A novel method of manufacturing, finishing, and attaching together the components of a golf club head is presented. The method permits separate heat treatments for the components to maximize hardness and strength and a novel means of attaching the components together to minimize weight.
COMPOSITE GOLF CLUB ASSEMBLY TECHNIQUE

BACKGROUND OF THE INVENTION

[0001] This invention relates to golf club head assembly from component parts. The desirability of assembling a golf club head from pre-cast or pre-machined components to save weight and cost is limited by the methods of assembly. This invention addresses the problems associated with assembling golf club heads from several parts constructed from different alloys of metal.

[0002] Other methods of golf club assembly have been put forward, notably “Composite Golf Club Head”, U.S. Pat. No. 5,154,425 by Niskanen et al., “Method of Manufacturing a Composite Golf Club Head”, U.S. Pat. Appl. 2002/0049097 by Murphy et al., and “Multiple Material Golf Club Head With Face Insert”, U.S. Appl. 2002/0142861 by Helmstetter et al. The technique embodied by the present invention departs from all of these by using a step assembly technique and novel attachment means to produce a club head that is strong and hard at the same time.

BRIEF SUMMARY OF THE INVENTION

[0003] This invention is a method and means of assembling a hollow golf club head from metal components using a novel attachment technique that avoids the problems of heat-treating the head. A typical composite golf club head made from titanium is composed of a body, a face-plate, and a sole plate. The titanium body is first cast, then assembled, then a machined face plate and sole plate are attached via inert-gas welding. The resulting composite head is then heat-treated to increase the strength of the materials.

[0004] In a pure titanium golf club head assembled from components, the metal of the club head is a different alloy than that of the face and sole plates. The face and sole plate require heating to a higher temperature than the metal of the club head itself to achieve the best club performance.

[0005] Annealing the face and sole plates, by raising them to an appropriate temperature, in a pre-assembled head requires that the entire club head be raised to that temperature, since all the parts are present together. The titanium alloy of the welding material is unable to withstand this temperature without the risk of cracking or deforming, so the optimum face-and-sole plate hardening temperature is never reached during manufacture.

[0006] The composite club head face and sole plates are therefore softer than needed for optimum performance. In a head pre-assembled and then heat-treated, a new means of assembling the titanium components is required to achieve optimum club performance from a strong and tough club head and a thoroughly hardened sole and face plate.

[0007] This technique can also be applied to golf club heads assembled from other light metals, such as magnesium.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] FIG. 1. Is an exploded diagram of a composite golf club head.

[0009] FIG. 2. Is a diagram of the face and sole plate assembly.

DETAILED DESCRIPTION OF THE INVENTION

[0010] Referring to FIG. 1 and FIG. 2, a typical club head design is shown. The composite club head is composed of a club head body containing a hosel, head body top, head body bottom, and a sole. There is a separate face and sole plate assembly comprised of a face plate and a sole plate.

[0011] Traditionally, the method of assembling these parts has been to weld them with titanium alloy to make a single piece. The single piece is then heat treated to harden the face and sole plates.

[0012] In this preferred embodiment of the invention, the sole plate and face plate are cast together in one piece. The two plates can be cast separately and attached separately to the club head assembly.

[0013] This invention is a method of assembling the components of the club head to permit separate heat treatment of the face and sole plates before assembly while constructing a solid, strong club head. The new method relies on adhesive film or an epoxy glue to assemble the parts. In alternate embodiments, a system of mechanical interlocks or electron beam welding can be used to assemble the golf club head.

[0014] The parts are separately cast or machined. In the preferred embodiment, the all-titanium golf club head, the club head body parts are cast from a different titanium alloy than the face plate and sole plate; the face and sole plates are hardened by heat treatment at a higher temperature than the other components, and all of the components are then assembled together using the attachment means by applying it at points and then the entire structure is heat-treated to a temperature of only 300 degrees Fahrenheit. This temperature is sufficient to cure the adhesive but does not threaten to crack the titanium body parts.

[0015] The resulting structure is light, strong, and possesses a hard face and sole plate. The advantages are that 1) the integrity and quality of the components can be controlled and cracks and breaks minimized, 2) the connection between the components is superstrong compared to titanium welding, and 3) the result is metallurgically sound—the strong parts are strong, the hard parts are hard, and the components can be assembled using any mechanical means, including screwing them together. In the preferred embodiment, the parts are glued with the aforementioned adhesive film.

[0016] While the preferred embodiment of the invention has been described, modifications can be made and other embodiments of this invention realized without departing from the intent and scope of any claims associated with this invention.

1. What is claimed is

a golf club assembly technique, the assembly technique comprised of the steps of component manufacture, component finishing, and club assembly,

the component manufacture step selected from the list of machining, casting, squeeze casting, or metal injection molding golf club components,
the club assembly step comprised of the steps of matching golf club components together and then attaching the components to each other by an attachment means.

2. The golf club assembly technique of claim 1 wherein the component finishing step is comprised of the steps of trimming and finishing all golf club components and heat-treating face plate and sole plate components separately from other golf club components to achieve maximum hardness for the face and sole plates.

3. The golf club assembly technique of claim 1 wherein the step of attaching the components to each other within the step of component assembly uses the attachment means of applying an adhesive to the attachment surfaces of the golf club components and then attaching the golf club components together.

4. The golf club assembly technique of claim 1 wherein the step of attaching the golf club components to each other within the step of component assembly is comprised of using mechanical interlocks or other mechanical attachment means to attach the golf club components to each other.

5. The golf club assembly technique of claim 1 wherein the step of attaching the golf club components to each other within the step of component assembly uses electron beam welding as the attachment means.