US 20030032500A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2003/0032500 A1**

Nakahara et al. (43) **Pub. Date: Feb. 13, 2003**

(54) **GOLF CLUB HEAD**

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(21) Appl. No.: **10/208,739**

(22) Filed: **Aug. 1, 2002**

(30) **Foreign Application Priority Data**

Aug. 3, 2001 (JP) JP2001-236362

Publication Classification

(51) **Int. Cl.**[7] **A63B 53/04**

(52) **U.S. Cl.** **473/345**; 473/346

(57) **ABSTRACT**

A golf club head is disclosed, which enables a low center of gravity to be achieved without spoiling appearance of the head and reducing strength thereof, and thus enables a carry to be increased. This golf club head has a hollow structure, and includes an opening in a crown portion and a plate member fixed to the opening. The plate member is made of a material having a specific strength of 294 N/mm^2 or higher. For example, this head includes a volume equal to or more than 350 cc, a center-of-gravity retreating amount GR from a shaft axis equal to or more than 15 mm, and a center-of-gravity position ratio GH/FH equal to or lower than 0.61. Here, the ratio GH/FH is calculated from a maximum height FH of a face surface and a center-of-gravity height GH on the face surface.

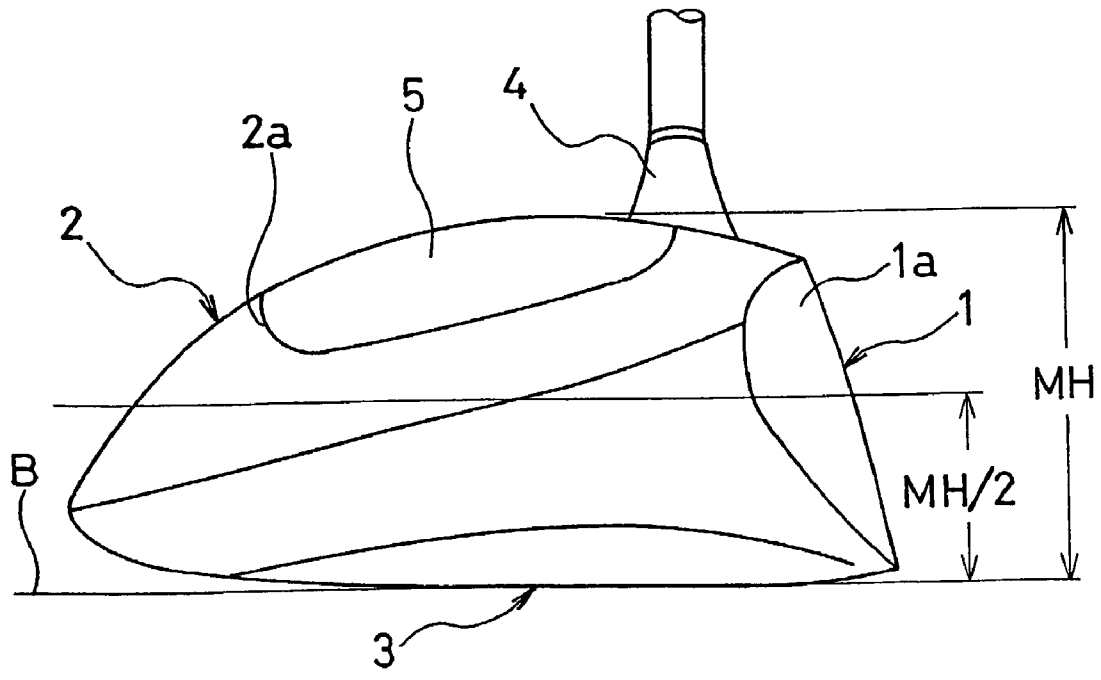


Fig.1

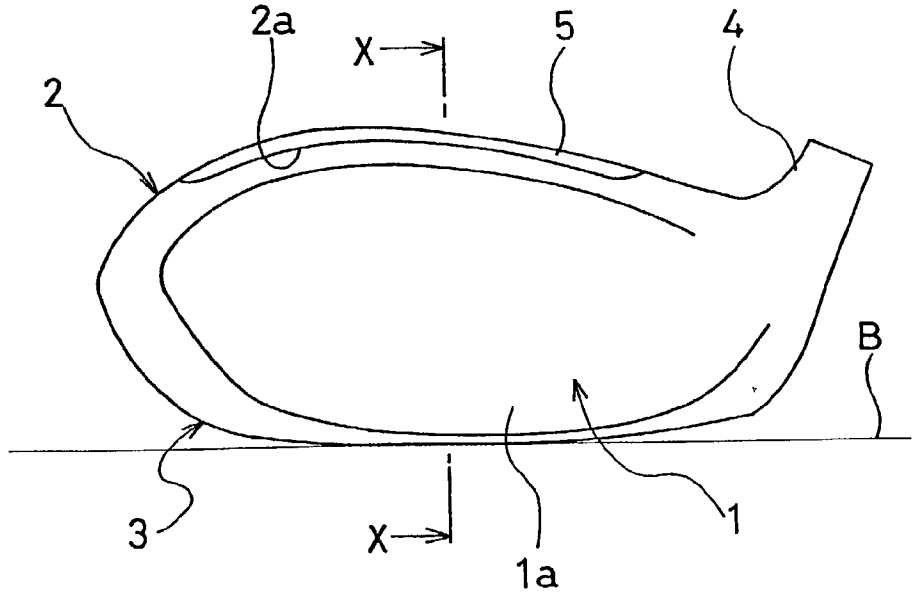


Fig.2

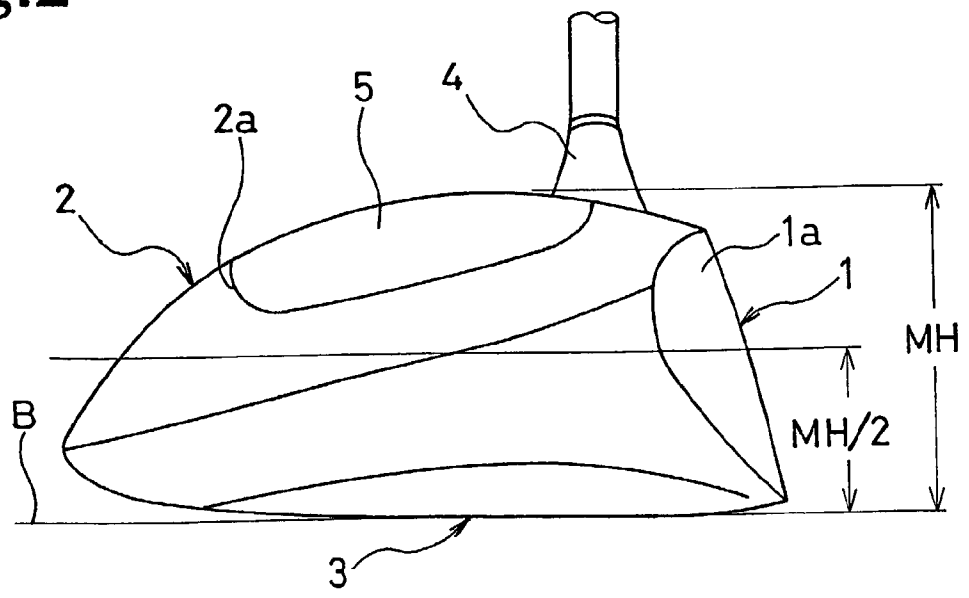


Fig.3

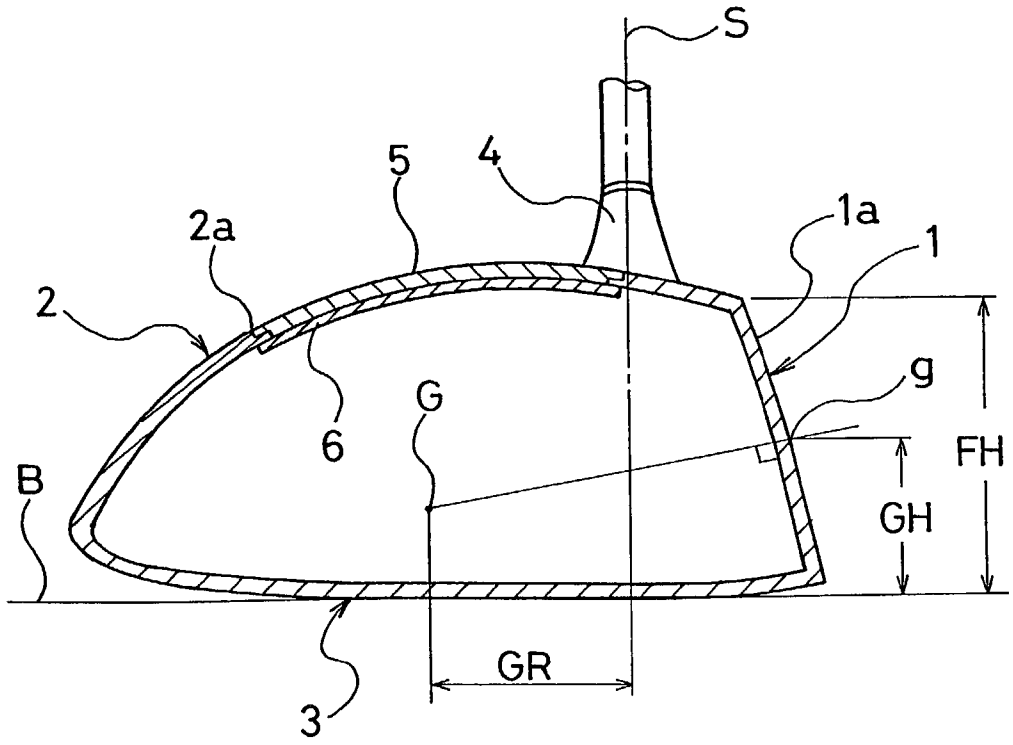


Fig.4

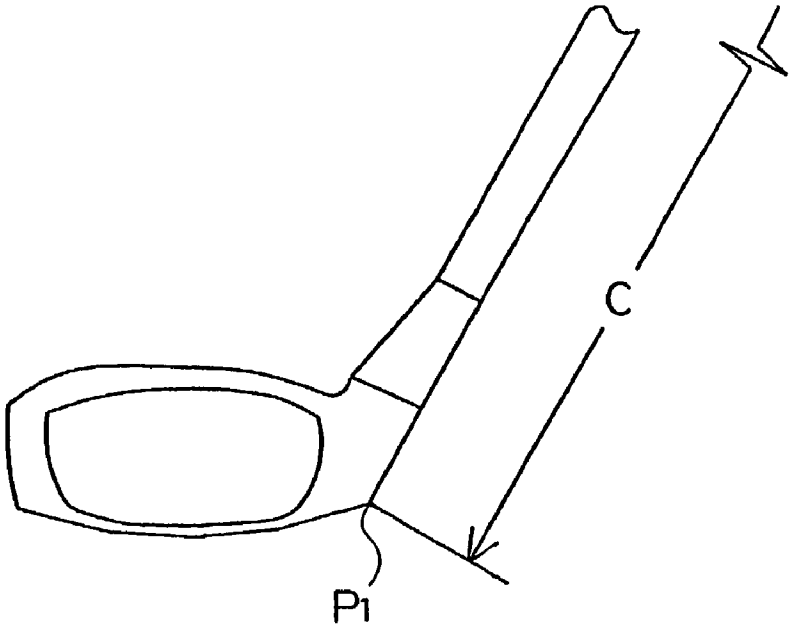


Fig.5

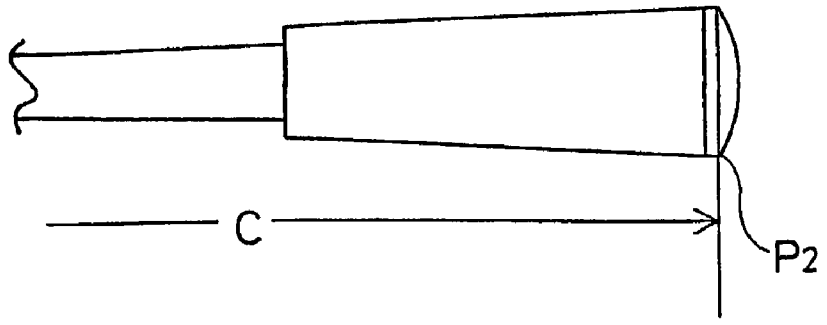


Fig.6

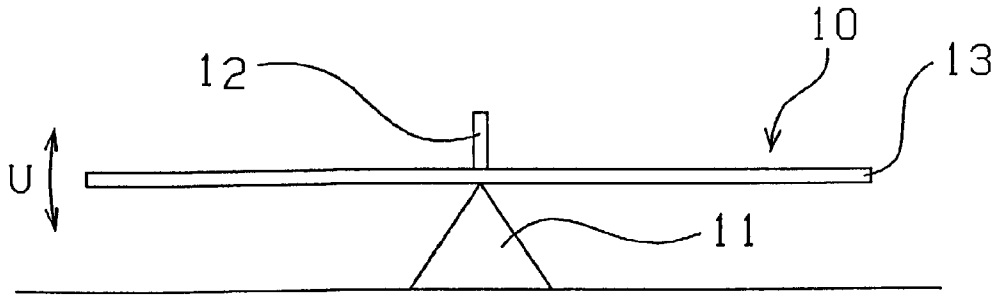


Fig.7

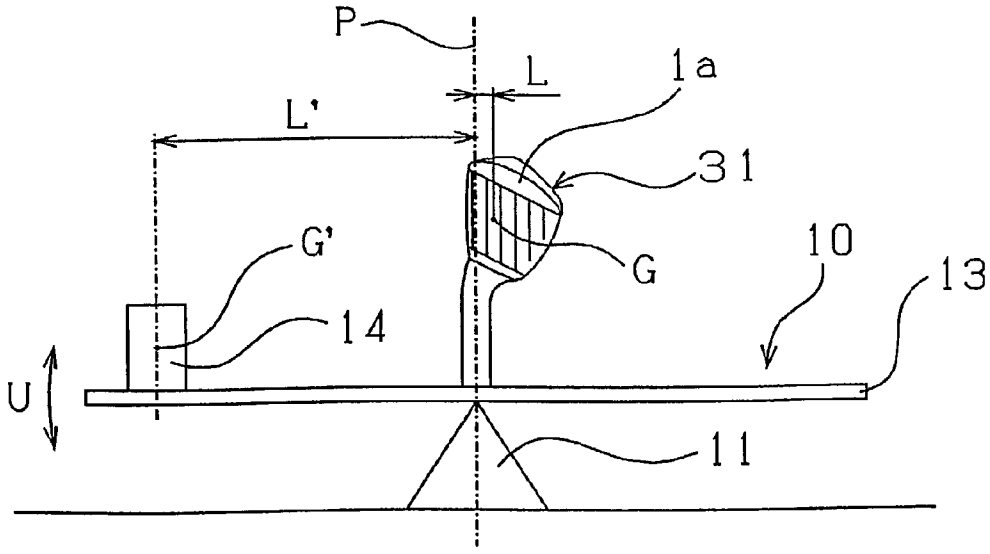


Fig.8

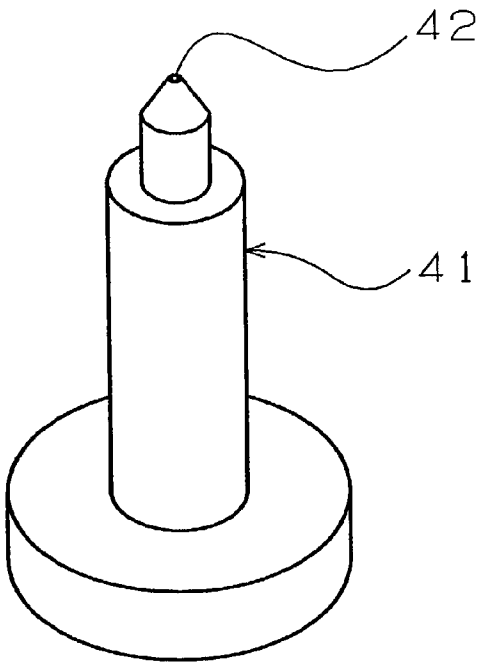


Fig.9

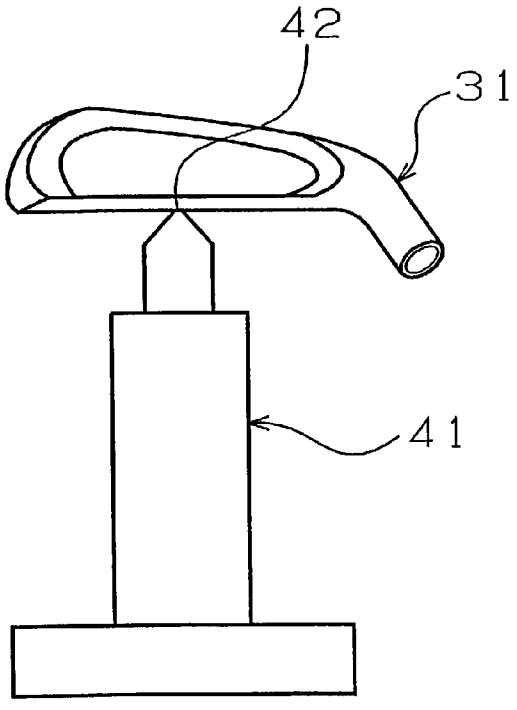
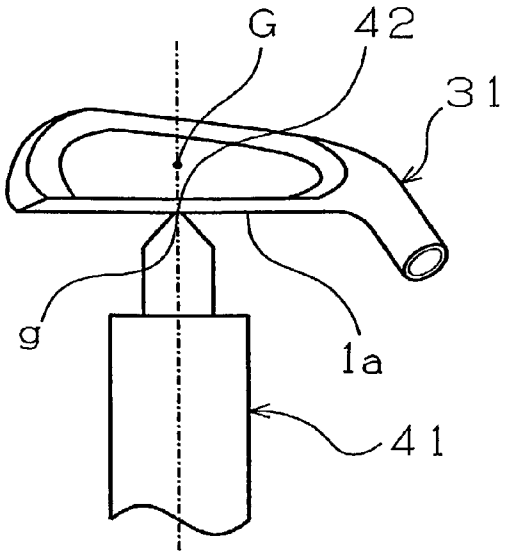
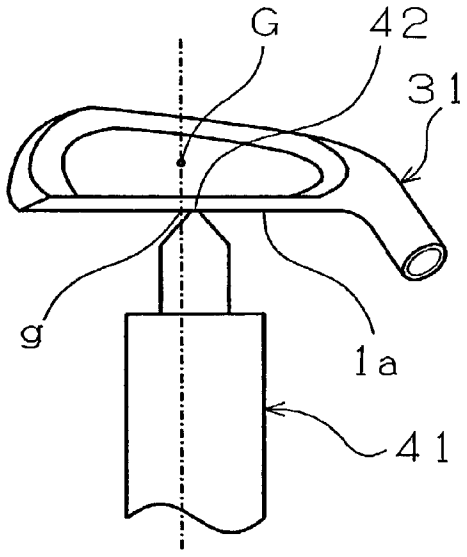


Fig.10 (a)



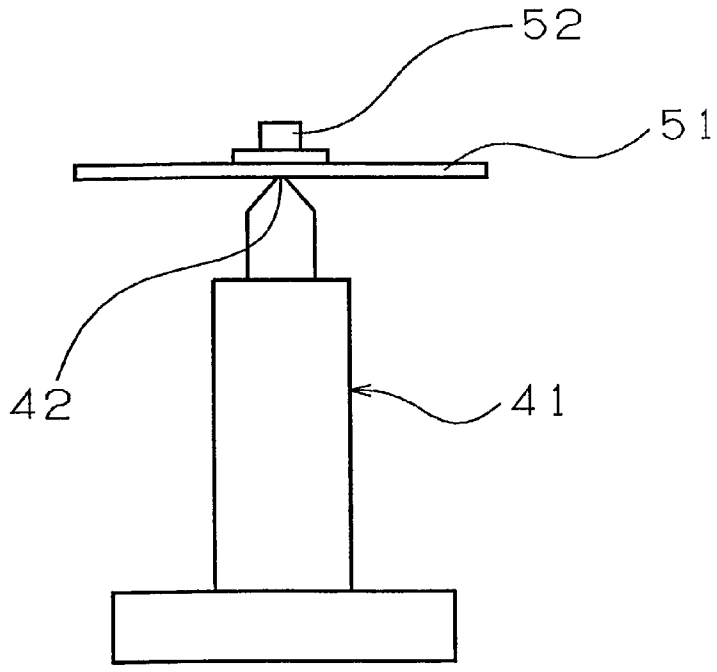
(a)

Fig.10 (b)



(b)

Fig.11



GOLF CLUB HEAD

BACKGROUND OF THE INVENTION

[0001] The present invention relates to a golf club head having a hollow structure. More specifically, the invention relates to a golf club head capable of increasing a carry by setting a low center of gravity to reduce a spin of a ball and increase a launch angle.

[0002] Conventionally, a metal golf club head having a hollow structure has been used for a golf club such as a utility club, a fairway wood and a #1 wood. In such a golf club head, because of use of metallic materials not only for face and sole portions but also for a crown portion, the center of gravity has been high. Especially, in the case of using a titanium material for a deep-face head of the #1 wood, the head having a volume of 300 to 400 cc, even if the head is designed based on a limit thickness to secure minimum necessary strength, a limitation on maximum head weight makes it difficult to adjust a position of a center of gravity by deviation in a weight distribution. Thus, it has been difficult to achieve a low center of gravity.

[0003] On the other hand, Japanese patent application Kokai publication No. 5-317465 describes a golf club head having no metallic materials disposed on the crown portion. However, this golf club head has a hole bored on the crown portion, or only has a plate of a lightweight resin or the like attached to the crown portion. Consequently, an appearance of the head has been bad, and strength thereof has been insufficient.

SUMMARY OF THE INVENTION

[0004] An object of the present invention is to provide a golf club head capable of achieving a low center of gravity even in the case of a so-called deep-face head without spoiling appearance of the head and without reducing strength thereof, thereby reducing a spin of a ball and increasing a launch angle to increase a carry.

[0005] In order to achieve the foregoing object, a golf club head of the present invention includes an opening in a crown portion, and a plate member fixed to the opening, the plate member being made of a material having a specific strength of 294 N/mm^2 or higher.

[0006] Here, the specific strength is a result of dividing a tensile strength (N/mm^2) by a specific gravity, and it means that as the specific strength is larger, the strength is higher while weight is light. Accordingly, by replacing a metallic material of the crown portion with the plate member, it is possible to achieve a low center of gravity even in a so-called deep-face golf club head without spoiling the appearance of the head and without reducing the strength thereof. The achievement of the low center of gravity enables the spin of a ball to be reduced, the launch angle to be increased, and thus the carry to be increased to a maximum.

[0007] In order to achieve a satisfactorily low center of gravity of the golf club head, preferably, a surface area ratio of the plate member to a portion above a position at half a maximum height of the crown portion is set equal to or higher than 20%.

[0008] According to the present invention, it is possible to provide a novel golf club head having a hollow structure, which is provided with a weight distribution that has never existed in the conventional art.

[0009] That is, the present invention provides a golf club head having a hollow structure, which includes a volume equal to or more than 350 cc, a center-of-gravity retreating amount GR from a shaft axis equal to or more than 15 mm, and a center-of-gravity position ratio GH/FH equal to or lower than 0.61, the ratio GH/FH being calculated from a maximum height FH of a face surface and a center-of-gravity height GH on the face surface.

[0010] The present invention provides a golf club head having a hollow structure, which includes a volume equal to or more than 300 cc but less than 350 cc, a center-of-gravity retreating amount GR from the shaft axis equal to or more than 18 mm, and a center-of-gravity position ratio GH/FH equal to or lower than 0.55, the ratio GH/FH being calculated from the maximum height FH of the face surface and the center-of-gravity height GH on the face surface.

[0011] The present invention further provides a golf club head having a hollow structure, which includes a volume equal to or more than 150 cc but less than 200 cc, a center-of-gravity retreating amount GR from the shaft axis equal to or more than 12 mm, and a center-of-gravity position ratio GH/FH equal to or lower than 0.50, the ratio GH/FH being calculated from the maximum height FH of the face surface and the center-of-gravity height GH on the face surface.

[0012] The present invention still further provides a golf club head having a hollow structure, which includes a volume equal to or more than 100 cc but less than 150 cc, a center-of-gravity retreating amount GR from the shaft axis equal to or more than 8 mm, and a center-of-gravity position ratio GH/FH equal to or lower than 0.50, the ratio GH/FH being calculated from the maximum height FH of the face surface and the center-of-gravity height GH on the face surface.

[0013] Each of the above-described golf club heads can be achieved by providing an opening in a crown portion, and fixing a plate member made of a material having a specific strength of 294 N/mm^2 or higher to the opening. However, it should be understood that a golf club head having the above-described weight distribution achieved by other means is also contained within the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] **FIG. 1** is a front view showing a golf club head according to an embodiment of the present invention.

[0015] **FIG. 2** is a side view showing the golf club head of the embodiment of the invention.

[0016] **FIG. 3** is a sectional view taken along a line X-X of **FIG. 1**.

[0017] **FIG. 4** is a front view of a peripheral portion of the golf club head for illustrating definition of a club length according to the invention.

[0018] **FIG. 5** is a front view of a peripheral portion of a golf club grip for illustrating the definition of the club length of the invention.

[0019] **FIG. 6** is a side view showing an example of measuring device of a center-of-gravity retreating amount.

[0020] **FIG. 7** is a side view showing measurement of the center-of-gravity retreating amount by the measuring device of **FIG. 6**.

[0021] **FIG. 8** is a perspective view showing a measuring device of a center of gravity of the head.

[0022] **FIG. 9** is a side view showing a measuring method of the center of gravity of the head in a state where the head is mounted on the center-of-gravity measuring device.

[0023] FIGS. **10**(*a*) and **10**(*b*) show the measuring method of the center of gravity of the head: **FIG. 10**(*a*) being a side view showing a state where the head is mounted on a position balanced with respect to the center-of-gravity measuring device; and **FIG. 10**(*b*) being a side view showing a state where the head is mounted on a position unbalanced with respect to the center-of-gravity measuring device.

[0024] **FIG. 11** is a side view showing a method of checking levelness of a supporting portion of the center-of-gravity measuring device in a state where a level is placed on the center-of-gravity measuring device.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0025] Next, detailed description will be made for a constitution of the present invention with reference to the accompanying drawings.

[0026] Each of FIGS. **1** to **3** shows a golf club head according to an embodiment of the present invention. As shown in **FIGS. 1 and 2**, the golf club head of the embodiment has a hollow structure, in which a crown portion **2** and a sole portion **3** are connected to a face portion **1** to be continuous. This golf club head also includes a hosel portion **4** provided on a heel side for fixing a shaft. As a material constituting the golf club head, a metallic material such as titanium, aluminum or stainless steel can be used.

[0027] In the golf club head, an opening **2***a* is provided in the crown portion **2**, and a plate member **5** is fixed to the opening **2***a*. This plate member **5** is made of a material having a specific strength of 294 N/mm^2 or higher. The upper limit of the specific strength is not especially limited in view of the function, and the higher specific strength can be selected as long as materials having the higher specific strength exist. As a material constituting the plate member **5**, a fiber reinforced plastic is available, which is prepared by impregnating a reinforced fiber such as a carbon fiber, a glass fiber and an alamido fiber with a matrix resin such as an epoxy resin, an unsaturated polyester resin and a vinylester resin. Especially, the carbon fiber is preferred as a reinforced fiber. Preferably, a material constituting the plate member **5** has a specific gravity of 0.5 to 2.0.

[0028] By replacing the metallic material of the crown portion **2** with the plate member **5** made of a material having such a high specific strength, a weight distribution in an upper part of the head is relatively reduced to lower a center of gravity G of the golf club head. Moreover, since the plate member **5** is present on the crown portion **2** to prevent exposure of the opening **2***a*, the appearance of the head is not spoiled. Since the specific strength of the plate member **5** is high, no reduction occurs in strength of the head. Accordingly, a low center of gravity can be achieved even in the case of the golf club head having a large volume and a deep face (face having a vertical width of, e.g., 46 mm or more). The lower center of gravity reduces a spin of a ball and increases a launch angle, thereby enabling a carry to be increased to a maximum.

[0029] In the foregoing golf club head, as shown in **FIG. 2**, preferably, a surface area ratio of the plate member **5** to a portion above a position at half a maximum height MH of the crown portion **2** is set equal to or higher than 20%. Accordingly, by setting the surface area ratio of the plate member **5** equal to or higher than 20%, a satisfactorily low center of gravity can be achieved for the golf club head. The upper limit of the surface area ratio is not especially limited in view of the function. The upper limit, however, is preferably set to 90% in consideration of the structure of the golf club head.

[0030] The plate member **5** can be adhered to the opening **2***a* of the crown portion **2**. For example, as shown in **FIG. 3, a** step is formed on a peripheral edge of the opening **2***a* of the crown portion **2**. On the other hand, a peripheral edge of the plate member **5** is processed to match the step and adhered to the opening **2***a*. When necessary, a plate member **6** made of a similar material to the plate member **5** may be adhered to the plate member **5** from the inner side of the head. Accordingly, the plate member **5** can be firmly fixed to the crown portion **2**. Needless to say, the method of fixing the plate member **5** is not limited to the above, but other methods can be used. The presence of the plate member **5** is apparent in the drawing, but the appearance of the golf club head is not affected at all if paint is applied.

[0031] According to the present invention, the following golf club heads can be constructed.

[0032] As a first golf club head, a golf club head is provided, which includes a volume equal to or more than 350 cc, a center-of-gravity retreating amount GR from a shaft axis S equal to or more than 15 mm, and a center-of-gravity position ratio GH/FH equal to or lower than 0.61, more preferably equal to or lower than 0.55, the ratio GH/FH being calculated from a maximum height FH of a face surface **1***a* and a center-of-gravity height GH on the face surface **1***a*. In this case, the upper limit of the volume of the golf club head is not especially limited in view of the function. The upper limit, however, is preferably set to 600 cc, preferably 500 cc, more preferably 400 cc in order to obtain necessary strength to the hit ball.

[0033] As a second golf club head, a golf club head is provided, which includes a volume equal to or more than 300 cc but less than 350 cc, a center-of-gravity retreating amount GR from the shaft axis S equal to or more than 18 mm, and a center-of-gravity position ratio GH/FH equal to or lower than 0.55, more preferably equal to or lower than 0.50, the ratio GH/FH being calculated from the maximum height FH of the face surface **1***a* and the center-of-gravity height GH on the face surface **1***a*.

[0034] As a third golf club head, a golf club head is provided, which includes a volume equal to or more than 150 cc but less than 200 cc, a center-of-gravity retreating amount GR from the shaft axis S equal to or more than 12 mm, and a center-of-gravity position ratio GH/FH equal to or lower than 0.50, the ratio GH/FH being calculated from the maximum height FH of the face surface **1***a* and the center-of-gravity height GH on the face surface **1***a*.

[0035] As a fourth golf club head, a golf club head is provided, which includes a volume equal to or more than 100 cc but less than 150 cc, a center-of-gravity retreating amount GR from the shaft axis S equal to or more than 8 mm, and a center-of-gravity position ratio GH/FH equal to or lower than 0.50, the ratio GH/FH being calculated from the maximum height FH of the face surface **1***a* and the center-of-gravity height GH on the face surface **1***a*.

[0036] Here, the center-of-gravity retreating amount GR means a distance between a center of gravity G of the head and a plane containing the shaft axis S and vertical to a reference surface B in a state where the head is placed on the reference surface B according to a lie angle, and the face surface **1***a* is directed to a target line.

[0037] The placement according to the lie angle means that gaps between a round of the sole surface of the head and a placement surface made of a plane are roughly equal to each other at toe and heel sides. If the round of the sole surface is unclear, the placement of the head is made such that a score line and the placement surface are parallel to each other. If the round of the sole surface is unclear, and the placement surface and the score line cannot be determined to be parallel to each other, for example in the case where the score line is not linear, the head is placed with the lie angle (degree) (=100−club length (inch)). For example, if the club length is 44 inches, the lie angle is 56° (=100−44).

[0038] The club length is measured by a measuring method set up by the Japan Golf Goods Association. As a measuring device, Club Measure II by Kamoshita Seikojo Co., Ltd., or the like is available. That is, as shown in **FIGS. 4 and 5**, when a heel end is set as a base point P_1, and a grip end is set as an end point P_2, then a distance C between the points P_1 and P_2 is set as the club length.

[0039] As shown in **FIG. 6**, the above-described center-of-gravity retreating amount GR is measured by a seesaw balance **10** swingable in an arrow direction U around a fulcrum **11**. The balance **10** includes a shaft pin **12** to be fitted into the hosel hole of the head without any gaps therebetween. The balance **10** is balanced in such a way as to set an arm **13** horizontal while no heads or heavy bodies are placed thereon. Here, as shown in **FIG. 7, a** head **31** of mass W is fitted over the shaft pin **12** extended in a vertical direction. The head **31** is then rotated and fixed so as to enable the center-of-gravity retreating amount GR to be measured in an arm longitudinal direction. In other words, the center-of-gravity retreating amount GR coincides with a distance L between a plane P passed through the fulcrum and set orthogonal to the arm longitudinal direction and the center of gravity G of the head **31**. In the side view of the balance **10**, the face surface **1***a* is somewhat seen because of presence of a loft angle and the lie angle in the head **31**.

[0040] Then, by using a heavy body **14** of mass W', a length L' from a center of gravity G' of the heavy body **14** to the fulcrum is selected such that the arm **13** is horizontally balanced. As a result, the center-of-gravity retreating amount GR can be calculated by GR=L=(W'×L')/W based on an equation of equilibrium W×L=W'×L'. The above description has been made on the principle of measuring the center-of-gravity retreating amount GR from the shaft axis. As a measuring device, a center-of-gravity measuring device by Kamoshita Seikojo Co., Ltd., can be used.

[0041] On the other hand, as shown in **FIG. 3**, the maximum height FH of the face surface is a height from the reference surface B to a highest position of the face surface **1***a* while the head is placed on the reference surface B according to the lie angle, and the face surface **1***a* is directed to the target line. The center-of-gravity height GH on the face surface is a height from the reference surface B to a point g in a placement state of the head similar to the above when a center of gravity position on the face surface **1***a* is obtained, the center of gravity position being composed of the point g at which a perpendicular from the center of gravity G to the face surface **1***a* intersects the face surface **1***a*.

[0042] The point g on the face surface **1***a* of the head is obtained by a center-of-gravity measuring device **41** similar to that shown in **FIG. 8**. The center-of-gravity measuring device **41** includes a supporting portion **42** for supporting an article to be measured for a center of gravity thereon. This supporting portion **42** supports the article to be measured in a balanced manner, and a position of the article can be known. That is, when the center-of-gravity position on the face surface **1***a* is obtained, as shown in **FIG. 9**, the head **31** is mounted on the supporting portion **42**, and an equilibrium position, at which the head **31** does not fall off even with hands off the head, is searched. In other words, as shown in **FIG. 10**(*a*), if the point g is contained in a contact portion between the face surface **1***a* and the supporting portion **42**, the head **31** mounted on the supporting portion **42** will not fall off even with hands off the head. However, as shown in **FIG. 10**(*b*), if the point g is not contained in the contact portion between the face surface **1***a* and the supporting portion **42**, the head **31** mounted on the supporting portion **42** will fall off with hands off the head. The point g is obtained based on this.

[0043] Preferably, the supporting portion **42** supports the article on a plane or at three points or more. Preferably, an area of the supporting portion **42** is set equal to 15 mm^2 or less. There is no lower limit on the area as long as the head **31** can be supported. The area of the supporting portion **42** is represented by an area of a planar part in the case of the support on the plane, and by an area of a figure connecting the respective points in the case of the support at three points or more. By setting the area of the supporting portion in the above range, the point g can be obtained more accurately.

[0044] Preferably, the plane formed by the supporting portion **42** becomes horizontal or substantially horizontal. Here, the state of being substantially horizontal means that an inclination with respect to a horizontal plane is within 2°, preferably within 1°. The state of being either horizontal or substantially horizontal can be checked by mounting and supporting a plate **51** on the supporting portion **42**, and placing a level **52** on the plate **51**. By setting the inclination of the plane of the supporting portion **42** within the above range, the point g can be obtained more accurately.

[0045] The foregoing center-of-gravity retreating amount GR is an important factor for lofting a hit ball. The upper limit of the center-of-gravity retreating amount GR is not especially limited in view of the function. The upper limit, however, is preferably set to, in consideration of arrangement of the hosel position and weight distribution of the golf club head, 70 mm when the volume is equal to or more than 350 cc, 70 mm when the volume is equal to or more than 300 cc but less than 350 cc, 55 mm when the volume is equal to or more than 150 cc but less than 200 cc, or 50 mm when

the volume is equal to or more than 100 cc but less than 150 cc. By setting the center-of-gravity retreating amount GR in the above range, a sufficient launch angle can be obtained.

[0046] The center-of-gravity position ratio GH/FH is an index for setting a low center of gravity. The lower limit of the center-of-gravity position ratio is not especially limited in view of the function. The lower limit, however, is preferably set to, in consideration of weight distribution of the golf club head, 0.35 when the volume is equal to or more than 350 cc, 0.33 when the volume is equal to or more than 300 cc but less than 350 cc, 0.30 when the volume is equal to or more than 150 cc but less than 200 cc, 0.30 when the volume is equal to or more than 100 cc but less than 150 cc. By setting the center-of-gravity position ratio in the above range, a sufficient carry can be obtained.

[0047] Especially, if the volume of the head is set large as in the cases of the first and second golf club heads, it is possible to increase the center-of-gravity retreating amount GR as much as possible, and reduce the center-of-gravity position ratio GH/FH as much as possible without adding any heavy bodies.

[0048] On the other hand, if the volume of the head is set small as in the cases of the third and fourth golf club heads, it is possible to increase the center-of-gravity retreating amount GR as much as possible, and reduce the center-of-gravity position ratio GH/FH as much as possible without using any metals of high specific gravity such as expensive tungsten as the heavy bodies.

EXAMPLES

[0049] With regard to a titanium alloy golf club head having a hollow structure, golf club heads of examples 1 to 4 and comparative examples 1 to 4 were respectively manufactured, in which the volumes, the center-of-gravity retreating amounts GR and the center-of-gravity position ratio GH/FH were varied as shown in Table 1. In each of the golf club heads of the examples 1 to 4, an opening was provided in the crown portion, and a plate member made of carbon reinforced plastic having a specific strength of about 1415 N/mm^2 was fixed to the opening. The surface area ratio of the plate member to the portion above the position at half the maximum height of the crown portion is as shown in Table 1.

[0050] Golf clubs having the forgoing golf club heads fixed were respectively prepared. Test hitting was carried out by a swing robot at a head speed of 40 m/s while a sweet spot of each golf club head was set as a hitting position, and the spin, the launch angle and the carry were evaluated. Results thereof are shown in Table 1. The results of the evaluation are represented by indexes using those of the comparative examples 1 to 4 corresponding to the examples 1 to 4 set as 100. The spin is better as the index value thereof is smaller, and the launch angle and the carry are better as the index values thereof are larger.

TABLE 1

	Volume (cc)	GR (mm)	GH/FH	Surface area ratio of plate member (%)	Spin	Launch angle	Carry
Comparative example 1	396	14.2	0.62	—	100	100	100
Example 1	400	16.2	0.51	30.8	94	106	112
Comparative example 2	310	16.0	0.56	—	100	100	100
Example 2	335	19.1	0.47	32.0	92	108	113
Comparative example 3	170	13.0	0.53	—	100	100	100
Example 3	151	15.0	0.48	27.5	96	105	109
Comparative example 4	135	10.0	0.55	—	100	100	100
Example 4	128	12.0	0.46	24.5	97	104	106

[0051] As understood from Table 1, compared with the corresponding comparative examples 1 to 4, the examples 1 to 4 have less spins, larger launch angles and longer carries.

[0052] According to the present invention, in the golf club head having a hollow structure, by providing the opening in the crown portion and fixing the plate member made of a material having a specific strength of 294 N/mm^2 or higher to the opening, a low center of gravity can be achieved even in the case of the deep face head without spoiling the appearance of the head and without reducing the strength thereof. Thus, it is possible to reduce the spin and increase the launch angle, thereby increasing the carry.

[0053] Also, according to the present invention, by providing each of following golf club heads (1) to (4), which is provided with a weight distribution that has never existed in the conventional art, a low center of gravity can be achieved. Thus, it is possible to reduce the spin and increase the launch angle, thereby increasing the carry.

[0054] (1) A golf club head having a hollow structure, which includes a volume equal to or more than 350 cc, a center-of-gravity retreating amount GR from a shaft axis equal to or more than 15 mm, and a center-of-gravity position ratio GH/FH equal to or lower than 0.61, the ratio GH/FH being calculated from a maximum height FH of a face surface and a center-of-gravity height GH on the face surface.

[0055] (2) A golf club head having a hollow structure, which includes a volume equal to or more than 300 cc but less than 350 cc, a center-of-gravity retreating amount GR from the shaft axis equal to or more than 18 mm, and a center-of-gravity position ratio GH/FH equal to or lower than 0.55, the ratio GH/FH being calculated from the maximum height FH of the face surface and the center-of-gravity height GH on the face surface.

[0056] (3) A golf club head having a hollow structure, which includes a volume equal to or more than 150 cc but less than 200 cc, a center-of-gravity retreating amount GR from the shaft axis equal to or more than 12 mm, and a center-of-gravity position ratio GH/FH equal to or lower than 0.50, the ratio GH/FH being calculated from the

maximum height FH of the face surface and the center-of-gravity height GH on the face surface.

[0057] (4) A golf club head having a hollow structure, which includes a volume equal to or more than 100 cc but less than 150 cc, a center-of-gravity retreating amount GR from the shaft axis equal to or more than 8 mm, and a center-of-gravity position ratio GH/FH equal to or lower than 0.50, the ratio GH/FH being calculated from the maximum height FH of the face surface and the center-of-gravity height GH on the face surface.

[0058] The preferred embodiments of the present invention have been described in detail. However, it should be understood that various changes, modifications and substitutions can be made without departing from the spirit and the scope of the invention as specified in appended claims.

What is claimed is:

1. A golf club head having a hollow structure, comprising:

a crown portion;

an opening in the crown portion; and

a plate member fixed to the opening, the plate member being made of a material having a specific strength of 294 N/mm^2 or higher.

2. A golf club head having a hollow structure, the head including:

a volume equal to or more than 350 cc;

a center-of-gravity retreating amount GR from a shaft axis equal to or more than 15 mm; and

a center-of-gravity position ratio GH/FH equal to or lower than 0.61, the ratio GH/FH being calculated from a maximum height FH of a face surface and a center-of-gravity height GH on the face surface.

3. A golf club head having a hollow structure, the head including:

a volume equal to or more than 300 cc but less than 350 cc;

a center-of-gravity retreating amount GR from a shaft axis equal to or more than 18 mm; and

a center-of-gravity position ratio GH/FH equal to or lower than 0.55, the ratio GH/FH being calculated from a maximum height FH of a face surface and a center-of-gravity height GH on the face surface.

4. A golf club head having a hollow structure, the head including:

a volume equal to or more than 150 cc but less than 200 cc;

a center-of-gravity retreating amount GR from a shaft axis equal to or more than 12 mm; and

a center-of-gravity position ratio GH/FH equal to or lower than 0.50, the ratio GH/FH being calculated from a maximum height FH of a face surface and a center-of-gravity height GH on the face surface.

5. A golf club head having a hollow structure, the head including:

a volume equal to or more than 100 cc but less than 150 cc;

a center-of-gravity retreating amount GR from a shaft axis equal to or more than 8 mm; and

a center-of-gravity position ratio GH/FH equal to or lower than 0.50, the ratio GH/FH being calculated from a maximum height FH of a face surface and a center-of-gravity height GH on the face surface.

6. The golf club head according to any one of claims 2 to 5, wherein an opening is provided in a crown portion, and a plate member made of a material having a specific strength of 294 N/mm^2 or higher is fixed to the opening.

7. The golf club head according to claim 1, wherein a surface area ratio of the plate member to a portion above a position at half a maximum height of the crown portion is set equal to or higher than 20%.

8. The golf club head according to claim 6, wherein a surface area ratio of the plate member to a portion above a position at half a maximum height of the crown portion is set equal to or higher than 20%.

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