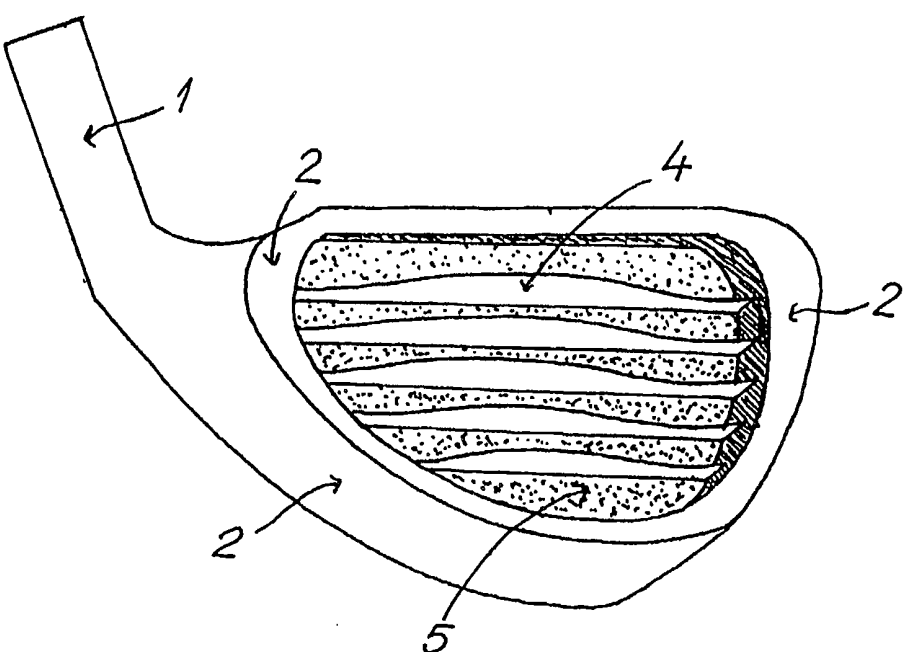




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(54) Title: GOLF CLUB HEAD HAVING IMPACT CONTROL AND FLEX INCREASING MEANS 		
(57) Abstract A golf club head with impact control and flex increasing means, said club comprising an inner end adapted to be fastened to a shaft, an outer end, a front face and a back face, the front face and the back face being situated on opposite sides of a wall (6), the front face being the impact face, adapted to hit a golf ball. The head has a cavity (5) in the back face, surrounded by a perimeter frame (2), whereby mutually parallel ribs (4) on the back face extend along the wall (6) at least between two opposite marginal portions of the frame (2). The ribs (4) have a larger height at their middle portion than at their end portions.		

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GOLF CLUB HEAD HAVING IMPACT CONTROL AND FLEX INCREASING MEANS.**BACKGROUND OF THE INVENTION**

This invention relates to a golf club head with impact control and flex increasing means.

Golf club heads generally comprise an inner end to be fastened to a shaft, an outer end, a front face and a back face, the front face and the back face being situated on opposite sides of a wall. The front face is the impact face, adapted to hit a golf ball.

US Patent 5.595.552 shows a golf club head having a cavity in the back face, surrounded by a perimeter frame. The frame, in particular along the bottom and the outer end of the head, has a relatively large thickness, and is a weighting element. Ribs extend radially from a center of the wall defining the bottom of the cavity to the perimeter frame. The purpose of these ribs is to eliminate undesirable vibrations in the golf club head during impact against a golf ball and to dampen other vibrations. The wall at the bottom of the cavity may also comprise a ring encircling a projection at the center of gravity of the club head body, and these members, together with the ribs, constitute means for tuning the club head and for controlling vibrations, in order to improve the sound and feel of the golf club during impact against a golf ball.

US Patent 5.377.985 shows a golf club head having ribs of constant height on the back face of the wall. Those embodiments which comprise ribs have no continuous frame surrounding the wall on which the ribs are situated, but merely frame portions.

US Patent 5.711.722 shows a golf club head having ribs on the back face of the wall. Each rib is of constant height in its entire length. Merely the relative heights of the ribs vary, in such a manner that ribs near the center of the club head have a larger height than ribs closer to the frame which surrounds the wall on which the ribs are situated. Thus, each rib has a constant stiffness along its length.

SUMMARY OF THE INVENTION.

The club head according to the invention comprises, on a wall defining the bottom of a cavity in the back face of a golf club, a plurality of ribs extending along the wall, mainly parallelly to two opposite margins of the frame of the club head. In addition a plurality of second ribs may extend mainly transversely of the first ribs, for instance mainly perpendicularly to the first ribs. Thus, the golf club head according to the invention may

comprise ribs in one or two directions.

According to the invention a particularly desirable effect is achieved by shaping the ribs in such a manner that the height of each rib from the bottom of the cavity is varying, by being greatest near the lengthwise middle portion of each rib. According to the present invention it has been recognized that improved dampening of vibrations and a better feel can be achieved by providing ribs having such a varying height. The ribs may be compared with a beam being supported at each end and being subjected to a bending load at or near its middle point, in a direction parallel to the main plane of the ribs.

The shape of the ribs gives the club head a larger "sweetspot" compared with prior art club heads, and causes a particular flexing or bending of the club head wall during impact.

The parallel ribs cause particular properties with respect to bending of the wall during impact.

The wall on which the ribs are situated can be made thinner than a corresponding wall without ribs. The combined stiffness of the wall and the ribs should be adapted to the users. Professional golf players may use clubs having a greater stiffness than clubs adapted to amateur players.

The golf club head according to the present invention can be made, for instance cast, from any suitable material used for golf club heads, such as steel or metal alloys.

DESCRIPTION OF THE DRAWINGS.

- Fig. 1 is a perspective view of an exemplary embodiment of a golf club head according to the present invention.
- Fig. 2 shows a section through the golf club head of Fig. 1, taken between two ribs.
- Fig. 3 shows a section through the golf club head of Figs. 1 and 2, perpendicular to the section of Fig. 2.
- Fig. 4 is a perspective view of another exemplary embodiment of a golf club head according to the present invention.
- Fig. 5 shows a section through the golf club head of Fig. 4, taken between two of the first ribs.
- Fig. 6 shows a section through the golf club head of Figs. 4 and 5, perpendicular to

the section of Fig. 5, between two of the second ribs.

DESCRIPTION OF PREFERRED EMBODIMENTS.

The Figs. 1 to 3 show a first embodiment of a golf club head according to the present invention, comprising a socket 1 adapted to be fastened to an end of a (not shown) club shaft, a frame 2 surrounding the main portion of the club head, a front face 3 on one side of a wall 6, a back face 5 on the opposite side of the wall 6, said back face 5 being the bottom of a cavity which is surrounded by the frame 2, and ribs 4 in the cavity. The ribs 4 are parallel to each other and mainly parallel to the top portion of the frame 2 (the upper portion of the frame as shown in Fig. 2). The cross sectional shape of the ribs 4 is shown in Fig. 3 to be triangular, but this shape is not a limitation, as the cross sectional shape may be for instance trapezoidal, rectangular or similar.

A possible longitudinal shape of the ribs 4 is shown in Fig. 2. As shown, the ribs 4 are highest in their middle portion 7 and lowest in portions 8 near their ends. Thus, the bending stiffness of each rib 4 is highest in their middle portion.

The effect of the ribs 4 is that the golf club head according to this embodiment has different properties with respect to stiffness in two directions, the first of which is mainly horizontal at the moment of impact, whereas the second direction is mainly vertical at the moment of impact. The ribs 4 do not substantially influence the stiffness against bending of the wall 6 in such a manner that the wall 6 becomes curved as seen in the section in Fig. 3 (The section shows the wall 6 in a straight condition; i.e. not curved). To the contrary the ribs 4 increase the bending stiffness of the wall 6 in such a manner that the curvature of the wall 6 at the moment of impact will decrease as seen in the section shown in Fig. 2 (The section shows the wall 6 in a straight condition; i.e. not curved). In other words; the wall 6 has a tendency to bend more during impact in the direction in which bending is not impeded by the ribs, compared with the direction in which the ribs impede bending.

The number of ribs 4 is not critical. As little as two ribs 4 may be used, but a rather large number is also possible, for instance eight. The stiffness of the wall 6 can be adjusted by the number of ribs 4 and their thickness or height, or generally by their cross sectional shape, in addition to the thickness of the wall 6 itself.

The Figs. 4 to 6 show another embodiment of a golf club head according to the present

invention, comprising a socket 1 adapted to be fastened to an end of a (not shown) club shaft, a frame 2 surrounding the main portion of the club head, a front face 3 on one side of a wall 6, a back face 5 on the opposite side of the wall 6, said back face 5 being the bottom of a cavity which is surrounded by the frame 2, and first ribs 4A and second ribs 4B in the cavity. The first ribs 4A are parallel to each other and mainly parallel to the top portion or margin of the frame 2 (the upper portion of the frame as shown in Fig. 5), while the second ribs 4B are parallel to each other and mainly perpendicular to the top portion or margin of the frame 2. The cross sectional shape of the ribs 4A and 4B is shown in Figs. 5 and 6 to be trapezoidal, but this shape is not a limitation, as the cross sectional shape may be for instance triangular, rectangular or similar.

A possible longitudinal shape of the ribs 4A and 4B is shown in Figs. 5 and 6. As shown, the ribs 4A and 4B are highest in their middle portion 7 and lowest in portions 8 near their ends. Thus, the bending stiffness of each rib 4A and 4B is highest in the middle portion.

The effect of the ribs 4 is that the golf club head has particular properties with respect to stiffness in two directions, the first of which is mainly horizontal at the moment of impact, whereas the second direction is mainly vertical at the moment of impact. The ribs 4A and 4B substantially influence the stiffness against bending of the wall 6 in two mutually perpendicular directions.

The number of ribs 4A and 4B is not critical. As little as two ribs 4A and 4B may be used, but a rather large number is also possible, for instance eight. The stiffness of the wall 6 can be adjusted by the number of ribs 4A and 4B and their thickness or height, or generally by their cross sectional shape, in addition to the thickness of the wall 6 itself.

CLAIMS.

1. A golf club head with impact control and flex increasing means, said club comprising an inner end adapted to be fastened to a shaft, an outer end, a front face and a back face, the front face and the back face being situated on opposite sides of a wall (6), the front face being the impact face, adapted to hit a golf ball, said head having a cavity (5) in the back face, surrounded by a perimeter frame (2), whereby mutually parallel ribs (4; 4A,4B) on the back face extend along the wall at least between two opposite marginal portions of the frame (2), characterized in that the ribs (4; 4A,4B) have a larger height at their middle portion than at their end portions..
2. A golf club head according to claim 1, characterized in that a first plurality of ribs (4; 4A) extends mainly parallelly to the top and bottom of the club head.
3. A golf club head according to claim 1 or 2, characterized in that a second plurality of ribs (4B) extends mainly parallelly to the inner and outer ends of the club head.
4. A golf club head according to claims 2 and 3, characterized in that the first ribs and the second ribs (4A,4B) are mutually perpendicular.
5. A golf club head according to any of the claims 1 to 4, characterized in that the number of first ribs (4; 4A), and second ribs (4B) when present, is between two and eight.

