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GOLF CLUB HEAD

The present invention relates to a golf club head used for golf.

A golf club of the kind described has been known in which to enhance the bounding properties of a ball when struck, a face which is formed integrally of carbon fibres impregnated with a thermosetting resin or the like or formed principally of a thermosetting resin and applied with another resin as an ornament is integrally incorporated into and secured to the front surface of the head against which a ball is struck. The total weight of the head varies with the number of the club (the greater the number, the greater the total weight of the head) but is decided according to the weight distribution of head-constituting members such as the wood portions of the head, lead material embedded into the wood portions, a sole plate incorporated into the lower surface of the wood portion, the face, screws for fastening the face and sole plate, etc. More specifically, in clubs having high numbers, the total weight of the head is increased by reducing the volume of the wood portion and the like having a small specific gravity and increasing the volume of the lead, the sole plate and the like having a greater specific gravity.

However, the aforementioned conventional wood club head involves the following problems:

(1) Since the face applying an impact to a ball is formed of hard material, the ball is liable to be damaged.

(2) For the same reason as described above, the impact when hitting a ball transmitted to the club hand grip is great, failing to give a better striking feel.

(3) A suitable loft (inclination) is set in the hitting surface including the face and the hitting surface is formed into an outwardly slightly inflated convex surface, and therefore, it is difficult to visually discern the direction of the hitting surface with respect to the hitting direction.

Moreover, as previously mentioned, in a club having a high number, the capacity of the lead embedded into the head is large and therefore, there sometimes occur "cracks" or the like in the wood portion of the head due to the impact during the stricking, temperature, humidity and the like.

It is an object of the present invention to overcome the above-noted problems.

For achieving the above-described object, the present invention provides a golf club head comprising a wood club head having a top surface, a front surface and a recess formed in said front surface, a front face body having a predetermined hardness and specific gravity secured in said recess for contact with a golf ball, said front face body having a front face and a horizontal recess formed in said front face, and a front face insert secured in the horizontal recess of said front face body, said front face insert being made of a metal having a greater specific gravity and lower hardness than the specific gravity and hardness of said front face body, whereby said front face insert prevents damage to a golf ball and minimizes the impact applied to the wood club head when the front face insert strikes a golf ball.

That is, in the manufacture of a club head, face insert moulding materials preliminarily worked into a rod or sheet like configuration are combined

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with a main face body moulding material in a laminated fashion, these materials are heated and pressurized within a mould to provide an integral form, the form is removed from the mould and cut into the required size to obtain a plurality of faces, and the faces are incorporated into a head body.

Since the face insert is soft as compared with the main face body portion, it is not only possible to prevent damage to the ball when struck but also possible to lighten the impact applied to the head to obtain a better handgrip feel. A face insert with an end exposed to the upper surface of the club head as a thin strip substantially parallel to the hitting surface is embedded whereby the exposed portion can be seen linearly from the top of the head, and therefore, it becomes possible to visually discern the angular relationship and positional relationship of the hitting surface with respect to the hitting direction. In addition, the number and size of these face inserts are adjusted to increase the weight thereof whereby the weight distribution of the lead material embedded into the wood portion of the head may be reduced to prevent occurrence of a "crack" in the wood portion.

The method of maufacturing a head comprises combining, in a laminated fashion, face body moulding materials formed of carbon fibres impregnated with a thermosetting resin or the like and main and side face insert moulding materials formed of brass or the like to provide an integral structure, and cutting the integral structure to obtain multiple pieces. This makes it possible to produce a number of faces precisely and effectively.

While the outline of the present invention has been set forth briefly, other objects and new

features of the present invention will be more clearly understood by reading the ensuing detailed description in connection with the emodiments shown in the accompanying drawings. It is to be noted, however, that the drawings merely illustrate one embodiment for explanation of the present invention and do not limit the technical scope of the present invention.

In the drawings:

Fig. 1 is a front view of a wood club head in accordance with one embodiment of the present invention;

Fig. 2 is a plan view of the wood club head;

Fig. 3 is a perspective view of a club face;

Fig. 4 is an explanatory view showing a part of the manufacturing method;

Fig. 5 is a plan view of a part of a side face insert moulding material;

Fig. 6 is a comparative table showing the weight distribution of the wood club head; and

Fig. 7 is a perspective view showing another example of a club face.

One embodiment of the present invention will be described hereinafter with reference to the drawings.

Referring to Figs. 1 and 2, a wood club head generally designated 1 is basically composed of a wood portion 2 made of persimmon or the like and having a lead material (not shonwn) embedded therein as a mass body, a sole plate 3 integrally incorporated into and secured to the lower surface of the wood portion 2 by means of screws (not shown) and made of a metal material such as stainless steel, and

a front face 6 integrally incorporated into and secured to a hitting surface 4 in the front of the wood portion 2 by means of screws 5. The hitting surface 4 is constructed such that the face 6 is incorporated into and secured in a recess formed in the front of the wood portion 2 and thereafter integrally subjected to polishing to finish it into a convex surface, the hitting surface 4 being formed with a number of horizontal grooves 7.

As shown in Fig. 3 on an enlarged scale, the face 6 includes a main face body 8 principally formed of hard carbon fibres impregnated with a thermosetting resin, and a transverse main face insert 9 horizontally embedded in a part of the front surface 8a of the main body 8. One surface of the insert 9 is exposed as a long and narrow front strip. Insert 9 is made of brass (copper, zinc alloy) which is softer than the impregnated carbon and has a high specific gravity. Face 6 also includes two sheet-like side face inserts 10,10 embedded parallel (substantially parallel to the hitting surface 4) to the front surface 8a of the main face body 8 in the upper portion of the latter, an end of each insert being exposed as a thin strip along the upper surface 8b of the main face body (upper surface of the head 1), inserts 10 being made of the same material (brass) as that of main face insert 9. Reference numeral 11 designates a back sole secured to the side of wood portion 2 opposite face 6 in order to balance the weight, back sole 11 being made of brass or the like.

In the manufacture of the face 6, carbon fibres are impregnated or coated with an epoxy resin into which a predetermined hardener is mixed, the impregnated fibres are then heated (at 90°C for

20 minutes), a number of half-dried prepregs are moulded, these prepregs are placed one over another to prepare face body moulding materials 8A, 8B, 8C in three layers having a suitable thickness, and a main face insert moulding material 8A and side face insert moulding materials 10A, 10B having predetermined shape and thickness prepared.

Next, as shown in Fig. 4, these moulding materials 8A, 8B, 8C, 10A,and 10B are put into a mould 12 in a laminated fashion, heated (at 120°C for 60 minutes), and pressurized (at 17 kg/cm^2) to provide an integral structure, after which the latter is removed from the mould 12 and cut into the desired size. The moulding materials 8A, 8B, 8C, 10A and 10B are, before cutting, of a size whereby the components of the face 6 may be obtained in multiple pieces, and for example, the side face insert moulding materials 10A, 10B are moulded in the size of approximately 48 cm in longitudinal dimension and 47.5 cm in laterial dimension.

Fig. 5 shows a plan view of a part of the side face insert moulding material 10A, and the size per face 6 product is shown by the broken lines. The rod-like main face insert moulding material 9A is arranged laterally in the figure, and these materials are prepared by the number in rows thereof arrayed in the vertical direction. The side face insert moulding materials 10A, 10B are preformed with a number of holes 13, 14 for adjusting the weight of the materials 10A, 10B. These holes 13, 14 vary with the number of the wood club with the face 6 incorporated therein, and the holes are sometimes not formed for use in heavy clubs. The face 6 obtained by the above-described steps is incorporated into the recess portion in the front of the wood portion 2 of

the wood club head and finished into a convex surface by polishing, as previously mentioned.

In the face 6, the main face insert 9 wherein the hitting surface 4 (the face 6 surface) is soft functions to minimize the damage given to the ball when struck and relieve the impact applied to the head 1, whereas the side face insert 10 functions to make it easy to visually determine the direction of the hitting surface 4 with respect to the hitting direction because the end of the insert 10 exposed at the upper surface of the head 1 brightly glitters with a luster peculiar to brass, and a player may employ the ends of inserts 10 as two straight lines substantially parallel to the hitting surface 4.

The direction, number and size of the main face insert 9 and the number, thickness and the like of the side face insert 10 are suitably predetermined. The weight of the face 6 is increased or decreased depending on the number and size of both the face inserts 9, 10 and the total weight of the head 1 may be adjusted.

Because of this, Fig. 6 represents one example of the weight distribution of the various elements while comparing it with prior art constructions, and as shown therein, the quantity of lead material embedded into the wood portion 2 may be relatively reduced. In this case, the top side face insert 10 may be adjusted in weight by boring a number of holes 13, 14 having a suitable size as previously mentioned but the main face insert, as shown in Fig.7, can increase and decrease in weight by the size of a portion 9a embedded into the face body 8 to always maintain constant the width (W) of the surface appearing in the form of an exposed strip on the front surface 8a of the body 8. Thereby, both

the face insert 9, 10 can be designed to accommodate the appearance of a club set to enhance the effect in terms of design.

According to the wood club head with the face incorporated therein constructed as described above, by the face inserts embedded in the face, the damage to the ball can be minimized and the hitting feeling can be enhanced. In addition, the direction of the face (hitting surface) is easily determined. Furthermore, the quantity of the lead material embedded into the wood portion can be reduced by the weight of the face insert to prevent a "crack" in the wood portion resulting from the impact, and the change in temperature and humidity during hitting.

The method of manufacturing a golf club head according to the present invention is extremely standardized and simplified to make it possible to easily produce a high-quality head with a face incorporated therein which may achieve the intended object.

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CLAIMS

1. A golf club head comprising a wood club head having a top surface, a front surface and a recess formed in said front surface, a front face body having a predetermined hardness and specific gravity secured in said recess for contact with a golf ball, said front face body having a front face and a horizontal recess formed in said front face, and a front face insert secured in the horizontal recess of said front face body, said front face insert being made of a metal having a greater specific gravity and lower hardness than the specific gravity and hardness of said front face body, whereby said front face insert prevents damage to a golf ball and minimizes the impact applied to the wood club head when the front face insert strikes a golf ball.

2. A golf club head according to Claim 1, wherein said front face body is made of carbon fibres impregnated with a thermosetting resin and said front face insert is made of brass.

3. A golf club head according to Claim 1 or 2 further comprising a front face insert extension formed integrally with said front face insert and embedded in said front face body at a rear portion of said front surface recess.

4. A golf club head according to Claim 1 further comprising at least one insert plate embedded in said front face body, the or each said insert plate being aligned substantially parallel to the front face of said front face body and having an end terminating at the top surface of said wood club head, whereby a golfer may determine the hitting direction visually from the terminating end of at least one said insert plate aligned substantially parallel to the front face of said front face body.

5. A golf club head according to Claim 4, wherein the or each said insert plate is made of a metal having a greater specific gravity and lower hardness than the specific gravity and hardness of said front face body.

6. A golf club head according to Claim 5, wherein the or each said metal insert plate is of brass.

7. A golf club head according to Claim 4, wherein the or each said insert plate includes at least one hole bored therein.

8. A golf club head according to Claim 1 further comprising a pair of mutually parallel insert plates embedded in said front face body, each said insert plate being aligned substantially parallel to the front face of said front face body and having an end terminating at the top surface of said wood club head, whereby a golfer may determine the hitting direction visually from the terminating ends of the insert plates aligned substantially parallel to the front face of the front face body.

9. A golf club head according to Claim 8, wherein said insert plates are made of a metal having a greater specific gravity and lower hardness than the specific gravity and hardness of said front face body.

10. A golf club head according to Claim 9, wherein said metal insert plates are of brass.

11. A golf club head according to Claim 8, wherein each insert plate includes at least one hole bored therein.

12. A golf club head according to Claim 1 constructed, arranged and adapted to operate substantially as herein described, with reference to, and as shown in, the accompanying drawings.