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(54) Golf Clubhead

(57) A wood type golf clubhead includes a face, a sole, a crown, a toe portion, a heel portion, and a hosel portion adjacent the heel portion. The hosel portion has an inverted or recessed portion which includes a generally concave wall. A hosel tube extends upwardly from the hosel portion. The hosel tube is supported within a boss which is formed integrally with the inside surface of the face. The hosel and boss coact to restrain relative rotation therebetween. An alignment groove is provided at the intersection between the face and the crown, and the groove includes a surface which lies within a plane which is substantially vertical when the clubhead is soled at address. The sole includes a flat portion for supporting the clubhead at address, and a rear wall curves upwardly and rearwardly from the flat portion to the crown. The toe portion and the crown merge at a relatively sharp angle to provide a streamlined shape.

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Description

This invention relates to a wood type of golf clubhead comprising a face, a sole, a crown, a toe wall, a heel wall and a hosel portion. More particularly the invention relates to a golf clubhead which has a recessed or inverted hosel portion, a hosel tube which is inserted into an opening in the hosel portion, an alignment groove for aligning the clubhead, a flat sole portion, and an aerodynamic shape.

Golf clubs of the wood type are no longer made only from wood. Such clubs are now commonly made from metal such as stainless steel, titanium, and aluminum and from composite material such as fibers of graphite, Kevlar, or boron and resin.

Many golf clubheads include a hosel which extends upwardly above the face of the clubhead for attaching the shaft of the clubhead. However, a conventional hosel increases weight in the high heel area. It is becoming increasingly common for golf club designers to redistribute the weight of the clubhead to the high toe and low heel areas as taught, for example, by US-A-4,471,961 and US-A-5,120,062.

Some clubheads have used a shorter hosel to reduce weight in the high heel area. For example, U.S. Patent Nos. 5,042,806 and 5,240,252 describe clubheads in which the hosel does not extend above the face. However, such a clubhead does not provide the same support for the shaft as does a clubhead with a traditional hosel.

Another problem with wood type clubheads is properly aligning the face of the clubhead. With iron type clubheads many golfers use the bottom groove of the face to align the clubhead square, i.e., perpendicular, to the intended line of flight. The top line of an iron clubhead cannot be used to align the clubhead because the top line is not perpendicular to the intended line of flight as viewed by a golfer at address.

However, the face of a wood type golf club has a low loft angle, and the grooves of the face are not easily apparent and usable for alignment at address. Using the face grooves for alignment is also complicated by the fact that the face of most wood type clubheads is provided with bulge and roll curvature, as explained, for example, in U.S. Patent No. 4,471,961.

Many wood type golf clubs therefore include some alignment indicator such as a line or arrow on the top of the clubhead which indicates the intended line of flight. However, some golfers prefer to use the face for aligning the clubhead square rather than relying on an indicator on top of the clubhead.

In the knowledge of this prior art, the aim of the invention is to lead up an improvement of a metal wood type clubhead. This problem is solved by the teaching according to the independent claims. Particular developments are given in the dependent claims.

One improvement is that the hosel portion is including a recessed portion which extends from the crown and heel wall toward the sole. The recessed portion may include a generally concave wall which is generally U-shaped in cross section in a plane which extends generally parallel to the face. Or the clubhead may include a hosel tube which extends upwardly from the hosel portion.

It is also provided that the face includes inner and outer surfaces, and a boss inside of the clubhead which is integral with the inner surface of the face, the boss having a generally cylindrical bore which extends through the hosel portion, wherein preferably the boss may include a gate portion which is integral with the heel wall for casting the heel wall, the face, and the boss or wherein preferably the clubhead may include a hosel tube which is secured within the bore of the boss and extends upwardly from the hosel portion.

The invention relates also to a clubhead in which the face includes a top portion which merges with the crown, the clubhead being provided with an alignment groove adjacent the area of merger between the face and the crown, the alignment groove including a surface which lies in a plane which extends generally vertically when the clubhead is soled at address.

Another example of the metal wood type clubhead comprises inside a boss which is integral with the inner surface of the face, the boss having a generally cylindrical bore which extends through the hosel portion, and a hosel tube which is secured within the bore of the boss and extends upwardly from the hosel portion. The boss may include a gate portion which is integral with the heel wall for casting the heel wall, the face, and the boss.

Within the frame of the invention is a metal wood type clubhead the face of which is including a top portion which merges with the crown, the clubhead being provided with an alignment groove adjacent the area of merger between the face and the crown, the alignment groove including a surface which lies in a plane which extends generally vertically when the clubhead is soled at address. A further embodiment of the metal wood type clubhead comprises a sole, the sole including a flat portion which is adapted to support the clubhead when the clubhead is soled on the ground at address, and a concave rear wall whic curves upwardly from the flat portion and away from the face and merges with the crown to form a curved rear edge. The crown of this clubhead may merge with the toe wall and heel wall to form a curved toe edge and a curve heel edge which forms a continuous curved outer periphery with the rear edge, the toe wall and the crown forming an included angle at the toe edge which is no greater than about 90°. The rear wall and the crown may form an included angle at the rear edge which is no greater than about 90°.

In accordance with the invention, another clubhead is provided with an inverted or recessed hosel portion. The inverted hosel portion includes a generally concave wall which curves toward the sole of the clubhead and reduces the weight in the high heel area. The shaft is reinforced by a hosel tube which extends upwardly from

the inverted hosel portion. The hosel tube is formed from light yet strong material, such as titanium, to minimize the weight in the hosel portion. A portion of the hosel tube coacts with the hosel portion to restrain relative rotation between the hosel tube and the hosel portion.

The clubhead is also provided with an alignment groove at the intersection of the face and the crown of the clubhead. A portion of the alginment groove lies in a vertical plane which is perpendicular to the midplane of the clubhead and allows a golfer to align the clubhead square to the line of flight.

The sole includes a flat portion which supports the clubhead in the address position. The toe portion and rear portion of the club extend upwardly from the flat portion to merge with the crown in a generally V-shaped aerodynamic profile.

With this clubhead the slot may extend diametrically across the bottom wall of the bore. The lugs, which have tapered side edges in one embodyment, may extend from the hosel tube at diametrically opposed locations.

The hosel tube should include a knurled portion inserted into the bore and/or a bottom edge between the lugs which is supported by the bottom wall of the bore.

The characteristics of one claim may be combined with characteristics of one or more other claims.

From the following description of preferred embodiments along with the drawings more advantages, characteristics and details of the invention and inherent to the same may be derived.

Description of the Drawing

The invention will be explained in conjunction with an illustrative embodiment shown in the accompanying drawing, in which --

Figure 1 is a fragmentary perspective view of a golf club formed in accordance with the invention;
Figure 2 is a front elevational view of the clubhead;
Figure 3 is a top view of the clubhead;
Figure 4 is a toe end view of the clubhead taken along the line 4-4 of Figure 2;
Figure 5 is a heel end view of the clubhead taken along the line 5-5 of Figure 2;
Figure 6 is a sectional view taken along the line 6-6 of Figure 3;
Figure 7 is an enlarged fragmentary view of a portion of Figure 7;
Figure 8 is a bottom view of the clubhead;
Figure 9 is a fragmentary sectional view taking the line 9-9 of Figure 3;
Figure 10 is a fragmentary sectional view taken along the line 10-10 of Figure 9;
Figure 11 is a fragmentray sectional view taken along the line 11-11 of Figure 3;
Figure 12 is a view similar to Figure 1 of another embodiment of a clubhead;
Figure 13 is a front elevational view of the clubhead of Figure 12;
Figure 14 is a bottom view of the clubhead of Figure 12;
Figure 15 is an enlarged side view of the hosel tube of Figure 12;
Figure 16 is a sectional view taken along the lines 16-16 of Figure 15;
Figure 17 is an end view taken along the lines 17-17 of Figure 16;
Figure 18 is a fragmentary sectional view of the hosel portion of the clubhead of Figure 12 without the hosel tube;
Figure 19 is a fragmentary sectional view of the hosel portion taken along the line 19-19 of Figure 18;
Figure 20 is a fragmentary sectional view taken along the line 20-20 of Figure 18;
Figure 21 is a sectional view of another embodiment of a hosel tube;
Figure 22 is a view similar to Figure 21 with a screw inserted in the hosel tube;
Figure 23 is a perspective view of yet another embodiment of a hosel tube;
Figure 24 is a fragmentary sectional view taken along the line 24-24 of Figure 23; and
Figure 25 is a fragmentary sectional view similar to Figure 18 of a hosel portion of a clubhead which has been modified to accept the hosel tube of Figure 23.

Description of Specific Embodiments

Figure 1 illustrates a wood type of golf club 15 which includes a clubhead 16 and a shaft 17. The particular clubhead illustrated is formed from metal, but the clubhead can also be formed from other material such as wood and composites.

The clubhead includes a face 19, a generally convex top portion or crown 20, and a generally convex bottom portion 21. The top and bottom portions merge to form a curved peripheral edge 22 which is relatively sharp or streamlined (Figures 2, 4, 5, and 6).

The bottom portion of the clubhead includes a sole 24, a toe wall 25 (Figure 2) which merges with the edge 22, a rear wall 26 (Figures 4 and 5) which merges with the edge 22, and a heel wall 27 (Figure 2) which merges with the edge 22. Both the toe wall 25 and the rear wall 26 form a relatively sharp included angle with the crown 20 at the edge 22, i.e., an angle which is no greater than about 90°.

The sole 24 includes a flat portion or pad 29 (Figures 2, 6, and 8). The flat portion is designed to support the clubhead on the ground at address in the proper loft and lie orientation. Although individual golfers might hold a particular clubhead differently at address, clubheads are designed with specific loft and lie angles which are measured with respect to one orientation of

the club. See, for example, the discussion in U.S. Patent No. 5,150,550.

Referring to Figure 2, the angle A between the centerline CL of the shaft and a horizontal ground plane G determines the lie of the clubhead. Referring to Figure 4, the angle B between the face 19 and a vertical plane V determines the loft of the clubhead. If the face includes bulge and/or roll curvature and is not planar, the loft angle is determined by a plane which is tangent to the center of the face. The tangent plane extends perpendicularly to a vertical midplane MP which extends through the center of the face perpendicular to the ground plane G and the vertical plane V. The flat portion 19 of the sole is coplanar with the ground plane G at address, and the size of the flat portion is preferably sufficient to provide tactile feedback to the golfer to enable the golfer to be aware of the correct address position.

A groove 30 (Figure 8) is provided in the sole pad 29 to facilitate moving the flat portion through turf, soil, or sand as the clubhead impacts the ball, the groove is aligned with the midplane MP and terminates in a flared rear end 31.

The rear wall 26 is slightly convex in Figures 4-6 and curves upwardly and rearwardly from the sole pad 29 to the edge 22. The toe wall 25 and heel wall 27 are also generally convex and curve outwardly and upwardly to the edge 22. The toe portion 32 of the face (Figure 2) is relative sharp and V-shaped, and the included angle of the V is about 90°.

A hosel portion 33 is located at the juncture between the crown 20 and the heel portion 34 of the face. The hosel portion includes an inverted or recessed portion 35 which is provided by a generally arcuate or concave wall 36. Referring to Figures 2 and 9, the concave wall 36 curves inwardly from the edge 22 toward the toe and upwardly toward the crown. The concave wall is generally channel-shaped and extends along an axis 37 (Figures 3 and 5) which is preferably substantially perpendicular to the vertical plane V at address.

In one specific embodiment of the invention, the concave wall was circular and had a radius of about 1/2 inch. The wall extended over an arc of about 90°. The maximum depth of the recess measured from a line extending across the recess from the shoulder 38 at the crown to the shoulder 39 at the heel was about 0.15 inch.

A hosel tube 41 extends upwardly from the center of the inverted portion 37 beyond the top of the crown 20. The shaft 17 is secured within the hosel tube by epoxy or adhesive. The hosel tube is preferably formed from titanium which is strong yet lightweight. The titanium tube reinforces the shaft without contributing excessive weight to the high heel area. However, the hosel tube can also be made of the same material as the clubhead, such as stainless steel and can also be formed integrally with the clubhead during the casting process.

The inverted portion 35 of the hosel reduces the amount of material and the weight in the hosel area. The reduction in weight in the hosel area enables weight to be redistributed to other areas of the clubhead, for example the high toe and low heel areas. The inverted portion also lowers the center of gravity of the clubhead and reduces drag or air resistance as the clubhead is swung. The combination of the inverted portion and the streamlined or tear drop shaped profile provided by the sharp peripheral edge 22 improves the aerodynamic features of the clubhead.

The inverted hosel portion also positions the shaft centerline farther from the heel and closer to the center of gravity CG (Figure 2) of the clubhead. Since the hosel tube 41 and the shaft extend through the center of the concave wall 36, the shaft is spaced away from the shoulder 39 on the heel.

The particular clubhead illustrated in Figures 1-11 is formed from 17-4 stainless steel by investment casting. As is well known in clubhead manufacturing, the investment casting process forms a hollow clubhead with an open bottom. The opening in the bottom is closed by a soleplate which is welded to the periphery of the opening.

Referring to Figures 9-11, a generally cylindrical boss or lug 44 is formed integrally with the rear surface 45 of the face. A portion of the boss advantageously extends to the heel wall 27 along the inside surface of the face to form an internal casting gate 46 for the molten metal which forms the clubhead.

As described in U.S. Patent No. 5,346,218, a mold for casting a metal clubhead conventionally includes an external gate through which the molten metal is poured. However, molds for large clubheads advantageously also include internal gates to facilitate flow of molten metal throughout the mold cavity. The boss 44 is formed by an internal gate in the mold which communicates with the conventional external gate at the heel portion of the mold. The internal gate facilitates the casting of the boss, the face, and the crown and also provides weight in the low heel area of the clubhead.

The boss is cast with an internal cylindrical bore 47 (Figure 9) for the hosel tube 41. The hosel is permanently secured within the bore by epoxy. The hosel can also be additionally or alternately secured by screw threads, mechanical force fit, interlock mechanism, etc. The bore terminates in a bottom wall 48 which supports the bottom of the hosel tube and the shaft. The bottom wall is provided with an opening 49 to permit the clubhead to be filled with polyurethane foam if desired.

The clubhead can also be cast from titanium or other suitable metal. Titanium is lighter than stainless steel and a titanium clubhead can be larger than a steel clubhead of the same weight. Since molten titanium flows more easily than molten steel, a titanium clubhead does not need an internal gate for the boss 44. The boss of a titanium clubhead can be formed integrally with the rear surface of the face 52 of the clubhead but does not need to extend to the heel wall.

Referring to Figures 1 and 2, the front surface of the face 19 of the clubhead 16 is provided with conventional

grooves 55 which are substantially parallel to the ground plane G. The specific embodiment of the clubhead which is illustrated in the drawing included bulge and roll curvatures which were oriented about axes 45° from the ground plane as described in U.S. Patent No. 4,471,961.

An alignment groove, cut, or recess 56 is provided at the intersection between the face 19 and the crown 20. The alignment groove curves upwardly between the toe portion and the heel portion of the edge 22 and forms the top edge of the face and the front edge of the crown. Referring to Figures 3, 4, and 7, the alignment groove includes a rear surface 57 which lies in a plane which is parallel to or substantially parallel to the vertical plane V.

The alignment groove is readily visible to the golfer at address and enables the golfer to align the clubhead by squaring the alignment groove to the intended line of flight. Even though the alignment groove follows the curvature of the crown 20, it appears straight or substantially straight to the golfer when viewed at address, particularly because the rear surface of the groove lies in a substantially vertical plane and is therefore substantially straight.

If desired, the plane of the alignment groove can be angled with respect to the face to provide an open or closed face when the alignment groove is squared in order to compensate for a hook or a slice.

In the preferred embodiment the alignment groove is located at the intersection of the face and crown. However, the alignment groove could also be located on the crown behind the face or on the face below the crown. The alignment groove is preferably formed during the casting process.

Alternatively, alignment means could be provided by a painted or cut line or other indicia which extended substantially parallel to the vertical plane V.

Referring to Figures 12-14, another embodiment of a clubhead 61 is similar to the clubhead 16. However, the sole 62 of the clubhead 61 is not provided with a groove. Instead, the sole has a flat portion or pad 63 with a flat surface which supports the clubhead on the ground at address.

The hosel portion 64 of the clubhead includes a cylindrical boss 65 (Figure 18) which has a cylindrical bore 66 and a bottom wall 67 (Figures 19 and 20). The outside surface of the boss can be connected to the face or heel wall of the clubhead, or the boss can be formed independently of the face and heel wall. The bottom wall is provided with a slot 68 which extends diametrically across the bottom of the bore.

A hosel tube 70 (Figures 15-17) includes a cylindrical portion 71 and a pair of lugs 72 which extend from the bottom end of the tube. Each lug is formed as an extension of the cylindrical side wall of the tube and has an arcuate curvature (see Figure 17). The hosel tube also includes a knurled portion 73 which is intended to be positioned in the bore 66 of the hosel portion of the clubhead.

The outside diameter of the hosel tube is slightly larger than the bore 66, and the lugs 72 are sized to fit relatively snugly into the slot 68 to substantially prevent rotation of the hosel tube within the bore. The bottom edge 74 of the hosel tube between the lugs is supported by the bottom wall 67 of the bore. The hosel tube can be secured within the bore by epoxy or adhesive.

The lugs prevent relative twisting between the hosel tube and the clubhead which could cause the adhesive bond to fracture. The knurled portion 73 further strengthens the attachment between the hosel tube and the clubhead.

If desired, the hosel tube can bear printing or other indicia 75 which is positioned relative to the lugs 72 so that the lugs are aligned with the slot 68 when the indicia is properly oriented with respect to the clubhead. For example, the indicia can be positioned on the hosel tube so that when the indicia is facing the clubface, the lugs are aligned with the slot. Proper insertion of the hosel tube is thereby facilitated. The side edges 76 of the lugs are also slightly tapered to facilitate insertion of the lugs into the slot.

Additional embodiments of the hosel tube are illustrated in Figures 21-24. In Figure 21 a hosel tube 78 includes a cylindrical side wall 79 and a bottom wall 80 which is provided with a central opening 81. A stainless steel thread-cutting Torx head screw 82 is inserted through the opening 81.

The hosel tube 78 is intended to be used with a clubhead of the type illustrated in Figures 9-11 which has an opening 49 in the bottom of the boss which provides the hosel tube bore. The opening is smaller than the screw 82, and the hosel tube is attached to the clubhead by threading the screw into the opening.

Referring to Figures 23 and 24, a hosel tube 84 has a cylindrical side wall 85 and a bottom wall 86. A projection 87 is formed on the bottom wall, and the projection has a non-circular periphery. In the embodiment illustrated in Figures 23 and 24, the projection has a rectangular periphery or side wall 88. The bottom wall may optionally be provided with a central opening 89.

Figure 25 illustrates a clubhead boss 90 for the hosel tube 84. The boss includes a cylindrical side wall 91 and a bottom wall 92. A depression or socket 93 is formed in the top surface of the bottom wall and has a shape corresponding to the shape of the projection 87. The bottom wall may also be provided with an opening 94.

The hosel tube 84 is inserted into the boss 90 so that the projection 87 is positioned in the socket 93 to prevent relative rotation between the hosel tube and the clubhead. The hosel tube can be secured by adhesive or epoxy. Additional securement can be provided, if desired, by inserting a screw through the openings 89 and 94.

While in the foregoing specification a detailed description of specific embodiments of the invention was set forth for the purpose of illustration, it will be understood that many of the details herein given can be

varied considerably by those skilled in the art without departing from the spirit and scope of the invention.

Claims

1. A metal wood type clubhead comprising a face, a sole, a crown, a toe wall, a heel wall, and a hosel portion, the hosel portion including a recessed portion which extends from the crown and heel wall toward the sole.

2. The clubhead of claim 1 in which the recessed portion includes a generally concace wall which is generally U-shaped in cross section in a plane which extends generally parallel to the face.

3. The clubhead of claim 1 including a hosel tube which extends upwardly from the hosel portion.

4. The clubhead of claim 1 or 2 in which the face includes inner and outer surfaces, and a boss inside of the clubhead which is integral with the inner surface of the face, the boss having a generally cylindrical bore which extends through the hosel portion.

5. The clubhead of claim 4 wherein the boss includes a gate portion which is integral with the heel wall for casting the heel wall, the face and the boss or wherein the clubhead includes a hosel tube which is secured within the bore of the boss and extends upwardly from the hosel portion.

6. The clubhead of one of the claim 1 to 5 in which the face includes a top portion which merges with the crown, the clubhead being provided with an alignment groove adjacent the area of merger between the face and the crown, the alignment groove including a surface which lies in a plane which extends generally vertically when the clubhead is soled at address.

7. A metal wood type clubhead comprising a face having inner and outer surfaces, a sole, a crown, a toe wall, a heel wall, a hosel portion, and a boss inside of the clubhead which is integral with the inner surface of the face, the boss having a generally cylindrical bore which extends through the hosel portion, and a hosel tube which is secured within the bore of the boss and extends upwardly from the hosel portion.

8. The clubhead of claim 7 in which the boss includes a gate portion which is integral with the heel wall for casting the heel wall, the face, and the boss.

9. A metal wood type clubhead comprising a face, a sole, a crown, a toe wall, a heel wall, and a hosel portion, the face including a top portion which merges with the crown, the clubhead being provided with an alignment groove adjacent the area of merger between the face and the crown, the alignment groove including a surface which lies in a plane which extends generally vertically when the clubhead is soled at address.

10. A metal wood type clubhead comprising a face, a sole, a crown, a toe wall, a heel wall, and a hosel portion, the sole including a flat portion which is adapted to support the clubhead when the clubhead is soled on the ground at address, and a concave rear wall which curves upwardly from the flat portion and away from the face and merges with the crown to form a curved rear edge.

11. The clubhead of claim 10 in which the crown merges with the toe wall and heel wall to form a curved toe edge and a curve heel edge which forms a continuous curved outer periphery with the rear edge, the toe wall and the crown forming an included angle at the toe edge which is no greater than about 90°.

12. The clubhead of claim 10 or 11 in which the rear wall and the crown form an included angle at the rear edge which is no greater than about 90°.

13. A metal wood type clubhead comprising a face, a sole, crown, a toe wall, a heel wall, a hosel portion, the hosel portion having a generally cylindrical bore, provided by a generally cylindrical side wall and a bottom wall, and a hosel tube positioned in the bore and extending upwardly from the hosel portion, and means on the hosel tube and the bottom wall of the bore for restraining relative rotation between the osel tube and the hosel portion.

14. The clubhead of claim 13 in which the restraining means is provided by an opening in the bottom wall of the bore and a portion of the hosel tube which extends through the opening or in which the restrainging means is provided by a slot in the bottom wall of the bore and a pair of lugs which extend from the hosel tube into the slot.

15. The clubhead of claim 13 or 14 in which the restraining means is provided by a socket in the bottom wall of the bore and a portion on the hosel tube which is positioned in the socket, wherein preferably the socket and the projection have correspondingly shaped non-circular peripheries.

16. The clubhead of one of the claims 13 to 15 in which the restraining means is provided by a screw on the hosel tube which is threaded into an opening in the bottom wall of the bore.

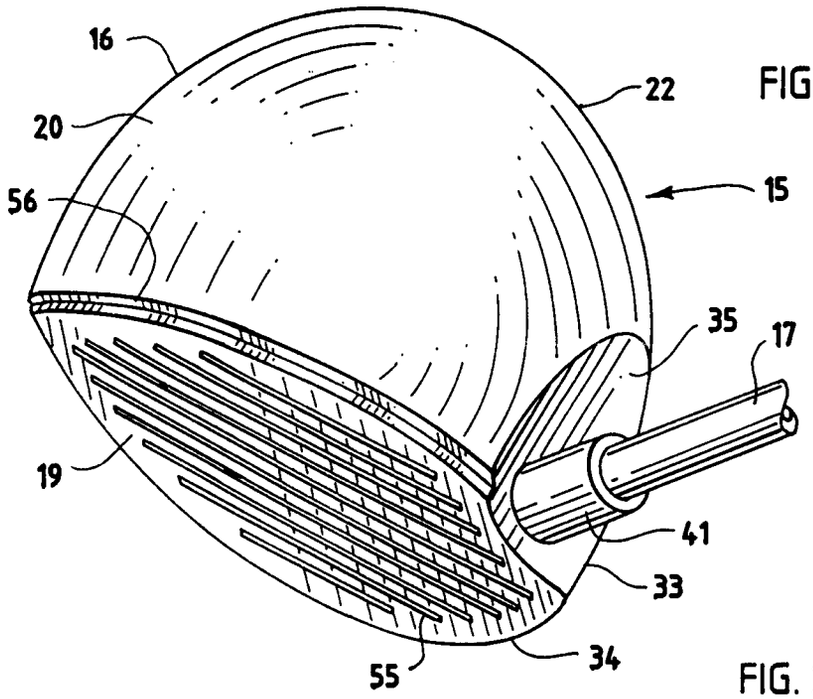
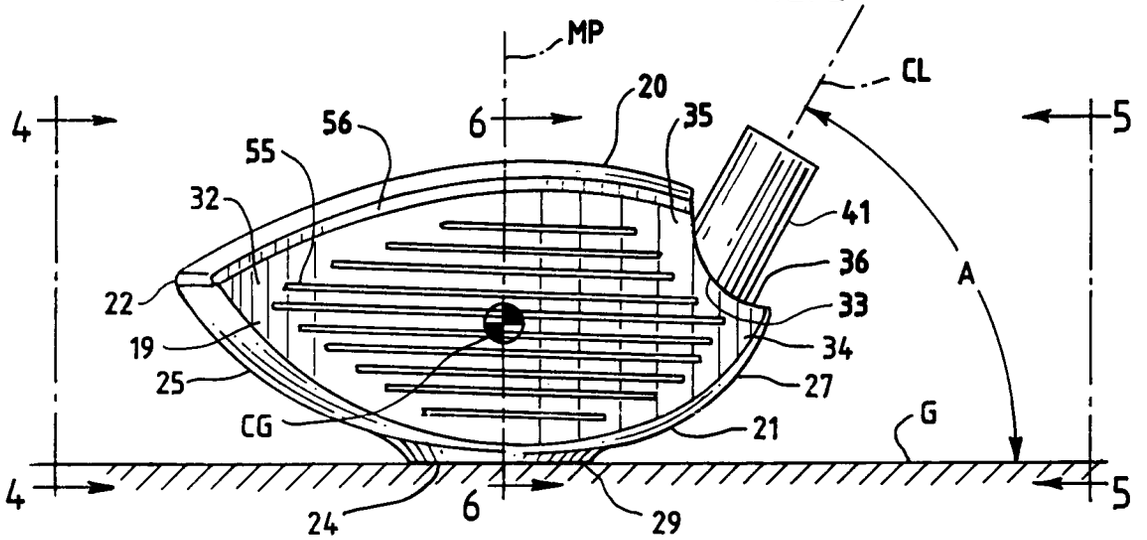


FIG. 1

FIG. 2



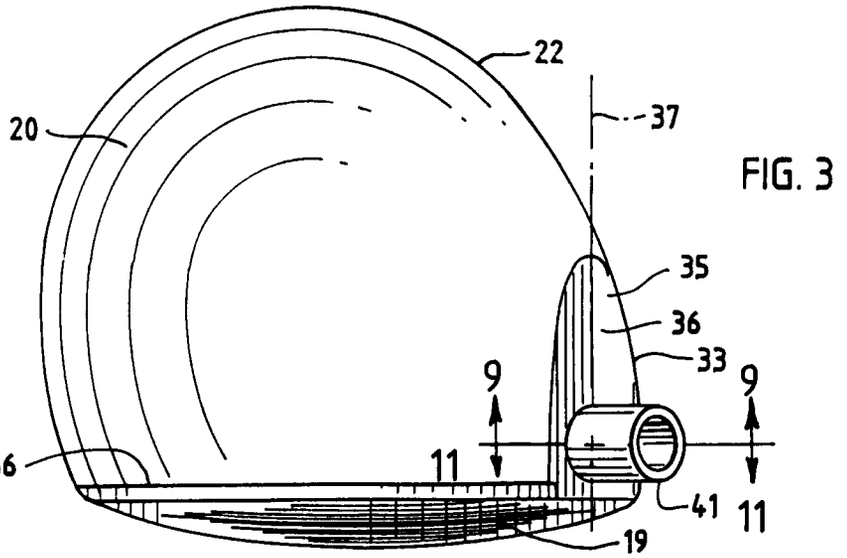


FIG. 3

FIG. 4

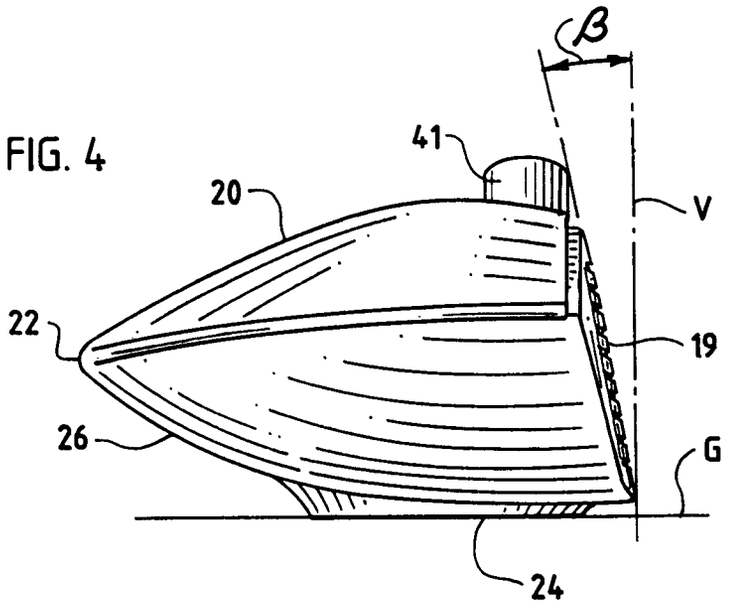


FIG. 5

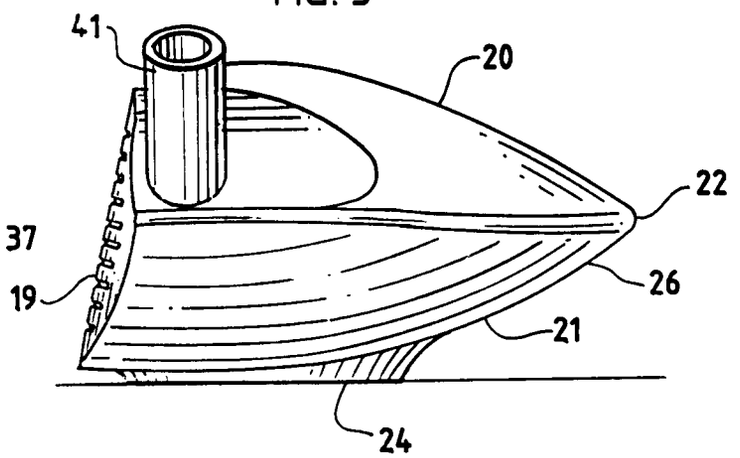


FIG. 6

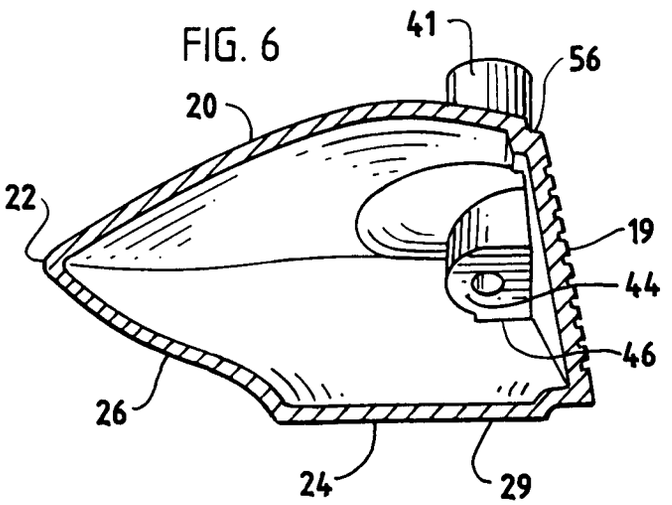


FIG. 7

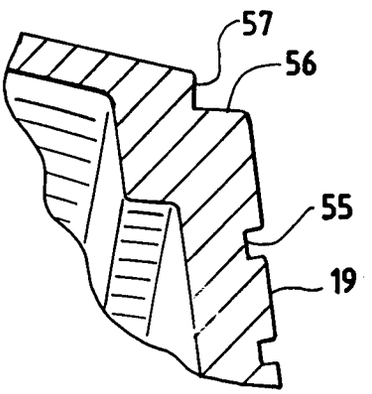


FIG. 8

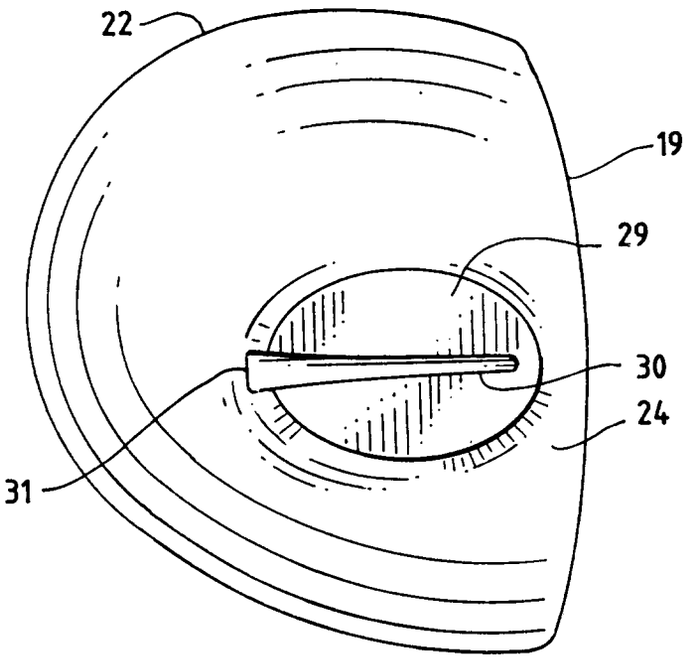


FIG. 9

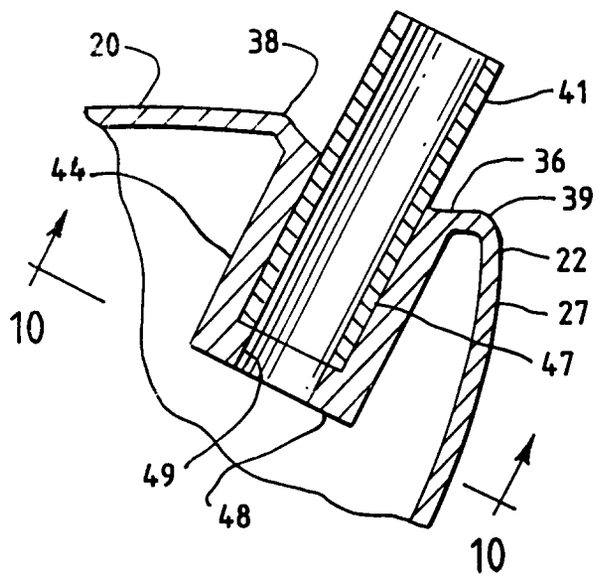


FIG. 10

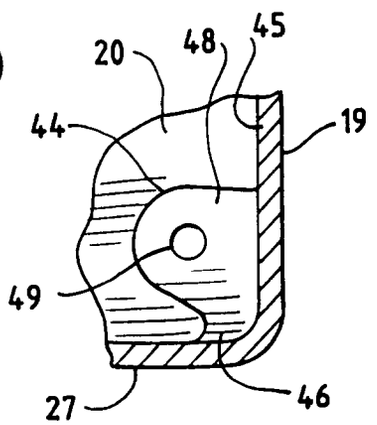


FIG. 11

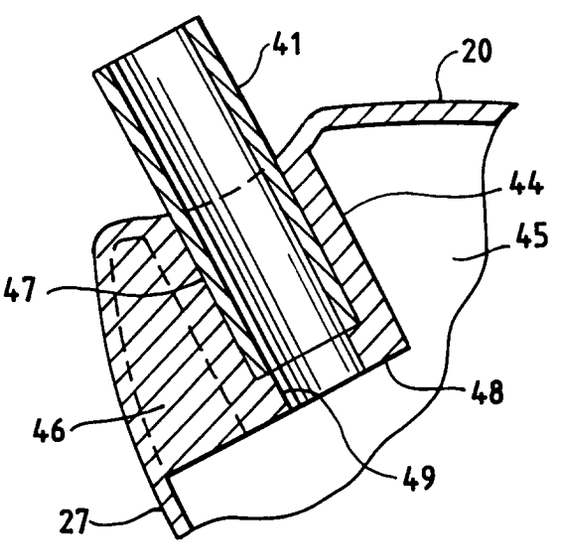


FIG. 12

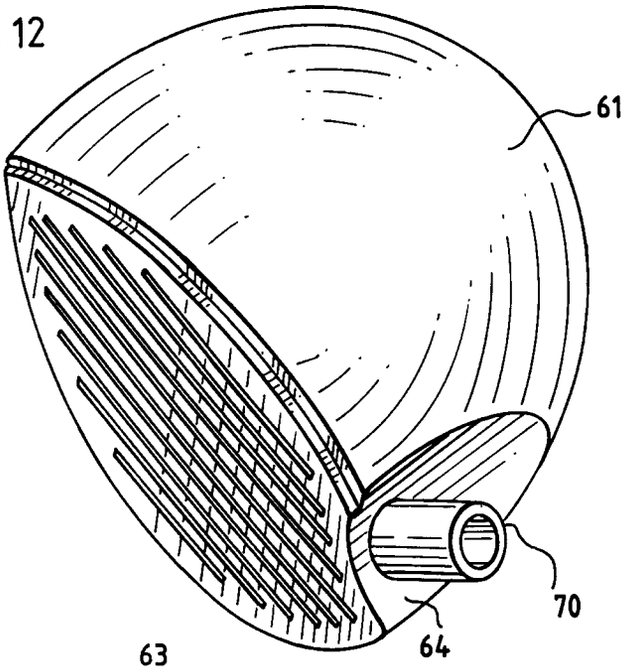


FIG. 14

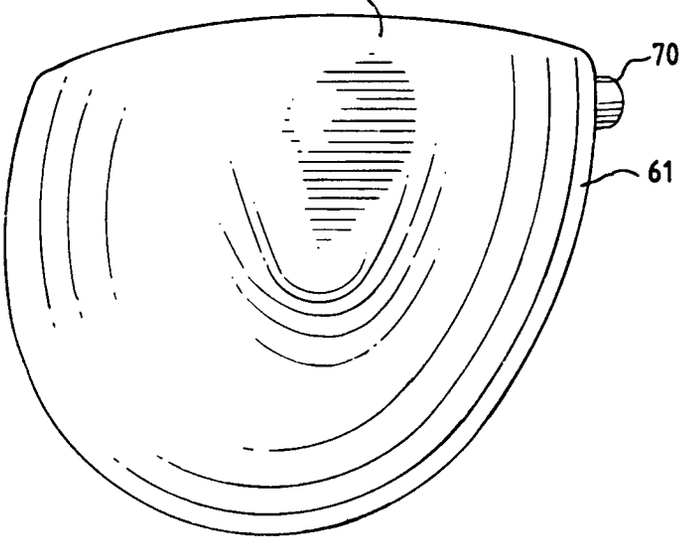
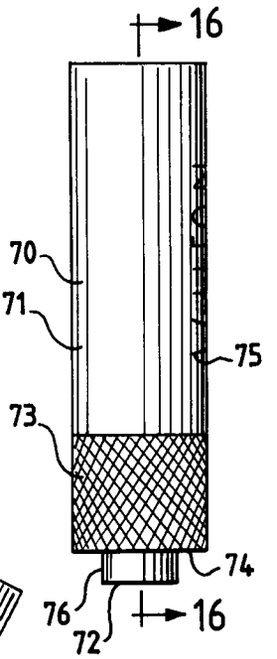


FIG. 15



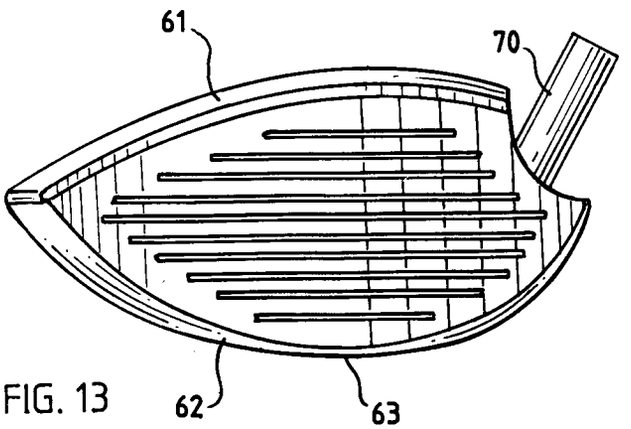


FIG. 13

FIG. 16

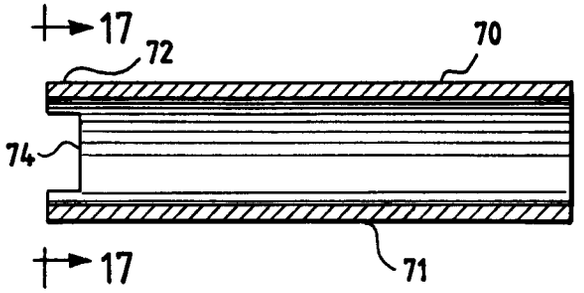


FIG. 17

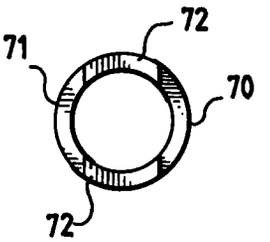


FIG. 18

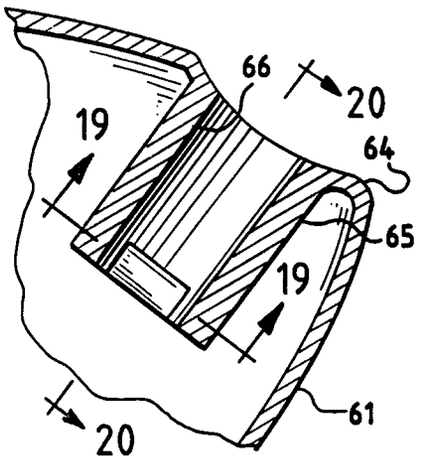


FIG. 20

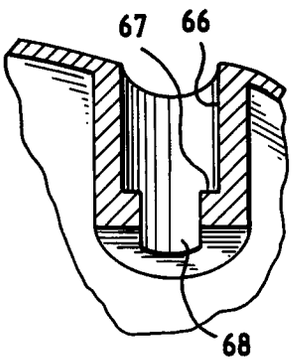


FIG. 21

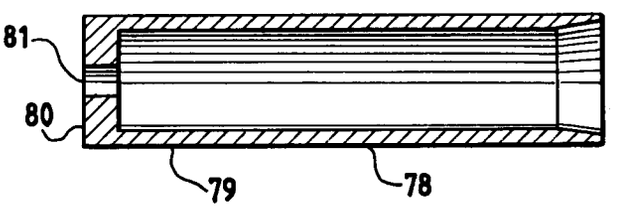


FIG. 19

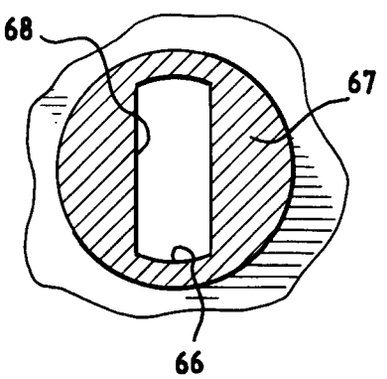


FIG. 22

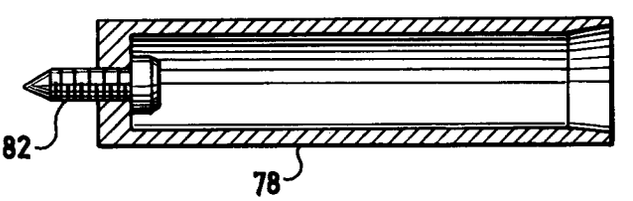


FIG. 23

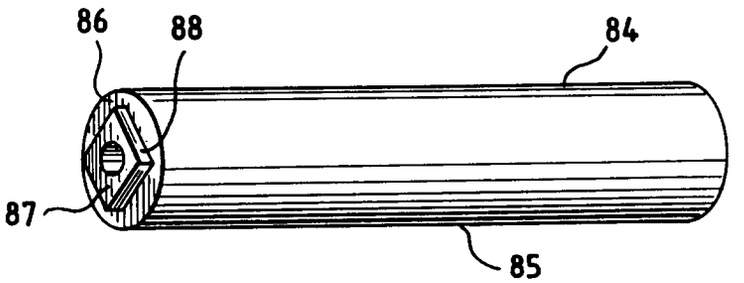


FIG. 24

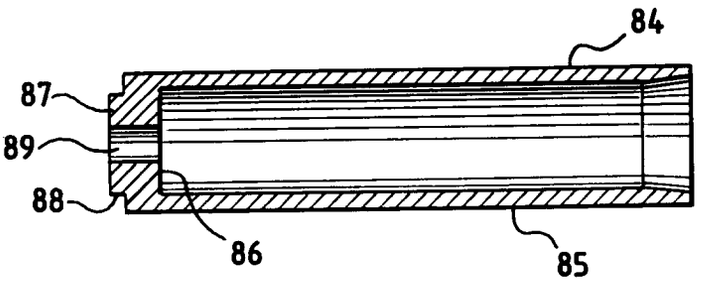


FIG. 25