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(54) **GOLF PUTTER**

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(57) **ABSTRACT**

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The present invention improves putting performance of a golf putter by balancing a torsional moment of the putter head.

Golf putter includes a weighting member (W) having a weight of 15 g or more that is positioned at a distance of 1 cm or more away from an upper face of a putter head (H) toward a shaft (S). The weighting member performs a function of shifting a center of gravity of the putter toward a heel thereof and shifting a center of impact of the shaft toward a putter grip (G). Thereby, the weighting member enables a better putting by preventing off-center hitting of a putting face of the putter and preventing off-direction moving of the putter head and grip (G) at the time of putting.

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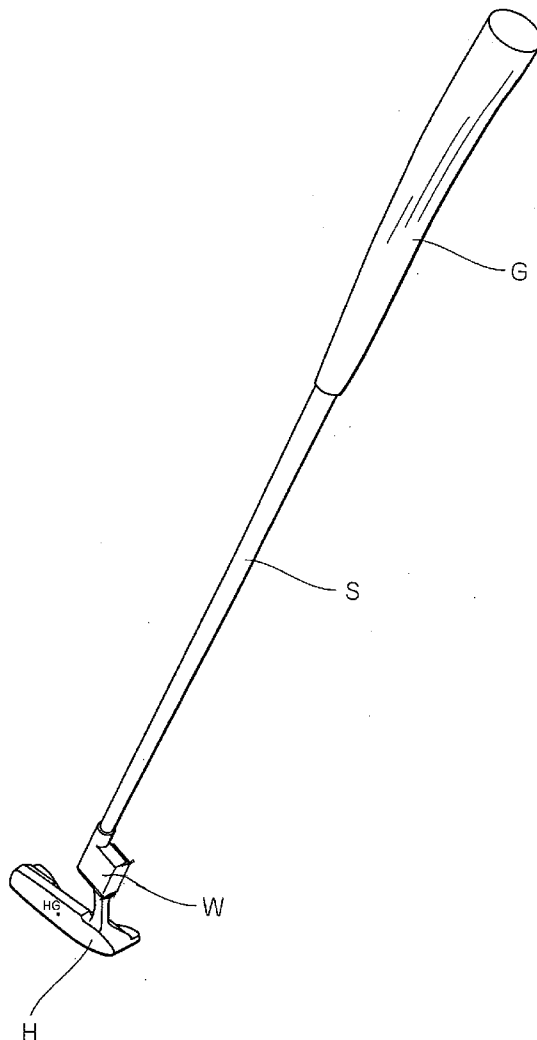


Fig. 1

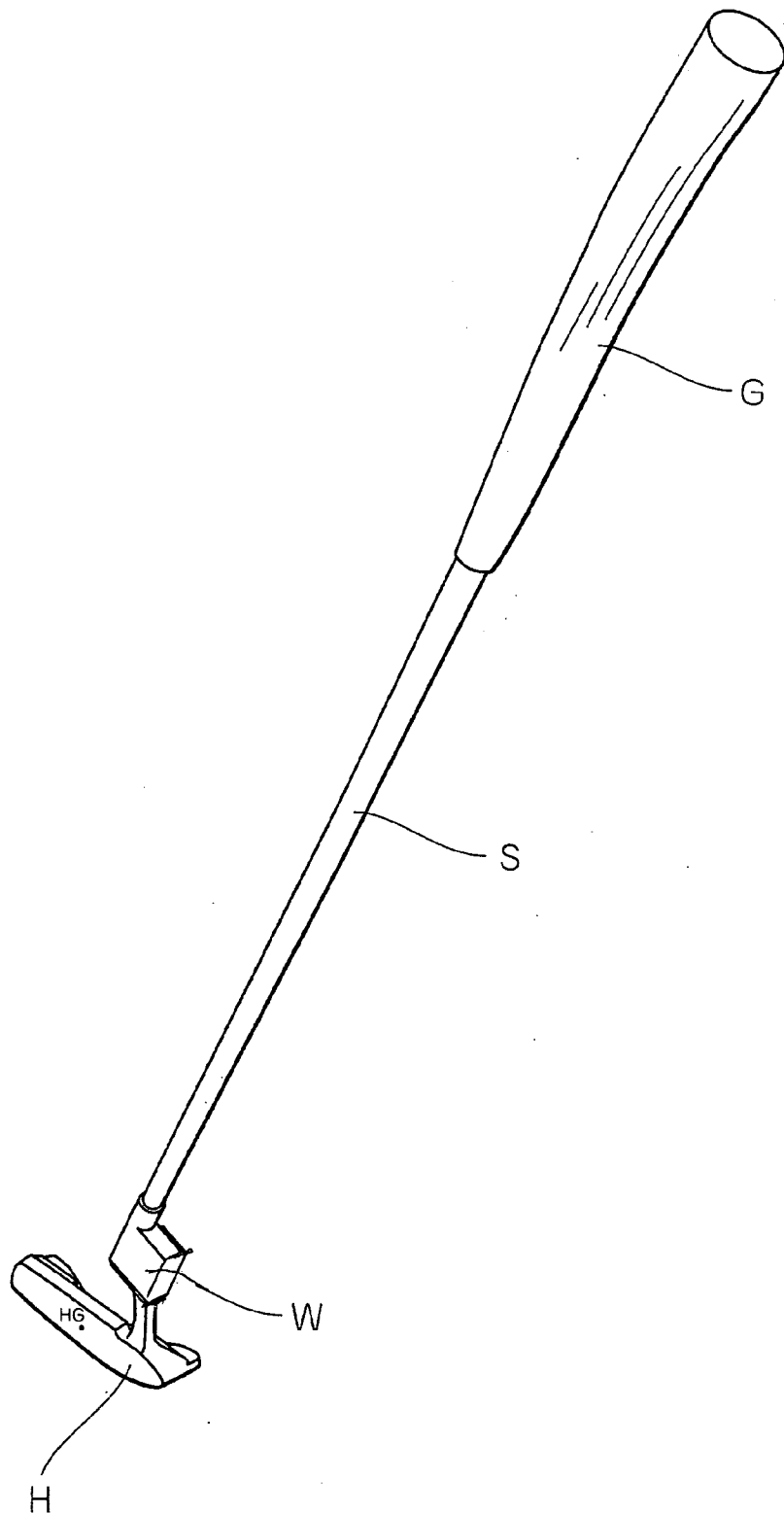


Fig. 2

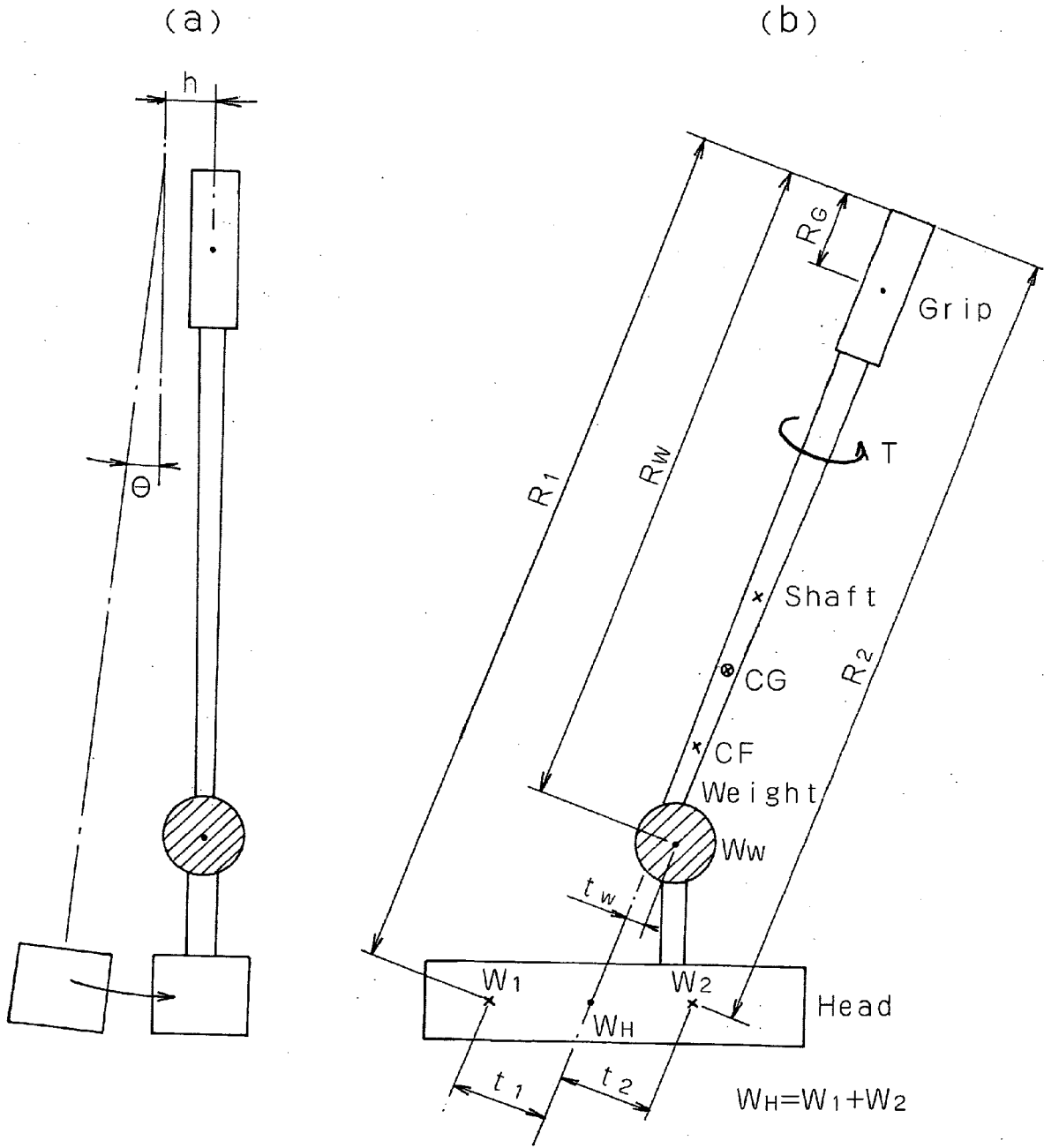


Fig. 3

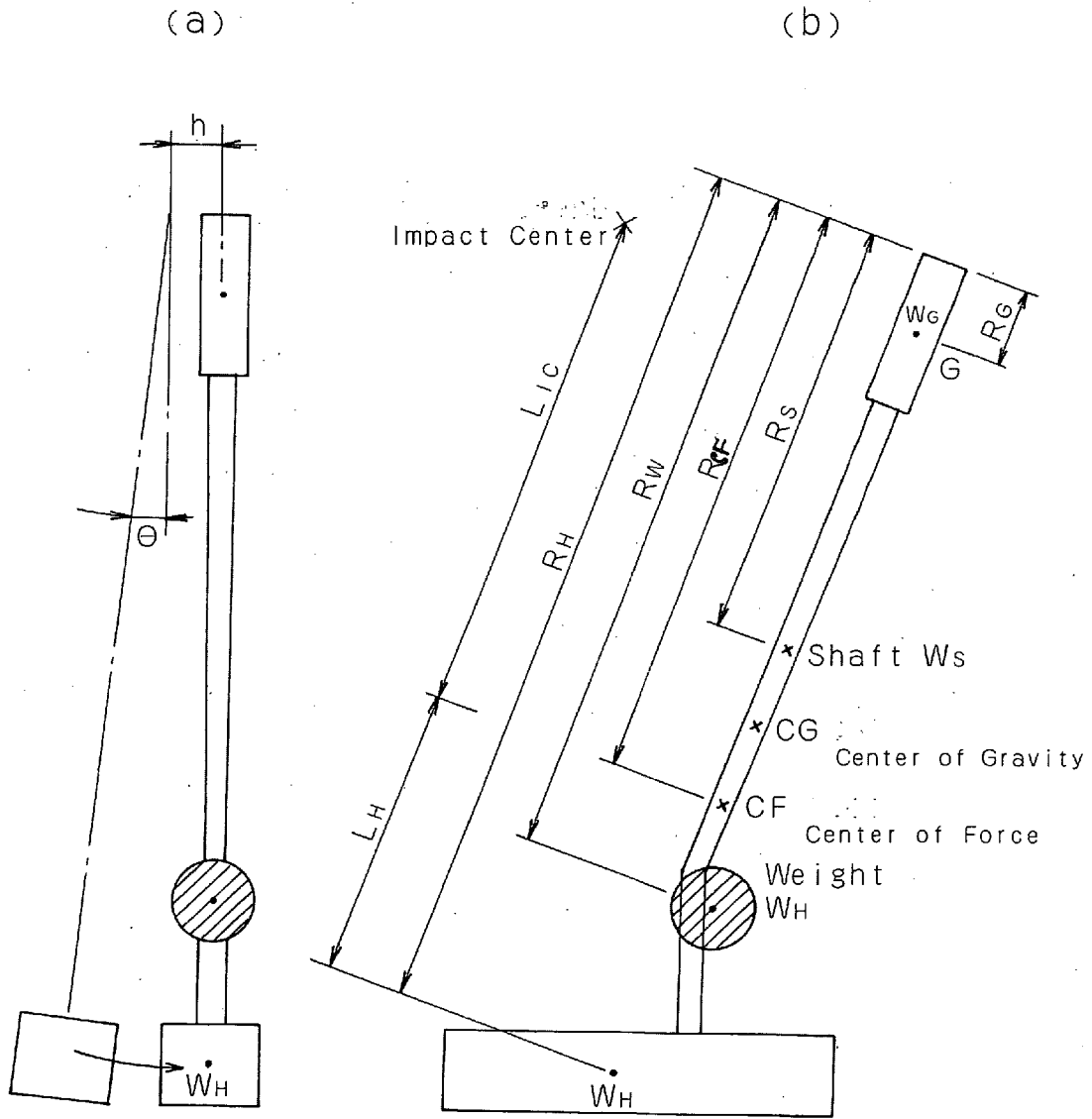


Fig. 4

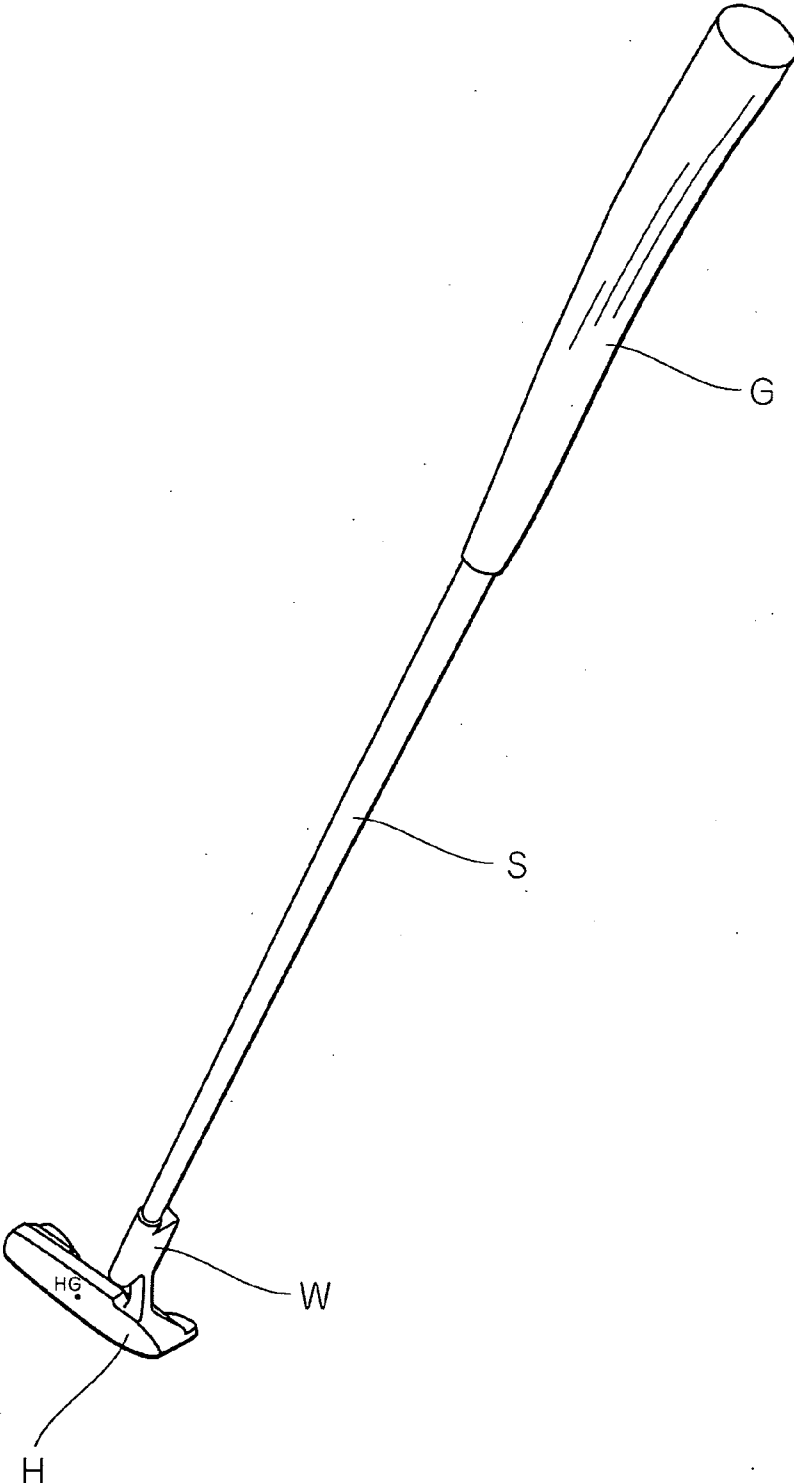
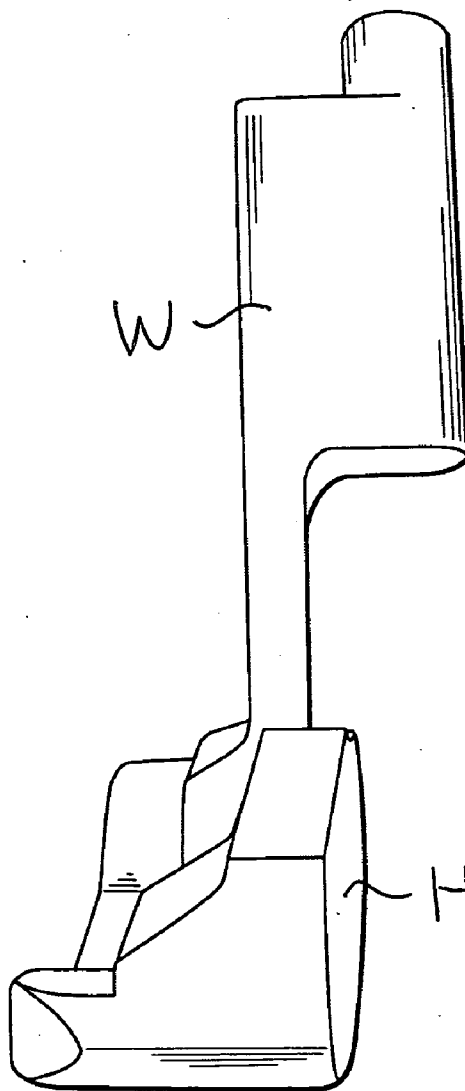


Fig. 5



GOLF PUTTER

FIELD OF THE INVENTION

[0001] The present invention relates to a putter in which a center of impact of a shaft is shifted toward the putter grip and more preferably to a putter in which a torsional moment of a putter head is balanced between the toe side and heel side.

BACKGROUND OF THE INVENTION

[0002] In a golf putter, it is important that a golf ball is hit without off-center hitting of the putter head and off-direction moving of the putter head and the grip at putting the golf ball.

[0003] The putters according to the prior art have been designed to prevent off-center hitting of the putter head, but the designs couldn't have been applied sufficiently to the putters. Furthermore, there was no consideration of off-direction moving of the putter head and the grip in the designs, thus the putters according to the prior art had only an advantage of some static balance of head.

[0004] Japanese Unexamined Patent Publication No. 2000-271253

[0005] Japanese Unexamined Patent Publication No. H10-314351

[0006] Japanese Unexamined Patent Publication No. H08-196667

[0007] Japanese Utility Model Registration No. 3100487

SUMMARY OF THE INVENTION

[0008] The present invention provides a golf putter free from off-center hitting of the putter head and off-direction moving of the putter head and grip at putting a golf ball.

[0009] The present inventors found that a dynamically balanced design is important in comparison with a statically balanced design to solve the problems such as off-center hitting of a putter head, moving the putter grip and twist of the putter head.

[0010] In other words, off-center hitting of a putter head is caused when a torsional moment around a shaft axis centered on an intersection point between the putter head and the shaft axis is not balanced each other. Off-direction moving of the putter head and the grip is caused when a center of impact does not exist in the vicinity of a putter grip position. In consideration of the above-mentioned facts, the present invention has been accomplished.

[0011] According to the first aspect of the present invention, a golf putter includes a weighting member W having a weight of 20 g or more that is positioned at a distance of 1 cm or more away from an upper face of the putter head toward the shaft. The weighting member performs a function of shifting a center of gravity of the putter toward the heel of putter head and shifting a center of impact of the shaft toward the putter grip.

[0012] According to the second aspect of the invention, a golf putter includes a weighting member W that is positioned at a distance of 1 cm or more away from an upper face of the putter head toward the shaft. The weighting member performs a function of balancing a torsional moment around the shaft axis of the toe side from an intersection point between the shaft axis and the putter head and a torsional moment around the shaft axis of the heel side from the intersection point and shifting a center of impact of the shaft toward the putter grip.

[0013] The golf putter according to the first or second aspect of the invention is improved in the following ways. (1) By balancing the torsional moment around the shaft axis of the toe side from the intersection point between the shaft axis

and the putter head and the torsional moment around the shaft axis of the heel side from the intersection point, off-center hitting of the putter head can be suppressed. (2) By shifting the center of impact of the shaft toward the putter grip, and preferably by positioning the center of impact of the shaft at the putter grip or in the vicinity of the putter grip, off-direction moving of the putter head and the grip can be suppressed.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] FIG. 1 is a perspective view illustrating a putter club according to a first embodiment of the invention.

[0015] FIGS. 2 (a) and 2(b) are explanatory views illustrating torsional moment balance of the putter club according to the first embodiment of the invention.

[0016] FIGS. 3 (a) and 3(b) are explanatory views illustrating a center of force of the putter club according to the first embodiment of the invention.

[0017] FIG. 4 is a schematic perspective view illustrating a putter club according to a second embodiment.

[0018] FIG. 5 is a side view illustrating a putter head and a weighting member according to the second embodiment.

[0019] W: WEIGHTING MEMBER

[0020] H: PUTTER HEAD

[0021] G: PUTTER GRIP

[0022] S: SHAFT

THE PREFERRED EMBODIMENTS OF THE INVENTION

[0023] Hereinafter, embodiments of the invention will be described with reference to detailed examples.

Example 1

[0024] As shown in FIG. 1, a leading end of the shaft S is connected to a putter head H at a position on a heel side apart from a center of gravity of the putter head H. The shaft straightly extends from the leading end to a curved point at a height of 3 cm in a vertical direction. The shaft is slightly inclined backward from the curved point. On the trailing end of the shaft, a putter grip G is provided. In the embodiment of the invention, a rectangular weighting member W having a weight of 15 g, preferably a weight of 15 to 100 g is provided at a position above the curved point of the shaft axis.

[0025] With such a configuration, it is possible to shift a center of gravity of the putter head toward a heel side, and balance a torsional moment of a toe side from an intersection point J between the shaft axis and the putter head and a torsional moment of a heel side from the intersection point by a torsional moment of the weighting member so as to offset difference between the torsional moment of the toe side and the torsional moment of the heel side in a preferred case as shown in FIGS. 2(a) and 2(b). Furthermore, in FIG. 2, motion of the putter grip G is represented by $h = -RG\theta$ when $x_G = RG\theta + h = 0$.

[0026] The torsional moment balance (Twist Moment Balance) is represented by

$$T = W1(R1 \cdot \ddot{\theta} + \dot{h})r1 / g - W2(R2 \cdot \ddot{\theta} + \dot{h})r2 / g - Ww(Rw \cdot \ddot{\theta} + \dot{h})rW / g = 0$$

[0027] where

[0028] $\ddot{\theta}$ is rotational angle acceleration, and

[0029] \dot{h} is translational acceleration.

[0030] To satisfy the equation mentioned above, Ww , Rw , and rw are selected.

[0031] Furthermore, as shown in FIGS. 3(a) and 3(b), an inertia moment I is defined as a moment around a center of force CF of the putter, and a distance LH is defined as a distance from the center of force CF of the putter to the putter head. The center of force CF is referred to as a balance point of a moment of a shaft axis when the putter is rotated and is translated by being swung. In consideration of the above-

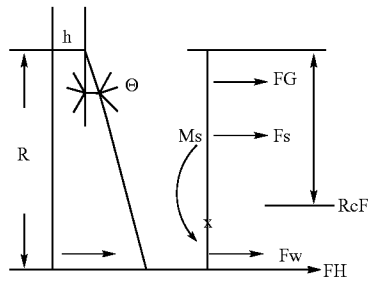
mentioned factors, the weighting member W shifts a center of impact of the putter by a distance of Lsh from the center of force CF of the putter toward the putter grip, preferably, to a position of the putter grip or in the vicinity thereof.

[0032] The shaft may straightly extend without a curved point and be directly attached. In this case, the center of gravity of the putter head is slightly shifted, but the center of impact is shifted to the putter grip position or in the vicinity thereof similarly to the case mentioned above.

[0033] The center of impact is defined as a position X2 in which is free from off-center hitting by balancing a translational acceleration h2 and a rotational acceleration θ2, X2=h2-θ2×Ls=0, where Ls is a distance from the center of force to the putter grip. Furthermore, a distance from the center of force CF of the putter to the center of impact of the putter is represented by Ls=I/W×LH, where I is the inertia moment around the center of force, W is a total weight of the putter, and LH is a distance from the center of force to the putter head.

[0034] In addition, a center of force RCF is represented by the following expression.

R CF = (W G·R G (R G·θ + h) + W S·R S (R S·θ + h) + W W·R W (R W·θ + h) + W H·R H (R H·θ + h)) / (W G·(R G·θ + h) + W S·(R S·θ + h) + W W·(R W·θ + h) + W H·(R H·θ + h))



[0035] A point at which a RCF (center of force) rotation moment Ms is equal to 0 is defined as a center of force.

[0036] The inertia moment I is represented by the following expression.

I = (RH - RCF)² WH / g + (Rw - Rcg)² Ws / g + (RCG - RG)² WG / g

[0037] Furthermore, LH=(RH-RCE), and LIC=Ig/WLh.

Example 2

[0038] FIGS. 4 and 5 show a second embodiment. In the embodiment, the weighting member W is formed to extend in a front and back direction of the putter head H instead of a widthwise direction (a direction connecting the toe and the heel) of the putter head H as shown in the first embodiment.

What is claimed is:

1. A golf putter comprising a weighting member (W) having a weight of 15 g or more that is positioned at a distance of 1 cm or more away from an upper face of a putter head (H) toward a shaft (S) so as to shift a center of gravity of the putter head toward a heel thereof and shift a center of impact of the shaft (S) toward a putter grip (G).

2. A golf putter comprising a weighting member (W) that is positioned at a distance of 1 cm or more away from an upper face of a putter head (H) toward a shaft (S) so as to balance a torsional moment around the shaft axis of a toe side from an intersection point between the shaft (S) axis and the putter head (H) and a torsional moment around the shaft axis of a heel side from the intersection point and shift a center of impact of the shaft (S) toward a putter grip (G).

3. The golf putter according to claim 1 or 2, wherein the center of impact of the shaft (S) is positioned at the putter grip (G) or in the vicinity of the putter grip (G).

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