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Kobayashi(10) **Pub. No.: US 2009/0176596 A1**(43) **Pub. Date: Jul. 9, 2009**(54) **WEDGE TYPE GOLF CLUB INCLUDING
PITCHING WEDGE, APPROACH WEDGE
AND SAND WEDGE**(30) **Foreign Application Priority Data**

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A63B 53/04 (2006.01)(52) **U.S. Cl.** **473/331; 473/349**(57) **ABSTRACT**

There is provided a golf club capable of giving a strong backspin to a golf ball. A shaft is connected to a head formed with score lines on a face surface thereof. A height from a sole face of the head or a horizontal plane flush with the sole face is formed greater than a radius of a golf ball. An upper protrusion and a lower protrusion are provided spacedly rearwardly of upper and lower portions of the head, respectively. By providing the center of gravity of the head in an upper portion than the center of the golf ball, backspin can be accelerated by a gear effect generated at the time of hitting the golf ball. Further, the height of up to the center of gravity of the head is freely adjustable.

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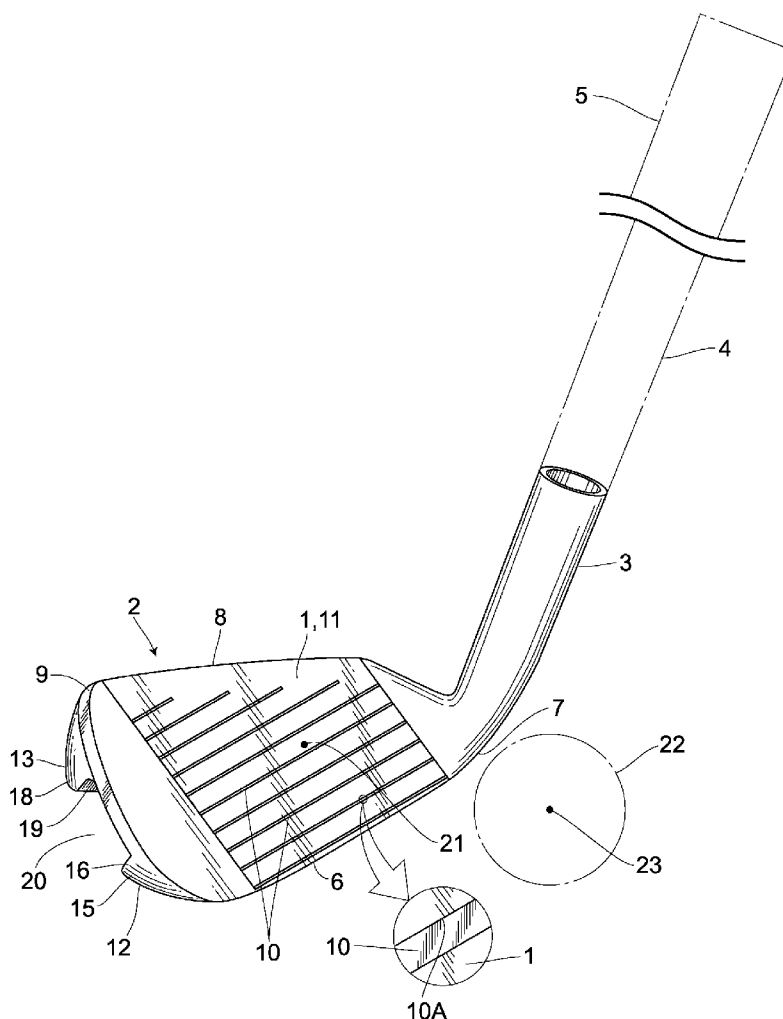
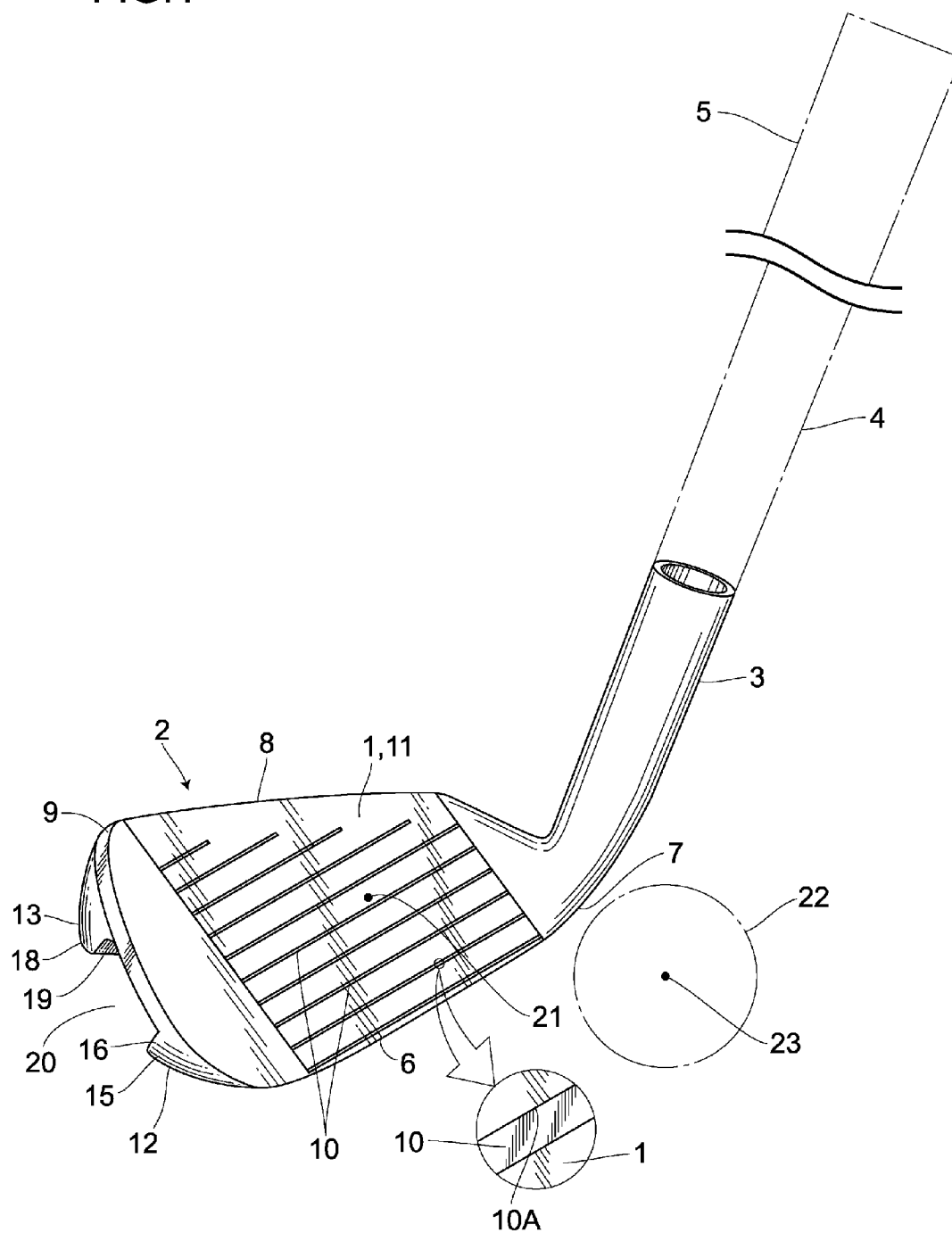
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Tsubame-shi (JP)(21) Appl. No.: **12/396,851**(22) Filed: **Mar. 3, 2009****Related U.S. Application Data**(63) Continuation-in-part of application No. 11/284,492,
filed on Nov. 22, 2005, now abandoned.

FIG. 1



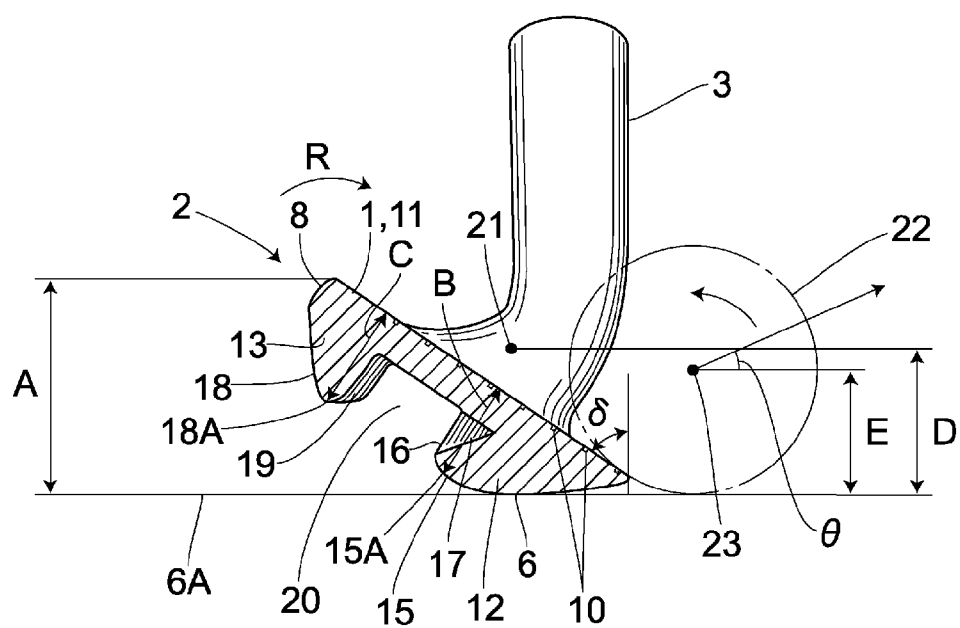


FIG.4

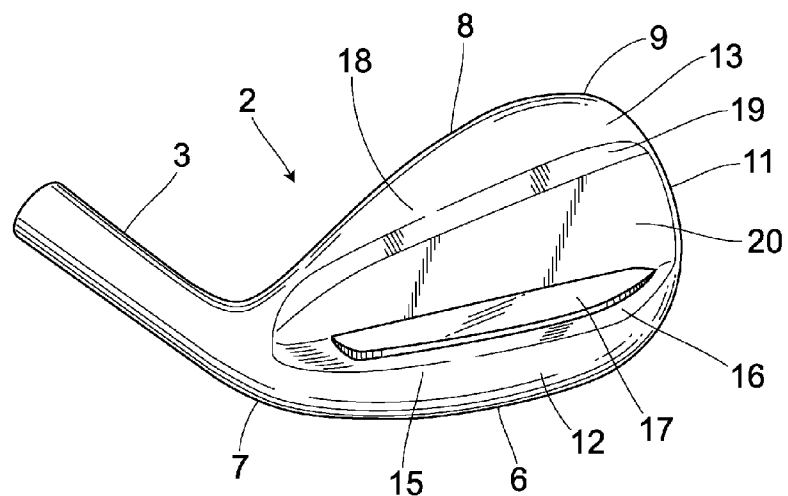


FIG.5

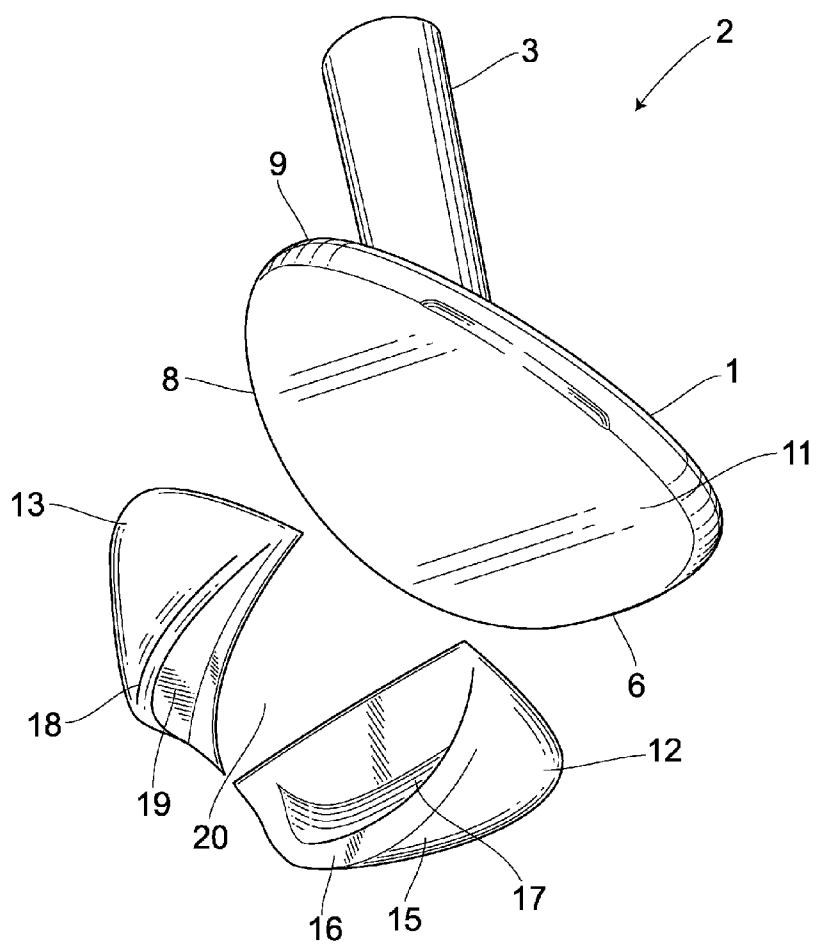


FIG.6

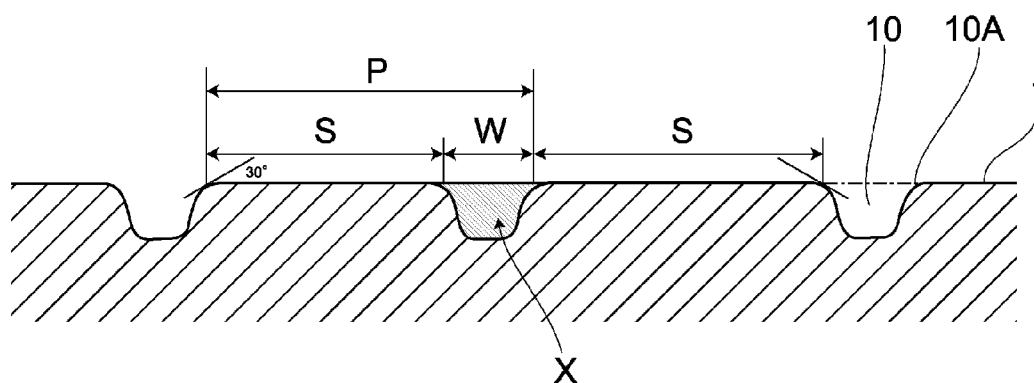


FIG.7

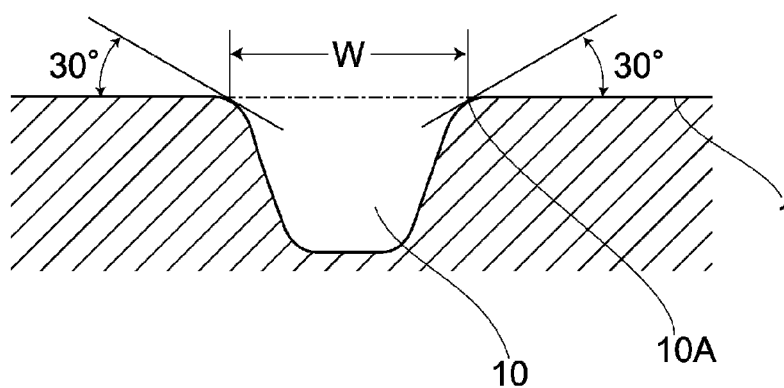


FIG.8

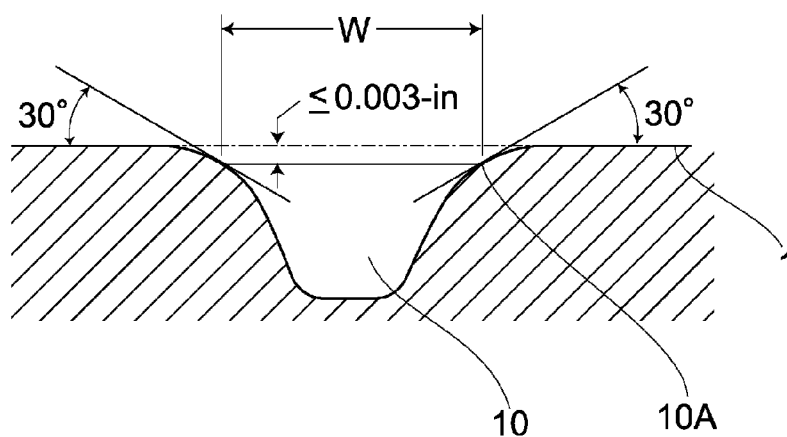
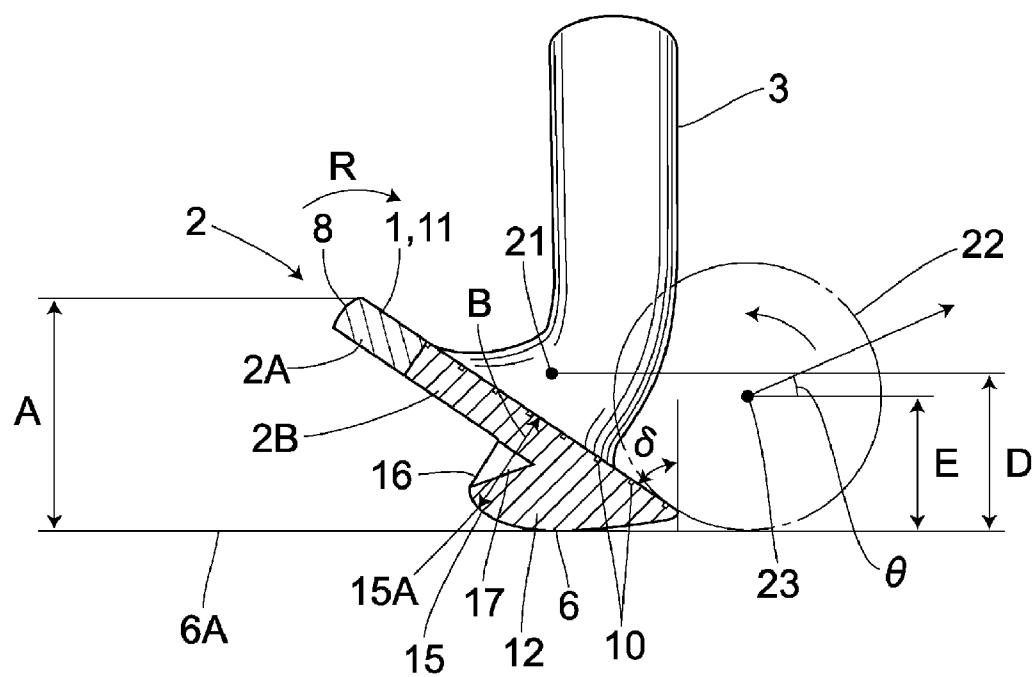
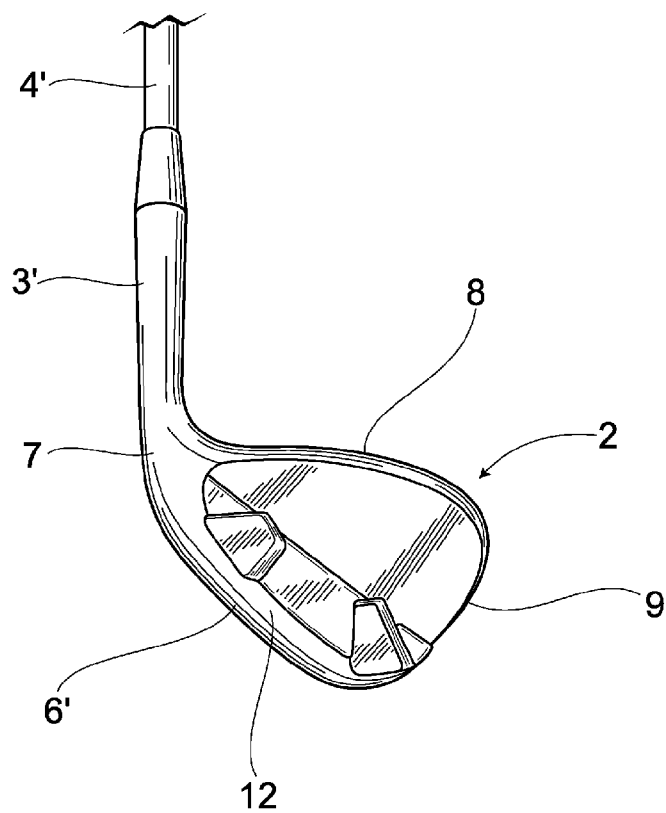


FIG.9





WEDGE TYPE GOLF CLUB INCLUDING PITCHING WEDGE, APPROACH WEDGE AND SAND WEDGE

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to a golf club, including a pitching wedge, an approach wedge and a sand wedge.

[0003] 2. Description of the Related Art

[0004] Golf clubs are classified roughly into a wood type, an iron type and a putter type. The wood-type golf club is used to give an initially low shot and hit a long ball, while the iron-type golf club is used to give an initially high shot to hit the ball with a backspin, taking aim at a target position from above, and the putter is used on a green.

[0005] Among the iron-type golf clubs, a pitching wedge type is used to hit a shot for giving a carry of up to about 110 yards (101 m), while a sand wedge type designed mainly for playing on a bunker is used to hit a shot for giving a carry of up to nearly 80 yards (73 m).

[0006] In these wedge types, a tilt angle of a face surface (a golf ball hitting area), i.e., a loft angle is set at approximately 52 to 56 degrees and a tilt angle of a shaft, i.e., a lie angle is set at nearly 64 degrees.

[0007] In each of these iron-type golf club heads, there are provided a sole face acting as a ground contact surface in a lower portion thereof and a face surface acting as a golf ball hitting area in front thereof. The face surface is formed with score lines and further the head is formed with a toe, a heel and a hosel for fitting a shaft thereto, and a depressed portion at a rear, as disclosed in Japanese unexamined patent publication No. 7-255879 along with its FIG. 1, FIG. 7.

[0008] For an approach shot when the golf ball is shot to be carried on the green, a pitch-and-run shot and a pitch shot are used. These shots are golf ball hitting methods for hitting the golf ball with a larger magnitude of the backspin (a reverse spin) to give a comparatively high shot, thus stopping the golf ball on the green. Particularly, the pitch shot method aims at giving the golf ball a strong backspin, so that the golf ball is dropped short of a cup on the green and then immediately stopped.

[0009] Heretofore, the face surface is formed with multiple small grooves called score lines as a means for applying a backspin to a golf ball at the time of hitting it. The assignee of the present application has ever filed applications (e.g., Japanese unexamined patent publication No. 2003-199851) pertaining to a golf club head, in which the score lines capable of applying a strong backspin to a ball are provided on the face surface by forming score lines on the face surface by press working, and then flattening the face surface by machining or press working to thereby sharpen the edge angles of the score lines so as to make the golf ball easy to be caught in the score lines, so that an effective spin can be applied to the golf ball.

[0010] Restrictions are, however, imposed on the face surface and the score lines by the Golf Rules due to their large influences on spin imparting performance. Therefore, there has not only been a limitation in the improvement of the edge portions of the score lines but also there have been possibilities that the golf ball may be cut by such sharp edge portions of the prior art at the time of striking the same.

[0011] Whilst in the case that the angles of the edge portion of the score lines are formed sharp in accordance with the prior art, the golf ball becomes easy to be caught in the edge portions so that a backspin will be easily applied thereto, there

remains, however, such a problem that not only the sharpness of each score line edge is decreased slightly at every shot but sands or the like will get into the score lines especially in the case of a bunker shot to make it impossible to ensure the sharpness of the edge portions.

SUMMARY OF THE INVENTION

[0012] To eliminate the above problems, it is therefore, an object of the invention to provide a golf club having a head with a face surface formed with score lines and a shaft connected with the head, which enables a strong backspin to be applied without the aid of the face surface having the score lines.

[0013] An aspect of the present invention is a wedge-type golf club, including a pitching wedge, an approach wedge and a sand wedge, comprising: a head having a sole face provided in a lower portion that acts as a ground contact surface, a face surface acting as a ball striking surface, provided on a front of said head with a certain loft angle, a shaft connecting portion on one side thereof, multiple score lines formed on the face surface of said head, and a shaft connected to said shaft connecting portion,

[0014] wherein a height of the center of gravity of said head is at least 21.335 mm and greater than a radius of a golf ball, the height of the center of gravity of said head being defined as a distance from a horizontal plane flush with the sole face of said head to the center of gravity of said head;

[0015] the center of gravity of said head is provided at an anterior position to said face surface, and

[0016] wherein for the score lines as measured, 50% or more of the measured values of X divided by the pitch of the score line are less than or equal to 0.0030" (0.0762 mm²/mm), where X denotes a traverse cross section of a groove per one score line, and the pitch of the score line is defined by the sum of the groove width and the groove separation.

[0017] Thus, the center of gravity of the head is positioned in a higher position than the center of a golf ball at the time of hitting a shot, and thus the face surface is allowed to rotate downward or clockwise due to the ball impact thus imparted, so that so-called gear effect is generated to thereby be able to accelerate the backspin of the ball even if the face is the one in which the backspin is hard to accelerate.

[0018] Further, as the above structure is employed for wedge type golf club, an approach shot from around a green can be preformed correctly.

[0019] Also, it is possible to ensure a height distance greater than a radius of a golf ball regulated under the current golfing rules.

[0020] Still also, as the center of gravity is arranged in a position anterior to the face surface, a ball striking angle at the time of hitting a golf ball can be decreased.

[0021] Another aspect of the present invention is a wedge-type golf club as set forth in the foregoing aspect, wherein an upper protrusion and a lower protrusion are provided spacedly rearwardly of upper and lower positions of said head, respectively such that a distance between a rear end of said upper protrusion and said face surface is greater than a distance between a rear end of said lower protrusion and said face surface.

[0022] Accordingly, the height of the center of gravity of the head measured with reference to the horizontal plane flush with the sole surface of the head is arbitrarily adjustable due to the adjustment of the weight distribution between the upper and lower protrusions.

[0023] A further aspect of the present invention is a wedge-type golf club set forth in the foregoing aspect, wherein an upper protrusion and a lower protrusion are provided spacedly rearwardly of upper and lower positions of said head, respectively, and the lower protrusion includes a depressed portion formed on an upper surface thereof.

[0024] Accordingly, it is possible for the lower protrusion to decrease the weight corresponding to the depressed portion, thus enabling the position adjustment of the center of gravity of the head to be carried out even more easily.

[0025] A still further aspect of the present invention is a wedge-type golf club set forth in the foregoing aspect, wherein said loft angle is set at 52 to 56 degrees, and the center of gravity of said head is arranged in a position anterior to the face surface, but posterior to a distal end of the sole face.

[0026] Accordingly, the face surface is allowed to rotate downward or clockwise due to the ball impact thus imparted, so that so-called gear effect is generated to thereby be able to accelerate the backspin of the ball.

BRIEF DESCRIPTION OF THE DRAWINGS

[0027] The invention will be more readily understood by reference to the following description, taken with the accompanying drawings, in which:

[0028] FIG. 1 is a front perspective view showing a wedge type golf club according to a first embodiment of the present invention.

[0029] FIG. 2 is a side view showing the first embodiment of the present invention.

[0030] FIG. 3 is a cross-sectional view showing the first embodiment of the present invention.

[0031] FIG. 4 is a rear perspective view showing the first embodiment of the present invention.

[0032] FIG. 5 is an exploded perspective view showing the first embodiment of the present invention.

[0033] FIG. 6 is an enlarged section of the golf club according to the first embodiment of the present invention, taken around the score lines thereof.

[0034] FIG. 7 is an explanatory diagram illustrating the method of measurement of the groove width in a case where the wedge is not rounded according to the first embodiment of the present invention.

[0035] FIG. 8 is an explanatory diagram illustrating the method of measurement of the groove width in a case where the wedge is rounded according to the first embodiment of the present invention.

[0036] FIG. 9 is a cross-sectional view showing a second embodiment of the present invention.

[0037] FIG. 10 is a side view showing a third embodiment of the present invention.

[0038] FIG. 11 is a perspective view showing the third embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0039] Next is a detailed description of preferred embodiments with reference to the appended drawings. It should be noted that the embodiments described below shall not be construed as limiting a subject matter of the present invention set forth in the claims, and that all the structures described below are not indispensable requisites for the present invention.

[0040] FIG. 1 to FIG. 8 show a first embodiment, which represents wedge type golf clubs including a pitching wedge, an approach wedge, a sand wedge or the like among iron-type golf clubs. A shaft connecting portion 3 called a hosel is provided at one side of a head 2 having a face surface 1 provided on a front of the head, acting as a golf ball hitting surface and a proximal end of a shaft 4 is connected to the shaft connecting portion 3. Further, a grip 5 is provided at a distal end of the shaft 4.

[0041] The head 2 is formed from steel or a combination of steel and other materials. In the present embodiment, the head formed from steel is shown. The head 2 is formed with a sole face 6 acting as a ground contact surface in a lower portion of the head, a heel 7 at one side of a lower portion of the head, a top 8 in an upper portion of the head and a toe 9 at the other side of the heel 7. Further, score lines 10 formed by small grooves are arranged spacedly on the face surface 1. The face surface 1 has a loft angle δ (delta) relative to a perpendicular line to a horizontal plane 6A flush with the sole face 6.

[0042] The head 2 is composed of four main weight components, i.e., a face surface portion 11, a rear lower portion 12, a rear upper portion 13, and the shaft connecting portion 3, which are integrated together to form the head 2. The face surface portion 11 essentially comprises the face surface 1 and has a substantially plate shape, including at least the face surface 1, a forepart of the sole surface 6, the top 8, the toe 9 and the heel 7. The rear lower portion 12 is formed with a lower protrusion 15 that extends rearwardly of the face surface portion 11 so as to construct a rear portion of the sole face 6. An upper surface 16 of the lower protrusion 15 is arranged so as to be substantially orthogonal to the surface of the face surface 1, at a lower position than nearly half a height A of the face surface 1, said height A being measured with reference to the sole face 6 or a horizontal plane 6A flush with the sole face 6. It should be noted that the inside of the upper surface 16 is formed with a depressed portion 17 that is formed in an undercut-shaped manner. In the meantime, the horizontal plane 6A of the sole face 6 is determined on the basis of a ground contact surface at the time of addressing a ball with the golf club.

[0043] On the other hand, the rear upper portion 13 is provided so as to extend from the top 8 and the toe 9 to thereby form an upper protrusion 18 rearwardly of the face surface portion 11. The upper protrusion 18 is solid and its lower surface 19 is arranged so as to be substantially orthogonal to the surface of the face surface 1, at a higher position than nearly half the aforesaid height A of the face surface. As a result, in the rear central portion of the face surface portion 11, i.e., in a region located in nearly half the height A of the face surface, a cavity 20 is formed as a space sandwiched between the upper surface 16 and the lower surface 19 so as to extend rearwardly of the face surface portion 11. In the meantime, it should be noted that the face surface portion 11, the rear lower portion 12, the rear upper portion 13 and the shaft connecting portion 3 are not to be arranged with any specific or clear borderline and thus they are to be all arranged in a seamless manner.

[0044] In addition, a maximal backward protruding length of the upper protrusion 18 in the rear lower portion 13, i.e., a distance C between a rear end 18A of the upper protrusion 18 and the surface of the face surface 1 is made larger than a maximal backward protruding length of the lower protrusion 15 in the rear upper portion 12, i.e., a distance B between a rear end 15A of the lower protrusion 15 and the surface of the

face surface **1** ($B < C$). Thus, the volume or eventually the weight of the rear lower portion **12** is made less than the volume or eventually the weight of the rear upper portion **13**. As a result, a height D of the center of gravity **21** of the head **2** measured with reference to the sole face **6** or the horizontal plane **6A** of the sole face **6** is formed larger than that of the center **23** of a golf ball **22** to be hit by the face surface **1**. Namely, the shortest length between the center of gravity **21** of the head **2** and the sole face **6** or the horizontal plane **6A** of the sole face **6** is greater than a radius E of the golf ball **22**. Since the golf ball **22** is required to have a diameter of 42.67 mm according to the current Golf Rules, the height (distance) D is set larger than the radius E of 21.335 mm. In the meantime, the height D does not exceed the height A of the face surface.

[0045] In a preferred form of the invention, the height D may be set at 23 mm, for example. This means that the center of gravity **21** of the head **2** is raised by about 13 to 16% as compared with the conventional ones since they were in the order of 19.8 mm or 20.4 mm.

[0046] Further, the center of gravity **21** arranged in a nearly central portion of a width direction of the face surface **1** is arranged in a position anterior to the face surface **1**, but posterior to a distal end of the sole face **6** (i.e., a lower end of the face surface **1**).

[0047] Next is a detailed description of the score lines **10** with reference to FIG. 6.

[0048] 1) Groove Width: This applies to all types of clubs with the exception of putters.

[0049] If 50% or more of the measured groove widths exceed 0.035 inch (0.889 mm), then the club is non-conforming to the new Rules. Accordingly, the score lines **10** are formed so as not to exceed the value.

[0050] If any single measured groove width exceeds 0.037 inch (0.940 mm), then the club is not-conforming. Accordingly, the score lines **10** are formed so as not to exceed the value.

[0051] 2) Groove Depth: This applies to all types of clubs with the exception of putters.

[0052] If 50% or more of the measured groove depths exceed 0.020 inch (0.508 mm), then the club is non-conforming to the new Rules. Accordingly, the score lines **10** are formed so as not to exceed the value.

[0053] If any single measured groove depth exceeds 0.022 inch (0.559 mm), then the club is not-conforming. Accordingly, the score lines **10** are formed so as not to exceed the value.

[0054] 3) Groove Separation: This applies to all types of clubs with the exception of putters.

[0055] If 50% or more of the measured groove separations are less than three times the maximum adjacent measured groove width, then the club is non-conforming. Accordingly, the score lines **10** are formed so as to ensure such groove separation.

[0056] If any single measured groove separation is less than three times the maximum adjacent measured groove width minus 0.008 inch (0.203 mm) then the club is nonconforming. Accordingly, the score lines **10** are formed so as to ensure such groove separation.

[0057] If 50% or more of the measured groove separations are less than 0.075 inch (1.905 mm) then the club is non-conforming. Accordingly, the score lines **10** are formed so as to ensure such groove separation.

[0058] If any single measured groove separation is less than 0.073" (1.854 mm) then the club is non-conforming. Accordingly, the score lines **10** are formed so as to ensure such groove separation.

[0059] 4) Groove Consistency: This applies to all types of clubs with the exception of putters.

[0060] The range of measured groove widths (i.e., difference between maximum width and minimum width) cannot exceed 0.010" (0.254 mm). Accordingly, the score lines **10** are formed so as to ensure such groove consistency.

[0061] The range of measured groove depths (i.e., difference between maximum depth and minimum depth) cannot exceed 0.010" (0.254 mm). Accordingly, the score lines **10** are formed so as to ensure such groove consistency.

[0062] 5) Groove Design

[0063] Grooves must be designed and manufactured with the intent of being symmetric, parallel and consistent throughout the impact area.

[0064] 6) Area over Width Plus Separation: This applies to all types of clubs with the exception of drivers and putters.

[0065] If 50% or more of the measured values of $X/(W+S)$ are greater than 0.0030" (0.0762 mm) then the club is non-conforming. Accordingly, the score lines **10** are formed so as not to exceed the value. In other words, as illustrated in FIG. 6, the score lines **10** are formed such that as for the score lines **10** as measured, 50% or more of the measured values of X (traverse cross section of the groove per one score line **10**) divided by the pitch of the score line (the sum of the groove width and the groove separation) are less than or equal to 0.0030" (0.0762 mm²/mm).

[0066] If the measured value of $X/(W+S)$ value for any single groove is greater than 0.0032" (0.0813 mm) then the club is non-conforming. Accordingly, the score lines **10** are formed so as not to exceed the value.

[0067] 7 Edge Radius: This applies to all types of clubs with claimed, marked or measured lofts of 25 degrees or more.

[0068] Rounding of groove edges shall be in the form of a radius having an effective radius not less than 0.010" (0.254 mm) as determined by the two circles method, nor greater than 0.020" (0.508 mm).

[0069] If 50% or more of the upper groove edges or 50% or more of the lower groove edges fail the two circles method subject to a 10 degree angular allowance, then the club is non-conforming. Accordingly, the score lines **10** are formed so as to meet the two circles method criteria.

[0070] If any single groove edge protrudes more than 0.0003" (0.0076 mm) outside the outer circle, then the club is non-conforming. Accordingly, the score lines **10** are formed so as to meet the criteria.

[0071] Next, will be explained 30° METHOD FOR MEASURING GROOVE WIDTH.

[0072] It is generally understood that the groove in a club face starts where there is a significant departure from the plane of the face (land area). This method specifies where the measurement of the groove width should be taken when the edges of the grooves are rounded.

[0073] The sidewall of a groove generally meets the face of the club (land area) with a filleted transition. The groove width measurement (W) is made between two points where a line, inclined at 30° to the land area of the club face, is tangent to the edge of the groove, as illustrated in FIG. 7. Further, as for the measurement of groove edge radius, if the tangent point using the 30° method occurs at a location that is more than 0.003" below the land area, then the width measurement

shall be made at the points on the groove that are 0.003" below the land area, as illustrated in FIG. 8.

[0074] Next is a description of a function of the above-structured golf club. In the case of using a wedge-type golf club among the above-described iron-type golf clubs to hit a pitch shot, the downswing of the golf club is carried out so that the head 2 is moved in an arc orbit in a manner thrusting into the underneath of the golf ball 22. At that moment, the face surface 1 contacts the golf ball 22 so as to get into the underneath thereof and then hits the golf ball 22. As a result, as shown in FIGS. 2 and 3, the golf ball 22 is caught in the edge portions 10A of the score lines 10 to be rotated counter-clockwise, so that the backspin is applied to the golf ball 22. Furthermore, when the golf ball 22 and the head 2 strike against each other at the time of hitting the golf ball 22, the center of gravity 21 is allowed to be located higher than the center 23 of the golf ball 22, and thus the face surface 1 instantaneously withdraws its sole face 6 side and raises its face surface 1 to thereby be rotated in the clockwise direction R. In other words, instantaneously the loft angle δ (delta) is decreased and as a result, the golf ball rubbed against the face surface 1 by the rotating motion of the face surface 1 is spun up in a direction reverse to the rotation of the face surface 1, so that the so-called gear effect is generated to accelerate the backspin.

[0075] Further, at the time of hitting the golf ball 22, the height D of the center of gravity 21 is larger than the radius E of the golf ball 22 and further the center of gravity 21 of the head 2 is provided in a position anterior to the face surface 1. Hence, as the center of gravity 21 thereof is located higher than the center 23 of the golf ball 22 at the time of hitting a shot, the golf ball 22 is allowed to fly comparatively low at an initial stage. More specifically, an initial flying-out angle θ (theta) of the golf ball 22 is diminished. Thus, the golf ball 22 becomes easy to be caught in the edge portions of the score lines 10 to be able to effectively apply backspin to the same. On the contrary, if the height D is smaller than the radius E of the golf ball 22, then the center of gravity 21 would be located lower than the center 23 of the golf ball 22. Hence, the initial flying-out angle θ would be increased so that the golf ball 22 become hard to be caught in the edge portions of the score lines 10, thus making it difficult to apply the backspin thereto.

[0076] Thus, at the time of hitting a pitch shot, the golf ball 22 is allowed to fly initially low to fall on a green with a strong backspin being applied thereto, thereby permitting the golf ball 22 to stop at a desired fall point or in the vicinity of that point.

[0077] According to the foregoing embodiment, there is provided the golf club comprising: the head 2 having the score lines 10 formed on the face surface 1 and the shaft 4 connected therewith, wherein the height D from the sole face 6 of the head 2 or the horizontal plane 6A of the sole face 6 to the center of gravity 21 of the head 2 is greater than the radius E of the golf ball 22. Consequently, at the time of hitting the shot, when the golf ball 22 strikes the head 2, then the face surface portion instantaneously withdraws in the sole face 6 side while it tends to erect the face and turns. Hence, the golf ball rubbed against the face surface 1 is spun up in a direction reverse to the rotation of the face surface 1, so that the backspin can be accelerated by the so-called gear effect.

[0078] Furthermore, as the height distance D is set at 21.335 mm or above, it is possible to ensure a height distance greater than a radius of a golf ball 22 regulated under the current golfing rules.

[0079] Moreover, the center of gravity 21 of the head 2 is provided in the position anterior to the face surface 1. Hence, an initial flying-out angle θ (theta) of the golf ball 22 is decreased and thus the golf ball 22 becomes easy to be caught in the edge portions 10A of the score lines 10, so that even when a shot is hit at a bunker or the like with a likelihood that the score lines 10 are prone to be clogged with sands, the backspin can be applied effectively to the golf ball 22.

[0080] Further, the score lines 10 are formed such that in the score lines 10 as measured, 50% or more of the measured values of the traverse cross section X of the groove per one score line 10 divided by the pitch of the score line are less than or equal to 0.0030" (0.0762 mm²/mm). For example, in the measured values of the traverse cross section X over by the pitch with respect to the multiple score lines 10 provided on the face 1 in multiple stages, six score lines 10 may be formed so that X/P may be less than or equal to 0.0030" (0.0762 mm²/mm) if the score lines 10 are ten in total, thus meeting the aforementioned Rules to regulate the ball spin tendency of the golf club. According to the present invention, the height D is equal to or greater than 21.335 mm, and thus, the height D greater than the radius of the golf ball 22 prescribed under the current Golf Rules can be ensured, yet ensuring the spin to be applied to the ball.

[0081] Moreover, the score lines 10 are formed such that the measured value of X/(W+S) value for any single groove is less than or equal to 0.0032" (0.0813 mm²/mm), thus meeting the aforementioned Rules to regulate the ball spin tendency of the golf club. As above mentioned, the height D is equal to or greater than 21.335 mm in the present invention, and thus, the height D greater than the radius of the golf ball 22 prescribed under the current Golf Rules can be ensured, yet ensuring the spin to be applied to the ball.

[0082] Further, the upper protrusion 18 and the lower protrusion 15 are provided spacedly rearward of the upper and lower portions of the head 2, respectively. The distance C between the rear end 18A of the upper protrusion 18 and the surface of the face surface 1 is formed greater than the distance B between the rear end 15A of the lower protrusion 15 and the surface of the face surface 1. Hence, as the center of gravity 21 in the head 2 is located on comparatively upper side, the height D from the sole face 6 of the head 2 or the horizontal plane 6A of the sole face 6 to the center of gravity 21 of the head 2 can be arbitrarily adjusted by the adjustment of weight distribution between the upper protrusion 18 and the lower protrusion 15. Besides, the moment of inertia in a vertical direction can be increased, so that a vertical jiggling at the time of hitting the shot is reduced to be able to improve the stability of a golf ball flying direction.

[0083] Further, the depressed portion 17 is formed on the upper surface 16 of the lower protrusion 15. Hence, the weight corresponding to the volume of a space inside the depressed portion 17 can be reduced in the lower protrusion 15, so that position adjustment in the center of gravity 21 can be more easily carried out.

[0084] Furthermore, by using, the wedge type golf club with its center of gravity thus positioned, approach shots from around the green can be precisely carried out.

[0085] FIG. 8 represents a second embodiment. The same reference symbols are appended to parts the same as in the first embodiment and a detailed description thereof is omitted. In the second embodiment, the specific gravity of a material that makes up an upper portion 2A of the top 8 of the head 2 is selected so as to be larger than that of a material of a lower

portion 2B as the remaining portion, i.e., of the material for forming the sole face 6 and the like. Thus, the height D of the center of the gravity 21 of the head 2 is greater than the radius E of the golf ball 22. Thus, in an alternative form of the invention, materials of different specific gravities may be combined together to form the head 2 for adjusting the position of the center of gravity without contriving a form of the head.

[0086] FIGS. 10 and 11 represent a third embodiment showing a head 2' of a sand wedge type, made from soft iron by forging. The head 2' comprises the foregoing score lines (not shown) on a face 1', and is formed such that a sole 6' is arranged at an angle α relative to a center axis of a shaft 4', said angle α being greater than or equal to 95 degrees but less than or equal to 120 degrees, preferably greater than or equal to 100 degrees or less than or equal to 115 degrees. Height D' of the center of gravity 21' of the head 2' measured with reference to a horizontal plane 6'A of the sole face 6' (said horizontal plane 6'A being arranged perpendicularly to a shaft connecting portion 3' at the front edge of the sole face 6') is formed larger than that a radius E' of a golf ball 22'. As a result, at the time of shot when the ball 22' collides against the head 2', the face surface 1' is rotated in a manner allowing its sole side to be lowered to thereby be arranged upright, whereby a reverse rotation relative to the rotation of the face surface 1' is applied to the ball 22' rubbed against the face surface 1', thus enabling the acceleration of the back spin due to so-called gear effect.

[0087] According to the above-structured head 2', there can be provided a high-bounce sole with the enlarged angle α of the sole 6', thus facilitating the smoothness at the time of swinging so that a player can expect that the sole 6' will slide well. It should be noted that such effect is difficult to expect if the angle α is not within the range of from 95 to 120 degrees. The head 2' thus structured enables a player to address various situations, such as opening or closing of the face surface 1', as well as raising or restraining the ball 22'. In addition, due to the aforesaid score lines being formed, spins can be applied to the ball 22' reliably.

[0088] As is evident from the foregoing, it should be noted that the golf club according to the present invention is applicable to various golf clubs such as other iron-type or wood-type golf clubs.

What is claimed is:

1. A wedge-type golf club, including a pitching wedge, an approach wedge and a sand wedge, comprising: a head having a sole face provided in a lower portion that acts as a ground

contact surface, a face surface acting as a ball striking surface, provided on a front of said head with a certain loft angle, a shaft connecting portion on one side thereof, multiple score lines formed on the face surface of said head, and a shaft connected to said shaft connecting portion,

wherein a height of the center of gravity of said head is at least 21.335 mm and greater than a radius of a golf ball, the height of the center of gravity of said head being defined as a distance from a horizontal plane flush with the sole face of said head to the center of gravity of said head;

the center of gravity of said head is provided at an anterior position to said face surface, and

wherein for the score lines as measured, 50% or more of the measured values of X divided by the pitch of the score line are less than or equal to 0.0030" (0.0762 mm²/mm), where X denotes a traverse cross section of the groove per one score line, and the pitch of the score line is defined by the sum of the groove width and the groove separation.

2. The wedge-type golf club according to claim 1, wherein said score lines are formed such that the measured value of X divided by the pitch of the score line for any single groove is less than or equal to 0.0032" (0.0813 mm²/mm).

3. The wedge-type golf club according to claim 2, wherein an upper protrusion and a lower protrusion are provided spacedly rearwardly of upper and lower positions of said head, respectively such that a distance between a rear end of said upper protrusion and said face surface is greater than a distance between a rear end of said lower protrusion and said face surface.

4. The wedge-type golf club according to claim 2, wherein an upper protrusion and a lower protrusion are provided spacedly rearwardly of upper and lower positions of said head, respectively, said lower protrusion including a depressed portion formed on an upper surface thereof.

5. The wedge-type golf club according to claim 3, wherein said lower protrusion includes a depressed portion formed on an upper surface thereof.

6. The wedge-type golf club according to claim 2, wherein said loft angle is set at 52 to 56 degrees, and the center of gravity of said head is arranged in a position anterior to the face surface, but posterior to a distal end of the sole face.

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