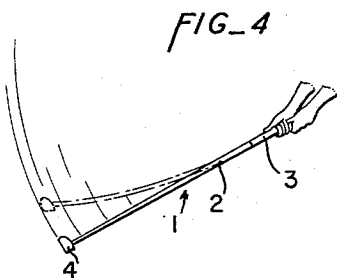
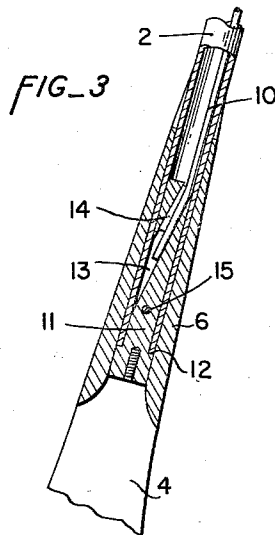
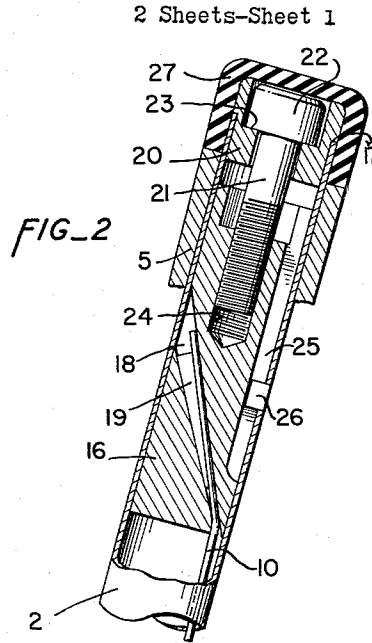
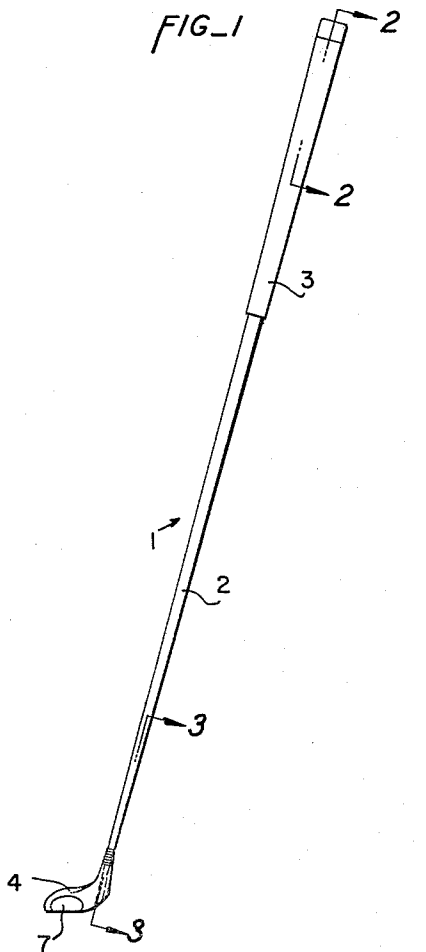


July 18, 1961

W. A. STEWART
PRESTRESSED GOLF CLUB

2,992,828

Filed June 14, 1956



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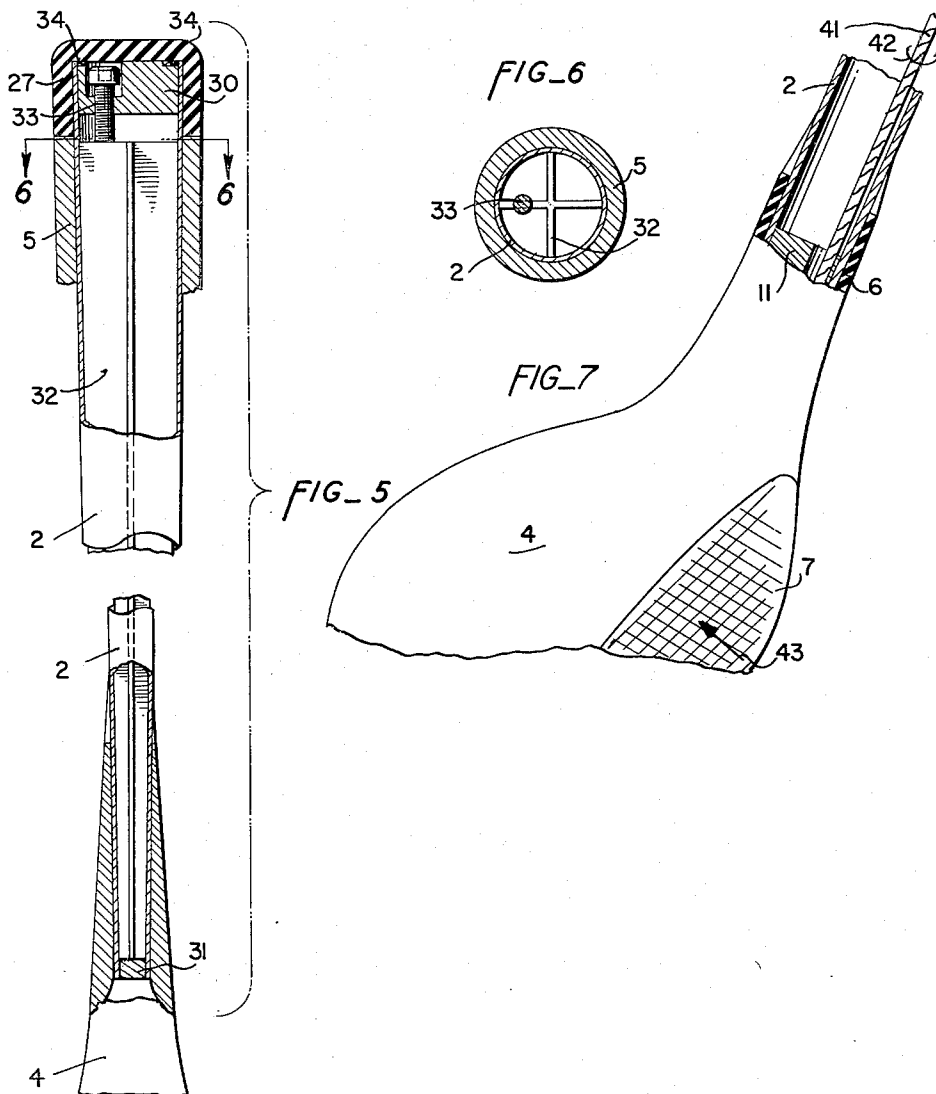
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2 Sheets-Sheet 2



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PRESTRESSED GOLF CLUB

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This invention relates to an implement adapted to be swung for striking an object, as for example a golf club.

In golf clubs and the like it is customary to provide an elongated shaft extending between a grip or handle portion and a ball-striking portion or head of the club. This shaft ordinarily has some measure of flexibility and resilience and the head is usually weighted to some extent.

As a consequence it is well known that on a golfer's downswing toward the ball, the shaft bends and the club head lags behind the position of the hands. This may affect the golfer's stroke in several ways.

In the first place, since the club head is eccentric to the shaft, the ball-striking face of the head tends to "open" or rotate slightly to the right, in the case of a right handed player, increasing the tendency to "slice." Furthermore, when the shaft bends, the full velocity and therefore the full force applied to the handle is not transmitted to the club head because some is lost in bending the shaft.

It is therefore an important object of this invention to provide a golf club which overcomes some of the faults of prior art devices.

Another object of this invention is to provide a prestressed golf club, the shaft of which resists bending during the downswing toward the ball.

It is still another object of this invention to provide an elongated implement adapted to be swung for striking an object which implement resists the tendency to bend just prior to and during such striking action.

It is yet another object of this invention to provide a golf club having means for prestressing the leading edge of the shaft thereof in compression.

A still further object of this invention is the provision of a golf club having means for applying a torsional stress to the head thereof in a direction opposite the direction of the force imparted thereto in striking a ball.

Other objects and advantages will become apparent from the following description taken in connection with the accompanying drawings in which:

FIG. 1 is a side elevational view of the golf club of this invention;

FIGS. 2, 3 are greatly enlarged longitudinally sectional views taken substantially along lines 2-2 and 3-3, respectively, of FIG. 1;

FIG. 4 is a front elevational view on a reduced scale of the golf club being swung toward a ball, showing the difference in operation between a conventional club and the club of this invention;

FIG. 5 is a greatly enlarged, longitudinal sectional view, partly broken away, similar to FIGS. 2, 3, and showing a modified form of the club of this invention;

FIG. 6 is a transverse sectional view taken substantially along lines 6-6 of FIG. 5;

FIG. 7 is an enlarged perspective view of a portion of the shaft and head of the golf club of this invention illustrating another feature thereof.

In detail, referring to FIG. 1, the golf club of this invention, generally designated 1, comprises an elongated, flexible shaft 2 having a grip or handle portion 3 at the upper end thereof and an object striking portion or head 4 secured to the lower end thereof. Shaft 2 may be formed to a hollow, tubular shape of steel or the like and is tapered slightly from handle portion 3 to head 4 so as to be somewhat flexible throughout its length. Handle

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portion 3 may be formed by wrapping the upper end of shaft 2 with a friction material 5 (FIG. 2), such as rubber, leather, or the like, for gripping by the hands.

As in a conventional golf club the lower end of shaft 2 projects into and is secured in a socket 6 (FIG. 3) in head 4. Head 4 is provided with a ball impacting face 7 (FIG. 1) which is eccentric to the longitudinal axis of shaft 2.

In the case of a conventional club, on the downswing toward the ball 8 (FIG. 4) the weight of head 4 causes it to lag behind and shaft 2 bends in a direction opposite the direction of swing as shown in dot-dash lines in FIG. 4. There is also a tendency for head 4 to rotate opposite to the direction of the downswing because of the eccentricity of said head with respect to the shaft, as previously noted. In order to prevent or limit these faults, the golf club of this invention is prestressed so it will remain relatively straight during the downswing as shown in solid lines in FIG. 4. With the club of this invention it is possible to direct the full force applied to the club handle 3 to ball 8 and to more easily control the golf shot.

One means of so prestressing the shaft 2 is shown in FIGS. 2 and 3 as comprising a relatively strong wire 10. A plug 11 is received in the bottom end of shaft 2 and may be provided with shoulders 12 for abutting said lower end of said shaft. Shaft 2 is provided with a tapered hole 13, which receives both the lower end of wire 10, and a tapered pin 14 for securing said wire in said hole. Pin 14 may be provided with a flat on the side adjacent wire 10 and is driven into the hole 13 adjacent the end of said wire to securely lock the same in place with respect to plug 11. A transverse pin 15 may be provided for securing the lower end of shaft 2 to the socket portion 6 of head 4.

A somewhat similar structure is provided at the upper end of shaft 2 (FIG. 2) in which a plug 16 is received. Plug 16 is provided with a tapered hole 18 for receiving the upper end of wire 10 alongside a tapered pin 19 driven into hole 18 to secure wire 10 therein. Pin 19 may also be filed flat on the side adjacent wire 10 so as to have a greater friction surface for engagement therewith.

It will be noted that both hole 13 and hole 18 open to the interior of shaft 2 adjacent the leading edge thereof, which edge is the one most closely adjacent the face 7 of club head 4. Wire 10 is therefore aligned along the leading edge of shaft 2. In order to put wire 10 under tension so as to compress the leading edge of shaft 2, the upper end of said shaft is provided with a plug 20 having shoulders 17 engaging the open upper end of said shaft. Plug 20 is formed with an aperture for receiving a bolt 21 therethrough with the underside of its head 22 in engagement with an upwardly directed recessed surface 23 on plug 20. The lower end of bolt 21 is in threaded engagement with a complementarily threaded hole 24 in the upper end of plug 16.

It will be obvious that upon rotating the bolt 21 in one direction plug 16 acts as a nut and travels upwardly on said bolt. In this manner wire 10 is put under tension since the lower end of said wire is fixed in plug 11. In order to prevent rotation of the plug 16 within shaft 2, said plug is formed with an outwardly opening longitudinally extending slot 25 (FIG. 2) into which a key or locking piece 26, secured to shaft 2, extends. Key 26 may be driven through and received in an aperture in the outer shell of tubular shaft 2.

It will be noted that when bolt 21 is tightened to put wire 10 under tension the leading edge of shaft 2, adjacent face 7 of head 4, will be placed in compression. In effect, tightening wire 10 tends to bow shaft 2 in a direction opposite to the direction the shaft would normally bend on the downswing (FIG. 4). It is to be understood that

wire 10 is not normally tensioned sufficiently to actually bow shaft 2 but just enough to prestress such shaft or apply a bending stress thereto in a direction opposite to the bending stress applied to the shaft in swinging the same toward the ball 8.

Hence, on the downswing of the club of this invention toward the ball, the bending stress imparted thereto by so swinging the club is taken up in opposing the stress maintained by wire 10, rather than in bending the club shaft 2. In this manner shaft 2 remains relatively straight during the downswing, (FIG. 4), and a greater and more easily controlled force is applied to ball 8 with the club of this invention.

It is seen in FIG. 2 that the tension in wire 10 and therefore the amount of prestressing of shaft 2 may be adjusted by adjusting the position of bolt 21. Preferably the upper end of plug 20 and head 22 of bolt 21 may be covered by a rubber cap 27 or the like for creating a finished appearance to the golf club. In order to prevent wire 10 from rattling against shaft 2, said wire may be plastic coated.

FIGS. 5 and 6 illustrate another means by which shaft 2 may be prestressed to provide a similar effect. In this modification, the upper and lower ends of shaft 2 are provided with fixed plugs 31, 31, respectively. Extending longitudinally thereof and received in the hollow center of shaft 2 is an elongated column member 32 which rests at its lower end on plug 31 and may have a cross section in the form of a cross X (FIG. 6) for purposes of stiffening said member. A bolt 33 is threaded through an opening in plug 30 and bears on the upper end of member 32 on the trailing side thereof, that is the side opposite face 7 of the club head 4. The upper end of shaft 2 may be flanged over plug 30 as at 34, or said plug may be welded or otherwise secured in shaft 2 to prevent its being forced outwardly thereof. The upper end of plug 30 may be covered by cap 27 as in the previous example.

The trailing edge of column member 32 may be compressed by screwing the bolt 33 down through plug 30. This action in effect places the trailing side of shaft 2, that is the side opposite face 7 of club head 4, in tension. A bending stress is thereby induced in shaft 2 opposite to the bending stress applied in swinging the club toward the ball.

It has been found that there is also a tendency for the club head 4 (FIGS. 1, 7) to rotate on the downswing in a clockwise direction as viewed from above because of the eccentricity of the head with respect to the shaft 2. In golf parlance this is known as opening the face of the club and may result in a tendency to "slice" the ball or curve the same to the right upon driving. It has also been found that prestressing the club shaft 2 in, for example, the manner shown in FIGS. 2, 3, may result in some instability of the club head 4 with respect to shaft 2. In order to overcome both of these effects, the modification illustrated in FIG. 7 may be applied.

The device of FIG. 7, is constructed substantially in accordance with FIGS. 2, 3, as previously described, except that the tensioning wire 41 of FIG. 7 is twisted throughout its length. Otherwise, wire 41 may be secured in the plug 11 in the lower end of shaft 2 in a manner similar to that shown and described in FIG. 3.

Twisting wire 41 in a clockwise direction looking down the shaft toward head 4, results in the tendency of said wire to unwind in the direction of arrow 42 when said wire is under tension. Arrow 42 denotes the counter-clockwise direction which is opposite to the direction of

the force imparted to head 4 in striking the ball, the latter direction being denoted by arrow 43 (FIG. 7). Hence the twisted wire 41 applies a torsional stress to shaft 2 and through socket 6 to club head 4 which stress is opposite to the torsional stress induced in the club head by striking the ball. Therefore, the previously described ill effects are overcome.

It will be noted that various modifications other than those specifically described herein may come within the scope of the invention, for example, a column member such as 32 may be prebent in a direction opposite the bend of the normal club shown in FIG. 4 before said member is inserted into hollow shaft 2. Assuming a relatively tight fit between the column member and the shaft, the latter will assume a prestressed condition as desired.

Another modification that may be considered comprises an oval or eccentric tubular shaft which is prebent in the direction of normal downswing bend shown in FIG. 4 and then straightened by charging the interior of the shaft with high pressure fluid. The high pressure fluid straightens and therefore prestresses the shaft as desired in much the same manner as a Bourden tube is straightened under internal pressure.

Various other modifications that would occur to a skilled workman in the field may be assumed to come within the scope of the following claims.

I claim:

1. A golf club comprising an elongated flexible shaft having a handle portion at one end, a head at the other end of said shaft having a ball-impacting face eccentric to the longitudinal axis of said shaft, and means for maintaining a static bending stress in said shaft opposite to the stress imparted thereto in swinging said club toward the ball, said means including an elongated member under tension secured at each end to opposite ends of said shaft on the side adjacent said face.

2. A golf club comprising an elongated flexible shaft having a handle portion at one end, a head at the other end of said shaft having a ball-impacting face eccentric to the longitudinal axis of said shaft, and means for maintaining a static bending stress in said shaft opposite to the stress imparted thereto in swinging said club toward the ball, said means including a wire under tension and secured at each end to opposite ends of said shaft on the side adjacent said face, and means for adjusting the tension in said wire.

3. A golf club comprising an elongated flexible shaft having a handle portion at one end, a head at the other end of said shaft having a ball-impacting face eccentric to the longitudinal axis of said shaft, and means for maintaining a static bending stress in said shaft opposite to the stress imparted thereto in swinging said club toward the ball, said means including a wire under tension and secured at each end to opposite ends of said shaft on the side adjacent said face, said wire being twisted in the direction of the force imparted to said head in impacting the ball.

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