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(54) **Golf club and method of swinging a golf club**

(57) Golf club (1) comprising a shaft (2) and a club head (4) attached to the shaft wherein the golf club is arranged to hit a golf ball at a sweet spot (14) on a striking face (6) at a loft angle to a reference plane through the sweet spot, the shaft (2) being at a lie angle to a lie direction of the club head (4), the club head comprising a

sole (8). The golf club comprises a striking area (15) located on the striking face (6) around the sweet spot, wherein the striking area has a projection in a projection direction (40) in the reference plane perpendicular to the lie direction on a projection area (25) of the sole, the projection area having a spherical shape.

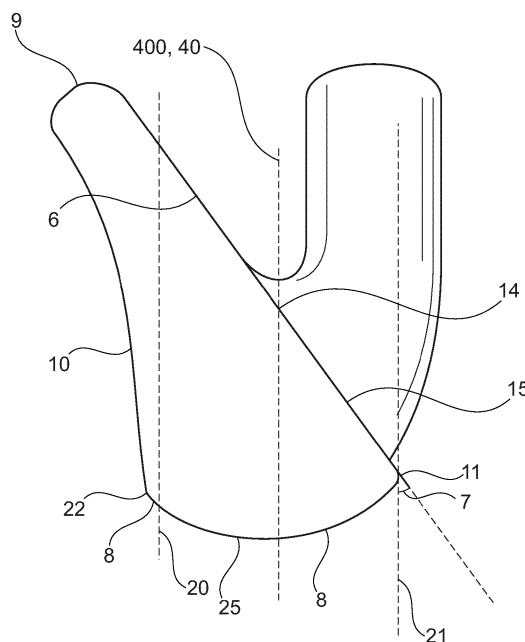


Fig. 2

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Description

Technical field

[0001] The invention relates to golf clubs and methods of swinging a golf club.

Background

[0002] Golf is a well-known activity performed by many, including a range of professionals and is also instructed by professional instructors. For this activity, a well-known golf club is used. The golf club comprises a shaft and a club head. The club head has a striking face for hitting the golf ball. The striking face is at an angle to the shaft, the so called loft. On the striking face there is a sweet spot, which is the position where ideally the golf ball is hit. The club head has a sole which faces the ground while hitting the golf ball. The edge between the striking face and the sole is the leading edge. When the golf club is in the intended orientation for hitting the golf ball in an ideal way, the leading edge is straight or has an elongated shape at least at a portion below the sweet spot. The angle between the straight or elongated part and the shaft is the so called the "lie". In this position the sole is straight or has an elongated shape in the direction parallel to the trajectory the golf club has just followed.

[0003] In use the person using the golf club aims at using a specific golf swing to hit the golf ball properly while simultaneously preventing the health problems. He first aligns his feet and shoulders to be parallel to the projection of the trajectory he intends the golf club to follow close to hitting the ball. In this position the golf ball is on the vertical projection of the centre line between his hips. When aligning himself, his feet are parallel to the centre line. The golf club is held such that the position of his hands overlaps slightly along the grip. Then he swings the golf club backward and upward. His front leg bends a little and the centre line between his hips rotates and points slightly backward. Then he swings the golf club forward while extending his front leg and rotating his hips passed the position where the centre line points to the position where the golf ball is. At the end of the swing the rear leg is bend and the left foot is rotated slightly.

[0004] Because the leading edge and the sole are straight or elongated, the swing has to be performed with high accuracy. When inaccurately performed, a part of the leading edge or the sole may hit the ground.

[0005] It is an object of the invention to provide a golf club head, which at least reduces this problem.

[0006] According to an embodiment there is provided a golf club comprising a shaft and club head attached to the shaft, wherein the golf club is arranged to hit a golf ball at a sweet spot on a striking face at a loft angle to a reference plane through the sweet spot, the shaft being at a line angle to a lie direction of the club head, the club head comprising a sole, characterised by a striking area located on the striking face around the sweet spot where-

in the striking area has a projection in a projection direction in the reference plane perpendicular to the lie direction on a projection area of the sole, the projection area having a spherical shape.

[0007] Because the striking area around the sweet spot is on the striking face and because striking face of a golf club head is at a loft angle to the reference plane through the sweet spot, the striking area can be projected in onto a projection area of the sole in a direction in the reference plane. Because the projection is in the direction perpendicular to the lie direction, the projection is onto the part of the sole that is intended to face the ground while hitting the golf ball in an optimal swing. As the projection area, i.e. the part onto which the projection is made, has a spherical shape, the chances that the ground is touched by the club head during the swing are lowered. This is because only 1 location will be closest to the ground and the rest of the projection area is further away due to the spherical curvature of the shape. Therefore the golf club is relatively well usable when the ground on which the golf ball rests is uneven.

[0008] As the curvature applies to all directions for a spherical shape, it applies in the direction perpendicular to the trajectory of the club head at the moment of hitting the golf ball as well as in the direction parallel to the trajectory of the club head at the moment of hitting the golf ball.

[0009] As this applies to the direction perpendicular to the trajectory, the golf club can be used with a larger variation in the inclination of the shaft with respect to the ground (than with prior art golf clubs), which in turn means that the accuracy of performing the swing is less important for performing a good swing.

[0010] As this also applies to the direction parallel to the trajectory of the club head, the performance of the golf club is improved.

[0011] The distance of the sole of the club head to the ground is less important at the part of the trajectory of the club head wherein the golf ball is hit and therefore the golf club requires less accuracy in performing the swing by the user.

[0012] Spherical shapes are relatively strong. With the projection area having this relatively strong shape, the club head is strong which is advantageous in case the club head hits the ground during use. This is particularly advantageous as the projection area is one of the most likely areas to hit the ground in case of a bad stroke or irregularities of the ground. In a preferred embodiment

- the club head comprises a top surface opposite to the sole; and
- the sole comprises a first area with a spherical shape, the first area comprising the projection area and a further area corresponding to the projection in the projection direction of at least a part of a top surface of the club head.

[0013] For some purposes, it may be advantageous to

have a large club head with a large sole area. For instance golf clubs of the "wood" type which are used for long distance shots have a relatively large dimension in the direction that in use is parallel to the trajectory of the club head at the moment of hitting the golf ball resulting in a large sole area. With a sole area, the larger the first area, the smaller the chances that the golf club touches the ground during a swing because the first area is spherical. As the first area comprises both the projection of the striking area and at least a part of the top surface, the first area is larger than the projection area. In a further preferred embodiment, the projection area has a surrounding edge and the further area is at least partly delimited by at least a part of the surrounding edge.

[0014] Because the further area shares a part of the edge surrounding the projection area with the projection area, the projection area and the further area are not discretely located on the sole and the golf club. This is advantageous, because this makes the variation in unevenness and variation in swings continuous, which makes the golf club easier to use. In an embodiment giving further advantages, the first area extends to the leading edge of the club head.

[0015] During a swing with the golf club, the leading edge is one of the most likely parts to hit the ground in case of a badly performed stroke. With the first area extending to the leading edge, there is less chance that the club head will hit the ground at the leading edge.

[0016] In another embodiment giving further advantages, the first area extends to the edge of the club head where the sole and a surface opposite to the striking face meet.

[0017] During a swing with a prior art golf club, the edge of the club head where the sole and the surface opposite to the striking face meet may be a likely part to hit the ground, especially in case the golf club has a large club head, such as a "wood" or a "hybrid". Because the first area extends to this edge, this risk is reduced.

[0018] In an embodiment, the radius of the spherical part is equal to the radius of the golf ball or be 4, 6, 7 8, 10 or 12 cm.

[0019] The smaller the radius is, the lower the chance that the club head will touch the ground.

[0020] It is another object of the invention to provide a method which requires less accuracy.

[0021] According to an embodiment of the invention, there is provided a method of swinging a golf club, wherein the golf club is according to one of the embodiments invention, wherein the shaft extends along an axis, and wherein the projection of the lower trajectory is the vertical projection of the part of the trajectory of the club head including the point where the club head hits a golf ball, characterized by

- comprising hitting the golf ball when the golf club has travelled to a position wherein the axis of shaft does not run through the torso of the user; and
- hitting the golf ball while the users hips are at a hip

angle (1005) smaller than 90 degrees to the lower trajectory.

[0022] Hitting the golf ball when the shaft has travelled to a position and orientation wherein the axis of the shaft does not run through the torso of the user, corresponds to a position of the shoulders of the user wherein the shoulders of the user are not parallel to the projection of the trajectory of the club head on the ground around the moment at which the golf ball is hit. As the golf ball is hit while the users hips are also at an angle smaller than 90 degrees, the swing and stance of the user feel more natural than the swing and stance of the shoulders during a prior art swing and leads to a more accurate executing of the swing. This is related to the fact that with the method according to the invention, the amount of body parts rotated by the user with respect to other body parts is lowered.

[0023] According to a preferred embodiment of the invention, the user aims before hitting the ball by rotating his head to look at the golf ball and the goal such that his eyes stay parallel to the shoulders of the user.

[0024] Keeping his eyes parallel advantageously improves the eye-body coordination of the user.

[0025] According to a preferred embodiment of the invention the method comprises gripping the golf club such that at the moment of hitting the golf ball a chopping movement can made by both hands of the user simultaneously.

[0026] Rotation of the radius and cubit around the elbow of a user are not necessary with a chopping movement. When both hands grip the golf club such that the simultaneously make a chopping movement, such rotations around both the users elbows are minimized. This means that the swing can be performed with optimal precision.

[0027] Examples of embodiments the invention will now be described with reference to the accompanying schematic drawings. Corresponding reference symbols in the schematic drawings indicate corresponding parts. The schematic drawings are not necessarily to scale and certain features may be exaggerated to better illustrate and explain the present invention. Further, the examples are not intended to be exhaustive or otherwise limit or restrict the invention to the precise configurations shown in the drawings and disclosed in the following detailed description.

Figure 1 depicts a golf club according to the invention
 Figure 2 depicts a side view of a club head for an "iron" type golf club according to the invention
 Figure 3 depicts a front view of a club head according to the invention
 Figure 4 depicts a side view of a club head for an hybrid according to the invention
 Figure 5 depicts relative positions of the feet of a user and the golf club and the golf ball while performing a swing according to the invention

Detailed description

[0028] A golf club (1) according to the invention (figure 1) comprises a shaft (2) with a grip (3) and a clubhead (4). The club head is attached to the shaft at a portion of the shaft called hosel (5).

[0029] The shaft (2) may be a tapered cylindrical tube or a series of stepped cylindrical tubes in telescopic fashion. The shaft has an axis (12) of rotational symmetry along which it extends from the grip in the direction of the hosel (5). The shaft is for instance made from wood, metal such as steel or titanium or from carbon fiber composite. The shaft may be roughly 13 mm in diameter near the grip and from 86 to 122 cm in length. The shaft typically weighs between 45 to 150 grams.

[0030] The clubhead (4) has a striking face (6), which is to make contact to the golf ball. Figure 2 shows a club head (4) corresponding to the type "iron". The club head (4) further comprises a sole (8), a top surface (9) and a surface opposite to the striking face (10). The edge between the striking face and the sole is the leading edge (11). This name is derived from its relative position during the forward swing during which it approached the ground first.

[0031] The club head may be made from wood such as thorn, apple, pear, dogwood, beech or persimmon or from laminates. Modern club heads however mostly are made from metals such as hollow titanium, steel or forged iron or from a composite.

[0032] The grip may be made from leather or rubber.

[0033] The golf club is intended for hitting the ball in an intended orientation to obtain optimal results. The part of the club head facing the ground, i.e. the surface of the golf court on which the golf ball is, when hitting the golf ball in the intended orientation, is the sole (8) of the club head (4). When swinging the golf club and hitting the ball, the club head follows a trajectory.

[0034] The striking face (6) comprises a sweet-spot (14), i.e. an location where optimal ball-striking results area achieved. The closer the ball is struck to the sweet-spot, the better the strike.

[0035] A reference plane (400) of the golf club is defined as the plane that intersects the striking face in a horizontal line, the intersection (100), when the golf club would be in the intended orientation for hitting a golf ball (1020) on a level surface, i.e. the reference plane is vertical. For other orientations of the golf club, the reference plane has a correspondingly different orientation.

[0036] The intersection extends along a lie direction. The projection of the axis (12) of symmetry on the reference plane (400) in the direction normal to the reference plane makes a lie angle (130) to the intersection (100), i.e. to the lie direction, between the reference plane and the striking face. The lie angle (130) is larger than 90 degrees. The angle which complements this lie angle (130) to form a 180 degree angle is the elevation angle (13).

[0037] The angle between the reference plane and the

club heads striking face is the "loft" (7) (figure 2). The striking face (6) also comprises a striking area (15) around the sweet-spot. In figure 2 the striking area is partly enclosed by the top edge (19) (i.e. the edge between the striking face (6) and the top surface (9)). The striking area is also partly enclosed by the leading edge (11). Furthermore, the striking area is delimited by lines 16, 17 and 18. When the golf club is in its intended orientation, the vertical projection of the striking area on the sole of the club head results in a projection area (25). The direction of the projection is given by lines 20 and 21 which are parallel to the reference plane (400). In other words, the projection is in a projection direction (40) in the reference plane (400) wherein the projection direction is perpendicular to the lie direction.

[0038] Preferably, when the golf club is in the intended orientation, the distance from the sweet-spot to the ground in the projection direction (40) is equal to the radius of a the golf ball. In this preferred situation, the sweet-spot is at a distance equal to the radius of the golf ball from the ground and the golf ball may be hit exactly on the sweet spot. The officially allowed diameter of the golf ball is 42,67 mm. For this, the distance between the sweet spot and the projection (24) of the sweet spot on the sole is equal to or less than the radius of the golf ball.

[0039] The projection area (25) has a spherical shape with a radius R. The radius (R) of the first area where the projection of the striking area is, may be equal to the radius of the golf ball or may for instance be 4, 6, 7 8, 10 or 12 cm. The centre point (23) of the spherical shape, the sweet spot (14) and the projection (24) of the sweet spot are all on the line in the projection direction (40). Therefore, a tangent to the sole at the projection (24) of the sweet spot is parallel to the intersection lie direction.

[0040] The spherical area extends to the leading edge (11). The spherical area also extends to the edge where the sole (8) and the surface opposite to the striking face meet (22).

[0041] The golf club may be optimised for a specific service and be a so called "wood", an "iron", "wedge", "hybrid", "chipper" or "putter". The optimisation may be realised by variation of the shaft length, flex, torsion strength and material or by variation in shape and material of the club head.

[0042] An example of the invention as used for a golf club of the type "hybrid" is shown in figure 4. The club head (4) of this example comprises a first area which is spherical. The first area comprises the projection area (25).

[0043] An example of the use of the golf club (1) will now be described (figure 5). As will be appreciated, the golf club (1) may be used by a professional in the entertainment industry for instance during tournaments, demonstrations or instruction sessions.

[0044] For explaining the method, reference is made to the lower trajectory (1004). This is the part of the trajectory of the club head which includes the point where the club head hits a golf ball. The projection (1000) of

this trajectory on the ground is used as well for explaining the method (see figure 5).

[0045] The user of the golf club (1) takes a natural pose with slightly bend knees with his feet (1001, 1011) on the ground. In the pose the axis (12), the shoulders of the user and the hips are not parallel to the projection of the lower trajectory. Preferably, the axis (12) is perpendicular to the lower trajectory. In figure 5, a hipline (1000) indicates the direction from one hip of the user to the other. The cross section of the torso of the user at hip height is indicated by reference number 1002.

[0046] The user then checks his grip of the golf club. If needed he rearranges his grip such that he can make a chopping movement while hitting the ball with both hands simultaneously. This is done by rearranging his grip of his hands around the axis (12).

[0047] The user then looks at where the golf ball needs to go, with his eyes parallel to his shoulders. This requires rotation of the neck of the user only. This step may also be performed before checking the grip of the user.

[0048] The user subsequently lifts the golf club (1) upward and finally swings the golf club forward and downward so that the club head follows the trajectory and hits the golf ball (1020) with the striking face. Figure 5 shows the golf club in a position just before hitting the golf ball (1020). While hitting the golf ball the centreline (1003) between the hips of the user is at a hip angle (1005) smaller than 90 degrees to the lower trajectory.

[0049] For optimal control of the result the golf club has its axis (12) in the reference plane.

[0050] While hitting the golf ball, the user makes a chopping movement with both hands simultaneously.

[0051] The stance of the user is such that if the shaft (2) of the golf club would extend beyond the grip (3) in the direction away from the grip head, the golf club would not be in the way of the users torso at the moment of hitting the golf ball (1020), i.e. the axis of the golf club does not run through the torso of the user.

Claims

1. Golf club (1) comprising a shaft (2) and a club head (4) attached to the shaft wherein the golf club is arranged to hit a golf ball at a sweet spot (14) on a striking face (6) at a loft angle to a reference plane through the sweet spot, the shaft (2) being at a lie angle to a lie direction of the club head (4), the club head comprising a sole (8);

characterised by

a striking area (15) located on the striking face (6) around the sweet spot, wherein the striking area has a projection in a projection direction (40) in the reference plane perpendicular to the lie direction on a projection area (25) of the sole, the projection area having a spherical shape.

2. Golf club according to claim 1, wherein

- the club head (4) comprises a top surface (9) opposite to the sole; and wherein
- the sole comprises a first area (25,30) with a spherical shape, the first area comprising the projection area (25) and a further area (30) corresponding to the projection in the projection direction (40) of at least a part (31) of a top surface of the club head.

3. Golf club according to claim 2, wherein

- the projection area (25) has a surrounding edge (32); and wherein the further area is at least partly delimited by at least a part of the surrounding edge.

4. Golf club according to claim 2 or 3, wherein the first area (25,30) extends to the leading edge (11) of the club head (4).

5. Golf club according to claim 2, 3 or 4, wherein the first area extends to the edge (34) of the club head where the sole and a surface (33) opposite to the striking face (6) meet.

6. Golf club according to any of the claims 2 to 5, wherein the radius of the spherical part is equal to the radius of the golf ball or be 4, 6, 7 8, 10 or 12 cm.

7. Golf club according to any of the claims 1 to 6, wherein the shaft (2) extends along an axis in the reference plane.

8. Method of swinging a golf club (1) according to any of the claims 1 to 7 wherein the shaft (2) extends along an axis and wherein the projection (1000) of the lower trajectory is the vertical projection of the part of the trajectory of the club head including the point where the club head (4) hits a golf ball (1020), **characterized by**

- comprising hitting the golf ball (1020) when the golf club has travelled to a position wherein the axis of shaft (2) does not run through the torso of the user; and
- hitting the golf ball while the users hips are at a hip angle (1005) smaller than 90 degrees to the lower trajectory.

9. Method of swinging a golf club (1) according to claim 8, comprising aiming before hitting the ball, by rotating the users head to look at the golf ball and the goal such that the eyes of the user stay parallel to the shoulders of the user.

10. Method of swinging a golf club (1) according to claim 8 or 9, comprising gripping the golf club such that at the moment of hitting the golf ball (1020) a chopping

movement can be made by both hands of the user simultaneously.

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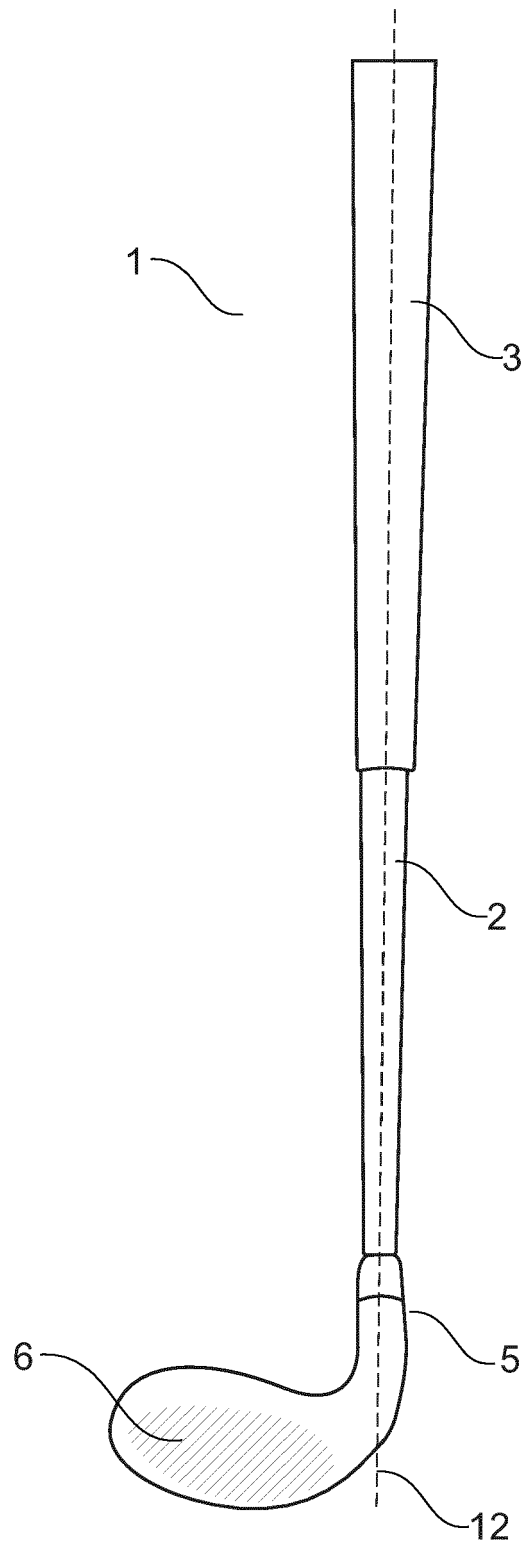


Fig. 1

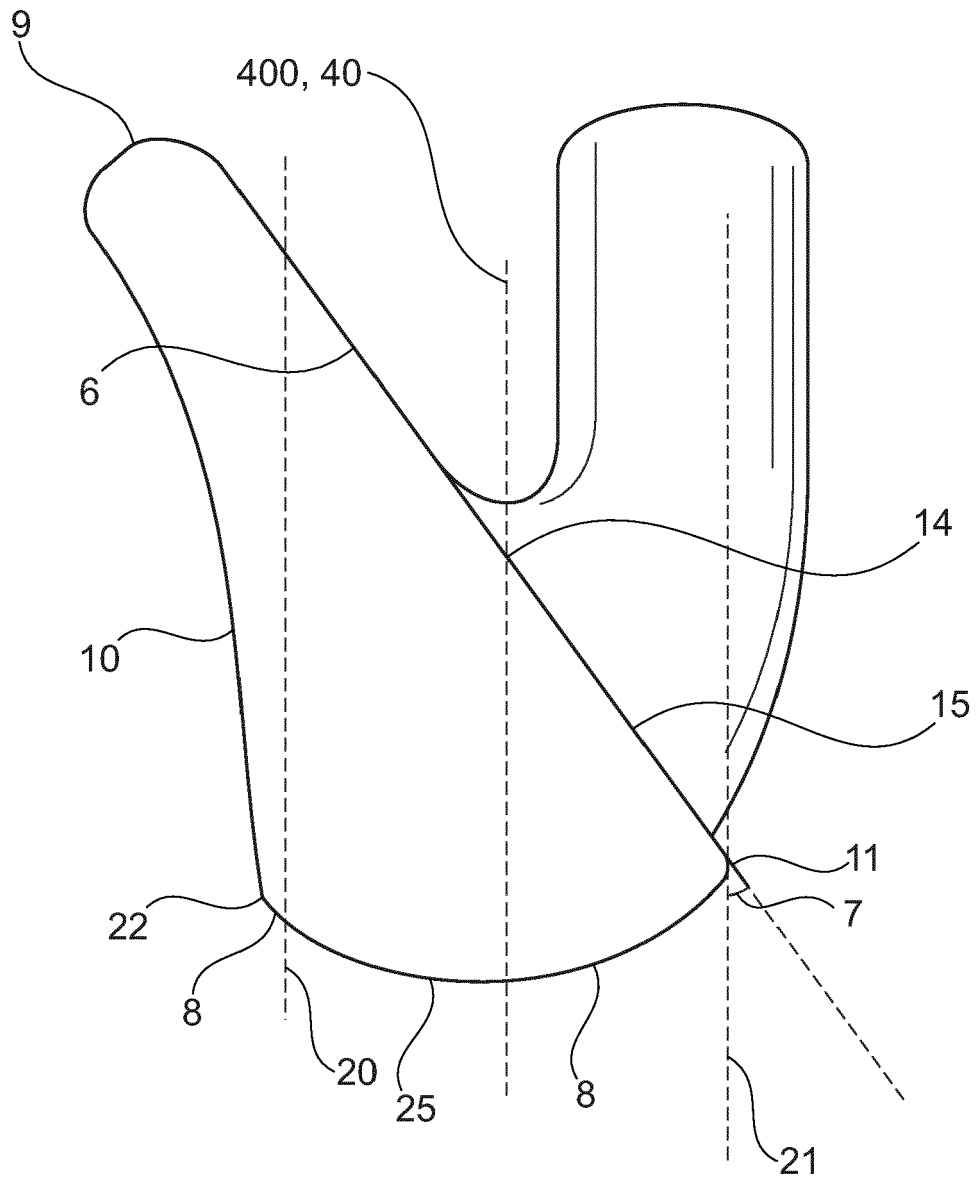


Fig. 2

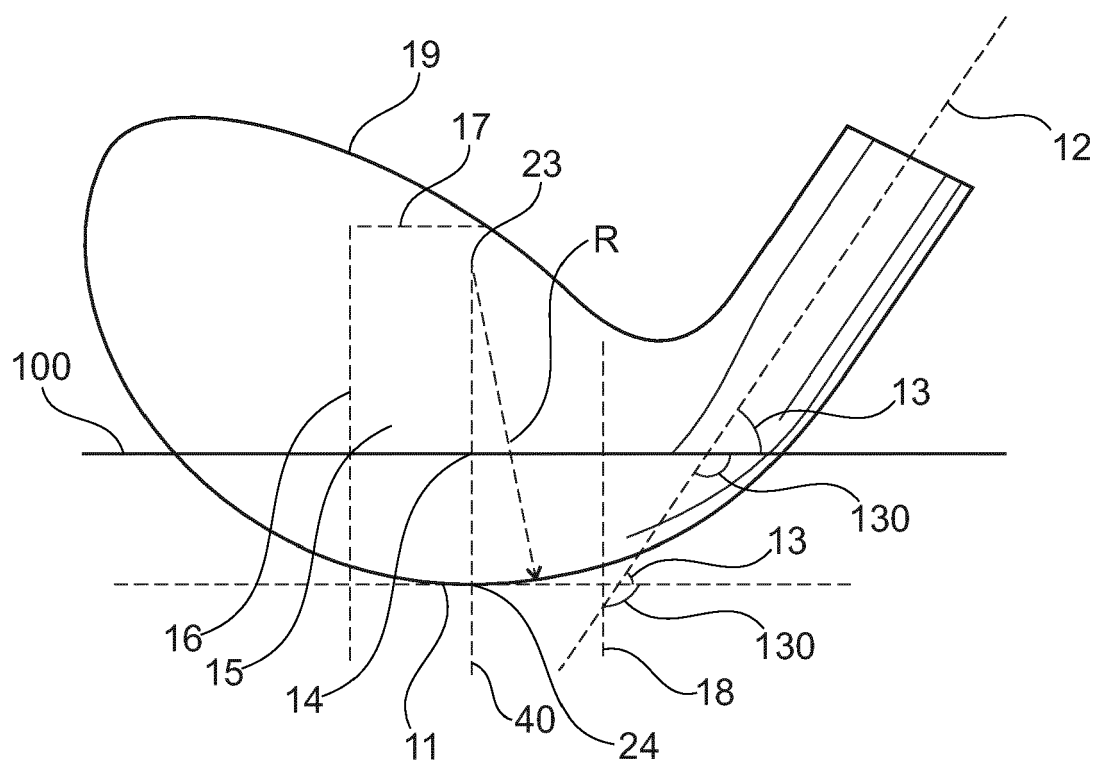


Fig. 3

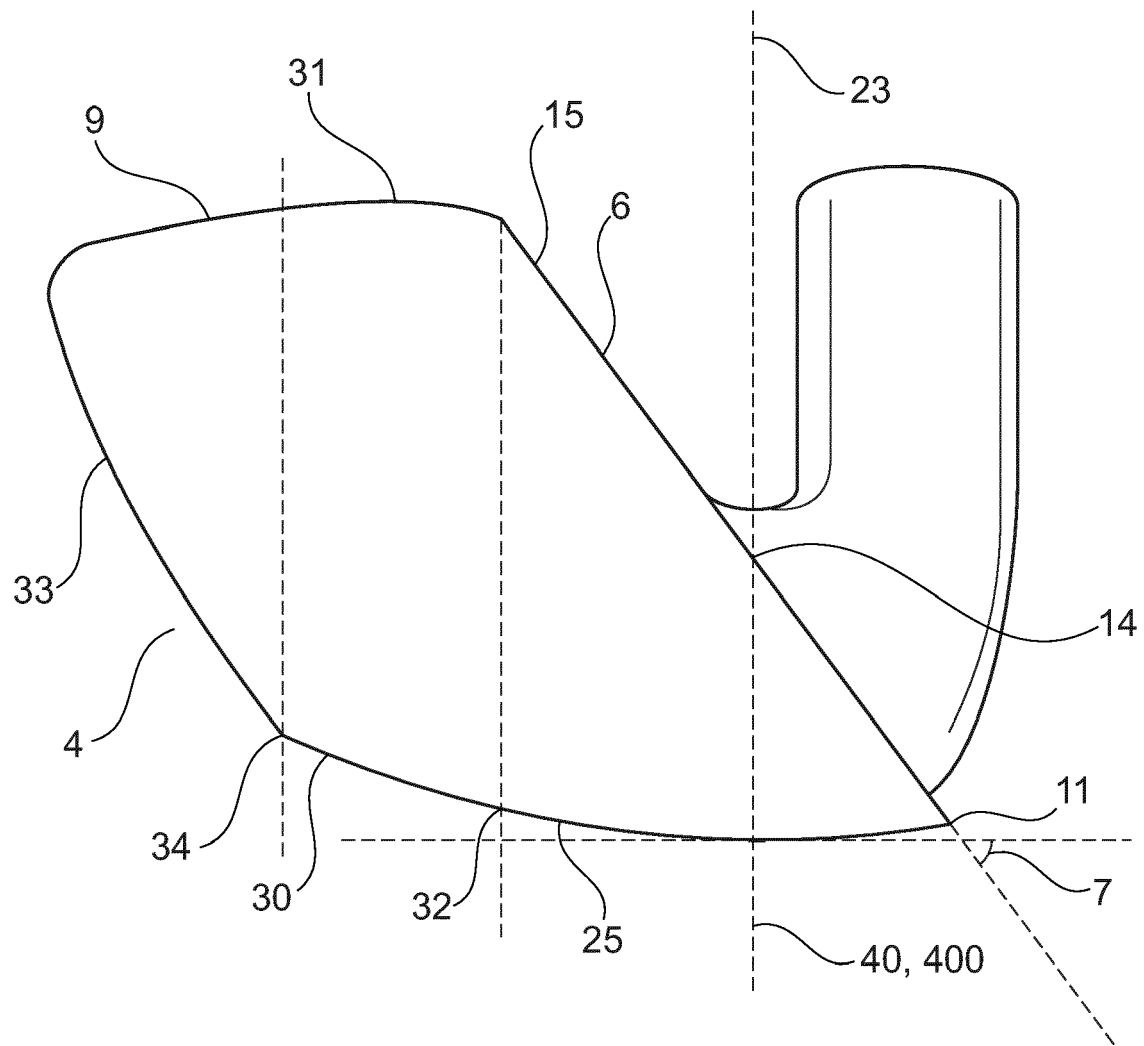


Fig. 4

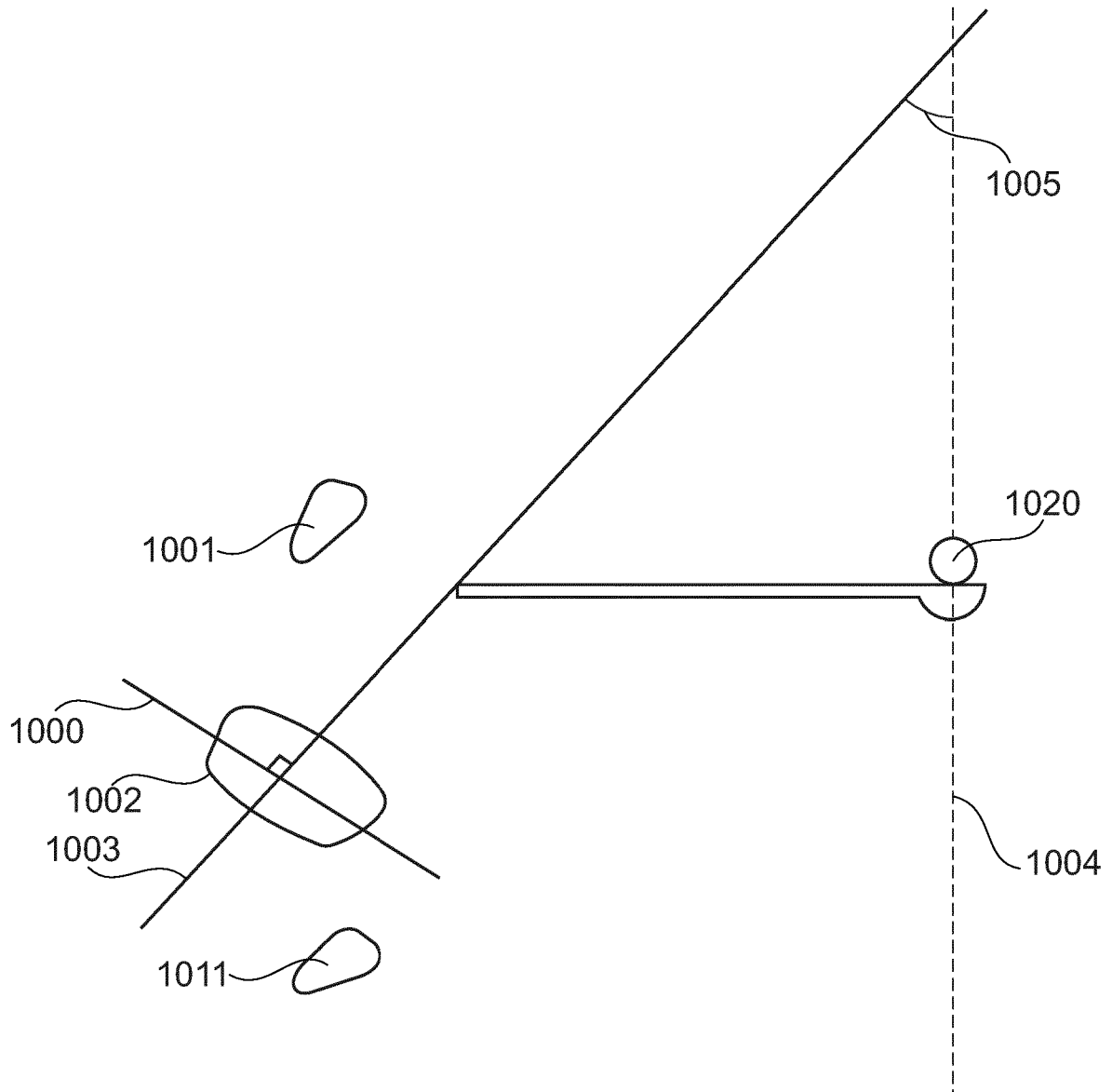


Fig. 5



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 Application Number
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Place of search Munich		Date of completion of the search 9 December 2013	Examiner Lundblad, Hampus
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