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Remarks:

A request for correction of the description has been filed pursuant to Rule 88 EPC. A decision on the request will be taken during the proceedings before the Examining Division (Guidelines for Examination in the EPO, A-V, 3.).

(54) **Golf club including high friction striking face**

(57) A wood type golf club which is provided with a convex golf ball striking surface has on said surface a metallic matrix containing hard particles which are harder than said metallic matrix and wherein portions of said particles protrude above said metallic matrix surface.

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Description

[0001] Applicant's U.S. Patent Number 4,768,787 has enjoyed considerable success with respect to golf clubs constituting the so-called "irons" series of clubs. This has been true in pitching wedges and sand wedges where the high friction surface has permitted long term use without deterioration of the friction causing elements in the surface. As set forth in that patent, the ball striking surface of the golf club has protruding therefrom hard sharp featured particles which will increase the friction between the ball striking surface of the golf club and the ball so as to impart maximum desired backspin on the ball.

[0002] Golf clubs that are identified as woods have long had convex surfaces thereon to create a gear effect and thus minimize hooks and slices. As used herein, the term "woods" means metal woods, wood woods, and driving irons. Typically, the horizontal radius of the face of a golf club is a circle that would be 9 to 14 inches in size and the vertical radius would be similar. Club manufacturers have known for a long while that the face radii on wood type golf clubs had an unusual effect on ball flight when balls are struck off the center of gravity. For example, a flat faced wood is completely intolerant of toe and heel hits. A ball hit as little as 1/2 inch outboard of the center of gravity starts toward the target but because of the hook spin created by recoil of the head veers sharply to the left. Conversely, a ball hit inboard of the center of gravity veers sharply to the right. This problem has been addressed by putting a radius on the club face to counter-act this phenomenon. Thus an outboard hit starts to the right of the target and veers back toward the center. Conversely, an inboard hit starts to the left of the target and veers back toward the center. The surface of such clubs are smooth bare metal or smooth painted hitting surfaces. Almost all woods have horizontal grooves, some with interrupted lines and dot patterns in the hitting area. Recently, the surfaces of some woods have been treated to create a harder impact area but these are still relatively smooth surfaces.

[0003] The present invention involves the creation of a ball striking surface on a convex face of a wood type golf club which is a high friction surface that creates unusually accurate and longer shots.

[0004] It is therefore an object of this invention to provide a wood type golf ball striking surface which is slightly convex in shape and wherein there are hard protruding sharp featured particles supported in a matrix of a softer metallic material.

[0005] It is further an object of this invention to provide longer life of the high action friction surface.

[0006] It is still further an object of this invention to provide a wood club head that will permit the player to have more repeatable precise and predictable golf shots.

[0007] It is still further an object of this invention to provide a golf club which will permit reduction of the skill

level required for a wood type golf club.

[0008] These, together with other objects of the invention, will become apparent from the following detailed description of the invention and the accompanying drawings.

Figure 1 is a top plan view of a wood type golf club of the prior art showing the slight convex face in the horizontal plane.

Figure 2 is a side elevation view of such a prior art golf club also showing the slight convex face in the vertical plane.

Figure 3 is a side elevation view of Applicant's invention on a wood type golf club.

Figure 4 shows Applicant's invention in the form of an insert on the face of a wood type golf club.

Figure 5 is a side elevation sectional view of the golf club head shown in Figure 4 showing the protruding particles on the striking surface of the golf club head.

[0009] Figures 1 and 2 show the prior art which shows the slight convex surface of the face of a wood type golf club in the horizontal and vertical planes. Figure 3 shows the hitting surface of Applicant's invention on a wood type golf club 10 with the hitting surface covered with sharp featured particles 11 in a metallic matrix. The horizontal grooves 12-12, common to a wood type golf club head, may or may not be included. Figure 4 shows the face of a typical wood type golf club head 13 provided with an insert 14 of a metal matrix with hard particles 15-15 protruding therefrom. The horizontal grooves may or may not be included.

[0010] While convex surfaces have long been used on woods, metal woods, and driving irons to create a gear effect, since the coefficient of friction is quite low, it is inadequate to compensate for differences in swing speeds and lubricity of balls and inclement conditions such as wet balls, light rough, wet club face, dirty club face, and the like. In addition, torque and recovery rate and various shafts used in conjunction with such wood golf club head have a significant effect on the gear effect. The high friction characteristics of Applicant's invention modulate these variables. As set forth in the following example, the high friction surface enhances the gear effect and produces reliable corrective spin on the ball which corrects for mis-hits and inclement conditions.

Example

[0011] Using a robot to swing a club head at the same speed and under controlled conditions, three drivers were constructed with identical weights, shafts, and grips. The first was a controlled driver with a slightly spherical smooth painted face (Number 1 driver). The other two had plasma sprayed composites of bronze containing two ratios of discrete particles of yttria stabi-

Ilzed zirconia (YSZ). The discrete particles of yttria protruded above the surface of the bronze. The ratios of discrete particles of yttria to bronze were as follows: for the Number 2 driver 80% bronze and 20% yttria; and for the Number 3 driver 90% bronze and 10% yttria. Eight shots were hit from the center of the club face, eight shots were hit from 1/2 inch outboard of the center and eight shots were hit from 1/2 inch inboard of the center for each of the three clubs. The swing speed was 90 miles per hour for each test. The results were as follows:

Control Number 1 driver - scatter 42 yards;
 Number 2 driver - scatter 30 yards; and
 Number 3 driver -scatter 4 yards.

[0012] These results were unexpected and showed a significant improvement over a conventional wood type driver.

[0013] The surface of the driver may be treated in a variety of ways to achieve the desired high friction surface effect as is set forth in detail in U.S. Patent Number 4,768,787, which is incorporated herein by reference. The preferred structure is that set forth in Figure 4 showing an insert on the face of the driver.

Claims

1. A wood type golf club provided with a convex golf ball striking surface, characterized in that said golf ball striking surface includes a metallic matrix thereon containing hard particles which are harder than said metallic matrix and in that portions of said particles protrude above said metallic matrix surface.
2. A golf club according to claim 1, characterized in that said harder particles have sharp features protruding above said metallic matrix surface.
3. A golf club according to claim 1, characterized in that said metallic matrix is bonded to said golf club.
4. A golf club according to claim 3, characterized in that said golf ball striking surface is provided with a composite of said softer metallic matrix material which is bonded to said golf club and which in turn contains said harder particles.

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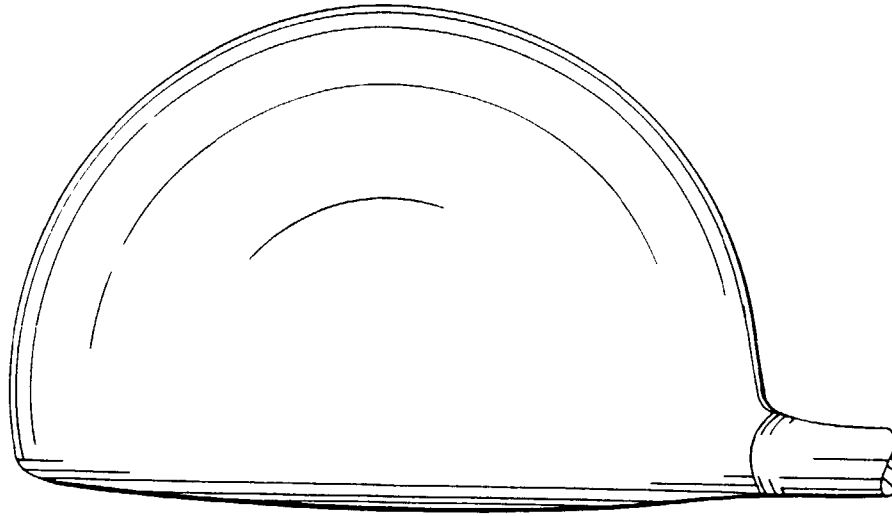


Fig. 1
(PRIOR ART)

Fig. 2
(PRIOR ART)

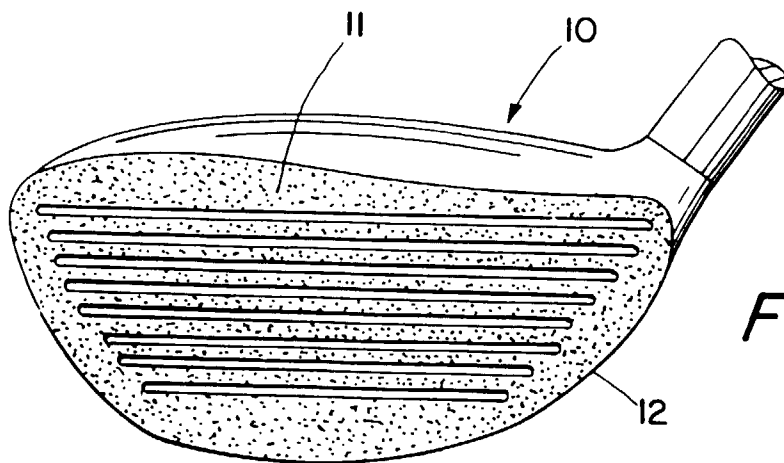
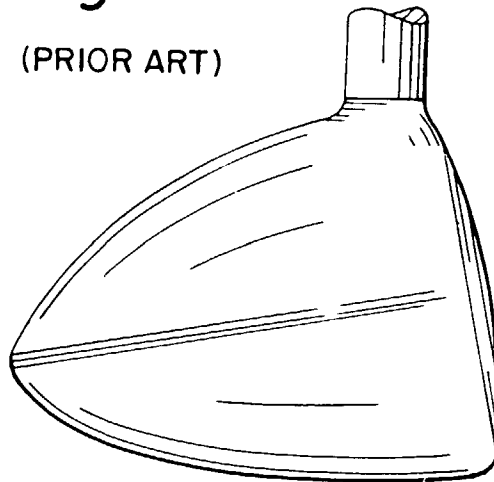


Fig. 3

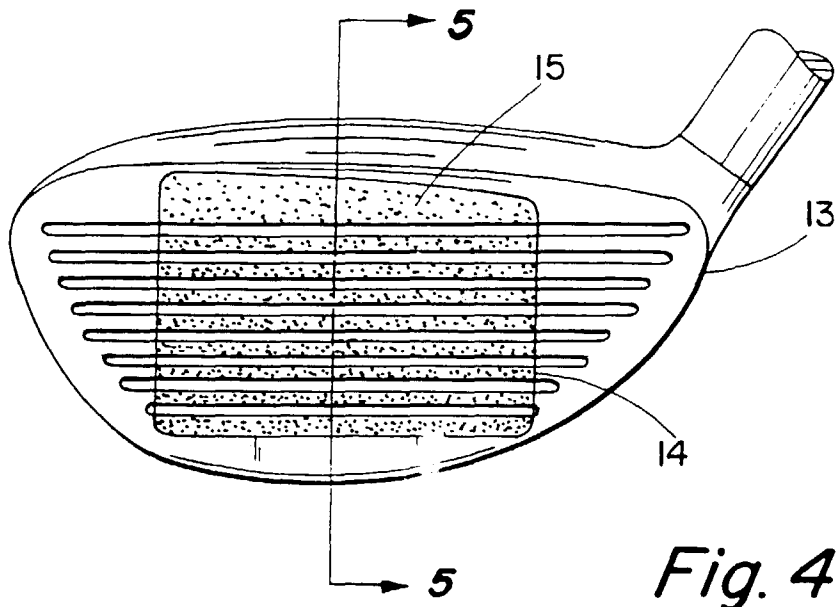


Fig. 4

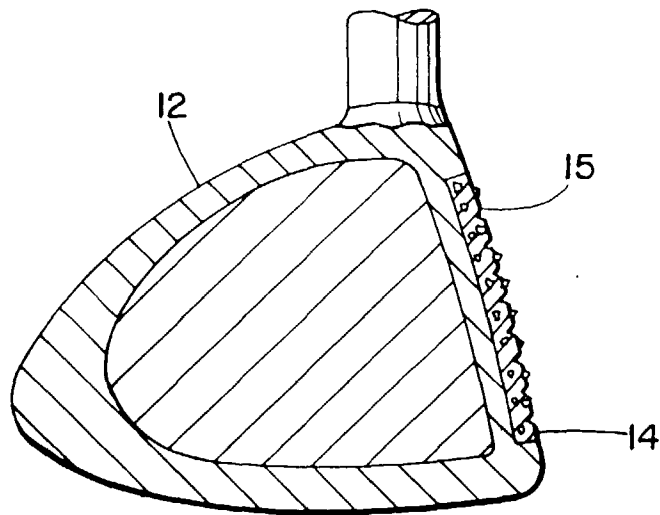


Fig. 5



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EUROPEAN SEARCH REPORT

Application Number
EP 98 11 6273

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
D,X	US 4 768 787 A (SHIRA CHESTER S., SAN DIEGO, US) 6 September 1988 * column 1, line 63 - line 68 * * column 3, line 37 - column 4, line 26 * * figures 3-7 *	1-4	A63B53/04
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A	PATENT ABSTRACTS OF JAPAN vol. 096, no. 004, 30 April 1996 & JP 07 313635 A (RYOBI LTD;OTHERS: 01), 5 December 1995 * abstract *	1-4	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
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Place of search		Date of completion of the search	Examiner
THE HAGUE		7 January 1999	Peis, S
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 98 11 6273

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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07-01-1999

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