Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).
The invention relates to a club head for a golfing putter, more particularly a putter head which is wing-shaped, seen from above, and exhibits a large moment of inertia about a horizontal axis (z-axis) and about a vertical axis (x-axis) through the mass centre of the putter relative to the mass of the club head. This means reduced loss in speed and direction if the golf ball is hit by the putter outside the putter's "sweet spot" (the point on the striking face located on the line of movement of the centre of gravity of the club head). The invention also relates to stabilizing aids for the wings of the club head and aiming aids integrated in the club head.

Conventional putters are designed as "heel/toe-weighted" or with a so-called "mallet" shape. Heal/toe-weighted putters have a large moment of inertia about the z-axis, thereby giving little loss in speed and direction in horizontal mishits. On the other hand, the moment of inertia about the x-axis is low, so that the loss in speed in vertical mishits will be large. Mallet putters have a relatively large moment of inertia about the z-axis, and the loss in speed in vertical mishits is relatively small. On the other hand, the moment of inertia about the x-axis is relatively small, so that the loss in speed and direction in horizontal mishits is relatively large.

US patent application 2003/013546 A1 discloses a wing-shaped putter head with toe and heel wings projecting rearwards in diverging directions from the face. The mass centre has been given a favourable position in that recesses in the body of the putter head are filled with a lighter material, preferably an elastomer like polyurethane.

US patent 6270422 B1 discloses a putter with detachable heel and toe wings, in which, on a top surface of each of the wings and on the club head, are placed aiming aids in the form of line markings in the surfaces located in a horizontal plane perpendicular to the face of the club head.

US patent 5470070 discloses a T-shaped putter head with aiming lines placed in an upper club surface and placed in a horizontal plane perpendicular to the face of the club head.

WO publication 01/91860 A1 discloses a symmetrical putter head suitable for both right-handed and left-handed players, in which aiming lines are placed in the upper surface of the club head.

It is of great importance for the striking properties of a putter club that in the moment of striking, the position of the club head is affected to the least possible degree by the collision with the ball. In the ideal stroke the putter hits the ball on the sweet spot. The effective mass moving in the stroke is not just the club head, but also parts of the shaft. The sweet spot (centre of rotation) of a shafted club is located higher than the sweet spot (centre of gravity) of the club head alone. In practice, most putters have the sweet spot higher than the centre of the striking face. Most players hit the ball with the striking face centre. Thus, it is beneficial to move club head mass down, so that the real sweet spot of the club is lowered towards the centre of the striking face.

In addition, an important factor for good performances in putting is to be able to aim the putter at the right angle towards the target. To make the aiming easier, there are different designs, in which lines or circles on the club head, or the shape of the lower part of the shaft, form(s) virtual aiming line(s) assuming a direction perpendicular to the striking face of the putter, viewed from above.

The invention has as its object to remedy the drawbacks of the prior art.

The object is achieved through the features specified in claim 1.

The club head for a putter has a wing shape, a toe wing extending rearwards from a toe portion of the club head and in a direction away from a striking face of a front portion of the club head, and a heel wing extending rearwards from a heel portion of the club head and in a direction away from the striking face of the club head. The outer side edges of the wings may have diverging directions, viewed from the striking face of the club head.

The club head is provided with an essentially transversal connection bracing the wings and extending between the outer wing portions of the opposite wings, possibly as a connection between the outer wing portion of each wing and a front portion of the club head, possibly as a combination of the bracing methods mentioned.

The mass centre of the club head can be located lower than the centre of the striking face. This is achieved by the wings advantageously having, in a front portion and a middle portion, an approximately L-shaped cross-section. Even other cross-sectional shapes that will give a predominant amount of mass in the lower portion of the wings can be used.

Alternatively, the position of the mass centre can be lowered by the use of a light material, for example aluminium, in the upper portions of the club head, combined with a heavy material, for example tungsten, in the lower portions of the club head.

Towards the rear end portion of the wings, the thickness of the vertical wall increases, while at the same time, the width of the wings increases. Thereby much mass is also placed at the rear of the wings, so that the moment of inertia of the club head about a vertical axis through the sweet spot will be large.

The moment of inertia of the club head about the vertical axis can also be increased by use of a light material, for example aluminium, in the mid portions of the club head, combined with a heavy material, for example tungsten, in the outer portions of the club head. It is also favourable for the club head to exhibit a large moment of inertia about a horizontal transversal axis through the sweet spot. This is achieved by using a heavy material in the club head's rear and outer portions, that is to say, the furthest out in the wings, whereas a light
material is used in the mid portions and front portions of the club head.

[0019] The lower, internal edge surfaces of the wings are parallel and at right angles to the striking face, viewed in a horizontal plane, thereby forming an aiming aid. Parallel to the lower, internal edge surfaces of the wings, the wings are advantageously provided with an additional aiming aid in the form of aiming line markings.

[0020] Alternatively or in addition to the above-mentioned aiming aids, each of the wings may be provided with an aiming aid in the form of one or more aiming line markings on a wing top surface, the aiming line markings being, in a horizontal plane, at right angles to the face.

[0021] Alternatively, the club head may be provided with aiming aids placed on or integrated in the bracing connections between the wings and/or between the wings and the front portion of the club head.

[0022] The front portion of the club head comprises the striking face, the toe portion, the heel portion and a shaft-connecting portion.

[0023] In the shaft-connecting portion the front club portion advantageously has an L-shaped cross-section for the purpose of placing a predominant amount of mass in the lower portion of the club head. Alternatively the shaft-connecting portion has a cross-section approximating a lying U-shape, in which an upper side surface and a lower side surface are formed to provide a stable attachment for a shaft without a large club mass being placed in this area. The U-shaped shaft-connecting portion gradually merges into a cross-section of an approximate L-shape or other cross-sectional shape giving a predominant amount of mass in the lower portion of the club head.

[0024] In the transition between the toe portion and the toe wing, the heel portion and heel wing, respectively, the thickness of the vertical wall is suitably increased to provide sufficient stability for the wings.

[0025] The upper side surface of the front portion of the club head is suitably provided with an additional aiming aid in the form of an aiming line marking lying parallel to the striking face.

[0026] Similarly, the upper side surface of the shaft-connecting portion is suitably provided with one or more aiming aids in the form of one or more aiming line markings lying at right angles to the striking face. The aiming line marking(s) may advantageously be extended in a direction away from the striking face by the shaft-connecting portion comprising one or more projecting aiming pins. Advantageously, one of the aiming line markings of the shaft-connecting portion coincides with a vertical plane extending through the "sweet spot" of the club head.

[0027] The aiming line markings, besides those formed by the geometrical shape of the club head (side edges, aiming pin and similar), are formed by, for example, recesses, indentations, elevations, colour markings or similar.

[0028] In what follows is described a non-limiting example of a preferred embodiment which is visualized in the accompanying drawings, in which:

Figure 1 shows a principle drawing of a toe/heel-weighted club head, in a top plan view;

Figure 2 shows a principle drawing of a "mallet"-shaped club head, in a top plan view;

Figure 3 shows a perspective drawing of an example of a wing-shaped club head not a part of the invention;

Figure 4 shows a front view of that same club head;

Figure 5 shows a rear view of that same club head;

Figure 6 shows a horizontal section VI-VI through said club head, seen from above as indicated in Figure 5;

Figure 7 shows a cross-section VII-VII through the club wing as indicated in Figure 6;

Figure 8 shows a side view of the club head;

Figure 9 shows a perspective drawing of another example of a wing-shaped club head not being a part of the invention;

Figure 10 shows a perspective drawing of a further alternatively wing-shaped club head according to the invention;

Figure 11 shows a top plan view of a further exemplary embodiment of a wing-shaped club head according to the invention;

Figure 12 shows a perspective drawing of the exemplary embodiment of Figure 11.
gether forming an approximately L-shaped cross-section. The vertical sidewall 33 is provided with an outer side surface 37. The bottom portion 35 is provided with an internal side edge 39 and an upper bottom surface 41. The upper bottom surface 41 is provided with a recessed aiming groove 43 lying parallel to and extending in approximately the entire length of the straight portion of the side edge 39. The rectilinear side edge portion 39 is advantageously at least 10 mm long. In a rear end portion 45 the cross-section of the wings 31, 31' gradually changes from an L-shape into a rectangular shape.

[0033] Each wing 31, 31' also includes a wing top surface 42, each provided with an aiming line marking 44. The aiming line markings 44 lie, in a horizontal plane, parallel to each other and parallel to the straight side edge 39 of the respective wing 31, 31'.

[0034] A front top surface 47 is provided with a recessed aiming groove 49, which lies parallel to the face 27.

[0035] The connecting portions 29, 29' are suitably provided with a hole 51, 51' for the insertion of the shaft (not shown).

[0036] The upper connecting portion 29 is provided with a recessed aiming groove 53, which is, in a horizontal plane, at right angles to the face 27 and is placed in a vertical plane that is at right angles to the face 27 and extends through the "sweet spot" of the club head. The aiming groove 53 is broken by the shaft hole 51.

Figure 9 shows an alternative example of a club head 21, in which the aiming groove 53 is extended rearwards along an aiming pin 54.

Figure 10 shows an embodiment of the club head 21, in which an intermediate plate 65 fills the space between the bottom portions 35 of the wings 31, 31'. An aiming line marking 67 in the upper surface 66 of the intermediate plate 65 is at right angles to the striking face 27.

Figures 11 and 12 show a further embodiment of the club head 21, in which the wings 31, 31' are interconnected by means of cross stays 71, 71', the cross stays 71, 71' projecting from the bottom portions 35 of the wings 31, 31'. The cross stays 71, 71' are connected by a stabilizing stay 73 to a mid portion 75. The stabilizing stay 73 is provided with rectilinear parallel side edge portions 77 that are at right angles to the striking face 27. A top surface 78 is provided with an aiming line marking 79.

[0037] The toe and heel portions 23, 25 separately have an approximately L-shaped cross-section, in which a lower front portion 55 projects essentially horizontally rearwards in a direction away from the striking face 27. The lower front portion 55 has a smooth transition into the lower connecting portion 29' for the shaft, alternatively into the mid portion 75 of the club head and the bottom portions 35 of the wings 31, 31'.

[0038] By means of the mass concentration of the projecting wings 31, 31' in their rear end portions 45, the club head 21 according to the invention exhibits a large moment of inertia.

[0039] The intermediate plate 65, alternatively the cross stays 71, 71', interconnect(s) the wings 31, 31' and brace(s) the wings 31, 31'. Thereby the natural oscillating frequency of the club head increases, resulting in a less audible sound produced by the club head's 21 impact on the ball in the moment of stroke. At the same time, the cross stays 71, 71' increase the mass concentration in the rear portion of the club head 21.

[0040] The stabilizing stay 73 increases the rigidity of the wings 31, 31' further.

[0041] By the toe and heel portions 23, 25 and the wings 31, 31' having an essentially L-shaped cross-section and by the cross stays 71, 71' projecting from the bottom portion 35 of the wings 31, 31', is achieved that the mass centre of the club head 21 is located lower than the centre of the face 27.

[0042] The internal side edge 39 of the wings 31, 31' together with the aiming grooves 43, 44, 49, 53 and 57, possibly the side edge portions 78 of the stabilizing stay 73 together with the aiming groove 79 work as aiming means to increase the precision of stroke.

**Claims**

1. A golf club head (21) for a putter club, in which the club head (21) is provided with a toe wing (31) projecting from a toe portion (23), and a heel wing (31') projecting from a heel portion (25), the wings (31, 31') being each provided with an outward side surface (37), the side surfaces (37) diverging relative to each other in a direction away from a striking face (27), characterized in that

- a substantial portion of the moment of inertia of the toe wing (31) and the heel wing (31') around a vertical axis coinciding with the clubs head centre of mass, is obtained by the mass of the rear end portion (45) of the wing (31, 31'), the mass per length unit of the end portion of each wing (31, 31') being substantially larger than the mass per length unit of adjacent mid portions of the wings (31, 31');

- and that at least one bracing means (65, 71, 71') is secured to the rear end portion (45) of either wing (31, 31').

2. A golf club head (21) in accordance with claim 1, characterized in that to a mid portion (29', 75) of the golf club head (21) there is secured at least one bracing means (65, 73).

3. A golf club head (21) in accordance with claim 1,
characterized in that the golf club head (21) includes an intermediate plate (65) filling the space between the lower portions (35) of the wings (31, 31').

4. A golf club head (21) in accordance with claim 1, characterized in that cross stays (71, 71') connect the rear end portions (45) of the wings (31, 31').

5. A golf club head (21) in accordance with claim 1, characterized in that cross stays (71, 71'), connecting the rear end portions (45) of the wings (31, 31'), are rigidly connected by a stabilizing stay (73) to the mid portion (75) of the golf club head (21).

6. A golf club head (21) in accordance with claim 1, characterized in that each of the wings (31, 31') has an inward-facing, rectilinear side edge portion (39) lying essentially parallel to each other and being, in a horizontal plane, essentially at right angles to the striking face (27).

7. A golf club head (21) in accordance with claim 5, characterized in that the rectilinear side edge portion (39) has an extent of at least 10 mm.

8. A golf club head (21) in accordance with claim 1, characterized in that the mass centre of the club head (21) is positioned lower, than the centre of the striking face (27).

9. A golf club head (21) in accordance with claim 1, characterized in that the toe portion (23) and the heel portion (25) have an L-shaped cross-section, a lower portion (55) thereof projecting essentially horizontally in a direction away from the striking face (27).

10. A golf club head (21) in accordance with claim 1, characterized in that a middle portion of each of the wings (31, 31') has an L-shaped cross-section, a bottom portion (35) thereof projecting essentially horizontally in a direction away from the outer side surface (37).

11. A golf club head (21) in accordance with claim 1, characterized in that the rear portions (45) of the club head (21) are formed essentially by a material of a specific gravity of more than 3.5 kg/dm³ and the front portions (23, 25, 27) of the club head (21) are formed essentially by a material of a specific gravity of less than 3.5 kg/dm³.

12. A golf club head (21) in accordance with claim 1, characterized in that the lower portions (29', 35, 55) of the club head (21) are formed essentially by a material having a specific gravity of more than 3.5 kg/dm³ and the upper portions (29, 47) of the club head (21) are formed essentially by a material of a specific gravity of less than 3.5 kg/dm³.

13. A golf club head (21) in accordance with claim 1, characterized in that the rear and outer portions (45) of the club head (21) are formed essentially by a material of a specific gravity larger than 3.5 kg/dm³ and the middle portions (29, 29', 75) of the club head (21) are formed essentially by a material of a specific gravity of less than 3.5 kg/dm³.

Patentansprüche

1. Golfschlägerkopf (21) für einen Putterschläger, wobei der Schlägerkopf (21) mit einem von einem Zehenteil (23) hervorstehenden Zehenflügel (31) und einem von einem Fersenteil (25) hervorstehenden Fersenflügel (31') versehen ist, die Flügel (31, 31') sind jeweils mit einer äußeren Seitenfläche (37) versehen, wobei die Seitenflächen (37) relativ zueinander in einer Richtung weg von einer Schlagfläche (27) auseinanderlaufen, dadurch gekennzeichnet, dass

- ein wesentlicher Anteil des Trägheitsmoments des Zehenflügels (31) und des Fersenflügels (31') um eine mit dem Schwerpunkt des Schlägerkopfs koinzidierenden vertikalen Achse durch die Masse der hinteren Endteile (45) der Flügel (31, 31') erzielt wird, die Masse je Längeneinheit der Endteils jeder Flügel (31, 31') deutlich größer als die Masse je Längeneinheit benachbarter mittlerer Teile der Flügel (31, 31') ist;
- und dass mindestens ein Verstärkungsmittel (65, 71, 71') am hinteren Endteil (45) jedes Flügels (31, 31') sicher befestigt ist.

2. Golfschlägerkopf (21) nach Anspruch 1, dadurch gekennzeichnet, dass an einem mittleren Teil (29', 75) des Golfschlägerkopfs (21) mindestens ein Verstärkungsmittel (65, 73) sicher befestigt ist.

3. Golfschlägerkopf (21) nach Anspruch 1, dadurch gekennzeichnet, dass der Golfschlägerkopf (21) eine den Raum zwischen den unteren Teilen (35) der Flügel (31, 31') ausfüllende Zwischenplatte (65) enthält.

4. Golfschlägerkopf (21) nach Anspruch 1, dadurch gekennzeichnet, dass Kreuzstege (71, 71') die hinteren Endteile (45) der Flügel (31, 31') verbinden.

5. Golfschlägerkopf (21) nach Anspruch 1, dadurch gekennzeichnet, dass die die hinteren Endteile (45) der Flügel (31, 31') verbindenden Kreuzstege (71, 71') mittels eines Stabilisierungsstegs (73) starr mit dem mittleren Teil (75) des Golfschlägerkopfs

7. Golfschlägerkopf (21) nach Anspruch 5, dadurch gekennzeichnet, dass die geradlinige Seitenkantenteil (39) eine Ausdehnung von mindestens 10 mm hat.

8. Golfschlägerkopf (21) nach Anspruch 1, dadurch gekennzeichnet, dass der Schwerpunkt des Schlägerkopfs (21) niedriger angeordnet ist als das Zentrum der Schlagfläche (27).


10. Golfschlägerkopf (21) nach Anspruch 1, dadurch gekennzeichnet, dass ein mittlerer Teil jedes Flügels (31, 31’) einen L-förmigen Querschnitt hat, wobei ein unterer Teil (35) davon im wesentlichen horizontal in einer Richtung weg von der äußeren Seitenfläche (37) ragt.


Revendications

1. Tête de club de golf (21) pour un fer droit, où la tête de club (21) comporte une aile d’orteil (31), qui s’étend d’une section d’orteil (23), et une aile de talon (31’), qui s’étend d’une section de talon (25), où les ailes (31, 31’) étant prévues chacune avec une surface latérale extérieure (37), où les surfaces latérales (37) divergent, une par rapport l’autre, dans une direction opposée à la face de frappe (27), caractérisée en ce que

- une partie essentielle du moment d’inertie de l’aile d’orteil (31) et de l’aile de talon (31’) autour d’un axe vertical, qui coïncide avec le centre de gravité de la tête de club, est obtenue par la masse de la section arrière (45) de l’aile (31, 31’),
- où la masse par unité de longueur à la section arrière de chaque aile (31, 31’) est essentiellement supérieure à la masse par unité de longueur des sections centrales adjacentes des ailes (31, 31’);
- et en ce qu’au moins un moyen d’entretoise (65, 71, 71’) est sécurisé à la section arrière (45) de chaque aile (31, 31’).

2. Tête de club de golf (21) suivant la revendication 1, caractérisée en ce qu’au moins un moyen d’entretoise (65, 73) est attaché à une section centrale (29’, 75) de la tête de club de golf (21).

3. Tête de club de golf (21) suivant la revendication 1, caractérisée en ce que la tête de club de golf (21) comporte une plaque intermédiaire (65) qui remplit l’espace entre les sections inférieures (35) des ailes (31, 31’).

4. Tête de club de golf (71) suivant la revendication 1, caractérisée en ce que des traverses (71, 71’) connectent les sections de bouts arrière (45) des ailes (31, 31’).

5. Tête de club de golf (21) suivant la revendication 1, caractérisée en ce que les traverses (71, 71’), qui connectent les sections de bouts arrière (45) des ailes (31, 31’), sont connectés d’une manière rigide par une traverse stabilisante (73) à la section centrale (75) de la tête de club de golf (21).

6. Tête de club de golf (21) suivant la revendication 1, caractérisée en ce que chaque aile (31, 31’) a une section de bord latérale rectiligne et orientée vers l’intérieur (39) qui est disposée essentiellement parallèlement l’une à l’autre et forme chacune, dans un plan horizontal, essentiellement un angle droit avec la face de frappe (27).
7. Tête de club de golf (21) suivant la revendication 5, **caractérisée en ce que** la section de bord latérale rectiligne (39) a une longueur d'au moins 10 millimètres.

8. Tête de club de golf (21) suivant la revendication 1, **caractérisée en ce que** le centre de cavité de la tête de club (21) est positionné plus bas que le centre de la face de frappe (27).

9. Tête de club de golf (21) suivant la revendication 1, **caractérisée en ce que** la section d'orteil (23) et la section de talon (25) ont une forme de « L » dans leur coupe transversale, dont une section inférieure (55) s'étend essentiellement d'une manière horizontale dans une direction opposée à la face de frappe (27).

10. Tête de club de golf (21) suivant la revendication 1, **caractérisée en ce qu' une section centrale de chaque aile (31, 31') a une forme de « L » dans sa coupe transversale, dont une section inférieure (35) s'étend essentiellement d'une manière horizontale dans une direction opposée à la surface latérale extérieure (37).

11. Tête de club de golf (21) suivant la revendication 1, **caractérisée en ce que** les sections arrières (45) de la tête de club (21) sont formées essentiellement par un matériau d’une gravité spécifique de plus de 3,5 kg/dm³ et où les sections avants (23, 25, 27) de la tête de club de golf (21) sont formées essentiellement d’un matériau d’une gravité spécifique de moins de 3,5 kg/dm³.

12. Tête de club de golf (21) suivant la revendication 1, **caractérisée en ce que** les parties inférieures (29, 35, 55) de la tête de club (21) sont formées essentiellement par un matériau qui a une gravité spécifique de plus de 3,5 kg/dm³ et où les sections supérieures (29, 47) de la tête de club (21) sont formées essentiellement par un matériau d’une gravité spécifique de moins de 3,5 kg/dm³.

13. Tête de club de golf (21) suivant la revendication 1, **caractérisée en ce que** les sections arrières et extérieures (45) de la tête de club (21) sont formées essentiellement par un matériau d’une gravité spécifique plus grand que 3,5 kg/dm³ et où les sections centrales (29, 29’, 75) de la tête de club (21) sont formées essentiellement par un matériau d’un gravité spécifique de moins de 3,5 kg/dm³.
REFERENCES CITED IN THE DESCRIPTION

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