ Joint Inventor

☐ Person to whom the inventor is obligated to assign.
 ☐ Person who shows sufficient proprietary interest

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor:

If the Applicant is an Organization check here. ☒

Organization Name Parsons Xtreme Golf, LLC

Mailing Address Information For Applicant:

Address 1	15475 N. 84th Street		
Address 2			
City	Scottsdale	State/Province	AZ
Country	US	Postal Code	85260
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button.

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	P-15-008-U02-US/30161
		Application Number	
Title of Invention	GOLF CLUB HEADS AND METHODS TO MANUFACTURE GOLF CLUB HEADS		

Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

If the Assignee or Non-Applicant Assignee is an Organization check here. ☐

Prefix	Given Name	Middle Name	Family Name	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1			
Address 2			
City		State/Province	
Country ¹		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button.

Signature:

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). However, if this Application Data Sheet is submitted with the **INITIAL** filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/Jonathan B. Thielbar/		Date (YYYY-MM-DD)	2016-09-12
First Name	Jonathan	Last Name	Thielbar	Registration Number
				70453

Additional Signature may be generated within this form by selecting the Add button.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	P-15-008-U02-US/30161
		Application Number	
Title of Invention	GOLF CLUB HEADS AND METHODS TO MANUFACTURE GOLF CLUB HEADS		

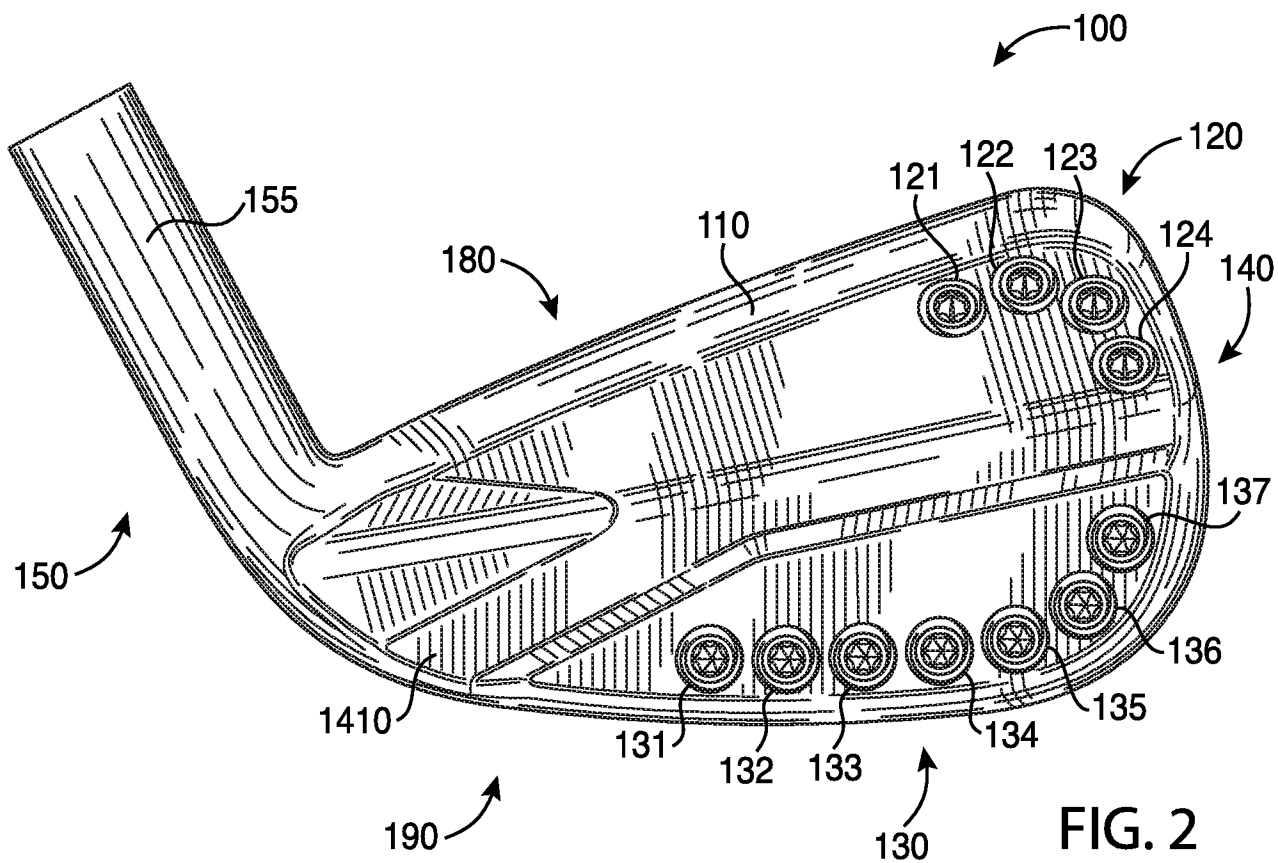
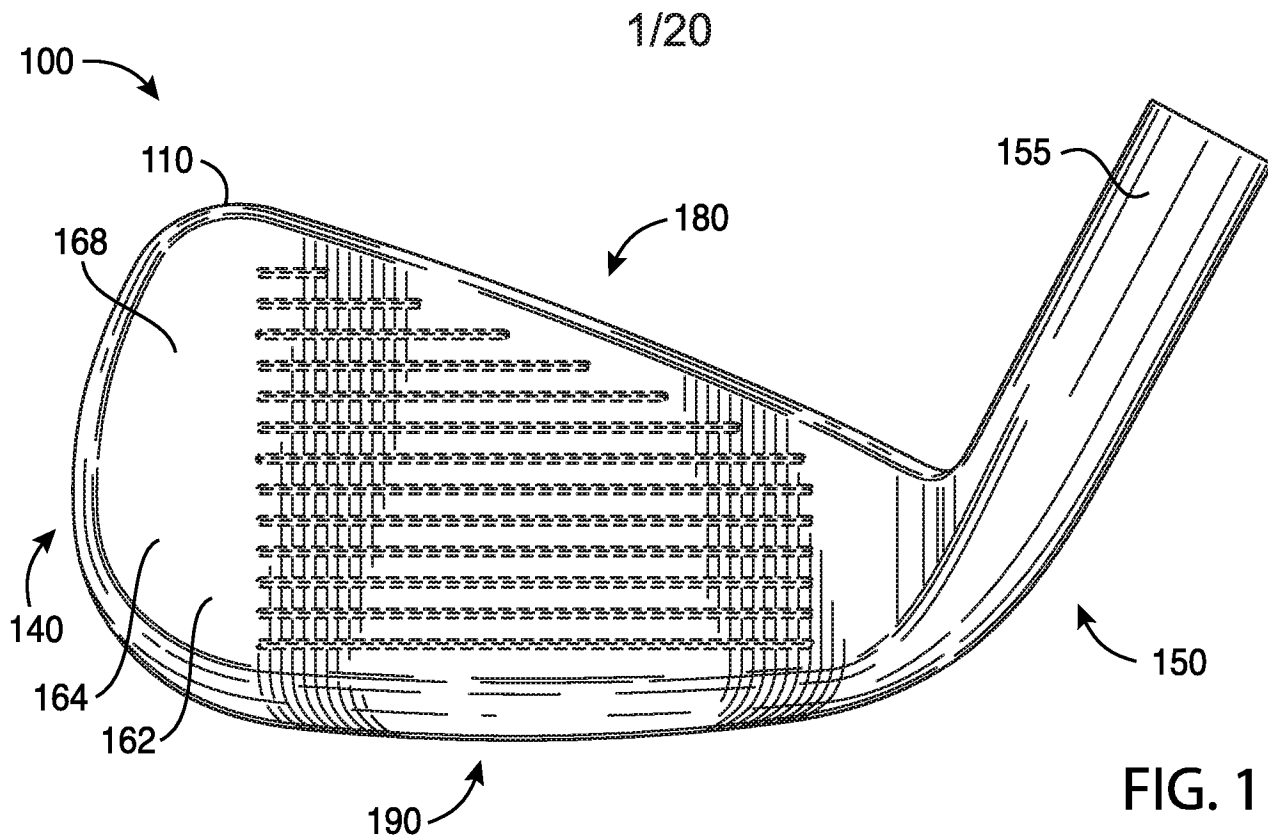
This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the international Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.



2/20

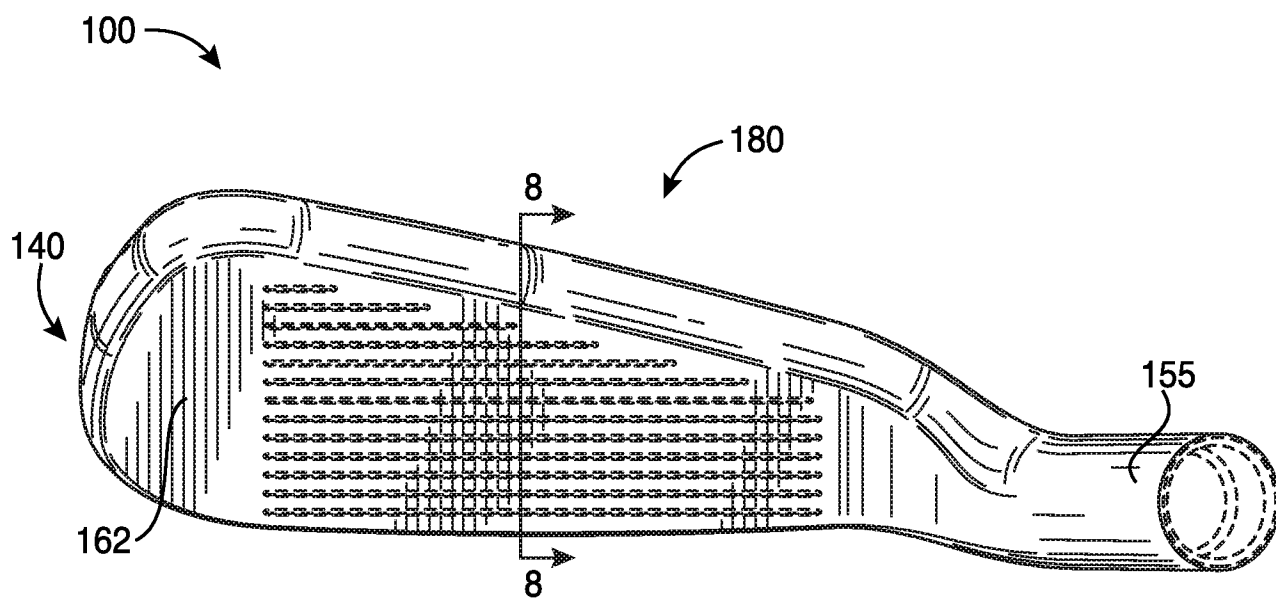


FIG. 3

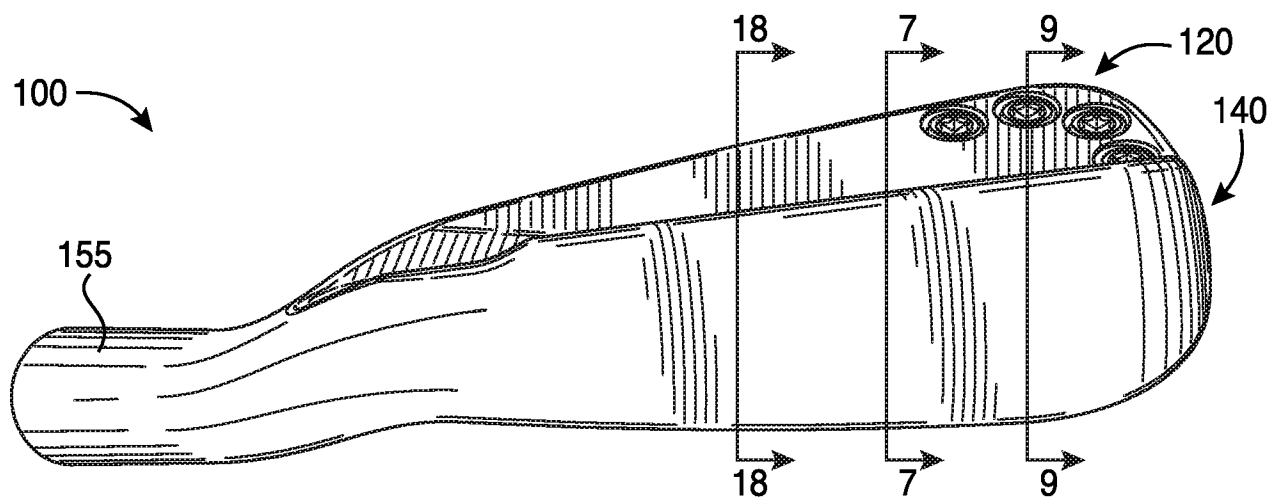
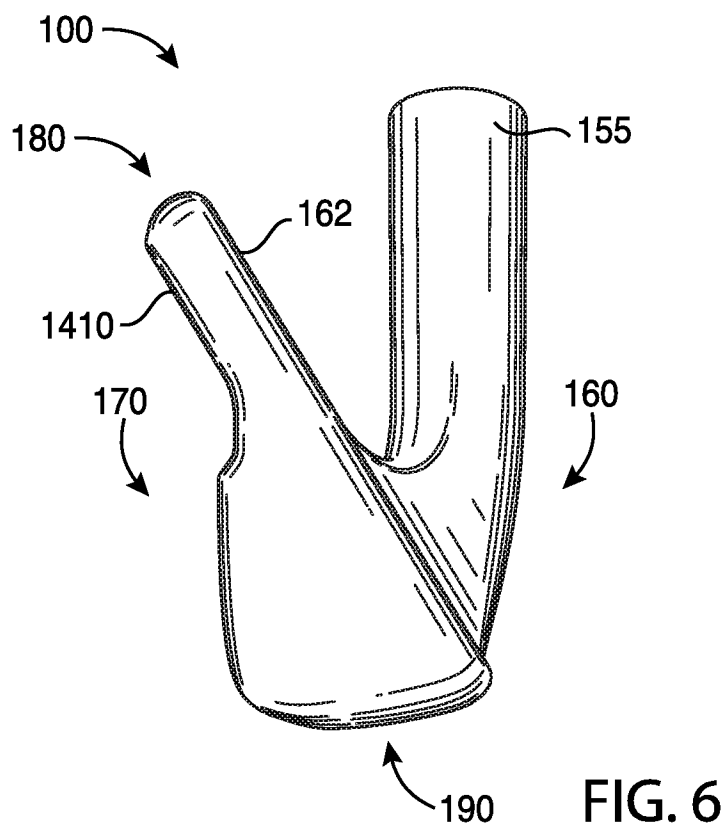
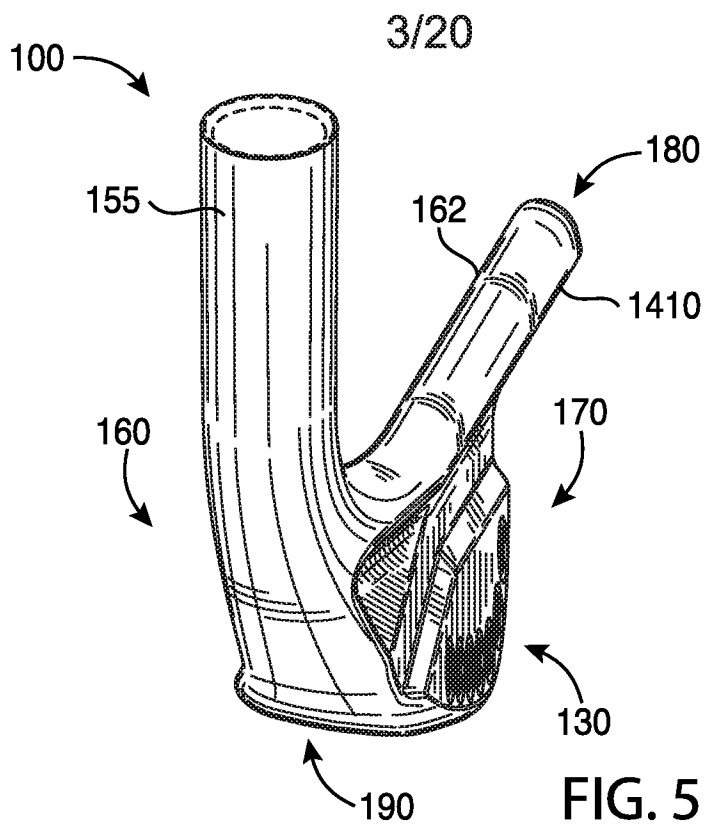


FIG. 4



4/20

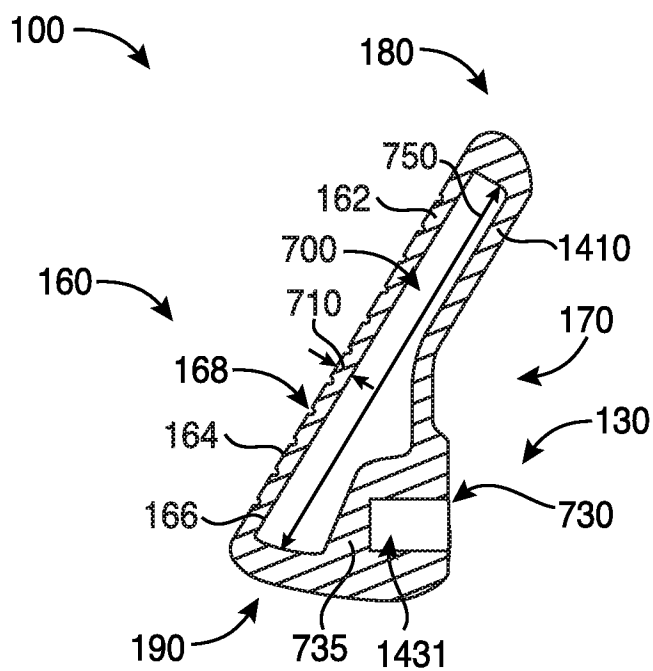


FIG. 7

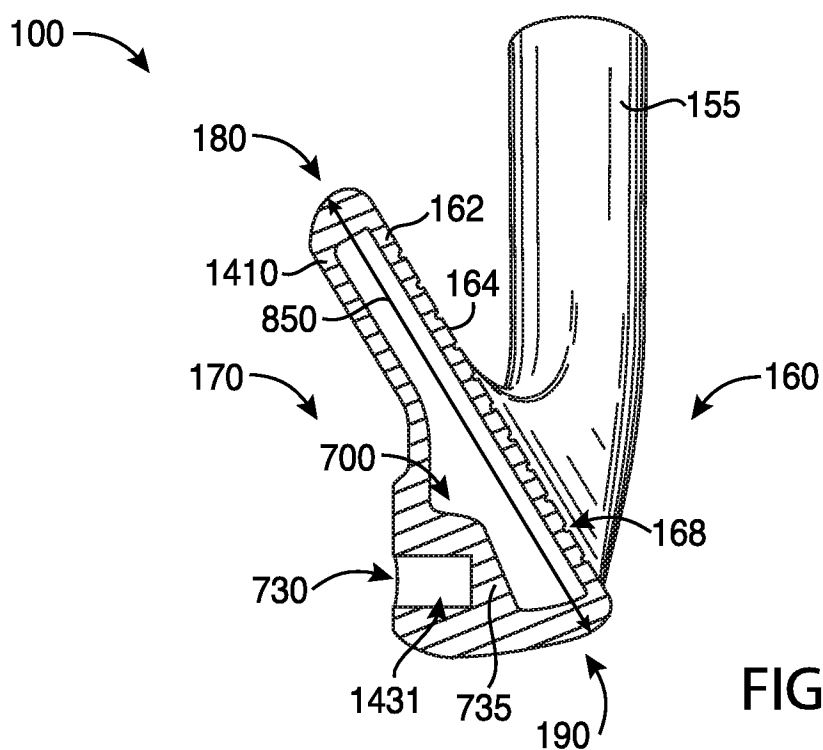


FIG. 8

5/20

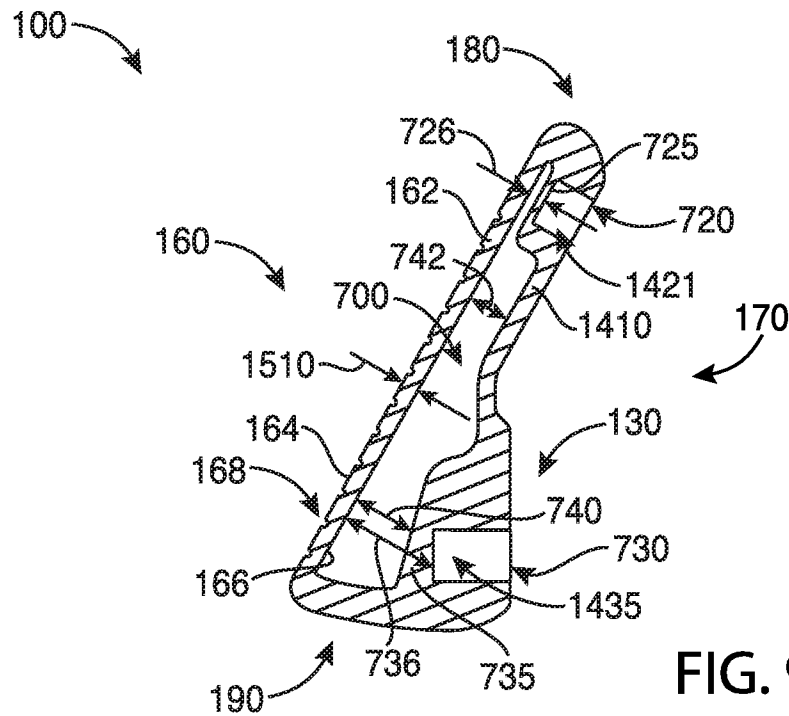


FIG. 9

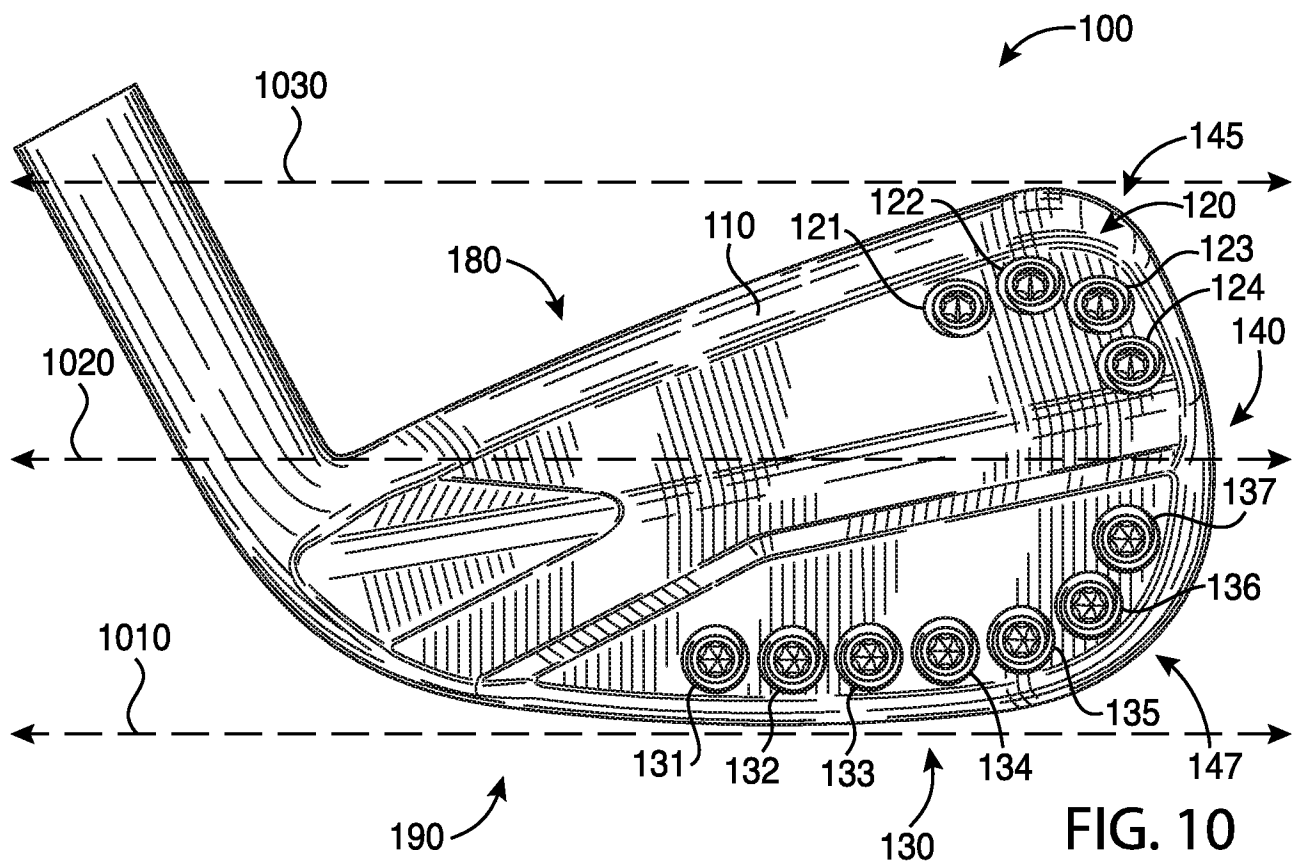


FIG. 10

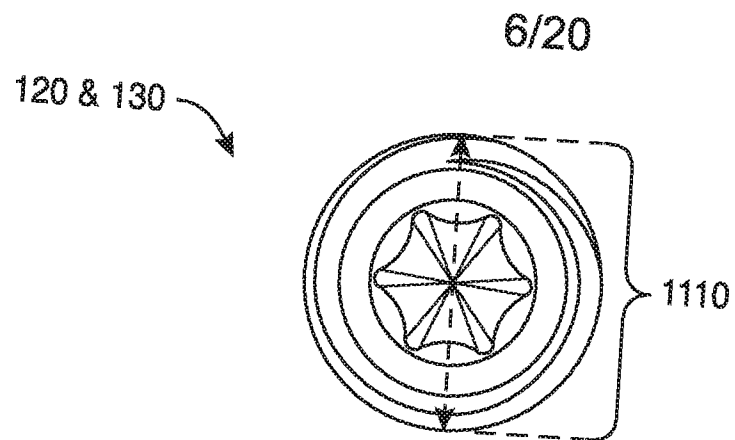


FIG. 11

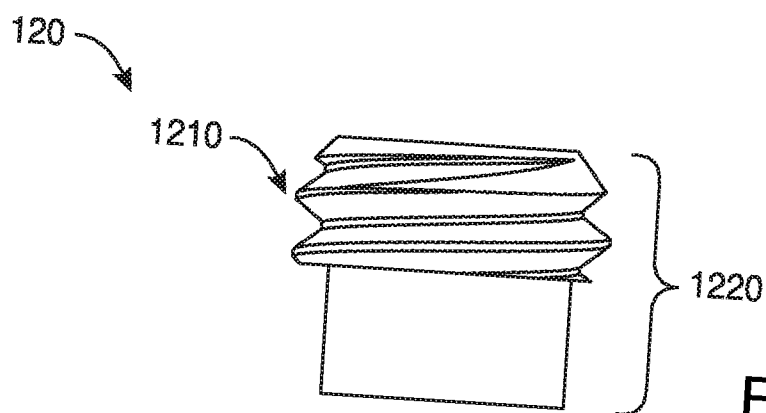


FIG. 12

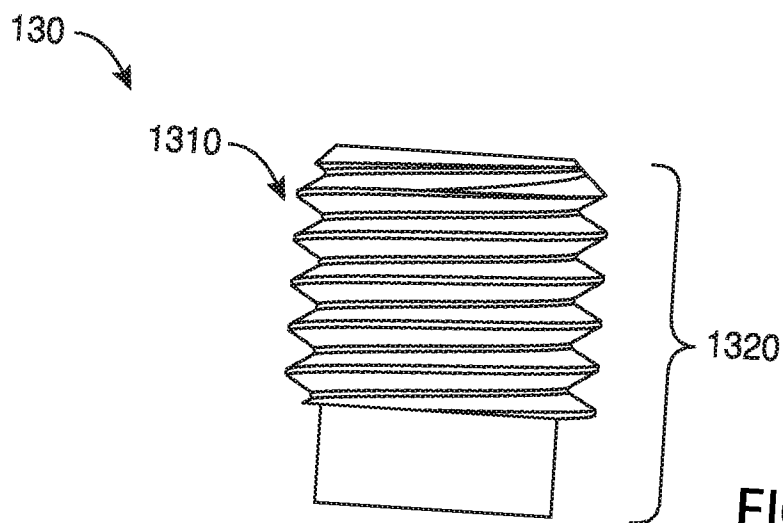
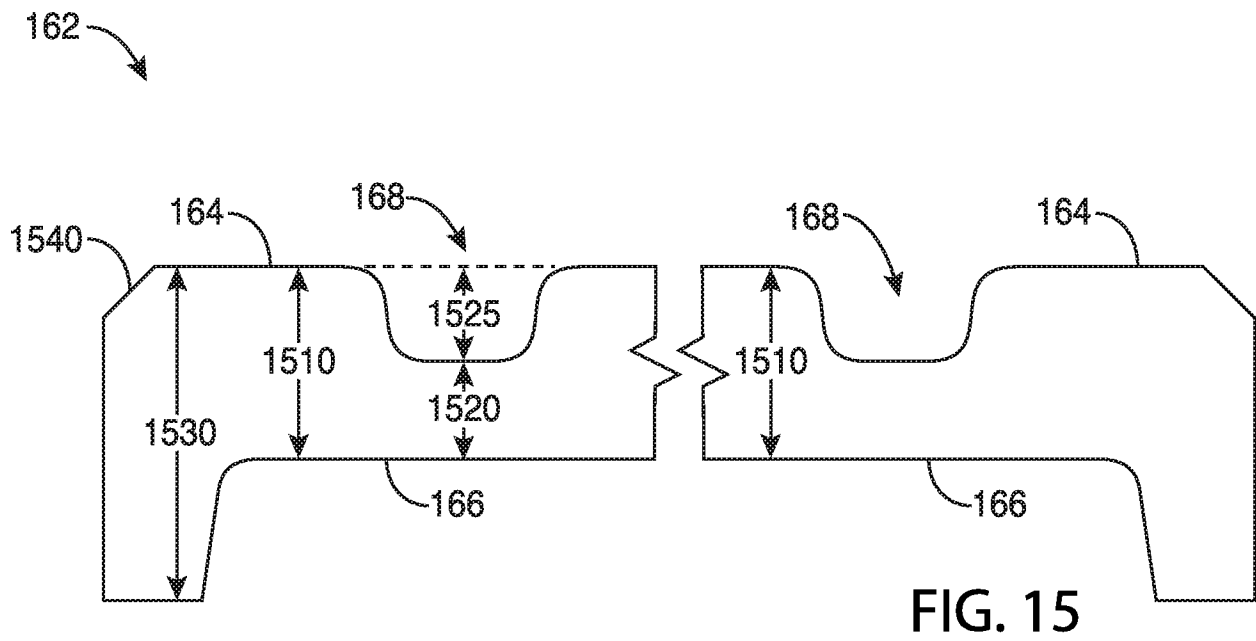
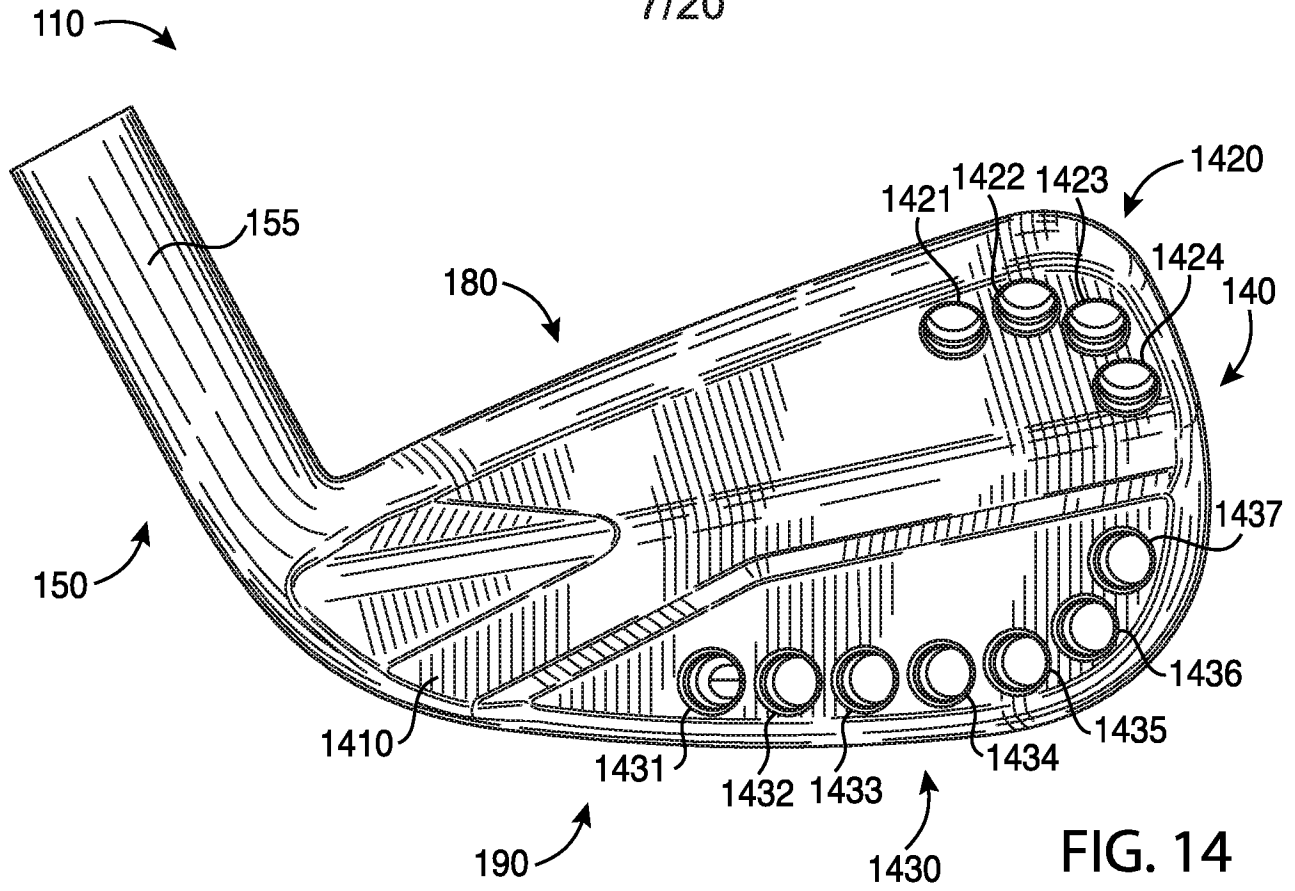


FIG. 13

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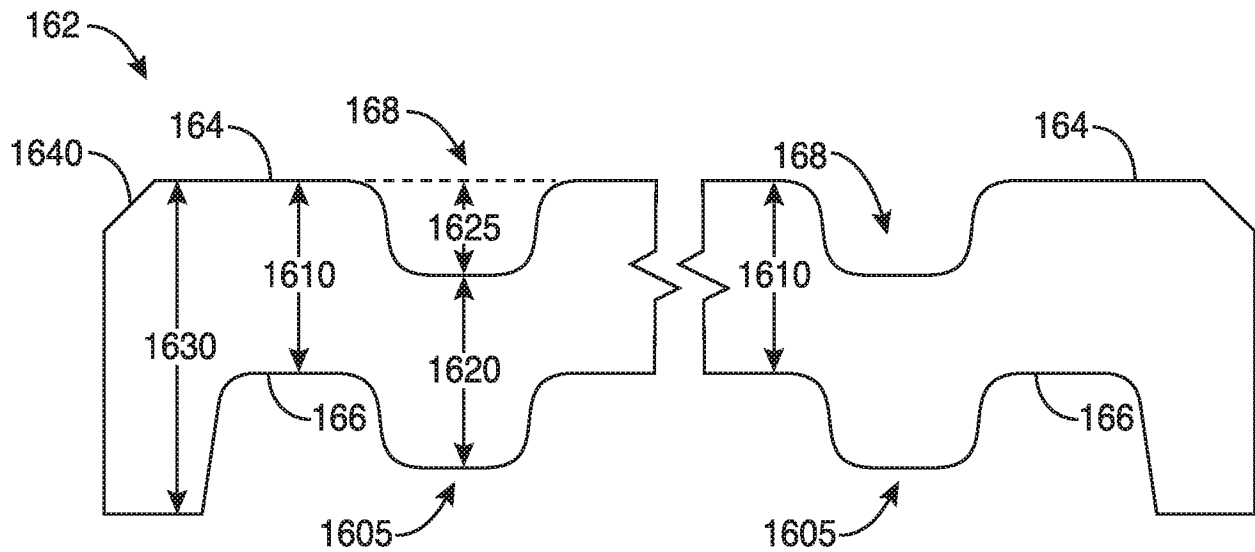


FIG. 16

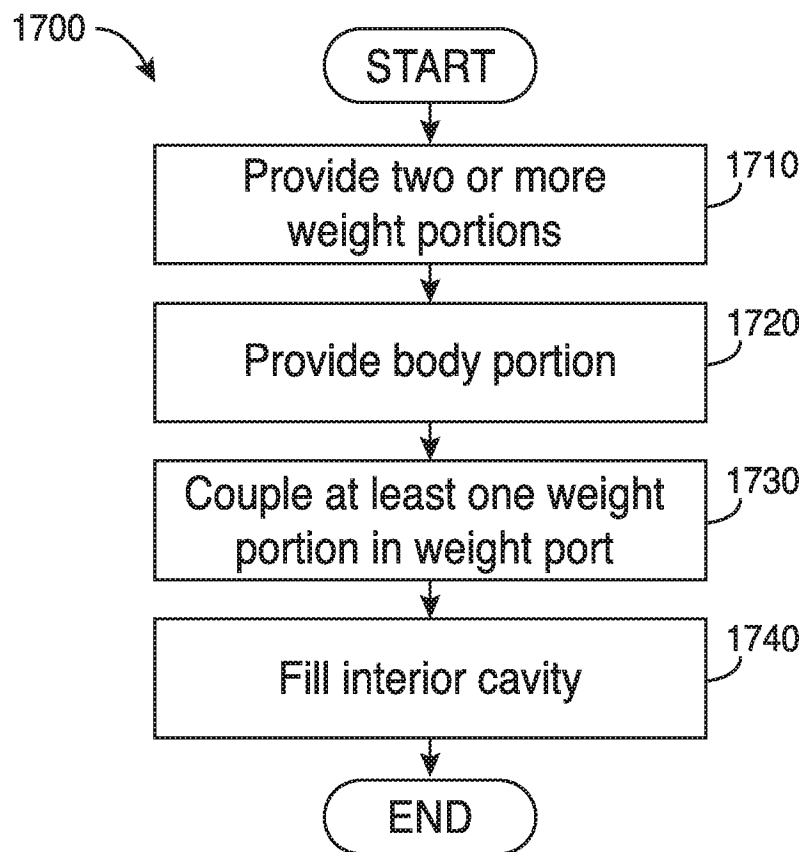


FIG. 17

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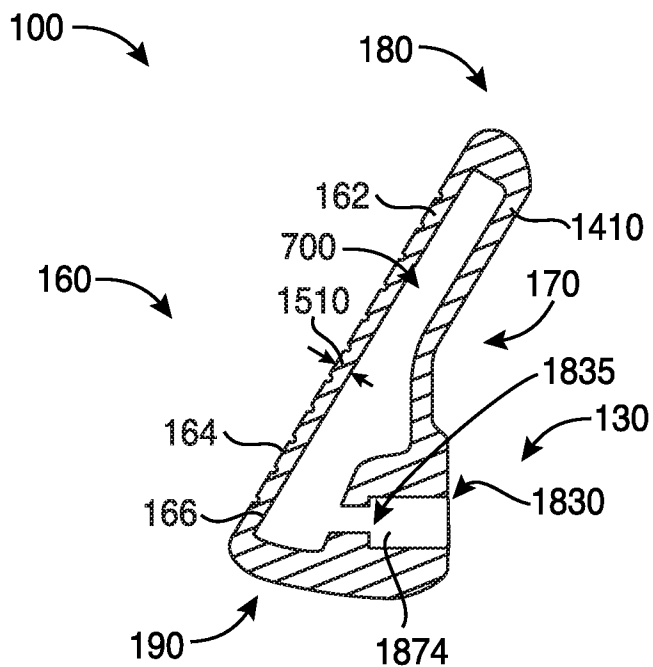


FIG. 18

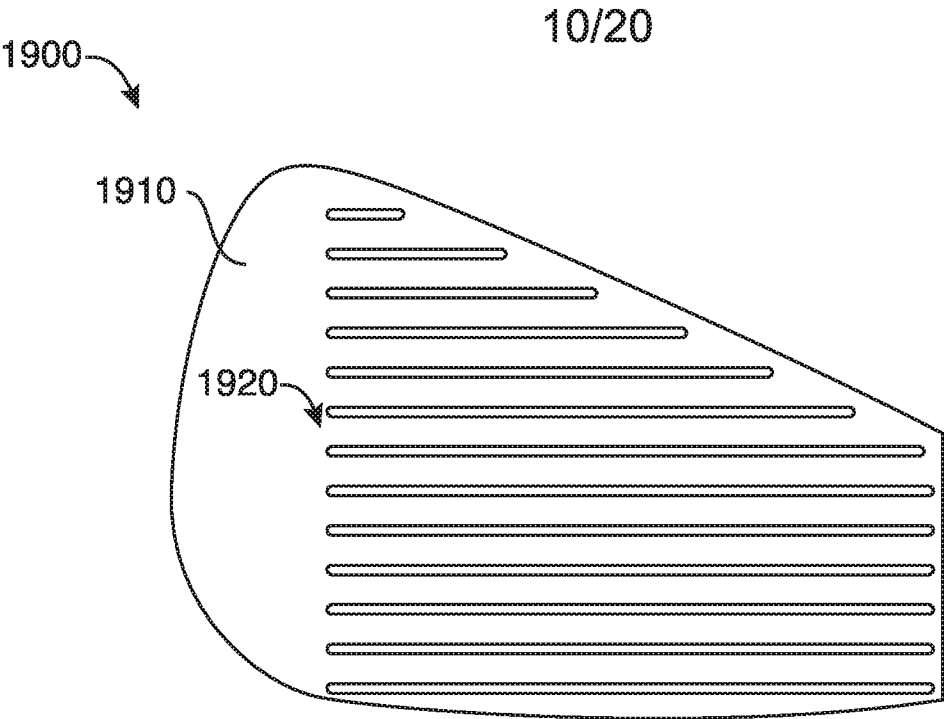


FIG. 19

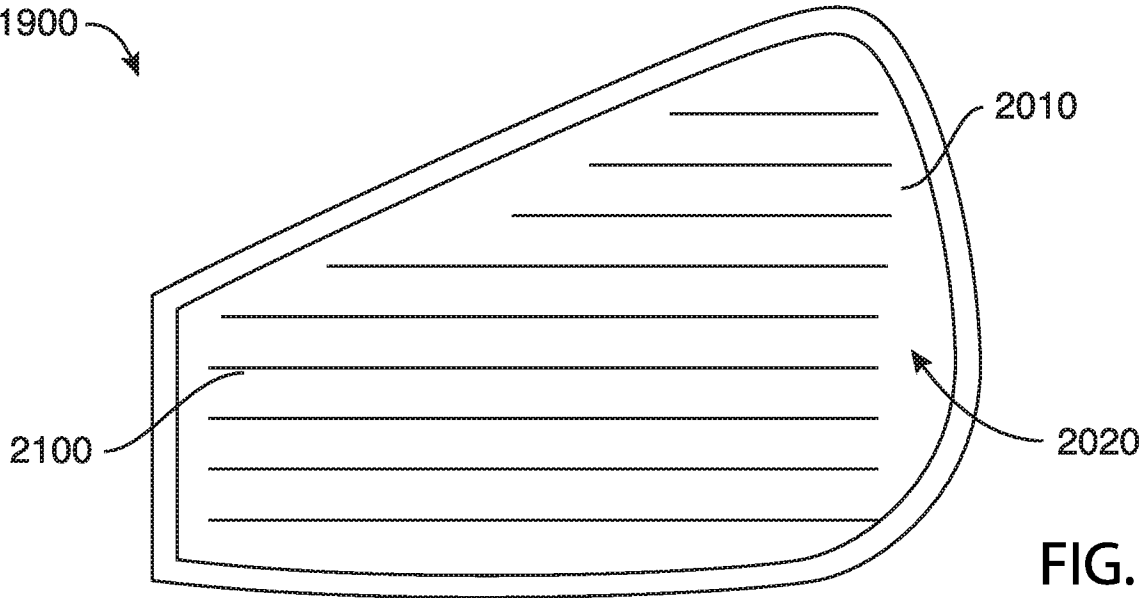


FIG. 20

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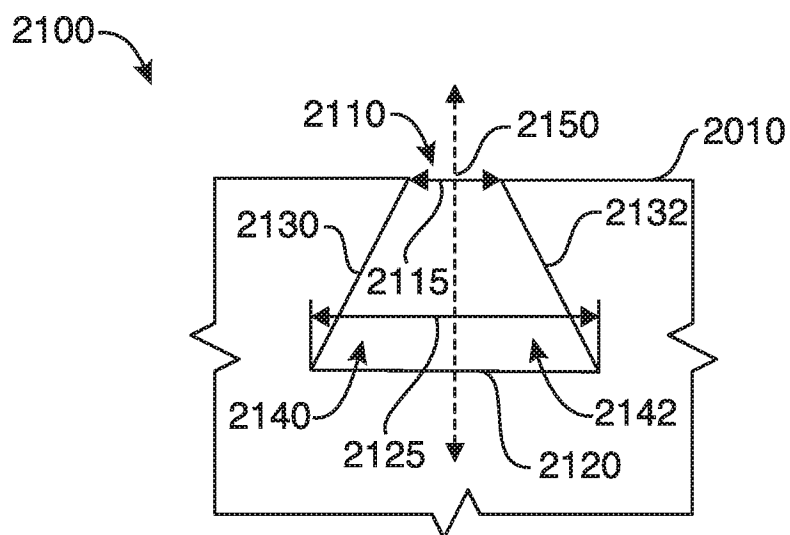


FIG. 21

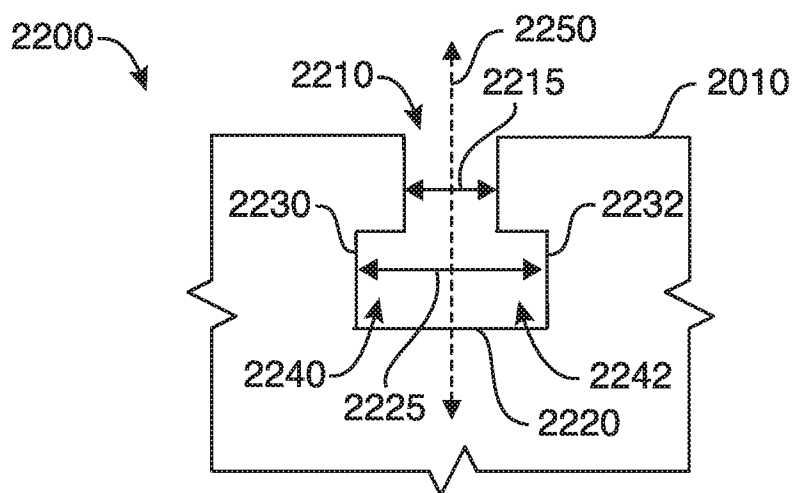


FIG. 22

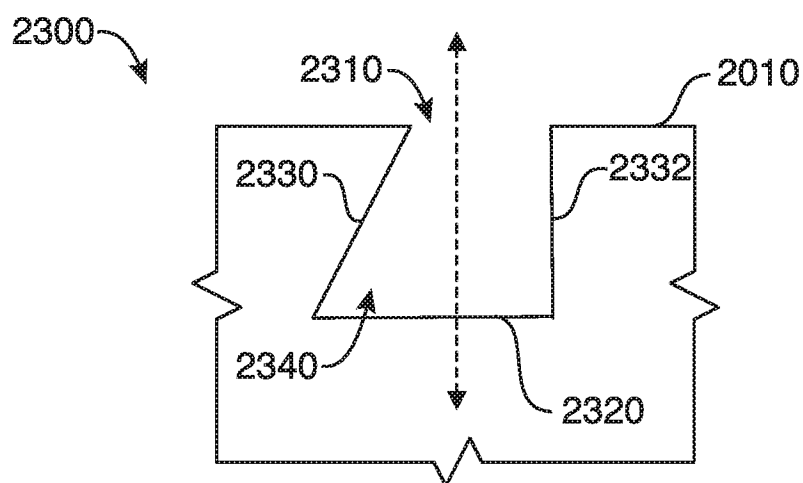


FIG. 23

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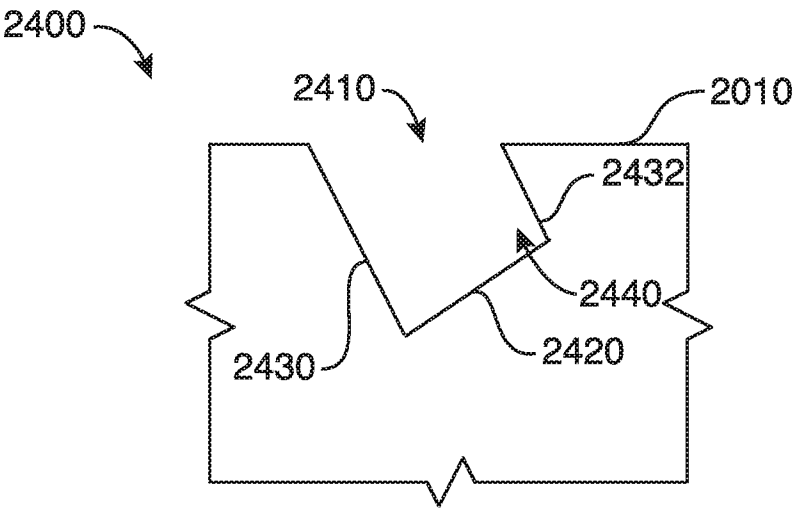


FIG. 24

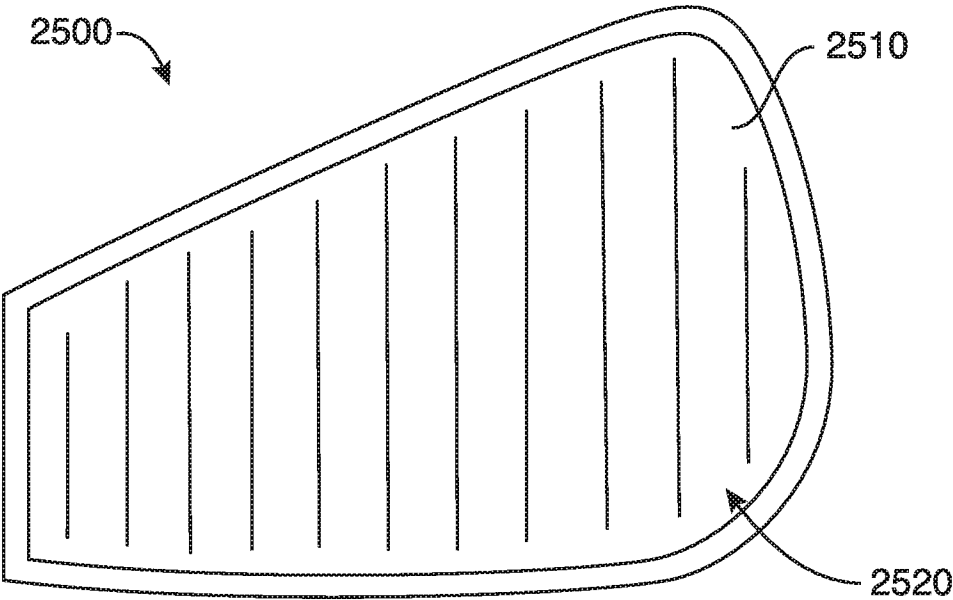


FIG. 25

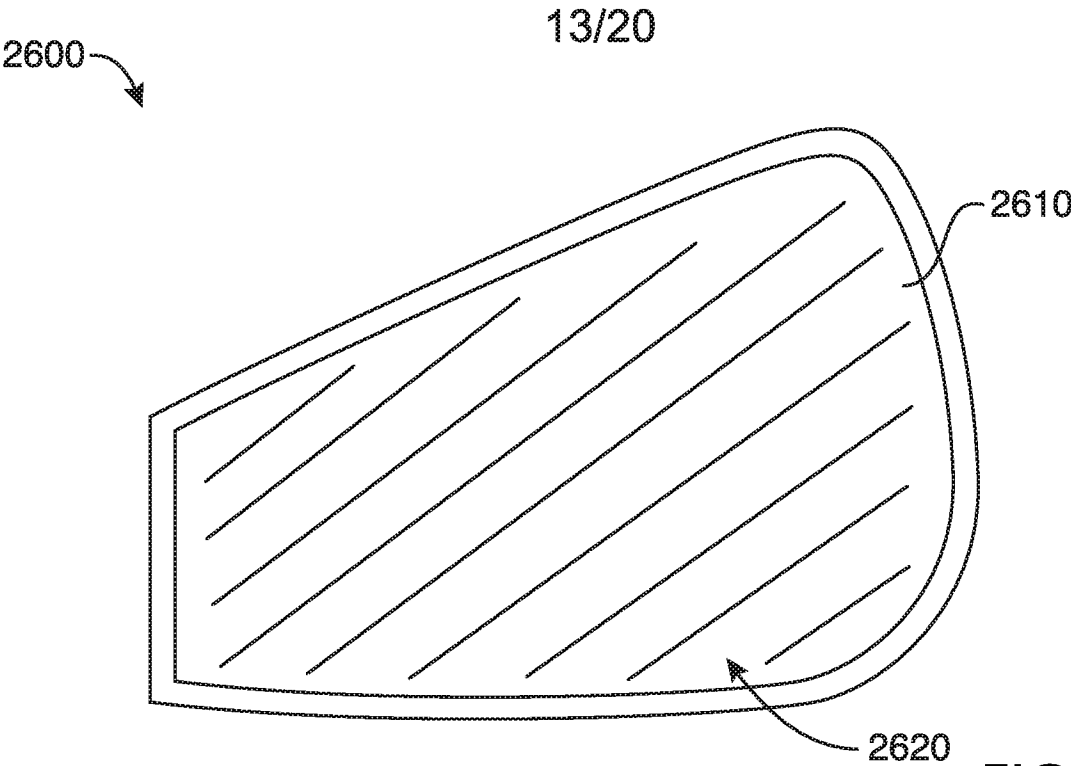


FIG. 26

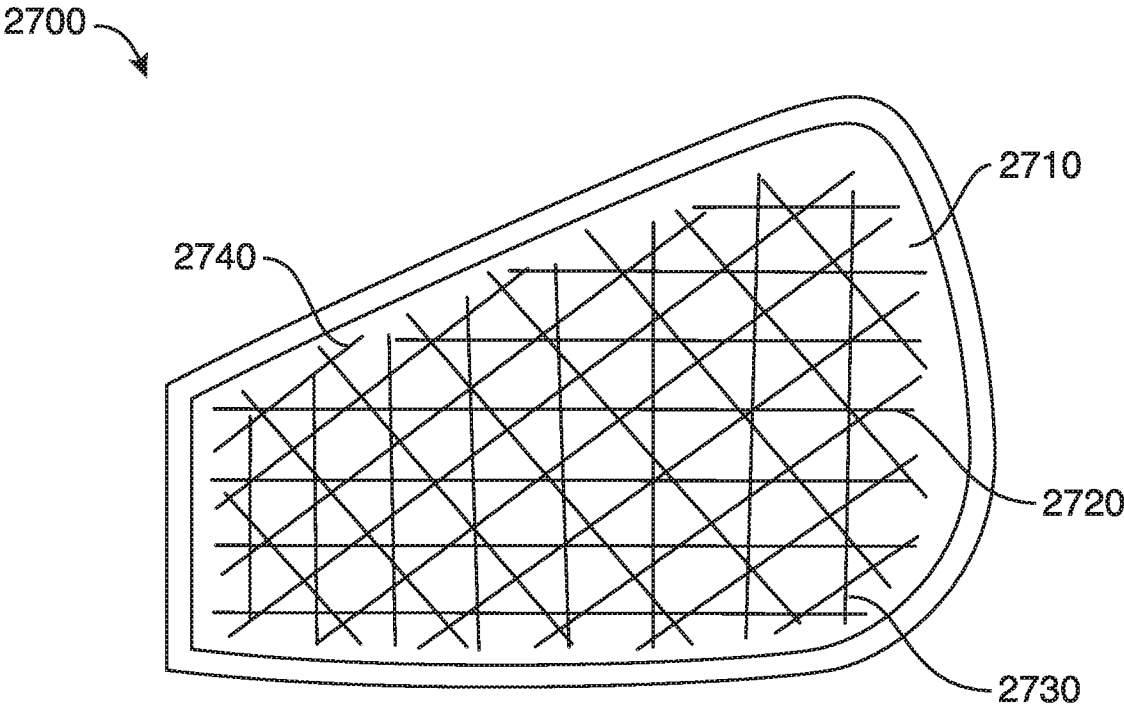


FIG. 27

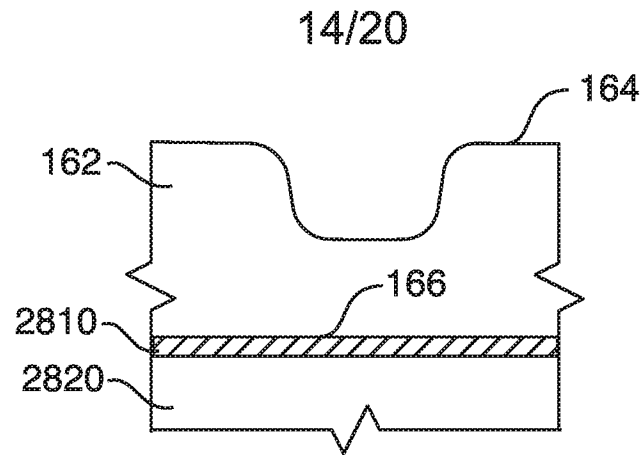


FIG. 28

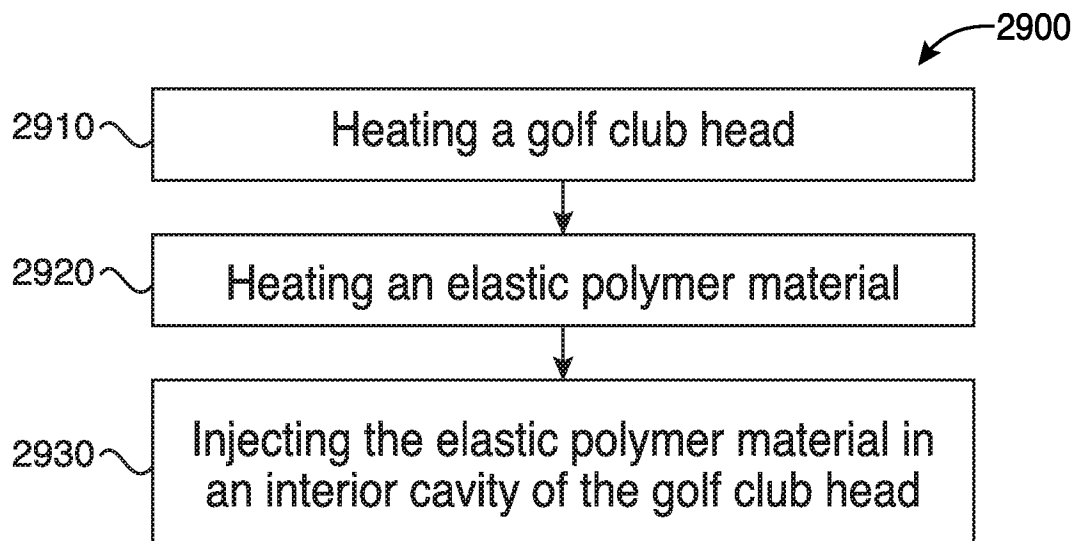


FIG. 29

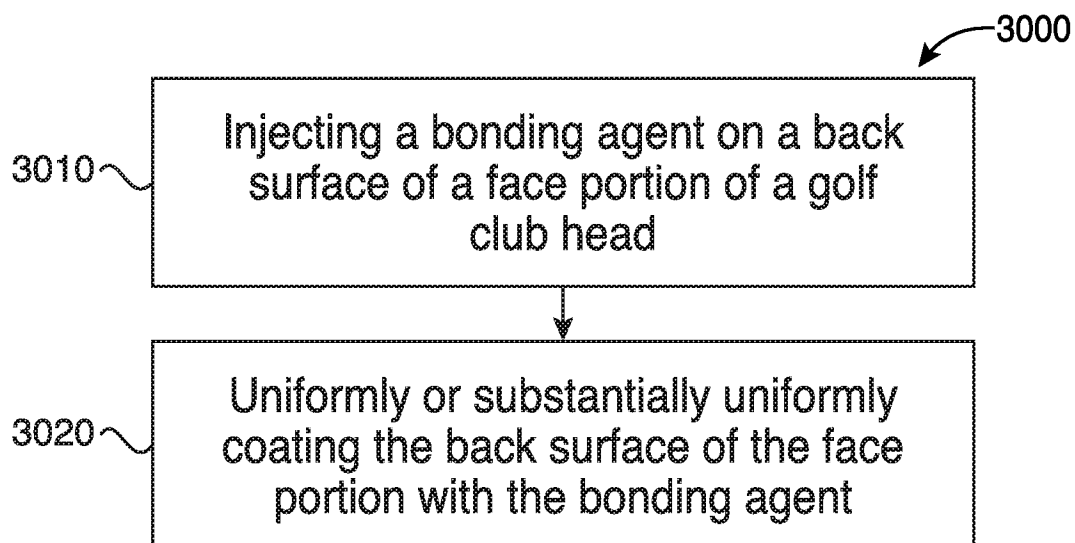
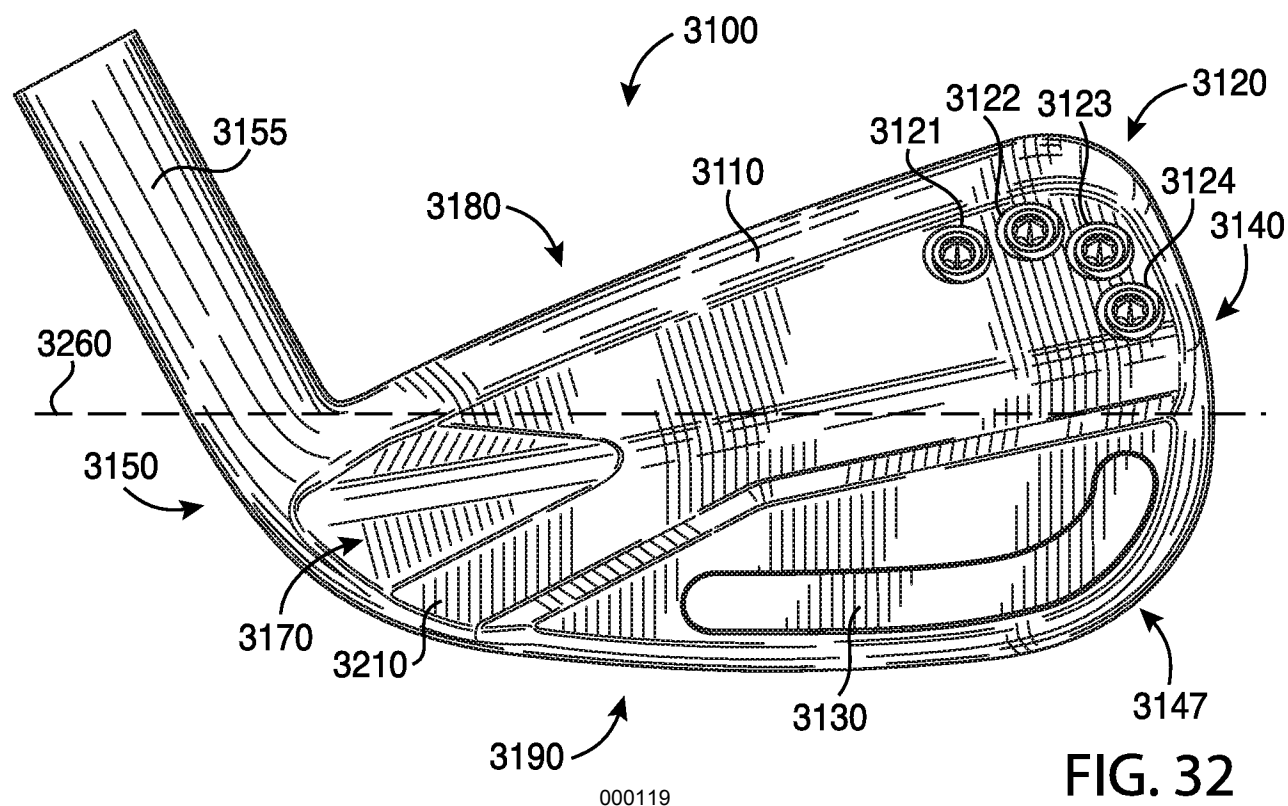
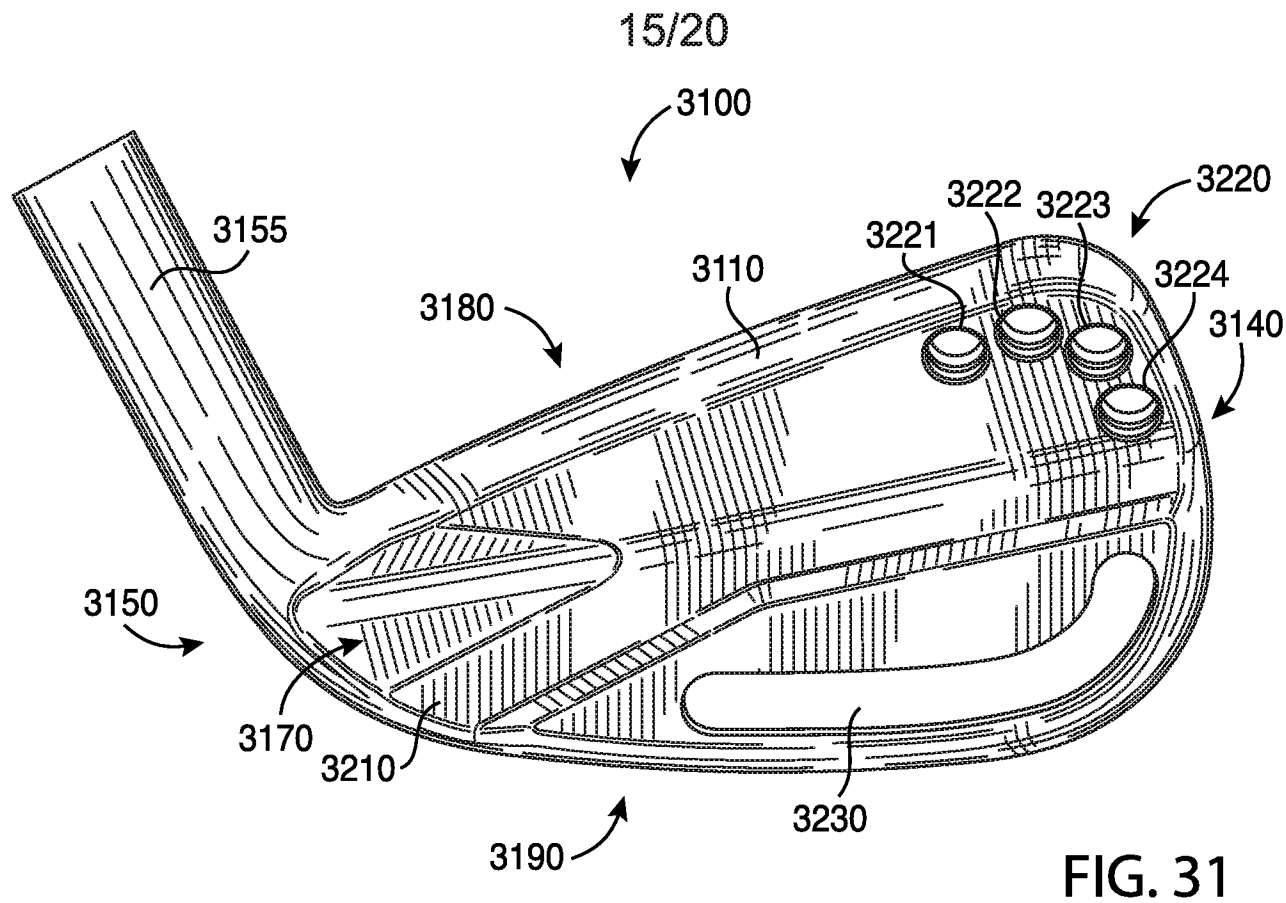
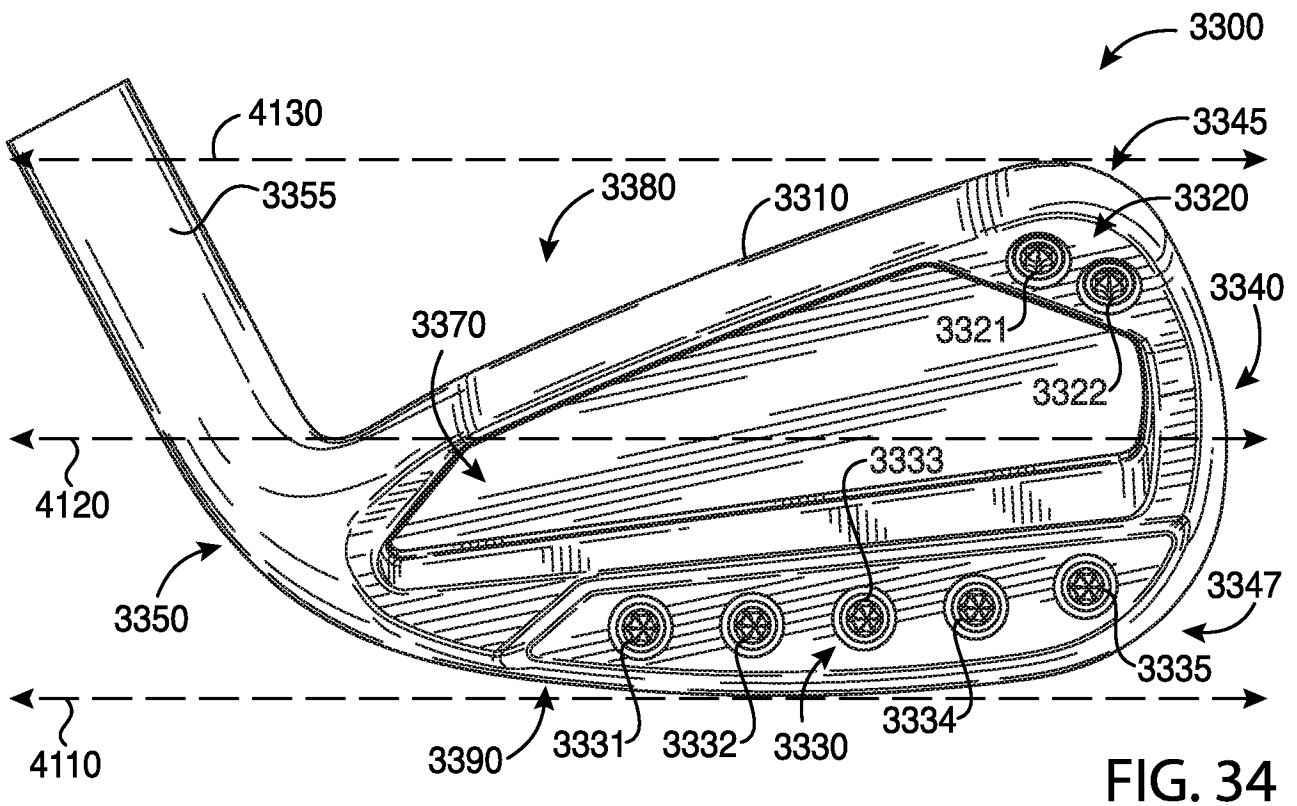
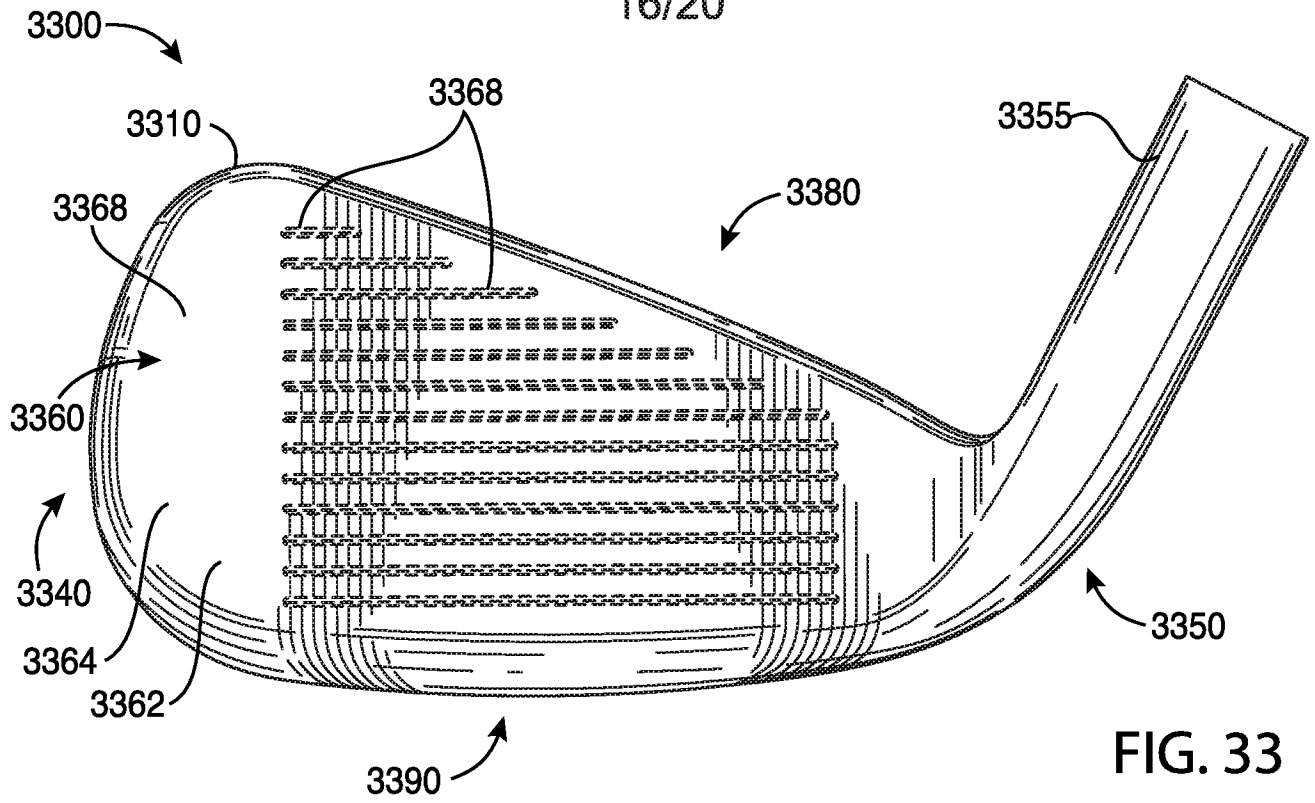


FIG. 30



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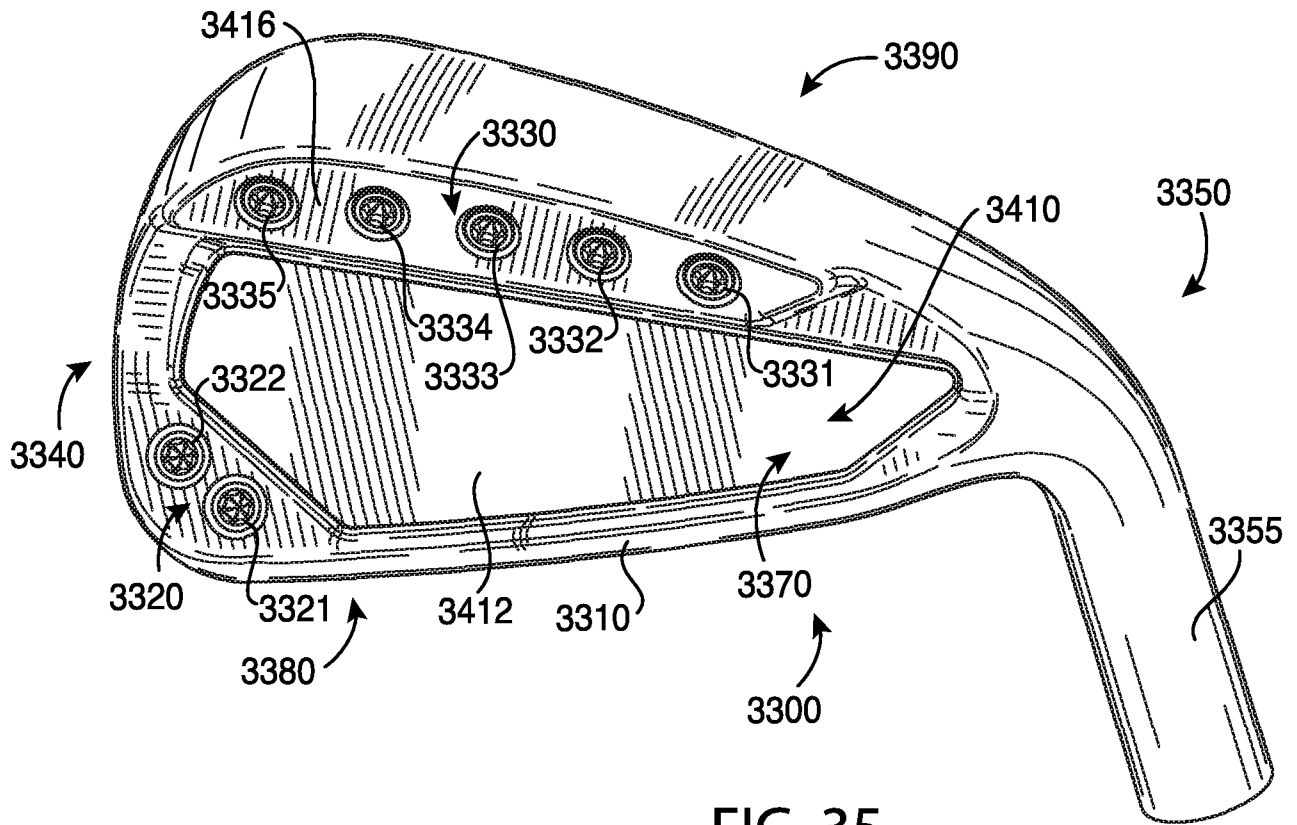


FIG. 35

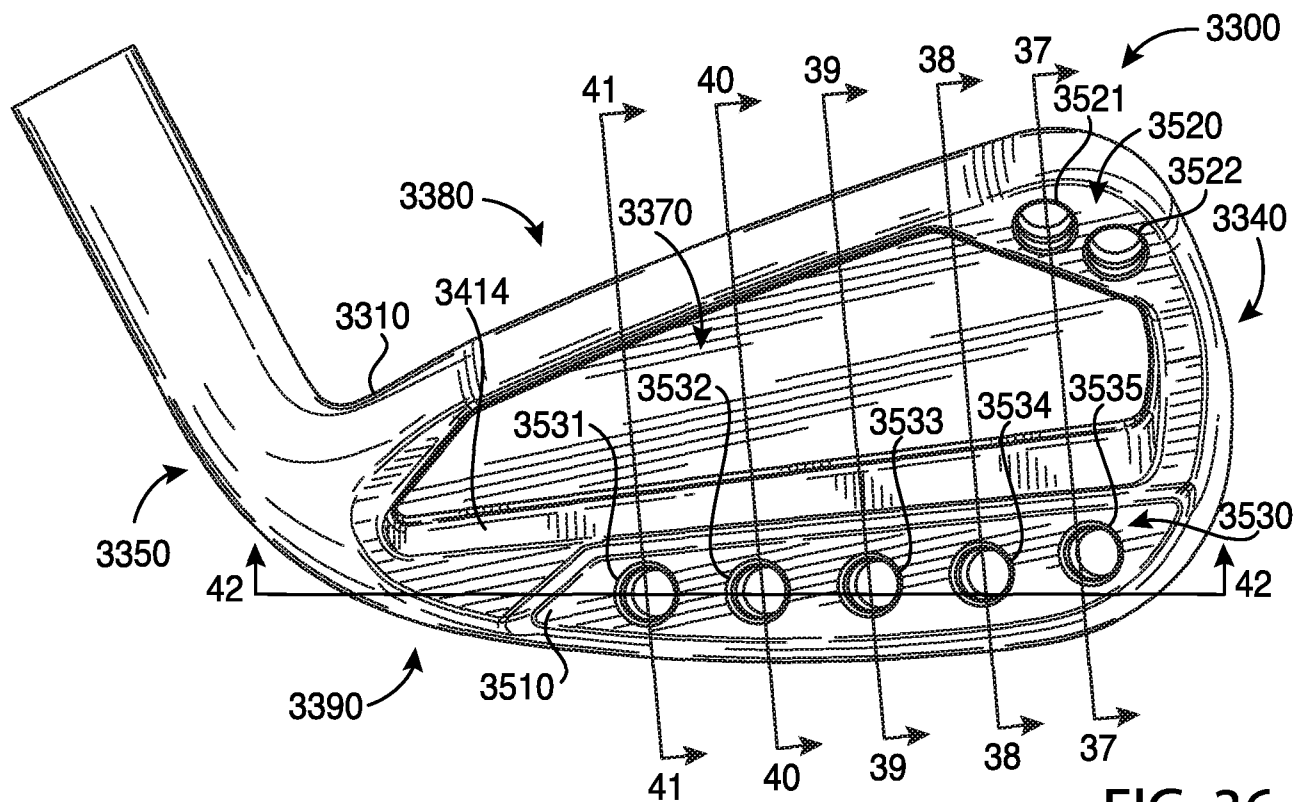


FIG. 36

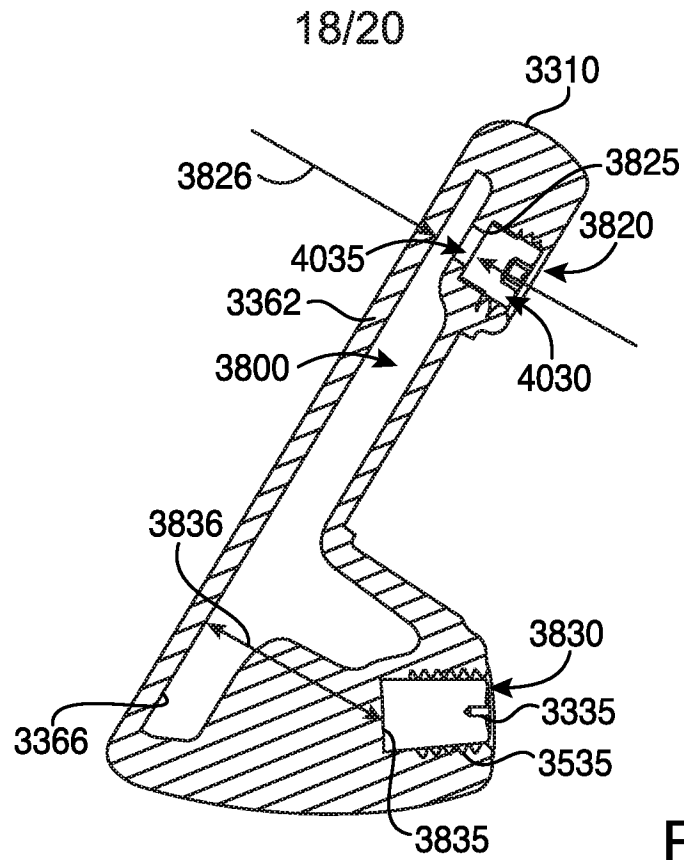


FIG. 37

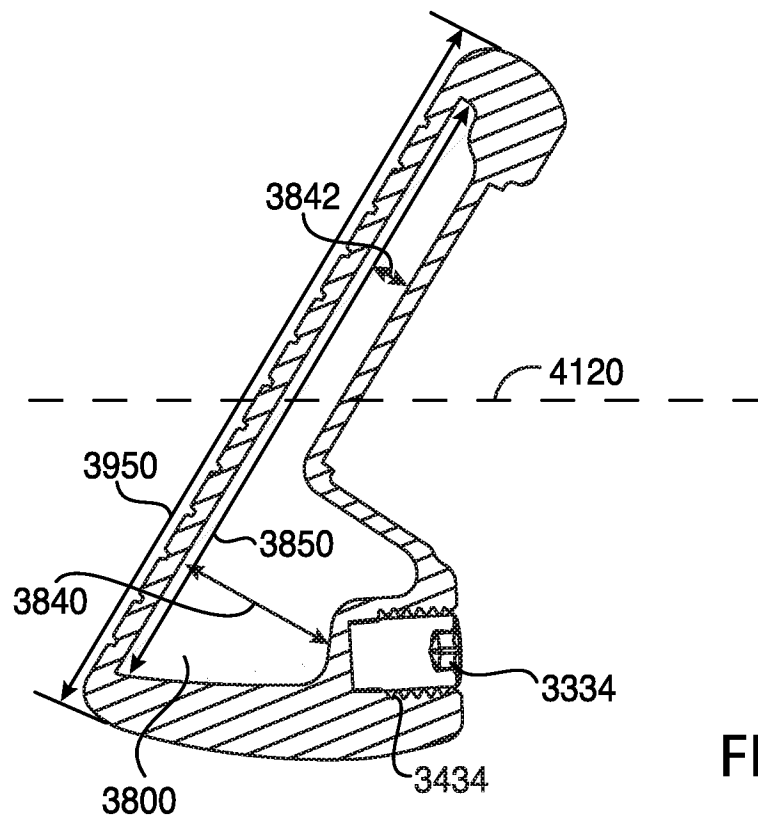


FIG. 38

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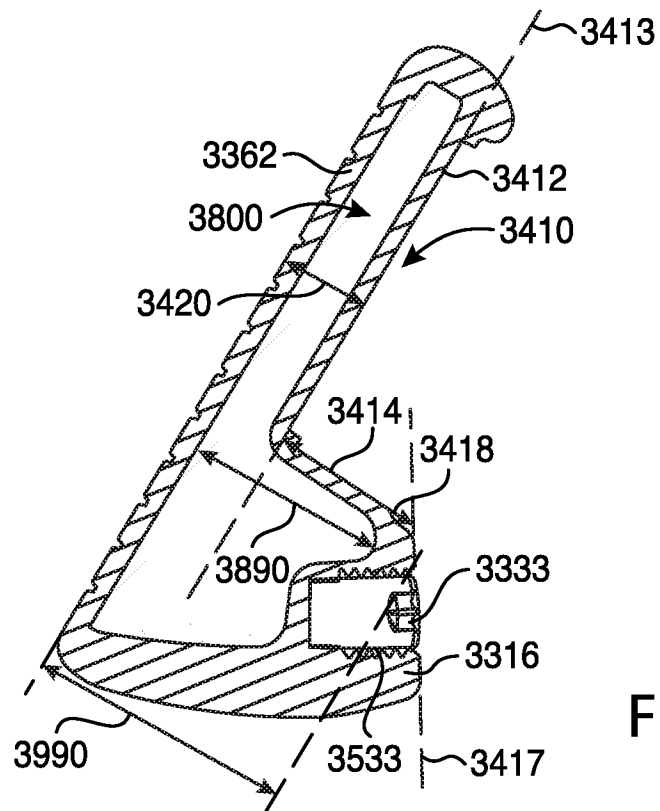


FIG. 39

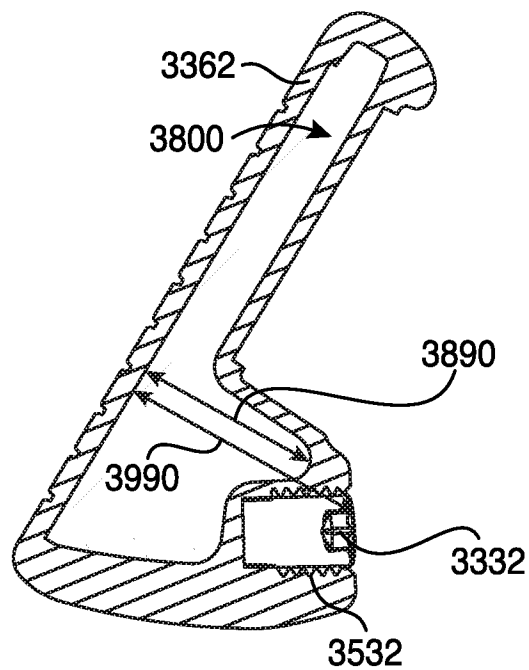


FIG. 40

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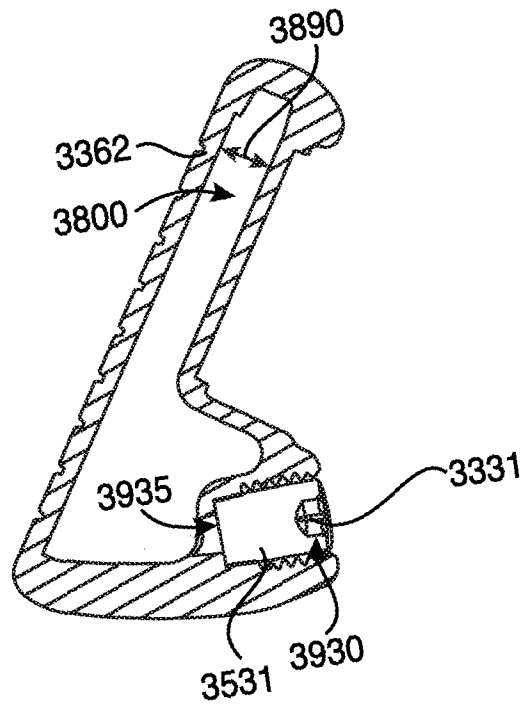


FIG. 41

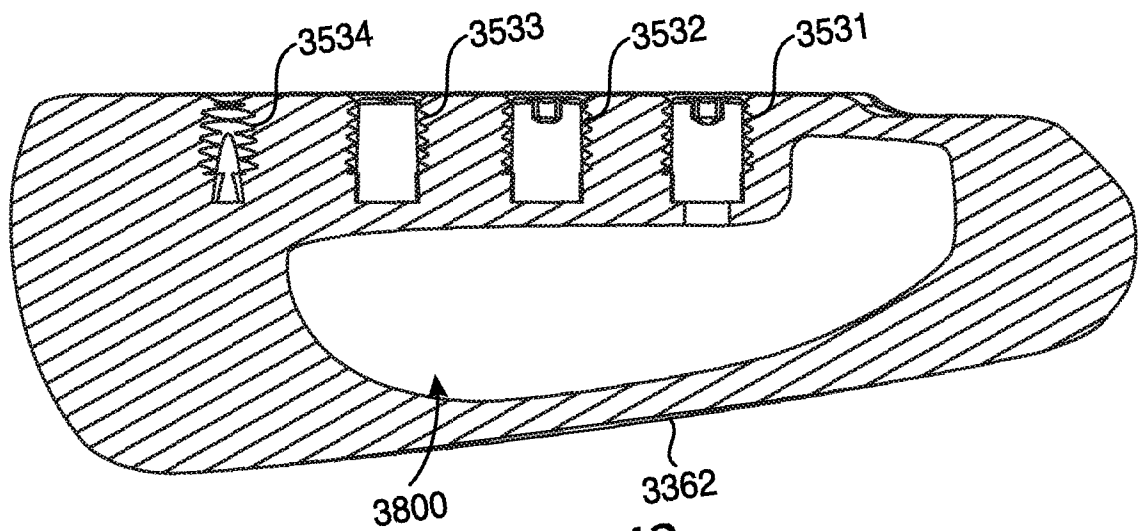


FIG. 42



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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
15/263,018	09/12/2016	3711	1600	P-15-008-U02-US/30161	20	3

CONFIRMATION NO. 6484

FILING RECEIPT



0000000083967994

122021
Loeb & Loeb LLP
321 North Clark Street Suite 2300
Chicago, IL 60654

Date Mailed: 09/23/2016

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Robert R. Parsons, Scottsdale, AZ;
Michael R. Nicolette, Scottsdale, AZ;
Bradley D. Schweigert, Anthem, AZ;

Applicant(s)

Parsons Xtreme Golf, LLC, Scottsdale, AZ;

Power of Attorney: The patent practitioners associated with Customer Number 122021

Domestic Priority data as claimed by applicant

This application is a CON of 15/043,090 02/12/2016
which claims benefit of 62/118,403 02/19/2015
and claims benefit of 62/159,856 05/11/2015
and claims benefit of 62/209,780 08/25/2015
and claims benefit of 62/277,636 01/12/2016
This application 15/263,018
is a CIP of 29/570,918 07/13/2016
which is a DIV of 29/547,678 12/07/2015 PAT D764610
which is a CIP of 29/540,066 09/21/2015 PAT D746926
which is a CIP of 29/537,413 08/25/2015 ABN

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.) - None.

Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

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The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 15/263,018**

Projected Publication Date: 12/29/2016

Non-Publication Request: No

Early Publication Request: No

Title

GOLF CLUB HEADS AND METHODS TO MANUFACTURE GOLF CLUB HEADS

Preliminary Class

473

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875						Application or Docket Number 15/263,018	
APPLICATION AS FILED - PART I							
(Column 1)		(Column 2)		SMALL ENTITY		OTHER THAN SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE(\$)	FEE(\$)		RATE(\$)	FEE(\$)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	280
SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A			N/A	600
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	720
TOTAL CLAIMS (37 CFR 1.16(j))	20	minus 20 = *			OR	x 80 =	0.00
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3	minus 3 = *				x 420 =	0.00
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						0.00
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							0.00
			TOTAL			TOTAL	1600
* If the difference in column 1 is less than zero, enter "0" in column 2.							
APPLICATION AS AMENDED - PART II							
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY	
AMENDMENT A	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)
	Total (37 CFR 1.16(i))	*	Minus **	=	x =	OR	x =
	Independent (37 CFR 1.16(h))	*	Minus ***	=	x =	OR	x =
	Application Size Fee (37 CFR 1.16(s))					OR	
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					OR	
			TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY	
AMENDMENT B	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)
	Total (37 CFR 1.16(i))	*	Minus **	=	x =	OR	x =
	Independent (37 CFR 1.16(h))	*	Minus ***	=	x =	OR	x =
	Application Size Fee (37 CFR 1.16(s))					OR	
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					OR	
			TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	
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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
15/263,018	09/12/2016	Robert R. Parsons	P-15-008-U02-US/30161

CONFIRMATION NO. 6484

PUBLICATION NOTICE



OC000000088176111

122021
Loeb & Loeb LLP
321 North Clark Street Suite 2300
Chicago, IL 60654

Title:GOLF CLUB HEADS AND METHODS TO MANUFACTURE GOLF CLUB HEADS

Publication No.US-2016-0375324-A1

Publication Date:12/29/2016

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Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

PLUS Search Results for S/N 15263018, Searched Mon Jul 31 10:22:46 EDT 2017

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15/263,018	09/12/2016	Robert R. Parsons	P-15-008-U02-US/30161	6484

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Loeb & Loeb LLP
321 North Clark Street Suite 2300
Chicago, IL 60654

EXAMINER

PASSANITI, SEBASTIANO

ART UNIT	PAPER NUMBER
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3711

NOTIFICATION DATE	DELIVERY MODE
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08/08/2017

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 15/263,018	Applicant(s) PARSONS ET AL.	
	Examiner SEBASTIANO PASSANITI	Art Unit 3711	AIA (First Inventor to File) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09/12/2016.
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
- 4) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

- 5) ☒ Claim(s) 1-20 is/are pending in the application.
5a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 6) ☐ Claim(s) _____ is/are allowed.
- 7) ☒ Claim(s) 1-20 is/are rejected.
- 8) ☐ Claim(s) _____ is/are objected to.
- 9) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

- 10) ☐ The specification is objected to by the Examiner.
- 11) ☒ The drawing(s) filed on 09/12/2016 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

- a) ☐ All b) ☐ Some** c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 3) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b)
Paper No(s)/Mail Date <u>09/12/2016</u> | 4) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

This Office action is responsive to communication received 09/12/2016 – application papers filed, including Power of Attorney and IDS.

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Continuation Data

This application is a CON of 15/043,090, filed 02/12/2016, PAT 9,468,821, which claims benefit of 62/118,403, filed 02/19/2015, and claims benefit of 62/159,856, filed 05/11/2015, and claims benefit of 62/209,780, filed 08/25/2015, and claims benefit of 62/277,636, filed 01/12/2016.

This application 15/263,018, filed 09/12/2016, is a CIP of 29/570,918, filed 07/13/2016, which is a DIV of 29/547,678, filed 12/07/2015, PAT D764,610, which is a CIP of 29/540,066, filed 09/21/2015, PAT D746,926, which is a CIP of 29/537,413, filed 08/25/2015, ABN.

Drawings

The drawings were received on 09/12/2016. These drawings are acceptable.

Status of Claims

Claims 1-20 are pending.

FOLLOWING IS AN ACTION ON THE MERITS:

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the

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unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory double patenting rejection is appropriate where the claims at issue are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the reference application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement. A terminal disclaimer must be signed in compliance with 37 CFR 1.321(b).

The USPTO internet Web site contains terminal disclaimer forms which may be used. Please visit <http://www.uspto.gov/forms/>. The filing date of the application will determine what form should be used.

A web-based eTerminal Disclaimer may be filled out completely online using web-screens. An eTerminal Disclaimer that meets all requirements is auto-processed and approved immediately upon submission. For more information about eTerminal

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Disclaimers, refer to <http://www.uspto.gov/patents/process/file/efs/guidance/eTD-info-l.jsp>.

Claims 1-20 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-20 of USPN 9,468,821.

Although the conflicting claims are not identical, they are not patentably distinct from each other because the '821 claims encompass the claims of the instant application.

For double patenting to exist as between the rejected claims and patent claims 1-20, it must be determined that the rejected claims are not patentably distinct from patent claims 1-20. In order to make this determination, it first must be determined whether there are any differences between the rejected claims and patent claims 1-20 and, if so, whether those differences render the claims patentably distinct.

Specific to claims 1-20, it is clear that all the elements of instant claims 1-20 are to be found in patent claims 1-20. The difference between instant claims 1-20 of the application and claims 1-20 of the patent lies in the fact that the patent claims include many more elements and are thus much more specific. Thus the invention of claims 1-20 of the patent is in effect a “species” of the “generic” invention of instant claims 1-20. It has been held that the generic invention is “anticipated” by the “species”. See *In re Goodman*, 29 USPQ2d 2010 (Fed. Cir. 1993). Since claims 1-20 are anticipated by claims 1-20 of the patent, claims 1-20 are not patentably distinct from claims 1-20 of the patent.

Claims 8 and 10-12 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-20 of USPN 9,421,437. Although the conflicting claims are not identical, they are not patentably distinct from each other because the '437 claims encompass the claims of the instant application.

As to claim 8, see claims 8, 10 and 18 of the '437 patent.

As to claim 10, see claim 9 of the '437 patent.

As to claim 11, see claims 1, 4, 1 and 18 of the '437 patent.

As to claim 12, see claims 13 and 20 of the '437 patent.

Claim 9 is rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-20 of USPN 9,421,437 in view of Hosokawa (USPN 5,647,808). To have modified the claimed invention of the '437 patent to include a *bonding portion configured to bond the elastic polymer material to the face portion* in order to integrally join and fasten the club head assembly would have been obvious in view of the patent to Hosokawa, which shows it to be old in the art to unite a foamed inner core to an outer shell via an adhesive or another appropriate bonding technique (col. 5, lines 27-32).

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Claims 8-12 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-20 of USPN 9,364,727.

Although the conflicting claims are not identical, they are not patentably distinct from each other because the '727 claims encompass the claims of the instant application.

As to claim 8, see claims 10, 12 and 18 of the '437 patent.

As to claim 9, see claim 1 of the '727 patent.

As to claim 10, see claims 10, 12 and 18 of the '727 patent.

As to claim 11, see claims 1 and 10 of the '727 patent.

As to claim 12, see claims 15 and 20 of the '727 patent.

Claims 8 and 10-12 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-20 of USPN 9,346,203. Although the conflicting claims are not identical, they are not patentably distinct from each other because the '203 claims encompass the claims of the instant application.

As to claim 8, see claims 1, 2, 6, 11 and 20 of the '203 patent.

As to claim 10, see claims 1, 2, 6, 11 and 20 of the '203 patent.

As to claim 11, see claims 1, 9 and 15 of the '203 patent.

As to claim 12, see claims 4, 5, 13 and 19 of the '203 patent.

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Claim 9 is rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-20 of USPN 9,346,203 in view of Hosokawa (USPN 5,647,808). To have modified the claimed invention of the '203 patent to include a *bonding portion configured to bond the elastic polymer material to the face portion* in order to integrally join and fasten the club head assembly would have been obvious in view of the patent to Hosokawa, which shows it to be old in the art to unite a foamed inner core to an outer shell via an adhesive or another appropriate bonding technique (col. 5, lines 27-32).

Claims 8 and 10-12 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-20 of USPN 9,345,938. Although the conflicting claims are not identical, they are not patentably distinct from each other because the '938 claims encompass the claims of the instant application.

As to claim 8, see claims 7, 11 and 12 of the '938 patent.

As to claim 10, see claims 7, 11, 12 and 13 of the '938 patent.

As to claim 11, see claims 1, 6, 11, 12, 15 and 16 of the '938 patent.

As to claim 12, see claims 5 and 14 of the '938 patent.

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Claim 9 is rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-20 of USPN 9,345,938 in view of Hosokawa (USPN 5,647,808). To have modified the claimed invention of the '938 patent to include a *bonding portion configured to bond the elastic polymer material to the face portion* in order to integrally join and fasten the club head assembly would have been obvious in view of the patent to Hosokawa, which shows it to be old in the art to unite a foamed inner core to an outer shell via an adhesive or another appropriate bonding technique (col. 5, lines 27-32).

Claims 8 and 10-12 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-20 of USPN 9,199,143. Although the conflicting claims are not identical, they are not patentably distinct from each other because the '143 claims encompass the claims of the instant application.

As to claim 8, see claims 1, 2 and 11 of the '143 patent.

As to claim 10, see claims 1, 2 and 11 of the '143 patent.

As to claim 11, see claims 1, 9, 11, 12 and 15 of the '143 patent.

As to claim 12, see claims 8 and 20 of the '143 patent.

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Claim 9 is rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-20 of USPN 9,199,143 in view of Hosokawa (USPN 5,647,808). To have modified the claimed invention of the '143 patent to include a *bonding portion configured to bond the elastic polymer material to the face portion* in order to integrally join and fasten the club head assembly would have been obvious in view of the patent to Hosokawa, which shows it to be old in the art to unite a foamed inner core to an outer shell via an adhesive or another appropriate bonding technique (col. 5, lines 27-32).

Claims 8 and 10-12 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-20 of USPN 8,961,336. Although the conflicting claims are not identical, they are not patentably distinct from each other because the '336 claims encompass the claims of the instant application.

As to claim 8, see claims 1, 12, 13 and 18 of the '336 patent.

As to claim 10, see claims 1, 12, 13 and 18 of the '336 patent.

As to claim 11, see claims 1, 10, 11, 12 and 18 of the '336 patent.

As to claim 12, see claims 9 and 20 of the '336 patent.

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Claim 9 is rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-20 of USPN 8,961,336 in view of Hosokawa (USPN 5,647,808). To have modified the claimed invention of the '336 patent to include a *bonding portion configured to bond the elastic polymer material to the face portion* in order to integrally join and fasten the club head assembly would have been obvious in view of the patent to Hosokawa, which shows it to be old in the art to unite a foamed inner core to an outer shell via an adhesive or another appropriate bonding technique (col. 5, lines 27-32).

Further Notes on Double Patenting

Applicant is respectfully urged to maintain a clear line of demarcation between the instant claim set and the claims in any further, related applications, which the applicant may be aware of. Maintaining a clear distinction between the instant claims and the claims of any further, copending applications, which the applicant may be aware of, will help to reduce the likelihood of obviousness-type double patenting concerns arising during later prosecution in the instant case. It is clear that the applicant, who in this case is most familiar with the language, content and prosecution history any further related applications, is best equipped to recognize any potential double patenting concerns and should therefore make an effort to amend the instant claims or file appropriate terminal disclaimers.

Claim Objections

Claim 8 is objected to because of the following informalities: In line 6, after "coupled", the term --to-- should be inserted. Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103 which forms the basis for all obviousness rejections set forth in this Office action:

A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103 are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims the examiner presumes that the subject matter of the various claims was commonly owned as of the effective filing date of the claimed invention(s) absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and effective filing dates of each claim that was not commonly owned as of the effective filing date of the later invention in order for the examiner to consider the applicability of 35 U.S.C. 102(b)(2)(C) for any potential 35 U.S.C. 102(a)(2) prior art against the later invention.

Claims 1-8 and 10-12 are rejected under 35 U.S.C. 103 as being unpatentable over Hsu (USPN 5,899,821) in view of Takeda (USPN 6,290,609).

As to claim 1, Hsu lacks a specific teaching of a plurality of weight ports along a periphery of the back portion below a horizontal midplane of the golf club head, wherein more than 50% of the mass of the body portion is located below the horizontal midplane of the golf club head. It is **WELL-KNOWN** in the golf club head art to provide peripheral weighting in a golf club head to allocate mass to specific areas of the head in order to change the weight balance of the head and relocate the location of the center of gravity of the head, as needed. Here, the teaching reference to Takeda shows an iron-type club head in which the peripheral area is populated with exterior ports that are selectively filled with a weighting material so that the weight balance of the head may be freely set. See col. 1, lines 55-64; col. 6, lines 29-53 in Takeda. Here, Takeda provides denser weights along the bottom periphery. Here, Takeda is clearly capable of providing more than 50% of the club head mass below the horizontal midplane of the head. For instance, the skilled artisan may simply leave the upper weight ports shown, for example in FIG. 9, void of weighting material, while supplying dense weighting material to the ports along the lower periphery. In view of the patent to Takeda, one of ordinary skill, before the effective filing date of the claimed invention, would have found it obvious to modify the device in Hsu by providing the periphery of the back portion with a plurality of exterior ports, such that the ports are filled with weights that serve to provide more than 50% of the mass of the club head body below the horizontal midplane of the head in order to provide a desirable weight distribution. Additionally,

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Hsu is deemed to show a hollow body having a face portion, a top portion, a toe portion, a sole portion and a back portion, along with a cavity between the top and sole portions (FIGS. 2, 3 and 5). As shown in FIG. 3, the width of the interior cavity below an imaginary horizontal midplane of the club head appears to have a width equal to about 20% to about 80% of the width of the club head body.

As to claim 2, Hsu, as modified by Takeda, would have included at least one port above the horizontal midplane. See FIG. 9 in Takeda, and col. 5, line 59 through col. 6, line 53.

As to claim 3, Takeda obviates the inclusion of plural weight ports, with adjacent one of the plural weight ports being separated by less than the port diameter. See, for example, the separation distance between (31B) and (31A) along the lower peripheral wall. To have minimized the distance between weight ports in the modified Hsu device would have been obvious, before the effective filing date of the claimed invention, to enable the skilled artisan to more closely control the mass distribution.

As to claim 4, see elastic polymer material (4) already disclosed by Hsu.

As to claim 5, Takeda obviates the inclusion of a weight port with weight disposed therein. Again, see FIG. 9 in Takeda, and col. 5, line 59 through col. 6, line 53.

As to claim 6, Hsu already discloses the introduction of an elastic polymer material (4) within the club head interior using at least one exterior 'weight' port. See FIGS. 1 and 3 and port (21).

As to claim 7, Hsu already discloses a face thickness of between 1.4 mm and 2 mm (0.055 inch to 0.079 inch), meeting the claimed thickness.

As to claim 8, Hsu lacks a plurality of weight portions coupled to the hollow body portion at a location below a horizontal midplane. It is **WELL-KNOWN** in the golf club head art to provide peripheral weighting in a golf club head to allocate mass to specific areas of the head in order to change the weight balance of the head and relocate the location of the center of gravity of the head, as needed. Here, the teaching reference to Takeda shows an iron-type club head in which the peripheral area is populated with exterior ports that are selectively filled with a weighting material so that the weight balance of the head may be freely set. See col. 1, lines 55-64; col. 6, lines 29-53 in Takeda. In view of the patent to Takeda, one of ordinary skill, before the effective filing date of the claimed invention, would have found it obvious to modify the device in Hsu by providing the periphery of the back portion with a plurality of exterior ports, such that the ports are filled with weights in order to provide a desirable weight distribution. Also, Hsu is deemed to show a hollow body having a face portion, a top portion, a toe portion, a sole portion and a back portion, along with a cavity between the top and sole portions (FIGS. 2, 3 and 5). Hsu already discloses the introduction of an elastic polymer material (4) within the club head interior using at least one exterior 'weight' port. See FIGS. 1 and 3 and port (21). As the cavity is completely filled with elastic polymer material (4), as shown in FIG. 3, it would appear that at least 50% of the elastic polymer material (4) in the interior cavity is below the horizontal midplane of the golf club head.

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As to claim 10, the cavity (3) in Hsu is completely filled with elastomer material and thus is at least 50% filled with elastomer material. Though Hsu is silent as to the specific *thermoplastic* elastomer material, the selection of a suitable elastomer material based on the properties of known thermoplastic elastomer materials would have been obvious to one of ordinary skill in the art, before the effective filing date of the claimed invention. See *In re Hopkins*, 145 USPQ 140. Here, the applicant has not invented the claimed thermoplastic elastomer material.

As to claim 11, the interior cavity (3) in Hsu would clearly separates a port structure (i.e, port 21) from the rear surface of the face (11). Here, port (21) may in and of itself be considered a 'weight' port. Any teaching gleaned from a review of the secondary Takeda reference would have rendered it obvious to include further weight ports along peripheral portions of the rear cap (2) in Hsu, whereby these additional ports would likewise be separated from the rear surface of face (11) by inner cavity (3).

As to claim 12, Hsu already discloses a face thickness of between 1.4 mm and 2 mm (0.055 inch to 0.079 inch), meeting the claimed thickness.

Claim 9 is are rejected under 35 U.S.C. 103 as being unpatentable over Hsu (USPN 5,899,821) in view of Takeda (USPN 6,290,609) and Hosokawa (USPN 5,647,808). To have further modified the device in Hsu, as previously modified by Takeda, to include a *bonding portion configured to bond the elastic polymer material to the face portion* in order to integrally join and fasten the club head assembly would have been obvious in view of the patent to Hosokawa, which shows it to be old in the art to

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unite a foamed inner core to an outer shell via an adhesive or another appropriate bonding technique (col. 5, lines 27-32).

Claims 13-15 are rejected under 35 U.S.C. 103 as being unpatentable over Wahl (USPN 6,811,496).

As to claim 13, Wahl shows an iron-type golf club head comprising: a hollow body portion having a face portion, a toe portion, a top portion, a sole portion, a back portion, and an interior cavity extending between the top and sole portions, the back portion comprising: an upper back wall portion above a horizontal midplane of the hollow body portion, a width of the hollow body portion above the horizontal midplane being defined by a distance between the upper back wall portion and the face portion; a lower back wall portion below the horizontal midplane, a width of the hollow body portion below the horizontal midplane being defined by a distance between the lower back wall portion and the face portion. Here, reference is made to 7-14B, wherein the aforementioned-claimed elements are clearly depicted; and a ledge portion extending between the upper back wall portion and the lower back wall portion in a direction from the face portion to the back portion. Here, the sole bar (26) is responsible for forming a ledge portion. Wahl also shows a plurality of exterior ports along a periphery of the back portion below the horizontal midplane of the golf club head. See the arrangement of weight ports in FIGS. 8 and 13. In Wahl, the interior cavity (70) is between the exterior ports and the face portion. See FIG. 14B, for example. Wahl lacks a specific description of *a width of the ledge portion is greater than a width of the hollow body portion above the horizontal midplane by a factor of greater than 1.0*. Wahl does

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suggest that the size of the sole bar (26) may be adjusted to provide the desired weight distribution (col. 4, lines 49-52). In view of the suggestion in Wahl, one of ordinary skill in the art, before the effective filing date of the claimed invention, would have found it obvious to modify the Wahl device by sizing the ledge portion (i.e., the sole bar 26) such that a width of the ledge portion is greater than a width of the hollow body portion above the horizontal midplane by a factor of greater than 1.0 so that the weight of the club head may be distributed in a manner that is acceptable to a golfer.

As to claim 14, Wahl lacks a specific description of *a width of the ledge portion is greater than the width of the hollow body portion above the horizontal midplane by a factor of greater than 1.0 and less than 3.0*. See the explanation under claim 13, supra. Here, the claimed *factor* is not deemed critical. One of ordinary skill in the art before the effective filing date of the claimed invention, would have found it obvious to modify the Wahl device by sizing the ledge portion (i.e., the sole bar 26) such that a width of the ledge portion is greater than a width of the hollow body portion above the horizontal midplane by a factor of greater than 1.0 and less than 3.0 so that the weight of the club head may be distributed in a manner that is acceptable to a golfer.

As to claim 15, see FIGS. 8 and 13 showing a plurality of weight portions, wherein each port of the plurality of exterior ports is configured to receive a weight portion of the plurality of weight portions.

Claims 16, 18 and 19 are rejected under 35 U.S.C. 103 as being unpatentable over Wahl (USPN 6,811,496) in view of Hsu (USPN 5,899,821).

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As to claim 16, the cavity (70) in Wahl lacks a thermoplastic elastomer material. Hsu shows it to be old to provide an elastomer material rearward of the striking face to help absorb vibration during impact between the striking surface and a golf ball. See col. 1, lines 27-30; col. 2, lines 18-25 in Hsu. In view of the patent to Hsu, one of ordinary skill in the art, before the effective filing date of the claimed invention, would have found it obvious to modify the device in Wahl by filling the cavity (70) with elastomeric material to cushion the shock from a struck golf ball, which would otherwise be transmitted to a golfer during club head use. Though Hsu is silent as to the specific *thermoplastic* elastomer material, the selection of a suitable elastomer material based on the properties of known thermoplastic elastomer materials would have been obvious to one of ordinary skill in the art, before the effective filing date of the claimed invention. See *In re Hopkins*, 145 USPQ 140. Here, the applicant has not invented the claimed thermoplastic elastomer material.

As to claim 18, see the comments for claim 17, *supra*.

As to claim 19, Hsu obviates the inclusion of a face having the claimed thickness and discloses a face thickness of between 1.4 mm and 2 mm (0.055 inch to 0.079 inch). See col. 1, lines 58-62 in Hsu. Moreover, it is **WELL-KNOWN** in the golf club head art that a thin face (as compared to a thicker dimensioned face) allows the face to deform to a greater extent and provide increased momentum to a golf ball during a shot. One of ordinary skill in the art, before the effective filing date of the claimed invention, and guided by the teaching in Hsu and the above reasoning, would have found it obvious to

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modify the device in Wahl by sizing the striking face (15) with a thickness of less than 1.5 mm, the motivation being to enhance the resilient features of the striking face.

Claim 17 is rejected under 35 U.S.C. 103 as being unpatentable over Wahl (USPN 6,811,496) in view of Hsu (USPN 5,899,821) and Hosokawa (USPN 5,647,808). The cavity (70) in Wahl lacks a thermoplastic elastomer material. Hsu shows it to be old to provide an elastomer material rearward of the striking face to help absorb vibration during impact between the striking surface and a golf ball. See col. 1, lines 27-30; col. 2, lines 18-25 in Hsu. In view of the patent to Hsu, one of ordinary skill in the art, before the effective filing date of the claimed invention, would have found it obvious to modify the device in Wahl by filling the cavity (70) with elastomeric material to cushion the shock from a struck golf ball, which would otherwise be transmitted to a golfer during club head use. Though Hsu is silent as to the specific *thermoplastic* elastomer material, the selection of a suitable elastomer material based on the properties of known thermoplastic elastomer materials would have been obvious to one of ordinary skill in the art, before the effective filing date of the claimed invention. See *In re Hopkins*, 145 USPQ 140. Here, the applicant has not invented the claimed thermoplastic elastomer material. To have further modified the device in Wahl, as modified by Hsu, to include a *bonding portion configured to bond the elastic polymer material to the face portion* in order to integrally join and fasten the club head assembly would have been obvious in view of the patent to Hosokawa, which shows it to be old in the art to unite a foamed inner core to an outer shell via an adhesive or another appropriate bonding technique (col. 5, lines 27-32).

Claim 20 is rejected under 35 U.S.C. 103 as being unpatentable over Wahl (USPN 6,811,496) in view of Takeda (USPN 6,290,609). Wahl lacks at least one port above the horizontal midplane. It is WELL-KNOWN in the golf club head art to provide peripheral weighting in a golf club head to allocate mass to specific areas of the head in order to change the weight balance of the head and relocate the location of the center of gravity of the head, as needed. Here, the teaching reference to Takeda shows an iron-type club head in which the peripheral area is populated with exterior ports that are selectively filled with a weighting material so that the weight balance of the head may be freely set. See col. 1, lines 55-64; col. 6, lines 29-53 in Takeda. Here, Takeda provides at least one port above the horizontal midplane. In view of the patent to Takeda, one of ordinary skill, before the effective filing date of the claimed invention, would have found it obvious to modify the device in Hsu by providing the periphery of the back portion with at least one port above the horizontal midplane in order to provide a desirable weight distribution.

Further References of Interest

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Cackett shows weight ports above and below the horizontal midplane;

Fig. 1B in Wahl shows a cavity filled with foam;

Fig. 6 in Hou;

Fig. 6 in Tseng ('485);

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Mimeur shows an elastomer filling and bonding portion adjacent the rear face portion;

Figs. 2F, 2G in Boyd;

Fig. 4 in Tseng ('295);

Morales shows a foam in the head/hosel portion;

Figs. 4 and 6 in Tseng ('502);

Figs. 1 and 3 in Lin.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SEBASTIANO PASSANITI whose telephone number is (571)272-4413. The examiner can normally be reached on Monday through Friday (9:00AM - 5:30PM).

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at <http://www.uspto.gov/interviewpractice>.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Melba N. Bumgarner can be reached on 571-272-4709. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for

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/Sebastiano Passaniti/
Primary Examiner
Art Unit 3711

S.Passaniti/sp
August 2, 2017

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A63B53/0475	08/02/2017	/SP/
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US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
473	324-350	08/02/2017	/SP/
473	287-292	08/02/2017	/SP/

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

SEARCH NOTES		
Search Notes	Date	Examiner
Inventor name searched in PALM	08/02/2017	/SP/
Combined forward/backward citation search of prior art of record	08/02/2017	/SP/
Review of Continuity Data Map in PE2E	08/02/2017	/SP/
Review of parent applications, as identified on Application Filing Receipt	08/02/2017	/SP/
Review of CLAIMS and PLUS search performed by STIC	08/02/2017	/SP/
EAST text search (attached)	08/02/2017	/SP/

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INTERFERENCE SEARCH			
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RULE				
APPLICANTS Parsons Xtreme Golf, LLC, Scottsdale, AZ;				
INVENTORS Robert R. Parsons, Scottsdale, AZ; Michael R. Nicolette, Scottsdale, AZ; Bradley D. Schweigert, Anthem, AZ;				
** CONTINUING DATA ***** This application is a CON of 15/043,090 02/12/2016 PAT 9468821 which claims benefit of 62/118,403 02/19/2015 and claims benefit of 62/159,856 05/11/2015 and claims benefit of 62/209,780 08/25/2015 and claims benefit of 62/277,636 01/12/2016 This application 15/263,018 09/12/2016 is a CIP of 29/570,918 07/13/2016 which is a DIV of 29/547,678 12/07/2015 PAT D764610 which is a CIP of 29/540,066 09/21/2015 PAT D746926 which is a CIP of 29/537,413 08/25/2015 ABN				
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** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ** 09/21/2016				
Foreign Priority claimed <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No 35 USC 119(a-d) conditions met <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Verified and /SEBASTIANO PASSANITI/ Acknowledged Examiner's Signature	<input type="checkbox"/> Met after Allowance Initials	STATE OR COUNTRY AZ	SHEETS DRAWINGS 20	TOTAL CLAIMS 20
INDEPENDENT CLAIMS 3				
ADDRESS Loeb & Loeb LLP 321 North Clark Street Suite 2300 Chicago, IL 60654 UNITED STATES				
TITLE GOLF CLUB HEADS AND METHODS TO MANUFACTURE GOLF CLUB HEADS				
FILING FEE RECEIVED 1600	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:	<input type="checkbox"/> All Fees <input type="checkbox"/> 1.16 Fees (Filing) <input type="checkbox"/> 1.17 Fees (Processing Ext. of time) <input type="checkbox"/> 1.18 Fees (Issue) <input type="checkbox"/> Other _____ <input type="checkbox"/> Credit		

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Art Unit		
Examiner Name	/Sebastiano Passaniti/	
Attorney Docket Number	P-15-008-U02-US/30161	

30	20140128175	A1	2014-05-08	Jertson et al.	
31	20140274441	A1	2014-05-08	Greer	
32	20140274451	A1	2014-09-18	Knight et al.	
33	20150231454	A1	2015-08-20	Parsons et al.	
34	20150231806	A1	2015-08-20	Parsons et al.	

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FOREIGN PATENT DOCUMENTS

Examiner Initial*	Cite No	Foreign Document Number ³	Country Code ²	Kind Code ⁴	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear	T ⁵
	1							<input type="checkbox"/>

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NON-PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T ⁵
	1	INTERNATIONAL SEARCH REPORT AND WRITTEN OPINION received in connection with corresponding application no. PCT/US2015/016666, on May 14, 2015 (8 pages).	<input type="checkbox"/>

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
(Not for submission under 37 CFR 1.99)

Application Number		
Filing Date		
First Named Inventor	Robert R. Parsons	
Art Unit		
Examiner Name	/Sebastiano Passaniti/	
Attorney Docket Number	P-15-008-U02-US/30161	

2	U.S. Appl. No. 29/512,313, Nicolette, "Golf Club Head," filed Dec. 18, 2014, cited by applicant.	<input type="checkbox"/>
3	Kozuchowski, Zak, "Callaway Mack Daddy 2 PM Grind Wedges" (http://www.golfwrz.com/276203/callaway-mack-daddy-2-pm-grind-wedges/), www.golfwrz.com , GolfWRX Holdings, LLC, published Jan. 21, 2015, cited by applicant.	<input type="checkbox"/>
4	Wall, Jonathan, "Details: Phil's Prototype Mack Daddy PM-Grind Wedge," (http://www.pgatour.com/equipmentreport/2015/01/21/callaway-wedge.html), www.pgatour.com , PGA Tour, Inc., published Jan. 21, 2015, cited by applicant.	<input type="checkbox"/>

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EXAMINER SIGNATURE

Examiner Signature	/Sebastiano Passaniti/	Date Considered	07/28/2017
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*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

¹ See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. ² Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). ³ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁴ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁵ Applicant is to place a check mark here if English language translation is attached.

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L20	10967	l14 or l15 or l16 or l17 or l18 or l19	US-PGPUB; USPAT	OR	OFF	2017/08/02 09:39
L19	4479	a63b2209/00.cpc.	US-PGPUB; USPAT	OR	OFF	2017/08/02 09:39
L18	3256	a63b2053/0491.cpc.	US-PGPUB; USPAT	OR	OFF	2017/08/02 09:39
L17	3721	a63b2053/0416.cpc.	US-PGPUB; USPAT	OR	OFF	2017/08/02 09:39
L16	3953	a63b2053/0408.cpc.	US-PGPUB; USPAT	OR	OFF	2017/08/02 09:39
L15	3947	a63b53/047.cpc.	US-PGPUB; USPAT	OR	OFF	2017/08/02 09:39
L14	5839	a63b53/0466.cpc.	US-PGPUB; USPAT	OR	OFF	2017/08/02 09:39
L13	608	a63b53/0475.cpc.	US-PGPUB; USPAT	OR	OFF	2017/08/02 09:39
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L10	30	bonding and thermoplastic and midplane and horizontal and periphery and face and toe and cavity and elastic same polymer and golf	US-PGPUB; USPAT	OR	OFF	2017/08/02 09:37
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		or ("4852882") or ("4854583") or ("4856546") or ("4871029") or ("4884812") or ("4923197") or ("4927144") or ("4932661") or ("4953866") or ("4991843") or ("4993475") or ("5004236") or ("5197733") or ("5207427") or ("5226659") or ("5316305") or ("5348304") or ("5354059") or ("5377985") or ("5444501") or ("5462279") or ("5464216") or ("5485998") or ("5497993") or ("5505450") or ("5564990") or ("5575720") or ("5603667") or ("5620351") or ("5653645") or ("5665012") or ("5687749") or ("5690562") or ("5709615") or ("5735753") or ("5827130") or ("5860313") or ("5884632") or ("5897448") or ("5899820") or ("5908356") or ("5921872") or ("5924939") or ("5926780") or ("5927490") or ("5931741") or ("5938542") or ("5944619") or ("5954592") or ("5954596") or ("5976033") or ("5984800") or ("5988378") or ("6001025") or ("6012992") or ("6024110") or ("6027415") or ("6042485") or ("6068560") or ("6080068") or ("6093116") or ("6102812") or ("6139446") or ("6198066") or ("6206790") or ("6231414") or ("6231458") or ("6248026") or ("7052409") or ("7247102") or ("8229711") or ("9050511") or ("9541572")).PN.				
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S30	14	parsons.in. and (less same port same diameter same plurality).clm.	USPAT	OR	OFF	2017/08/01 11:13
S29	30	parsons.in. and (less same port same diameter).clm.	US- PGPUB; USPAT	OR	OFF	2017/08/01 11:13
S28	0	parsons.in. and (less same than same port same diameter).clm.	US- PGPUB; USPAT	OR	OFF	2017/08/01 11:13
S27	0	parsons.in. and (less same than same port same diameter same exterior).clm.	US- PGPUB; USPAT	OR	OFF	2017/08/01 11:13
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EAST Search History (Interference)

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Doc Code: DIST.E.FILE Document Description: Electronic Terminal Disclaimer - Filed		PTO/SB/26 U.S. Patent and Trademark Office Department of Commerce	
Electronic Petition Request	TERMINAL DISCLAIMER TO OBVIATE A DOUBLE PATENTING REJECTION OVER A "PRIOR" PATENT		
Application Number	15263018		
Filing Date	12-Sep-2016		
First Named Inventor	Robert Parsons		
Attorney Docket Number	P-15-008-U02-US/30161		
Title of Invention	GOLF CLUB HEADS AND METHODS TO MANUFACTURE GOLF CLUB HEADS		
<input checked="" type="checkbox"/> Filing of terminal disclaimer does not obviate requirement for response under 37 CFR 1.111 to outstanding Office Action <input checked="" type="checkbox"/> This electronic Terminal Disclaimer is not being used for a Joint Research Agreement.			
Owner		Percent Interest	
PARSONS XTREME GOLF, LLC		100%	
The owner(s) with percent interest listed above in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of prior patent number(s) 8961336 9199143 9345938 9346203 9364727 9421437 9468821			

as the term of said prior patent is presently shortened by any terminal disclaimer. The owner hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and the prior patent are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.

In making the above disclaimer, the owner does not disclaim the terminal part of the term of any patent granted on the instant application that would extend to the expiration date of the full statutory term of the prior patent, "as the term of said prior patent is presently shortened by any terminal disclaimer," in the event that said prior patent later:

- expires for failure to pay a maintenance fee;
- is held unenforceable;
- is found invalid by a court of competent jurisdiction;
- is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321;
- has all claims canceled by a reexamination certificate;
- is reissued; or
- is in any manner terminated prior to the expiration of its full statutory term as presently shortened by any terminal disclaimer.

☒ Terminal disclaimer fee under 37 CFR 1.20(d) is included with Electronic Terminal Disclaimer request.

☐ I certify, in accordance with 37 CFR 1.4(d)(4), that the terminal disclaimer fee under 37 CFR 1.20(d) required for this terminal disclaimer has already been paid in the above-identified application.

Applicant claims the following fee status:

- ☐ Small Entity
- ☐ Micro Entity
- ☒ Regular Undiscounted

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

THIS PORTION MUST BE COMPLETED BY THE SIGNATORY OR SIGNATORIES

I certify, in accordance with 37 CFR 1.4(d)(4) that I am:

☒ An attorney or agent registered to practice before the Patent and Trademark Office who is of record in this application

Registration Number 70453

☐ A sole inventor

☐ A joint inventor; I certify that I am authorized to sign this submission on behalf of all of the inventors as evidenced by the power of attorney in the application

☐ A joint inventor; all of whom are signing this request

Signature	/Jonathan B. Thielbar/
Name	Jonathan B. Thielbar

*Statement under 37 CFR 3.73(b) is required if terminal disclaimer is signed by the assignee (owner).
Form PTO/SB/96 may be used for making this certification. See MPEP § 324.

Electronic Patent Application Fee Transmittal

Application Number:	15263018			
Filing Date:	12-Sep-2016			
Title of Invention:	GOLF CLUB HEADS AND METHODS TO MANUFACTURE GOLF CLUB HEADS			
First Named Inventor/Applicant Name:	Robert R. Parsons			
Filer:	Jonathan Burgess Thielbar/Rolanda Crawford			
Attorney Docket Number:	P-15-008-U02-US/30161			
Filed as Large Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
STATUTORY OR TERMINAL DISCLAIMER	1814	1	160	160
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				160

Doc Code: DISQ.E.FILE

Document Description: Electronic Terminal Disclaimer – Approved

Application No.: 15263018

Filing Date: 12-Sep-2016

Applicant/Patent under Reexamination: Parsons

Electronic Terminal Disclaimer filed on August 28, 2017

☒ APPROVED

This patent is subject to a terminal disclaimer

☐ DISAPPROVED

Approved/Disapproved by: Electronic Terminal Disclaimer automatically approved by EFS-Web

U.S. Patent and Trademark Office

Electronic Acknowledgement Receipt

EFS ID:	30198014
Application Number:	15263018
International Application Number:	
Confirmation Number:	6484
Title of Invention:	GOLF CLUB HEADS AND METHODS TO MANUFACTURE GOLF CLUB HEADS
First Named Inventor/Applicant Name:	Robert R. Parsons
Customer Number:	122021
Filer:	Jonathan Burgess Thielbar/Rolanda Crawford
Filer Authorized By:	Jonathan Burgess Thielbar
Attorney Docket Number:	P-15-008-U02-US/30161
Receipt Date:	28-AUG-2017
Filing Date:	12-SEP-2016
Time Stamp:	17:14:28
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$ 160
RAM confirmation Number	082917INTEFSW17142600
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

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File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Terminal Disclaimer-Filed (Electronic)	eTerminal-Disclaimer.pdf	35909	no	3
			abf68f7f471c3eb200bf60f6e53429e6c892f18d		
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30631	no	2
			8335891a298931233d1c1e49b7bb1f4227969909		
Warnings:					
Information:					
Total Files Size (in bytes):			66540		
<p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p><u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>					

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

<i>In re</i> Patent Application of:)	Group Art Unit: 3711
Robert R. Parsons et al.)	
)	Examiner: Passaniti, Sebastiano
Application No. 15/263,018)	
)	Confirmation No.: 6484
Filed: September 12, 2016)	
)	
For: GOLF CLUB HEADS AND METHODS TO)	
MANUFACTURE GOLF CLUB HEADS)	

RESPONSE TO OFFICE ACTION DATED AUGUST 8, 2017

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

In response to the Office action dated August 8, 2017, please consider the following.

Amendments to the Claims begin on page 2 of this paper.

Remarks begin on page 8 of this paper.

Applicants do not believe that an extension of time fee or other fees are required beyond those that may otherwise be provided for in documents accompanying this paper. However, if additional extensions of time are necessary to prevent abandonment of this application, then Applicant petitions such extensions of time under 37 C.F.R. § 1.136(a), and authorize the charging of any required fees to our Deposit Account No. 502876.

AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A golf club head comprising:

a face portion;

a ~~hollow~~ body portion having ~~a face portion~~, a toe portion, a top portion, a sole portion, a back portion, and an interior cavity extending between the top and sole portions; ~~[[and]]~~

a plurality of exterior ports at least one port located closer to the toe portion than the heel portion and connected to the interior cavity; along a periphery of the back portion below a horizontal midplane of the golf club head;

at least one weight portion located closer to the heel portion than the at least one port;

wherein the interior cavity is filled with a polymer material from the at least one port,
~~wherein a width of the interior cavity below the horizontal midplane is greater than or equal to 20% of a width of the hollow body portion below the horizontal midplane and less than or equal to 80% of a width of the hollow body portion below the horizontal midplane, and~~

wherein more than 50% of a mass of the body portion is located below ~~[[the]]~~ a horizontal midplane of the golf club head, and

wherein a portion of the at least one weight portion is closer to the face portion than a portion of the polymer material in the interior cavity.

2. (Currently Amended) A golf club head as defined in claim 1 ~~further comprising~~
wherein the at least one port is located at or near a periphery of the body portion above the horizontal midplane.

3. (Currently Amended) A golf club head as defined in claim 1, wherein the at least one port is located at or below the horizontal midplane ~~each of the plurality of exterior ports is associated with a port diameter, and wherein at least two adjacent exterior ports are separated by less than the port diameter.~~

4. (Currently Amended) A golf club head as defined in claim 1, wherein the ~~interior cavity is partially or entirely filled with~~ polymer material ~~is an elastic polymer material.~~

5. (Currently Amended) A golf club head as defined in claim 1 wherein the at least one weight portion is located below the horizontal midplane and is located closer to the toe portion than the heel portion ~~further comprising a plurality of weight portions, wherein each port of the plurality of exterior ports is configured to receive a weight portion of the plurality of weight portions.~~

6. (Currently Amended) A golf club head as defined in claim 1, wherein a width of the interior cavity at or below the horizontal midplane and above the at least one weight portion is greater than a width of the interior cavity near the top portion and greater than a width of the interior cavity near the sole portion ~~at least one of the exterior ports is connected to the interior cavity, and wherein the interior cavity is partially or entirely filled with an elastic polymer material from the at least one exterior port.~~

7. (Currently Amended) A golf club head as defined in claim 1, wherein the face portion comprises a thickness of less than or equal to 1.9 millimeters (0.075 inch) ~~4.5 millimeters (0.06 inch)~~.

8. (Currently Amended) An iron-type golf club head comprising:

- a face portion;
- a ~~hollow~~ body portion having ~~a face portion~~, a toe portion, a top portion, a sole portion, a back portion, and an interior cavity extending between the top and sole portions;
- at least one port connected to the interior cavity;
- an elastic polymer material injection molded in the interior cavity through the at least one port ~~an opening on the back portion to structurally support the face portion during impact with a golf ball;~~ and
- ~~a plurality of weight portions~~ at least one weight portion coupled to the ~~hollow~~ body portion at a location below a horizontal midplane of the golf club head,
- ~~wherein at least 50% of the elastic polymer material in the interior cavity is below the horizontal midplane of the golf club head~~
- wherein a width of the interior cavity at or below the horizontal midplane and above the at least one weight portion is greater than a width of the interior cavity near the top portion and greater than a width of the interior cavity between the at least one weight portion and the face portion.

9. (Original) An iron-type golf club head as defined in claim 8 further comprising a bonding portion configured to bond the elastic polymer material to the face portion.

10. (Original) An iron-type golf club head as defined in claim 8, wherein the interior cavity comprises a cavity having at least 50% filled with a thermoplastic elastomer material.

11. (Original) An iron-type golf club head as defined in claim 8, wherein a portion of the interior cavity is configured to separate the face portion and the at least one weight portion ~~plurality of weight portions~~.

12. (Currently Amended) An iron-type golf club head as defined in claim 8, wherein the face portion comprises a thickness of less than or equal to 1.9 millimeters (0.075 inch) ~~4.5 millimeters (0.06 inch)~~.

13. (Canceled)

14. (Canceled)

15. (Canceled)

16. (Canceled)

17. (Canceled)

18. (Canceled)

19. (Canceled)

20. (Canceled)

21. (New) A golf club head comprising:

a face portion;

a body portion having a toe portion, a top portion, a sole portion, a back portion, and an interior cavity extending between the top and sole portions;

at least one port located closer to the toe portion than the heel portion and connected to the interior cavity; and

at least one weight portion located closer the toe portion than the heel portion and located between the at least one port and the heel portion,

wherein the interior cavity is filled with a polymer material from the at least one port, and

wherein a first portion of the polymer material above a horizontal midplane of the body portion has a first width, a second portion of the polymer material below the horizontal midplane has a second width greater than the first width, and a third portion of the polymer material between the first width and the second width has a third width greater than the first width and greater than the second width, and wherein the third width is located between the at least one weight portion and the top portion.

22. (New) A golf club head as defined in claim 1, wherein the third width is between the at least one weight portion and the horizontal midplane.

23. (New) A golf club head as defined in claim 1, wherein a portion of the at least one weight portion is closer to the face portion than a portion of the polymer material in the interior cavity.

24. (New) A golf club head as defined in claim 1, wherein the at least one port is located at or below the horizontal midplane.

25. (New) A golf club head as defined in claim 1, wherein the at least one weight portion is located below the horizontal midplane.

26. (New) A golf club head as defined in claim 1, wherein the at least one weight portion is closer to the sole portion than the at least one port.

27. (New) A golf club head as defined in claim 1, wherein the polymer material is an elastic polymer material.

28. (New) A golf club head as defined in claim 1, wherein the face portion comprises a thickness of less than or equal to 1.9 millimeters (0.075 inch).

REMARKS

Claims 1-12 and 21-28 are pending. Claims 13-20 have been canceled.

Claims 1-20 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-20 of USPN 9,468,821. Claims 8 and 10-12 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-20 of USPN 9,421,437. Claim 9 is rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-20 of USPN 9,421,437 in view of Hosokawa (USPN 5,647,808). Claims 8-12 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-20 of USPN 9,364,727. Claims 8 and 10-12 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-20 of USPN 9,346,203. Claim 9 is rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-20 of USPN 9,346,203 in view of Hosokawa (USPN 5,647,808). Claims 8 and 10-12 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-20 of USPN 9,345,938. Claim 9 is rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-20 of USPN 9,345,938 in view of Hosokawa (USPN 5,647,808). Claims 8 and 10-12 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-20 of USPN 9,199,143. Claim 9 is rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-20 of USPN 9,199,143 in view of Hosokawa (USPN 5,647,808). Claims 8 and 10-12 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-20 of USPN 8,961,336. Claim 9 is rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over

claims 1-20 of USPN 8,961,336 in view of Hosokawa (USPN 5,647,808). Terminal Disclaimers are being filed herewith to overcome the double patenting rejections.

Claim 8 has been objected to for an informality noted on page 10 of the Office action. Claim 8 has been amended to corrected the noted informality.

Claims 1-8 and 10-12 are rejected under 35 U.S.C. 103 as being unpatentable over Hsu (USPN 5,899,821) in view of Takeda (USPN 6,290,609).

Claim 1 has been amended to recite “at least one weight portion located closer to the heel portion than the at least one port,” and “wherein a portion of the at least one weight portion is closer to the face portion than a portion of the polymer material in the interior cavity.” The noted amendment is supported in FIGS. 7-9, 18, and 37-42. Hsu and Takeda do not teach or suggest the noted elements of claim 1. Therefore, Claim 1 and dependent claims 2-7 are patentable over Hsu in view of Takeda.

Claim 8 has been amended to recite “wherein a width of the interior cavity at or below the horizontal midplane and above the at least one weight portion is greater than a width of the interior cavity near the top portion and greater than a width of the interior cavity between the at least one weight portion and the face portion.” The noted amendment is supported in FIGS. 7-9, 18, and 37-42. Hsu and Takeda do not teach or suggest the noted elements of claim 8. Therefore, Claim 8 and dependent claims 10-12 are patentable over Hsu in view of Takeda.

Claim 9 is are rejected under 35 U.S.C. 103 as being unpatentable over Hsu (USPN 5,899,821) in view of Takeda (USPN 6,290,609) and Hosokawa (USPN 5,647,808). Claim 8 is patentable over Hsu in view of Takeda as discussed above. Therefore, claim 9 is patentable over Hsu in view of Takeda and Hosokawa.

Claims 13-15 are rejected under 35 U.S.C. 103 as being unpatentable over Wahl (USPN 6,811,496). Claims 16, 18 and 19 are rejected under 35 U.S.C. 103 as being unpatentable over Wahl in view of Hsu. Claim 17 is rejected under 35 U.S.C. 103 as being unpatentable over Wahl in view of Hsu and Hosokawa. Claim 20 is rejected under 35 U.S.C. 103 as being unpatentable over Wahl in view of Takeda. Claims 13- 20 have been canceled.

Applicant has amended dependent claims 2-7, 11 and 12 so that the languages thereof correspond to the amended language of the base independent claim. No new matter is added.

New claims 21-28 have been presented. Claim 21 recites “wherein a first portion of the polymer material above a horizontal midplane of the body portion has a first width, a second portion of the polymer material below the horizontal midplane has a second width greater than the first width, and a third portion of the polymer material between the first width and the second width has a third width greater than the first width and greater than the second width, and wherein the third width is located between the at least one weight portion and the top portion.” The noted elements of claim 21 are supported in FIGS. 7-9, 18, and 37-42 Hsu, Takeda, Hosokawa and Wahl when considered alone or in combination do not teach or suggest the noted elements of claim 21. Therefore, claim 21 is patentable over Hsu, Takeda, Hosokawa and Wahl. Claims 22-28 are similar to the other pending dependent claims. No new matter is added.

Conclusion

In view of the above, Applicant believes that the claims are in condition for allowance. The Examiner is invited to contact Applicant's undersigned counsel to expedite the prosecution of this case should there be any unresolved matters remaining.

Date: August 28, 2017

Respectfully submitted,
LOEB & LOEB LLP

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Jonathan B. Thielbar, Reg. No. 70,453
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LOEB & LOEB LLP
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Chicago, Illinois 60654

Electronic Acknowledgement Receipt

EFS ID:	30197096
Application Number:	15263018
International Application Number:	
Confirmation Number:	6484
Title of Invention:	GOLF CLUB HEADS AND METHODS TO MANUFACTURE GOLF CLUB HEADS
First Named Inventor/Applicant Name:	Robert R. Parsons
Customer Number:	122021
Filer:	Jonathan Burgess Thielbar/Rolanda Crawford
Filer Authorized By:	Jonathan Burgess Thielbar
Attorney Docket Number:	P-15-008-U02-US/30161
Receipt Date:	28-AUG-2017
Filing Date:	12-SEP-2016
Time Stamp:	17:17:40
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		222769-30161_ROA.pdf	58745	yes	11
			4500ed02a0e29d1041d2d5952d23ed29e4373f4d		

	Multipart Description/PDF files in .zip description		
	Document Description	Start	End
	Amendment/Req. Reconsideration-After Non-Final Reject	1	1
	Claims	2	7
	Applicant Arguments/Remarks Made in an Amendment	8	11

Warnings:

Information:

Total Files Size (in bytes):	58745
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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 15/263,018	Filing Date 09/12/2016	<input type="checkbox"/> To be Mailed
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ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

(Column 1)

(Column 2)

FOR	NUMBER FILED	NUMBER EXTRA		RATE (\$)	FEE (\$)
<input type="checkbox"/> BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
<input type="checkbox"/> SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
<input type="checkbox"/> EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		X \$ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		X \$ =	
<input type="checkbox"/> APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED – PART II

(Column 1)

(Column 2)

(Column 3)

	08/28/2017	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE (\$)	ADDITIONAL FEE (\$)
AMENDMENT	Total (37 CFR 1.16(i))	* 20	Minus	** 20	= 0		X \$80 =	0
	Independent (37 CFR 1.16(h))	* 3	Minus	*** 3	= 0		X \$420 =	0
	<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))							
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
	TOTAL ADD'L FEE							0

(Column 1)

(Column 2)

(Column 3)

		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE (\$)	ADDITIONAL FEE (\$)
AMENDMENT	Total (37 CFR 1.16(i))	*	Minus	**	=		X \$ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		X \$ =	
	<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))							
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
	TOTAL ADD'L FEE							

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
ZETA ADAMS

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		15263018
	Filing Date		2016-09-12
	First Named Inventor	Robert R. Parsons	
	Art Unit	3711	
	Examiner Name	PASSANITI, SEBASTIANO	
	Attorney Docket Number	P-15-008-U02-US/30161	

U.S. PATENTS						
Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
	1					

If you wish to add additional U.S. Patent citation information please click the Add button.

U.S. PATENT APPLICATION PUBLICATIONS						
Examiner Initial*	Cite No	Publication Number	Kind Code ¹	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
	1	20080318706	A1	2008-12-25	Larson	

If you wish to add additional U.S. Published Application citation information please click the Add button.

FOREIGN PATENT DOCUMENTS								
Examiner Initial*	Cite No	Foreign Document Number ³	Country Code ²	Kind Code ⁴	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear	T ⁵
	1							<input type="checkbox"/>

If you wish to add additional Foreign Patent Document citation information please click the Add button

NON-PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T ⁵

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
(Not for submission under 37 CFR 1.99)

Application Number	15263018
Filing Date	2016-09-12
First Named Inventor	Robert R. Parsons
Art Unit	3711
Examiner Name	PASSANITI, SEBASTIANO
Attorney Docket Number	P-15-008-U02-US/30161

1	Taylor Made Golf Company, Inc., https://taylormadegolf.com/on/demandware.static/-/Sites-TMaG-Library/default/v1459859109590/docs/productspecs/TM_S2013_Catalog18.pdf , published January 2013, cited by applicant.	<input type="checkbox"/>
2	RocketBladez Press Release, "GolfBalled", http://golfballed.com/index.php?option=com_content&view=article&id=724:taylormade-...10/13/2017 , published January 3, 2013, cited by applicant.	<input type="checkbox"/>

If you wish to add additional non-patent literature document citation information please click the Add button

EXAMINER SIGNATURE

Examiner Signature		Date Considered	
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*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

¹ See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. ² Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). ³ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁴ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁵ Applicant is to place a check mark here if English language translation is attached.

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
(Not for submission under 37 CFR 1.99)

Application Number	15263018
Filing Date	2016-09-12
First Named Inventor	Robert R. Parsons
Art Unit	3711
Examiner Name	PASSANITI, SEBASTIANO
Attorney Docket Number	P-15-008-U02-US/30161

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☒ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Jonathan B. Thielbar/	Date (YYYY-MM-DD)	2017-11-08
Name/Print	Jonathan B. Thielbar	Registration Number	70453

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Patent Application Fee Transmittal

Application Number:	15263018			
Filing Date:	12-Sep-2016			
Title of Invention:	GOLF CLUB HEADS AND METHODS TO MANUFACTURE GOLF CLUB HEADS			
First Named Inventor/Applicant Name:	Robert R. Parsons			
Filer:	Jonathan Burgess Thielbar/Rolanda Crawford			
Attorney Docket Number:	P-15-008-U02-US/30161			
Filed as Large Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Submission- Information Disclosure Stmt	1806	1	180	180
Total in USD (\$)				180

Electronic Acknowledgement Receipt

EFS ID:	30895557
Application Number:	15263018
International Application Number:	
Confirmation Number:	6484
Title of Invention:	GOLF CLUB HEADS AND METHODS TO MANUFACTURE GOLF CLUB HEADS
First Named Inventor/Applicant Name:	Robert R. Parsons
Customer Number:	122021
Filer:	Jonathan Burgess Thielbar/Rolanda Crawford
Filer Authorized By:	Jonathan Burgess Thielbar
Attorney Docket Number:	P-15-008-U02-US/30161
Receipt Date:	08-NOV-2017
Filing Date:	12-SEP-2016
Time Stamp:	17:59:34
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$ 180
RAM confirmation Number	110917INTEFSW18002700
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

000215

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	222769-30161_IDS.pdf	65507	no	4
			b19265de550078e0e9d4aaeb8de37366ee8dc4dc		
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
2	Other Reference-Patent/App/Search documents	RocketBladez_Press_Release.pdf	177367	no	3
			d4732fc0bea458259ae1b153be6c53ac6d86deb8		
Warnings:					
Information:					
3	Other Reference-Patent/App/Search documents	TM_S2013_Catalog18.pdf	532086	no	1
			e7f3ce7e7af544e733d796983ab8685730392dd7		
Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	30696	no	2
			0ca0a21247096a9518aac1aa6f91f50ccdbca66c		
Warnings:					
Information:					
Total Files Size (in bytes):			805656		

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

122021 7590 12/18/2017
Loeb & Loeb LLP
321 North Clark Street Suite 2300
Chicago, IL 60654

EXAMINER

PASSANITI, SEBASTIANO

ART UNIT

PAPER NUMBER

3711

DATE MAILED: 12/18/2017

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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15/263,018

09/12/2016

Robert R. Parsons

P-15-008-U02-US/30161

6484

TITLE OF INVENTION: GOLF CLUB HEADS AND METHODS TO MANUFACTURE GOLF CLUB HEADS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$960	\$0	\$0	\$960	03/19/2018

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: **Mail** **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

122021 7590 12/18/2017
Loeb & Loeb LLP
321 North Clark Street Suite 2300
Chicago, IL 60654

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/263,018	09/12/2016	Robert R. Parsons	P-15-008-U02-US/30161	6484

TITLE OF INVENTION: GOLF CLUB HEADS AND METHODS TO MANUFACTURE GOLF CLUB HEADS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$960	\$0	\$0	\$960	03/19/2018

EXAMINER	ART UNIT	CLASS-SUBCLASS
PASSANITI, SEBASTIANO	3711	473-332000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

- (1) The names of up to 3 registered patent attorneys or agents OR, alternatively, 1 _____
- (2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. 2 _____
- 3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

- ☐ Issue Fee
- ☐ Publication Fee (No small entity discount permitted)
- ☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)

- ☐ A check is enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached.
- ☐ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. Change in Entity Status (from status indicated above)

- ☐ Applicant certifying micro entity status. See 37 CFR 1.29
- ☐ Applicant asserting small entity status. See 37 CFR 1.27
- ☐ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____

Date _____

Typed or printed name _____

Registration No. _____



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/263,018	09/12/2016	Robert R. Parsons	P-15-008-U02-US/30161	6484
122021	7590	12/18/2017	EXAMINER	
Loeb & Loeb LLP 321 North Clark Street Suite 2300 Chicago, IL 60654			PASSANITI, SEBASTIANO	
			ART UNIT	PAPER NUMBER
			3711	
DATE MAILED: 12/18/2017				

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No. 15/263,018	Applicant(s) PARSONS ET AL.	
	Examiner SEBASTIANO PASSANITI	Art Unit 3711	AIA (First Inventor to File) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to Amendment and Terminal Disclaimer (08/28/2017); IDS (11/08/2017).
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are 1-12 and 21-28. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

- a) ☐ All b) ☐ Some *c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|--|--|
| 1. <input type="checkbox"/> Notice of References Cited (PTO-892) | 5. <input checked="" type="checkbox"/> Examiner's Amendment/Comment |
| 2. <input checked="" type="checkbox"/> Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date <u>11/08/2017</u> | 6. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| 3. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 7. <input type="checkbox"/> Other _____. |
| 4. <input checked="" type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date <u>hereto</u> . | |

/SEBASTIANO PASSANITI/
Primary Examiner, Art Unit 3711

DETAILED ACTION

This Office action is responsive to communication received 08/28/2017 – Amendment and Terminal Disclaimer; 11/08/2017 – IDS.

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

EXAMINER'S AMENDMENT

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in an interview with Jonathan Thielbar on December 01, 2017.

The following changes have been made in the specification and in the claims in accordance with the interview of 12/01/2017 in order to provide proper antecedent basis in the specification for the claimed subject matter and to overcome further minor objections in the claims along with the correction of the dependency of certain claims.

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IN THE SPECIFICATION:

Original paragraph [0116] has been REPLACED with the following, amended paragraph [0116]:

[0116] Turning to FIG. 37, for example, the first and second sets of weight portions 3320 and 3330, respectively, may be located away from the back surface 3366 of the face portion 3362 (e.g., not directly coupled to each other). That is, the first and second sets of weight portions 3320 and 3330, respectively, and the back surface 3366 may be partially or entirely separated by an interior cavity 3800 of the body portion 3300. For example, each exterior weight port of the first and second sets of exterior weight ports 3320 and 3330 may include an opening (e.g., generally shown as 3820 and 3830) and a port wall (e.g., generally shown as 3825 and 3835). The port walls 3825 and 3835 may be integral portions of the back wall portion 3510 (e.g., a section of the back wall portion 3510). Each of the openings 3820 and 3830 may be configured to receive a weight portion such as weight portions 3321 and 3335, respectively. The opening 3820 may be located at one end of the weight port 3521, and the port wall 3825 may be located or proximate to at an opposite end of the weight port 3521. In a similar manner, the opening 3830 may be located at one end of the weight port 3535, and the port wall 3835 may be located at or proximate to an opposite end of the weight port 3535. The port walls 3825 and 3835 may be separated from the face portion 3362 (e.g., separated by the interior cavity 3800). Each port wall of the first set of weight ports 3520, such as the port wall 3825 may have a distance 3826 from the back surface 3366 of the face portion

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3362 as shown in FIG. 37. Each port wall of the second set of weight ports 3530, such as the port wall 3835 may have a distance 3836 from the back surface 3366 of the face portion 3362. The distances 3826 and 3836 may be determined to optimize the location of the center of gravity of the golf club head 3300 when the first and second sets of weight ports 3520 and 3530, respectively, receive weight portions as described herein. According to one example, the distance 3836 may be greater than the distance 3826 so that the center of gravity of the golf club head 3300 is moved toward the back portion 3370 and/or lowered toward the sole portion 3390. According to one example, the distance 3836 may be greater than the distance 3826 by a factor ranging from about 1.5 to about 4. In other words, the distance 3836 may be about 1.5 times to about 4 times greater than the distance 3826. As a result, a width 3840 (shown in FIG. 38) of a portion of the interior cavity 3800 below the horizontal midplane 4120 may be greater than a width 3842 of the interior cavity 3800 above the horizontal midplane 4120. As shown in the figures (e.g., FIGs. 8, 9, 18, 37, 38, 39, 40, and/or 41) the apparatus, methods, and articles of manufacture described herein may include at least a portion of at least a weight portion (e.g., the first set of weight portions or the second set of weight portions) closer to the face portion than at least a portion of a polymer material in the interior cavity. In one example as illustrated FIGs. 37-41, at least a portion of at least one of the weight portions of the first set of weight portions 3320 (e.g., one generally shown as 3321 and/or 3322) or the second set of weight portions 3330 (e.g., one generally shown as 3331, 3332, 3333, 3334, and/or 3335) may be closer to the face portion 3362 than at least a portion of a polymer material which may partially or entirely fill the interior cavity

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3800. The apparatus, methods, and articles of manufacture described herein are not limited in this regard.

Original paragraph [0125] has been REPLACED with the following, amended paragraph [0125]:

[0125] The interior cavity 3800 may be associated with a cavity width 3840 (W_C), and the body portion 3310 may be associated with a body width 3990 (W_B). The cavity width 3840 and the body width 3990 may vary between the top portion 3380 and the sole portion 3390 and between the toe portion 3340 and the heel portion 3350. The cavity width 3840 may be at least 50% of a body width 3990 ($W_C > 0.5 * W_B$) at certain regions on the body portion 3310 between the top and sole portions 3370 and 3390 and between the toe and heel portions 3340 and 3350. According to another example, the cavity width 3840 may vary between about 40% - 60% of a body width 3990 at certain regions between the top and sole portions 3380 and 3390. According to another example, the cavity width 3840 may vary between about 30% - 70% of a body width 3990 at certain regions between the top and sole portions 3380 and 3390. According to another example, the cavity width 3840 may vary between about 20% - 80% of a body width 3990 at certain regions between the top and sole portions 3380. For example, the cavity width 3840 may vary between about 20% - 80% of the body width 3990 at or below the horizontal midplane 4120. With the cavity width 3890 of the interior cavity 3800 that may vary between about 20% or more to about 80% or less of the body width

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3990 at or below the horizontal midplane 4120, a substantial portion of the mass of the golf club head 3300 may be moved lower and farther back as compared to a golf club head with a cavity width of less than about 20% of the body width. Further, the golf club head 3300 may produce relatively more consistent feel, sound, and/or result when the golf club head 3300 strikes a golf ball via the face portion 3362 than a golf club head with a cavity width of less than about 20% of the body width. In one example as illustrated in FIGs. 37-41, the cavity width 3890 at or below the horizontal midplane 4120 and above at least one weight portion (e.g., one generally shown as 3331, 3332, 3333, 3334, and/or 3335) may be greater than a cavity width (e.g., one generally shown as 3842 in FIG. 38) of the interior cavity 3800 at or near the top portion 3380 of the body portion 3310 and greater than a cavity width (e.g., one generally shown as 3840 in FIG. 38) of the interior cavity 3800 at or near the sole portion 3390. The apparatus, methods, and articles of manufacture described herein are not limited in this regard.

Original paragraph [0130] has been REPLACED with the following, amended paragraph [0130]:

[0130] As described herein, the cavity width 3840 may vary between about 20%-80% of a body width 3990 at or below the horizontal midplane 4120. According to one example, at least 50% of the elastic polymer or elastomer material partially or filling the interior cavity 3800 may be located below the horizontal midplane 4120 of the golf club head 3300. Accordingly, the center of gravity of the golf club head 3300 may be further

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lowered and moved farther back as compared to a golf club head with a cavity width of less than about 20% of the body width and that is partially or fully filled with an elastic polymer or elastomer material. Further, the golf club head 3300 may produce relatively more consistent feel, sound, and/or result when the golf club head 3300 strikes a golf ball via the face portion 3362 as compared to a golf club head with a cavity width of less than about 20% of the body width that is partially or fully filled with an elastic polymer material. In one example as illustrated in FIGs. 37-41, the elastic polymer material or the elastomer material in the interior cavity 3800 may have a first portion located above the horizontal midplane 4120, a second portion located below the horizontal midplane 4120, and a third portion located between the first portion and the second portion. The first portion may have a first width, the second portion may have a second width greater than the first width, and the third portion may have a third width greater than the first width and greater than the second width. In one example, the third portion may be located between at least one weight portion (e.g., one generally shown as 3331, 3332, 3333, 3334, and/or 3335) and the top portion 3380 of the body portion 3310. In another example, the third portion may be located between at least one weight portion (e.g., one generally shown as 3331, 3332, 3333, 3334, and/or 3335) and the horizontal midplane 4120. In yet another example, at least a portion of at least one weight portion (e.g., one generally shown as 3331, 3332, 3333, 3334, and/or-3335) may be closer to the face portion 3362 than at least a portion of the elastic polymer material or the elastomer material in the interior cavity 3800.

IN THE CLAIMS:

Claim 1 – line 3, after “toe portion,” the phrase --a heel portion, -- has been INSERTED;

Claim 21 – line 3, after “toe portion,” the phrase --a heel portion, -- has been INSERTED;

Claim 21 – line 13, “width” (first and second occurrences) have been CHANGED to --portion--;

Claim 21 – line 14, “width” (third occurrence) has been CHANGED to --portion--;

Claim 23 – line 1, “1” has been CHANGED to --21-;

Claim 24 – line 1, “1” has been CHANGED to --21-;

Claim 26 – line 1, “1” has been CHANGED to --21-;

Claim 28 – line 1, “1” has been CHANGED to --21-.

REASONS FOR ALLOWANCE

The following is an examiner’s statement of reasons for allowance:

As to independent claim 1, the specific combination of a body portion, a face portion and an interior cavity containing a polymer material, with the claimed port and weight portion located with respect to portions of the body or cavity, as claimed, and with the mass of the body portion distributed with respect to the horizontal midplane, is not shown, suggested or rendered obvious by the prior art of record.

As to independent claim 8, the specific combination of a body portion, a face portion and an interior cavity containing a polymer material, with the claimed port and

Art Unit: 3711

weight portion located with respect to portions of the body or cavity, as claimed, and with the width of the interior cavity varying, as claimed, is not shown, suggested or rendered obvious by the prior art of record.

As to independent claim 21, the specific combination of a body portion, a face portion and an interior cavity containing a polymer material, with the claimed port and weight portion located with respect to portions of the body or cavity, as claimed, and with the width of the polymer material varying, as claimed, is not shown, suggested or rendered obvious by the prior art of record.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SEBASTIANO PASSANITI whose telephone number is (571)272-4413. The examiner can normally be reached on Monday through Friday (9:00AM - 5:30PM).

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at <http://www.uspto.gov/interviewpractice>.

Art Unit: 3711

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Melba N. Bumgarner can be reached on 571-272-4709. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Sebastiano Passaniti/
Primary Examiner
Art Unit 3711

S.Passaniti/sp
December 1, 2017

<i>Examiner-Initiated Interview Summary</i>	Application No. 15/263,018	Applicant(s) PARSONS ET AL.	
	Examiner SEBASTIANO PASSANITI	Art Unit 3711	

All participants (applicant, applicant's representative, PTO personnel):

(1) SEBASTIANO PASSANITI. (3) ____.

(2) JONATHAN THIELBAR (Reg. No. 70,453). (4) ____.

Date of Interview: 01 December 2017.

Type: ☒ Telephonic ☐ Video Conference
 ☐ Personal [copy given to: ☐ applicant ☐ applicant's representative]

Exhibit shown or demonstration conducted: ☐ Yes ☐ No.
 If Yes, brief description: _____.

Issues Discussed ☐101 ☐112 ☐102 ☐103 ☒Others
 (For each of the checked box(es) above, please describe below the issue and detailed description of the discussion)

Claim(s) discussed: 1-12 and 21-28.

Identification of prior art discussed: None.

Substance of Interview
 (For each issue discussed, provide a detailed description and indicate if agreement was reached. Some topics may include: identification or clarification of a reference or a portion thereof, claim interpretation, proposed amendments, arguments of any applied references etc...)

The examiner noted that some of the claim language presented with the 08/28/2017 amendment lacks proper antecedent basis in the specifications. The applicant proposed amendments to the specification to provide proper antecedent basis for the claimed subject matter, noting that no new matter is being added. The applicant's attorney proposed some further changes to the claims to provide corrections to claims 1 and 21 to provide proper antecedent basis for "the heel portion" and corrections to claims 22-28 to correct the dependency of these claims. Applicant's proposed changes were submitted via facsimile (received 11/08/2017) and will be incorporated via an examiner's amendment.

Applicant recordation instructions: It is not necessary for applicant to provide a separate record of the substance of interview.

Examiner recordation instructions: Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

☒ Attachment

/SEBASTIANO PASSANITI/ Primary Examiner, Art Unit 3711	
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Doc code: IDS

PTO/SB/08a (03-15)

Doc description: Information Disclosure Statement (IDS) Filed

Approved for use through 07/31/2016. OMB 0651-0031

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		15263018	
	Filing Date		2016-09-12	
	First Named Inventor	Robert R. Parsons		
	Art Unit	3711		
	Examiner Name	PASSANITI, SEBASTIANO		
	Attorney Docket Number	P-15-008-U02-US/30161		

U.S.PATENTS						
Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1					

If you wish to add additional U.S. Patent citation information please click the Add button.

U.S.PATENT APPLICATION PUBLICATIONS						
Examiner Initial*	Cite No	Publication Number	Kind Code ¹	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20080318706	A1	2008-12-25	Larson	

If you wish to add additional U.S. Published Application citation information please click the Add button.

FOREIGN PATENT DOCUMENTS								
Examiner Initial*	Cite No	Foreign Document Number ³	Country Code ²	Kind Code ⁴	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T ⁵
	1							<input type="checkbox"/>

If you wish to add additional Foreign Patent Document citation information please click the Add button

NON-PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T ⁵

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
(Not for submission under 37 CFR 1.99)

Application Number	15263018
Filing Date	2016-09-12
First Named Inventor	Robert R. Parsons
Art Unit	3711
Examiner Name	PASSANITI, SEBASTIANO
Attorney Docket Number	P-15-008-U02-US/30161

1	Taylor Made Golf Company, Inc., https://taylormadegolf.com/on/demandware.static/-/Sites-TMaG-Library/default/v1459859109590/docs/productspecs/TM_S2013_Catalog18.pdf , published January 2013, cited by applicant.	<input type="checkbox"/>
2	RocketBladez Press Release, "GolfBalled", http://golfballed.com/index.php?option=com_content&view=article&id=724:taylormade-...10/13/2017 , published January 3, 2013, cited by applicant.	<input type="checkbox"/>


If you wish to add additional non-patent literature document citation information please click the Add button

EXAMINER SIGNATURE

Examiner Signature	/SEBASTIANO PASSANITI/	Date Considered	11/09/2017
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*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

¹ See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. ² Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). ³ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁴ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST 16 if possible. ⁵ Applicant is to place a check mark here if English language translation is attached.

Search Notes 	Application/Control No. 15263018	Applicant(s)/Patent Under Reexamination PARSONS ET AL.
	Examiner SEBASTIANO PASSANITI	Art Unit 3711

CPC- SEARCHED		
Symbol	Date	Examiner
A63B53/0475	08/02/2017	/SP/
A63B53/0466	08/02/2017	/SP/
A63B53/047	08/02/2017	/SP/
A63B2053/0408	08/02/2017	/SP/
A63B2053/0416	08/02/2017	/SP/
A63B2053/0491	08/02/2017	/SP/
A63B2209/00	08/02/2017	/SP/
ABOVE UPDATED	11/06/2017	/SP/
ABOVE UPDATED	12/01/2017	/SP/
A63B2053/0445	12/01/2017	/SP/

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
473	324-350	08/02/2017	/SP/
473	287-292	08/02/2017	/SP/
ABOVE	UPDATED	11/06/2017	/SP/
ABOVE	UPDATED	12/01/2017	/SP/

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

SEARCH NOTES		
Search Notes	Date	Examiner
Inventor name searched in PALM	08/02/2017	/SP/
Combined forward/backward citation search of prior art of record	08/02/2017	/SP/
Review of Continuity Data Map in PE2E	08/02/2017	/SP/
Review of parent applications, as identified on Application Filing Receipt	08/02/2017	/SP/

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SEARCH NOTES

Search Notes	Date	Examiner
Review of CLAIMS and PLUS search performed by STIC	08/02/2017	/SP/
EAST text search (attached)	08/02/2017	/SP/

INTERFERENCE SEARCH

US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
A63B	53/0475; 53/0466; 53/047; 2053/0408; 2053/0416; 2053/0491; 2209/00; 2053/0445	12/01/2017	/SP/

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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L10	4	(portion and cavity and face and weight and polymer and heel and between and width and first and second).clm.	US-PGPUB; USPAT	OR	OFF	2017/12/01 15:45
L9	0	(elastic and polymer and closer adj4 face and weight and portion and cavity and extending and sole and width and golf and body).clm.	US-PGPUB; USPAT	OR	OFF	2017/12/01 15:45
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L7	0	(50% adj3 mass adj3 body and midplane and horizontal and golf and sole and back and toe and heel and interior and face and thickness).clm.	US-PGPUB; USPAT	OR	OFF	2017/12/01 15:43
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L5	2	(horizontal and midplane and interior and cavity and closer and toe and mass and weight and portion and below and thermoplastic and golf and filled).clm.	US-PGPUB; USPAT	OR	OFF	2017/12/01 15:42
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L3	17	(heel and portion and golf and weight and portion and elastic and cavity and face and mass and body and polymer).clm.	US-PGPUB; USPAT	OR	OFF	2017/12/01 15:40
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S81	8439	((473/324-350) or (473/287-292)).CCLS.	US-PGPUB; USPAT	OR	OFF	2017/12/01 08:46
S80	923	a63b2053/0445.cpc.	US-PGPUB; USPAT	OR	OFF	2017/12/01 08:46
S79	11236	S73 or S74 or S75 or S76 or S77 or S78	US-PGPUB; USPAT	OR	OFF	2017/12/01 08:46
S78	4579	a63b2209/00.cpc.	US-	OR	OFF	2017/12/01

			PGPUB; USPAT			08:46
S77	3381	a63b2053/0491.cpc.	US- PGPUB; USPAT	OR	OFF	2017/12/01 08:46
S76	3778	a63b2053/0416.cpc.	US- PGPUB; USPAT	OR	OFF	2017/12/01 08:46
S75	4088	a63b2053/0408.cpc.	US- PGPUB; USPAT	OR	OFF	2017/12/01 08:46
S74	4040	a63b53/047.cpc.	US- PGPUB; USPAT	OR	OFF	2017/12/01 08:46
S73	5999	a63b53/0466.cpc.	US- PGPUB; USPAT	OR	OFF	2017/12/01 08:46
S72	1	("20080318706").PN.	US- PGPUB; USPAT	OR	OFF	2017/12/01 07:54
S71	140	("1133129" "2328583" "3652094" "4340230" "4754977" "5013041" "5050879" "5297794" "5385348" "5439223" "5599243" "6015354" "6077171").PN. OR ("6290609").URPN.	US- PGPUB; USPAT; USOCR	OR	OFF	2017/11/05 22:45
S70	158	("1133129" "1449559" "1463533" "3059926" "4023801" "4135035" "4340230" "4715601" "4754977" "5024437" "5050879").PN. OR ("6077171").URPN.	US- PGPUB; USPAT; USOCR	OR	OFF	2017/11/05 22:44
S69	2	((("6077171") or ("20110269567")).PN.	US- PGPUB; USPAT	OR	OFF	2017/11/05 22:43
S68	4	((("5899821") or ("6290609") or ("5647808") or ("6811496")).PN.	US- PGPUB; USPAT	OR	OFF	2017/11/05 22:17
S67	1	(interior and cavity and polymer and closer and 50% and horizontal and midplane and weight and portion and face and material and port).clm.	USPAT	OR	OFF	2017/11/05 22:15
S66	3	(interior and cavity and polymer and closer and horizontal and midplane and weight and portion and face and material and port).clm.	USPAT	OR	OFF	2017/11/05 22:14
S65	10	(interior and cavity and polymer and horizontal and midplane and weight and portion and face and material and port).clm.	USPAT	OR	OFF	2017/11/05 22:13
S64	11	(interior and cavity and polymer and horizontal and midplane and weight and portion and face and material).clm.	USPAT	OR	OFF	2017/11/05 22:13
S63	22	(interior and cavity and polymer and horizontal and midplane and weight and portion and face and material).clm.	US- PGPUB; USPAT	OR	OFF	2017/11/05 22:13

EAST Search History (I nterference)

< This search history is empty >

12/ 1/ 2017 3:46:46 PM

C:\Users\spassaniti\Documents\EAST\Workspaces\15263018.wsp

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Date: November 8, 2017**Time:** 4:31 PM Central Time**To:** Sebastiano Passaniti
USPTO**Fax:** 15712734413**From:** Jonathan Thielbar**Fax:** 3122758556
Phone: 212-470-4199
Email: jthielbar@loeb.com**Pages (including Cover):** 12**Re:** U.S. Application No. 15/263,018 - Proposed Examiner Amendments**MESSAGE TO ADDRESSEE:**

Dear Examiner Passaniti,

Please find attached a set of proposed amendments to the specification and claims in U.S. App No. 15/263,018. Please do not hesitate to call me with any further questions at 312-464-3326

Best,
Jon Thielbar
Reg. No. 70,453

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Application Serial No. 15/263,018

PATENT
P-15-008-U02-US/30161**PROPOSED AMENDMENTS TO THE SPECIFICATION**

Please amend the specification as follows. Applicant respectfully submits that no new matter is added by these amendments.

Please replace original paragraph [0116] with the following, amended paragraph [0116]:

[0116] Turning to FIG. 37, for example, the first and second sets of weight portions 3320 and 3330, respectively, may be located away from the back surface 3366 of the face portion 3362 (e.g., not directly coupled to each other). That is, the first and second sets of weight portions 3320 and 3330, respectively, and the back surface 3366 may be partially or entirely separated by an interior cavity 3800 of the body portion 3300. For example, each exterior weight port of the first and second sets of exterior weight ports 3320 and 3330 may include an opening (e.g., generally shown as 3820 and 3830) and a port wall (e.g., generally shown as 3825 and 3835). The port walls 3825 and 3835 may be integral portions of the back wall portion 3510 (e.g., a section of the back wall portion 3510). Each of the openings 3820 and 3830 may be configured to receive a weight portion such as weight portions 3321 and 3335, respectively. The opening 3820 may be located at one end of the weight port 3521, and the port wall 3825 may be located or proximate to at an opposite end of the weight port 3521. In a similar manner, the opening 3830 may be located at one end of the weight port 3535, and the port wall 3835 may be located at or proximate to an opposite end of the weight port 3535. The port walls 3825 and 3835 may be separated from the face portion 3362 (e.g., separated by the interior cavity 3800). Each port wall of the first set of weight ports 3520, such as the port wall 3825 may have a distance 3826 from the back surface 3366 of the face portion 3362 as shown in FIG. 37. Each port wall of the second set of weight ports 3530, such as the port wall 3835 may have a distance 3836 from the back surface 3366 of the face portion 3362. The distances 3826 and 3836 may be determined to

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optimize the location of the center of gravity of the golf club head 3300 when the first and second sets of weight ports 3520 and 3530, respectively, receive weight portions as described herein. According to one example, the distance 3836 may be greater than the distance 3826 so that the center of gravity of the golf club head 3300 is moved toward the back portion 3370 and/or lowered toward the sole portion 3390. According to one example, the distance 3836 may be greater than the distance 3826 by a factor ranging from about 1.5 to about 4. In other words, the distance 3836 may be about 1.5 times to about 4 times greater than the distance 3826. As a result, a width 3840 (shown in FIG. 38) of a portion of the interior cavity 3800 below the horizontal midplane 4120 may be greater than a width 3842 of the interior cavity 3800 above the horizontal midplane 4120. As shown in the figures (e.g., FIGs. 8, 9, 18, 37, 38, 39, 40, and/or 41) the apparatus, methods, and articles of manufacture described herein may include at least a portion of at least a weight portion (e.g., the first set of weight portions or the second set of weight portions) closer to the face portion than at least a portion of a polymer material in the interior cavity. In one example as illustrated FIGs. 37-41, at least a portion of at least one of the weight portions of the first set of weight portions 3320 (e.g., one generally shown as 3321 and/or 3322) or the second set of weight portions 3330 (e.g., one generally shown as 3331, 3332, 3333, 3334, and/or 3335) may be closer to the face portion 3362 than at least a portion of a polymer material, which may partially or entirely fill the interior cavity 3800. The apparatus, methods, and articles of manufacture described herein are not limited in this regard.

Please replace original paragraph [0125] with the following, amended paragraph [0125]:

[0125] The interior cavity 3800 may be associated with a cavity width 3840 (W_C), and the body portion 3310 may be associated with a body width 3990 (W_B). The cavity width 3840 and the body width 3990 may vary between the top portion 3380 and the sole portion 3390 and

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Application Serial No. 15/263,018

PATENT
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between the toe portion 3340 and the heel portion 3350. The cavity width 3840 may be at least 50% of a body width 3990 ($W_C > 0.5 * W_B$) at certain regions on the body portion 3310 between the top and sole portions 3370 and 3390 and between the toe and heel portions 3340 and 3350. According to another example, the cavity width 3840 may vary between about 40% - 60% of a body width 3990 at certain regions between the top and sole portions 3380 and 3390. According to another example, the cavity width 3840 may vary between about 30% - 70% of a body width 3990 at certain regions between the top and sole portions 3380 and 3390. According to another example, the cavity width 3840 may vary between about 20% - 80% of a body width 3990 at certain regions between the top and sole portions 3380. For example, the cavity width 3840 may vary between about 20% - 80% of the body width 3990 at or below the horizontal midplane 4120. With the cavity width 3890 of the interior cavity 3800 that may vary between about 20% or more to about 80% or less of the body width 3990 at or below the horizontal midplane 4120, a substantial portion of the mass of the golf club head 3300 may be moved lower and farther back as compared to a golf club head with a cavity width of less than about 20% of the body width. Further, the golf club head 3300 may produce relatively more consistent feel, sound, and/or result when the golf club head 3300 strikes a golf ball via the face portion 3362 than a golf club head with a cavity width of less than about 20% of the body width. In one example as illustrated in FIGs. 37-41, the cavity width 3890 at or below the horizontal midplane 4120 and above at least one weight portion (e.g., one generally shown as 3331, 3332, 3333, 3334, and/or 3335) may be greater than a cavity width (e.g., one generally shown as 3842 in FIG. 38) of the interior cavity 3800 at or near the top portion 3380 of the body portion 3310 and greater than a cavity width (e.g., one generally shown as 3840 in FIG. 38) of the interior cavity 3800 at or near the

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PATENT

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11/08/2017.../SP/

sole portion 3390. The apparatus, methods, and articles of manufacture described herein are not limited in this regard.

Please replace original paragraph [0130] with the following, amended paragraph [0130]:

[0130] As described herein, the cavity width 3840 may vary between about 20%-80% of a body width 3990 at or below the horizontal midplane 4120. According to one example, at least 50% of the elastic polymer or elastomer material partially or filling the interior cavity 3800 may be located below the horizontal midplane 4120 of the golf club head 3300. Accordingly, the center of gravity of the golf club head 3300 may be further lowered and moved farther back as compared to a golf club head with a cavity width of less than about 20% of the body width and that is partially or fully filled with an elastic polymer or elastomer material. Further, the golf club head 3300 may produce relatively more consistent feel, sound, and/or result when the golf club head 3300 strikes a golf ball via the face portion 3362 as compared to a golf club head with a cavity width of less than about 20% of the body width that is partially or fully filled with an elastic polymer material. In one example as illustrated in FIGs. 37-41, the elastic polymer material or the elastomer material in the interior cavity 3800 may have a first portion located above the horizontal midplane 4120, a second portion located below the horizontal midplane 4120, and a third portion located between the first portion and the second portion. The first portion may have a first width, the second portion may have a second width greater than the first width, and the third portion may have a third width greater than the first width and greater than the second width. In one example, the third portion may be located between at least one weight portion (e.g., one generally shown as 3331, 3332, 3333, 3334, and/or 3335) and the top portion 3380 of the body portion 3310. In another example, the third portion may be located between at

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Application Serial No. 15/263,018

PATENT

P-15-008-U02-US/30161

least one weight portion (e.g., one generally shown as 3331, 3332, 3333, 3334, and/or 3335) and the horizontal midplane 4120. In yet another example, at least a portion of at least one weight portion (e.g., one generally shown as 3331, 3332, 3333, 3334, and/or-3335) may be closer to the face portion 3362 than at least a portion of the elastic polymer material or the elastomer material in the interior cavity 3800.

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Application Serial No. 15/263,018

PATENT
P-15-008-U02-US/30161**PROPOSED AMENDMENTS TO THE CLAIMS**

1. (Currently Amended) A golf club head comprising:
a face portion;
a body portion having a toe portion, a heel portion, a top portion, a sole portion, a back portion, and an interior cavity extending between the top and sole portions;
at least one port located closer to the toe portion than the heel portion and connected to the interior cavity;
at least one weight portion located closer to the heel portion than the at least one port;
wherein the interior cavity is filled with a polymer material from the at least one port,
wherein more than 50% of a mass of the body portion is located below a horizontal midplane of the golf club head, and
wherein a portion of the at least one weight portion is closer to the face portion than a portion of the polymer material in the interior cavity.
2. (Previously Presented) A golf club head as defined in claim 1 wherein the at least one port is located at or near a periphery of the body portion.
3. (Previously Presented) A golf club head as defined in claim 1, wherein the at least one port is located at or below the horizontal midplane.
4. (Previously Presented) A golf club head as defined in claim 1, wherein the polymer material is an elastic polymer material.

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Application Serial No. 15/263,018

PATENT
P-15-008-U02-US/30161

5. (Previously Presented) A golf club head as defined in claim 1 wherein the at least one weight portion is located below the horizontal midplane and is located closer to the toe portion than the heel portion.

6. (Previously Presented) A golf club head as defined in claim 1, wherein a width of the interior cavity at or below the horizontal midplane and above the at least one weight portion is greater than a width of the interior cavity near the top portion and greater than a width of the interior cavity near the sole portion.

7. (Previously Presented) A golf club head as defined in claim 1, wherein the face portion comprises a thickness of less than or equal to 1.9 millimeters (0.075 inch).

8. (Previously Presented) An iron-type golf club head comprising:

- a face portion;
- a body portion having a toe portion, a top portion, a sole portion, a back portion, and an interior cavity extending between the top and sole portions;
- at least one port connected to the interior cavity;
- an elastic polymer material injection molded in the interior cavity through the at least one port; and
- at least one weight portion coupled to the body portion at a location below a horizontal midplane of the golf club head,

wherein a width of the interior cavity at or below the horizontal midplane and above the at least one weight portion is greater than a width of the interior cavity near the top portion and

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Application Serial No. 15/263,018

PATENT
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greater than a width of the interior cavity between the at least one weight portion and the face portion.

9. (Original) An iron-type golf club head as defined in claim 8 further comprising a bonding portion configured to bond the elastic polymer material to the face portion.

10. (Original) An iron-type golf club head as defined in claim 8, wherein the interior cavity comprises a cavity having at least 50% filled with a thermoplastic elastomer material.

11. (Previously Presented) An iron-type golf club head as defined in claim 8, wherein a portion of the interior cavity is configured to separate the face portion and the at least one weight portion.

12. (Previously Presented) An iron-type golf club head as defined in claim 8, wherein the face portion comprises a thickness of less than or equal to 1.9 millimeters (0.075 inch).

13. (Canceled)

14. (Canceled)

15. (Canceled)

16. (Canceled)

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Application Serial No. 15/263,018

PATENT
P-15-008-U02-US/30161

17. (Canceled)

18. (Canceled)

19. (Canceled)

20. (Canceled)

21. (Currently Amended) A golf club head comprising:

a face portion;

a body portion having a toe portion, a heel portion, a top portion, a sole portion, a back portion, and an interior cavity extending between the top and sole portions;

at least one port located closer to the toe portion than the heel portion and connected to the interior cavity; and

at least one weight portion located closer the toe portion than the heel portion and located between the at least one port and the heel portion,

wherein the interior cavity is filled with a polymer material from the at least one port, and

wherein a first portion of the polymer material above a horizontal midplane of the body portion has a first width, a second portion of the polymer material below the horizontal midplane has a second width greater than the first width, and a third portion of the polymer material between the first ~~width-portion~~ and the second ~~width-portion~~ has a third width greater than the

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first width and greater than the second width, and wherein the third ~~width~~ portion is located between the at least one weight portion and the top portion.

22. (Currently Amended) A golf club head as defined in claim ~~[[1]]~~ 21, wherein the third width is between the at least one weight portion and the horizontal midplane.

23. (Currently Amended) A golf club head as defined in claim 1, wherein a portion of the at least one weight portion is closer to the face portion than a portion of the polymer material in the interior cavity.

24. (Currently Amended) A golf club head as defined in claim 1, wherein the at least one port is located at or below the horizontal midplane.

25. (Currently Amended) A golf club head as defined in claim ~~[[1]]~~ 21, wherein the at least one weight portion is located below the horizontal midplane.

26. (Currently Amended) A golf club head as defined in claim 1, wherein the at least one weight portion is closer to the sole portion than the at least one port.

27. (Currently Amended) A golf club head as defined in claim ~~[[1]]~~ 21, wherein the polymer material is an elastic polymer material.


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Application Serial No. 15/263,018

PATENT

P-15-008-U02-US/30161


28. (Currently Amended) A golf club head as defined in claim 1, wherein the face portion comprises a thickness of less than or equal to 1.9 millimeters (0.075 inch).

Issue Classification 	Application/Control No. 15263018	Applicant(s)/Patent Under Reexamination PARSONS ET AL.	
	Examiner SEBASTIANO PASSANITI	Art Unit 3711	

CPC						
Symbol					Type	Version
A63B		53	/	0475	F	2013-01-01
A63B		2053	/	0408	A	2013-01-01
A63B		2053	/	0416	A	2013-01-01
A63B		2053	/	0445	A	2013-01-01
A63B		53	/	0466	I	2013-01-01
A63B		2053	/	0491	A	2013-01-01
A63B		2209	/	00	A	2013-01-01
A63B		53	/	047	I	2013-01-01
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CPC Combination Sets				
Symbol	Type	Set	Ranking	Version

NONE		Total Claims Allowed:	
		20	
(Assistant Examiner)	(Date)		
/SEBASTIANO PASSANITI/ Primary Examiner.Art Unit 3711	12/01/2017	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	32, 37

Issue Classification 	Application/Control No. 15263018	Applicant(s)/Patent Under Reexamination PARSONS ET AL.
	Examiner SEBASTIANO PASSANITI	Art Unit 3711

<input type="checkbox"/> Claims renumbered in the same order as presented by applicant															
<input type="checkbox"/> CPA															
<input checked="" type="checkbox"/> T.D.															
<input type="checkbox"/> R.1.47															
Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	1		17												
2	2		18												
3	3		19												
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10	10	18	26												
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12	12	20	28												
	13														
	14														
	15														
	16														

NONE	Total Claims Allowed:	
(Assistant Examiner)	(Date)	20
/SEBASTIANO PASSANITI/ Primary Examiner.Art Unit 3711	12/01/2017	O.G. Print Claim(s) 1
(Primary Examiner)	(Date)	O.G. Print Figure 32, 37

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: **Mail** **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax **(571)-273-2885**

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

122021 7590 12/18/2017
Loeb & Loeb LLP
321 North Clark Street Suite 2300
Chicago, IL 60654

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/263,018	09/12/2016	Robert R. Parsons	P-15-008-U02-US/30161	6484

TITLE OF INVENTION: GOLF CLUB HEADS AND METHODS TO MANUFACTURE GOLF CLUB HEADS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$960	\$0	\$0	\$960	03/19/2018

EXAMINER	ART UNIT	CLASS-SUBCLASS
PASSANITI, SEBASTIANO	3711	473-332000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

- (1) The names of up to 3 registered patent attorneys or agents OR, alternatively, 1 _____
- (2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. 2 _____
- 3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

PARSONS XTREME GOLF, LLC

Scottsdale, Arizona

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

- ☒ Issue Fee
- ☐ Publication Fee (No small entity discount permitted)
- ☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)

- ☐ A check is enclosed.
- ☒ Payment by credit card.
- ☒ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number 50-2876 (enclose an extra copy of this form).

5. Change in Entity Status (from status indicated above)

- ☐ Applicant certifying micro entity status. See 37 CFR 1.29
- ☐ Applicant asserting small entity status. See 37 CFR 1.27
- ☐ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature /Jonathan B. Thielbar/

Date December 18, 2017

Typed or printed name Jonathan B. Thielbar

Registration No. 70,453

Electronic Patent Application Fee Transmittal

Application Number:	15263018			
Filing Date:	12-Sep-2016			
Title of Invention:	GOLF CLUB HEADS AND METHODS TO MANUFACTURE GOLF CLUB HEADS			
First Named Inventor/Applicant Name:	Robert R. Parsons			
Filer:	Jonathan Burgess Thielbar/Rolanda Crawford			
Attorney Docket Number:	P-15-008-U02-US/30161			
Filed as Large Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
UTILITY APPL ISSUE FEE	1501	1	960	960

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				960

Electronic Acknowledgement Receipt

EFS ID:	31261932
Application Number:	15263018
International Application Number:	
Confirmation Number:	6484
Title of Invention:	GOLF CLUB HEADS AND METHODS TO MANUFACTURE GOLF CLUB HEADS
First Named Inventor/Applicant Name:	Robert R. Parsons
Customer Number:	122021
Filer:	Jonathan Burgess Thielbar/Rolanda Crawford
Filer Authorized By:	Jonathan Burgess Thielbar
Attorney Docket Number:	P-15-008-U02-US/30161
Receipt Date:	18-DEC-2017
Filing Date:	12-SEP-2016
Time Stamp:	17:46:00
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$960
RAM confirmation Number	121917INTEFSW17470200
Deposit Account	502876
Authorized User	Rolanda Crawford

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

37 CFR 1.20 (Post Issuance fees)

37 CFR 1.21 (Miscellaneous fees and charges)

000258

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	222769-30161_ISSF.pdf	187613	no	1
			35d3ded082977f328c7fd89969651f039780ca56		
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30804	no	2
			86aee94120c8d3251d77bdcfb47525b147bfc746		
Warnings:					
Information:					
Total Files Size (in bytes):			218417		
<p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p><u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>					



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/263,018	09/12/2016	Robert R. Parsons	P-15-008-U02-US/30161	6484

122021 7590 12/28/2017
Loeb & Loeb LLP
321 North Clark Street Suite 2300
Chicago, IL 60654

EXAMINER

PASSANITI, SEBASTIANO

ART UNIT	PAPER NUMBER
----------	--------------

3711

NOTIFICATION DATE	DELIVERY MODE
-------------------	---------------

12/28/2017

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

chpatent@loeb.com
frankie@yamcapital.com
patents@pxg.com

Supplemental Notice of Allowability	Application No. 15/263,018	Applicant(s) PARSONS ET AL.	
	Examiner SEBASTIANO PASSANITI	Art Unit 3711	AIA (First Inventor to File) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to Amendment and Terminal Disclaimer (08/28/2017); IDS (11/08/2017).
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are 1-12 and 21-28. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

- a) ☐ All b) ☐ Some *c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|--|---|
| 1. <input type="checkbox"/> Notice of References Cited (PTO-892) | 5. <input checked="" type="checkbox"/> Examiner's Amendment/Comment |
| 2. <input type="checkbox"/> Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date _____ | 6. <input type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| 3. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 7. <input type="checkbox"/> Other _____. |
| 4. <input type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date _____. | |

/SEBASTIANO PASSANITI/
Primary Examiner, Art Unit 3711

DETAILED ACTION

Supplemental Action

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Supplemental to the *Notice of Allowability* (NOA), mailed with the Notice of Allowance and Fee(s) Due of 12/18/2017, the applicant's attention is directed to the following correction made in the claims. This change is commensurate with the changes discussed with applicant's attorney on 12/01/2017 (see the *Examiner-Initiated Interview Summary*, mailed 12/18/2017). The NOA mailed 12/18/2017 inadvertently indicated a change to claim 21-line 14 when referencing the third occurrence of the term "width" where in fact line 14 only includes two occurrences of the term "width". Thus, the following supplemental examiner's amendment presents the correct change that is to be made to claim 21-line 14.

IN THE CLAIMS:

Claim 21-line 14, "width" (second occurrence) has been CHANGED to --portion--.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SEBASTIANO PASSANITI whose telephone number is (571)272-4413. The examiner can normally be reached on Monday through Friday (9:00AM - 5:30PM).

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an

Art Unit: 3711

interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at <http://www.uspto.gov/interviewpractice>.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Melba N. Bumgarner can be reached on 571-272-4709. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Sebastiano Passaniti/
Primary Examiner
Art Unit 3711

S.Passaniti/sp
December 21, 2017



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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/263,018	01/30/2018	9878220	P-15-008-U02-US/30161	6484

122021 7590 01/10/2018
Loeb & Loeb LLP
321 North Clark Street Suite 2300
Chicago, IL 60654

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

The Patent Term Adjustment is 0 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site <http://pair.uspto.gov> for additional applicants):

Robert R. Parsons, Scottsdale, AZ;
Parsons Xtreme Golf, LLC, Scottsdale, AZ;
Michael R. Nicolette, Scottsdale, AZ;
Bradley D. Schweigert, Anthem, AZ;

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.