

(12) **UK Patent Application** (19) **GB** (11) **2 338 903** (13) **A**

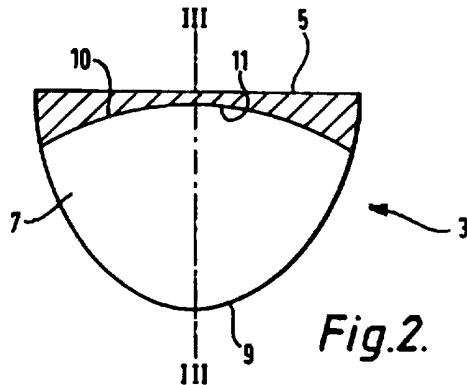
(43) Date of A Publication 12.01.2000

(21) Application No <b>9814210.2</b>	(51) INT CL <sup>7</sup> <b>A63B 53/04</b>
(22) Date of Filing <b>01.07.1998</b>	(52) UK CL (Edition R ) <b>A6D D23B</b>
(71) Applicant(s) <b>Kevin Woolgar</b> <b>Unit E, Kingsway Industrial Estate, Kingsway, LUTON,</b> <b>Bedfordshire, LU1 1LP, United Kingdom</b>	(56) Documents Cited <b>GB 2259863 A GB 2162431 A CH 000595117 A</b> <b>US 5028049 A US 4444392 A</b>
(72) Inventor(s) <b>Kevin Woolgar</b>	(58) Field of Search UK CL (Edition Q ) <b>A6D D23B</b> INT CL <sup>6</sup> <b>A63B 53/04</b> <b>Online: WPI, EPODOC, PAJ</b>
(74) Agent and/or Address for Service <b>Fry Heath &amp; Spence</b> <b>The Old College, 53 High Street, HORLEY, Surrey,</b> <b>RH6 7BN, United Kingdom</b>	

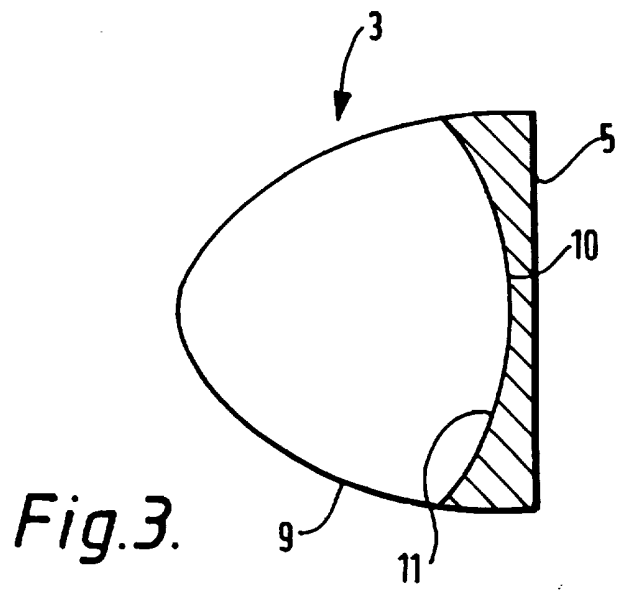
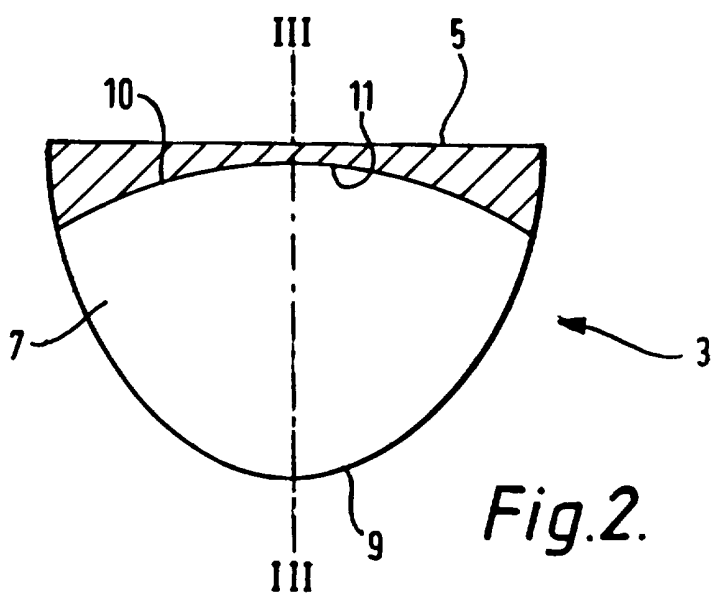
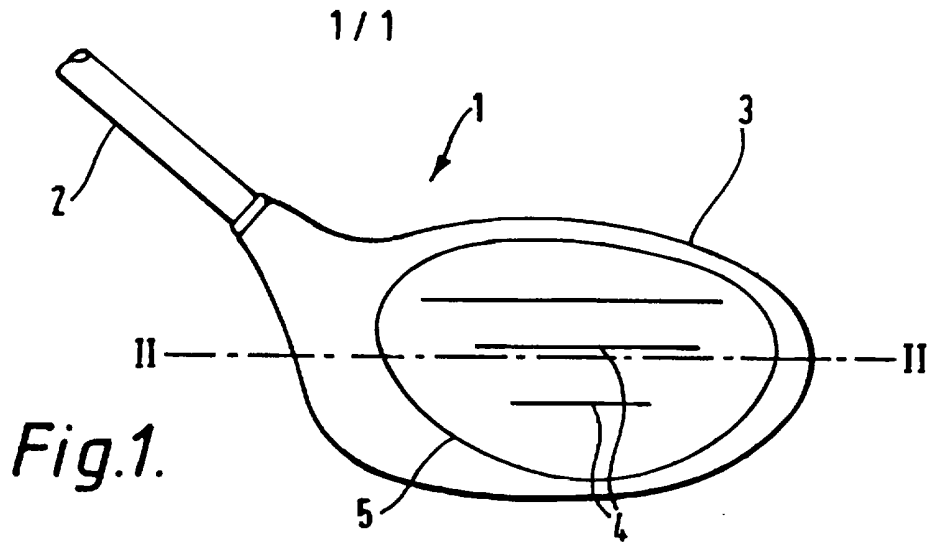
(54) Abstract Title  
**Golf club face**

(57) A golf club face whose mass is distributed such that it increases progressively from the central area of the club face to the periphery thereof.

The mass distribution may be achieved by increasing the thickness of the face progressively from the centre of the club face to the periphery thereof. Alternatively, the mass distribution may be achieved by using composite materials having different masses. The club face may be made of steel or titanium and may be interchangeable. The face may be used on both wood and iron club heads.



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IMPROVEMENTS RELATING TO GOLF CLUBS

This invention relates to golf clubs and more particularly to golf club faces.

When a golf ball is struck off-centre, deflection of the striking face of the club tends to occur. This results in an "open" or "closed" club face at impact, which imparts spin to the ball causing an undesirable "slice" or "hook", respectively.

This problem has been addressed by toe-heel weighting (especially in woods) and by perimeter weighting in irons. In toe-heel weighted woods, a striking plate of uniform thickness acts as the club face. It is set into a surrounding club head (now often made of metal) which contributes mass at each end (the "toe" and "heel") of the club head.

In perimeter weighted irons, the aim has been to shift as much of the mass of the club head to its periphery as possible. This has been achieved, for example, by the use of light, rigid face materials (such as titanium and ceramic) set into a relatively heavy cavity-backed head which provides peripheral mass.

In both cases, when an off-centre shot is struck the mass which lies outside the ball provides inertia to the club head and reduces deflection of the face resulting in straighter shots.

It has now been found that improved feel and truer flight can be achieved by providing peripheral weighting to the club face of both woods and irons, wherein the weighting is achieved by distributing mass such that it increases progressively and peripherally from the centre of the club face. Moreover, the extra thickness at the face confers greater rigidity on the face which decreases "rebound" of the golf ball from the club face and prevents deformation of the face on impact.

Thus, according to the present invention there is provided a golf club face whose mass is distributed such that it increases progressively from the central area of the club face to the periphery thereof.

The mass distribution at the face gives a feeling of solidity to the head during striking of a golf ball. The inertia of the mass distributed throughout the face resists rearward deflection of the head so a ball may be mis-struck off-centre at any region of the face with less deflection (and attendant hook or slice) than with a standard club.

The mass distribution is conveniently achieved by increasing the thickness of the face progressively from the centre of the club face to the periphery thereof. Alternatively, the mass distribution can be achieved by using composite materials having different masses.

Variation in the thickness of the face may be achieved by any convenient means including casting, pressing, machining, turning, abrading, grinding or laminating. The result is a club face having a substantially concave back.

As used herein, the term "progressively" is intended to define a progressive or gradual change. As applied to the thickness of the face, the term implies a smooth or finely stepped gradation.

The face may be manufactured from any suitable material. Particularly preferred are metallic materials, such as steel or titanium.

Also contemplated by the invention is a golf club head comprising the face of the invention. The head may be for a wood or an iron. Those skilled in the art will appreciate that "wood" is a term of art used in contradistinction to "iron" to define a particular class of golf club, and does not necessarily imply a wooden construction. Indeed, woods are now generally fabricated from steel, titanium or plastics. Particularly preferred for use with the invention are hollow-headed woods.

Also contemplated is a golf club head adapted to receive the face of the invention, since the face may be supplied independently of the other elements of the golf club and/or may be interchangeable therewith.

The invention also covers a golf club comprising the face or head of the invention. Thus, the clubs of the invention may further comprise a shaft (preferably of steel or graphite) and/or a grip.

The invention will now be described by way of example only with reference to the accompanying drawings, in which:

Figure 1 is a simplified view of the face of a golf club according to the invention;

Figure 2 is a section taken along line II-II of Figure 1; and

Figure 3 is a section taken along line III-III of Figure 2.

Referring to Figure 1, the golf club 1 comprises a shaft 2, head 3 and a striking plate or facing plate 5. Grooves 4 are found in the exposed surface of the facing plate 5. The facing plate is secured within a frontal

cavity (not shown) of the head.

As will be seen from Figures 2 and 3, the illustrated head 3 comprises a body 9 housed within a casing 7. The body is formed with a smoothly convex surface 10 to which the inner surface 11 of the facing plate 5 is secured. As shown, the surface 11 is concave and closely complements the convex shaping of the surface 10 thereby ensuring a secure fit one to the other. The facing plate is typically of steel and is typically of 2 to 3 mm thickness at its centre increasing progressively to about 6-7 mm at its periphery. Thus, the mass of the facing plate 5 increases progressively from its central area to its periphery.

As illustrated, the change in thickness of the facing plate is smoothly progressive from the centre of the plate to its periphery. This desired change could alternatively be achieved by a series of discrete steps or by employing composite materials having different masses.

As explained previously, the unique mass distribution at the facing plate gives a feeling of solidity to the head during striking of a golf ball. The inertia of the mass distributed throughout the face resists rearward deflection of the head so a ball may be mis-struck off-centre at any region of the face with less deflection (and attendant hook or slice) than with a standard club. It is also possible intentionally to impart spin to a ball by striking the ball off-centre.

It will be appreciated that the foregoing is merely exemplary of golf clubs in accordance with the invention and that modifications can readily be made thereto without departing from the true scope of the invention.

**CLAIMS:**

1. A golf club face whose mass is distributed such that it increases progressively from the central area of the club face to the periphery thereof.
2. A golf club face as claimed in claim 1 wherein the mass distribution is achieved by increasing the thickness of the face progressively from the centre of the club face to the periphery thereof.
3. A golf club face as claimed in claim 1 wherein the mass distribution is achieved by using composite materials having different masses.
4. A golf club face is as claimed in any one of claims 1 to 3 wherein variation in the thickness of the face is achieved by casting, pressing, machining, turning, abrading, grinding or laminating.
5. A golf club face as claimed in any one of claims 1 to 4 whose back is substantially concave.
6. A club face as claimed in any one of claims 1 to 5 of steel or titanium.
7. A golf club head having a face as claimed in any one of the preceding claims.
8. A golf club head which is adapted to receive a club face as claimed in any one of claims 1 to 6.
9. A club head as claimed in claim 8 whose face is interchangeable.
10. A golf club substantially as herein described and as illustrated in Figures 1 to 3 of the accompanying drawings.



Application No: GB 9814210.2  
Claims searched: 1-10

Examiner: Paul Jenkins  
Date of search: 22 January 1999

**Patents Act 1977**  
**Search Report under Section 17**

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:  
UK Cl (Ed.Q): A6D (D23B)  
Int Cl (Ed.6): A63B 53/04  
Other: Online: WPI, EPODOC, PAJ

**Documents considered to be relevant:**

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2259863 A (DUNLOP) Page 4 lines 23-34	1, 3-9
X	GB 2162431 A (SONY) Whole document especially Page 3 lines 44-48	1-5, 7
X	US 5028049 (MCKEIGHEN) Column 3 lines 12-47	1-2, 4-7
X	US 4444392 (DUCLOS) Figure 3	1-2, 4-7
X	CH 595117 (ZBINDEN) Whole document	1-2, 4-7

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.