United States Patent [19]

Petro

[11] **3,764,137**

[45] **Oct. 9, 1973**

[54] **COMBINATION STIFF AND FLEXIBLE GOLF CLUB SHAFT**

[76] Inventor: **Anthony J. Petro**, P.O. Box 338, Dippel Manor, Pa. 18201

[22] Filed: **June 9, 1972**

[21] Appl. No.: **261,547**

[52] **U.S. Cl.** ..... **273/80 B**

[51] **Int. Cl.** **A63b 53/12**

[58] **Field of Search** ..... 273/77 R, 80 R, 80 B, 273/81 R, 193 R, 194 R, 183 R, 162 R

[56] **References Cited**

UNITED STATES PATENTS

1,589,297	6/1926	Lard	273/80 B UX
2,078,728	4/1937	Lard	273/80 B
2,220,852	11/1940	Scott	273/80 B
2,992,828	7/1961	Stewart	273/80 B

FOREIGN PATENTS OR APPLICATIONS

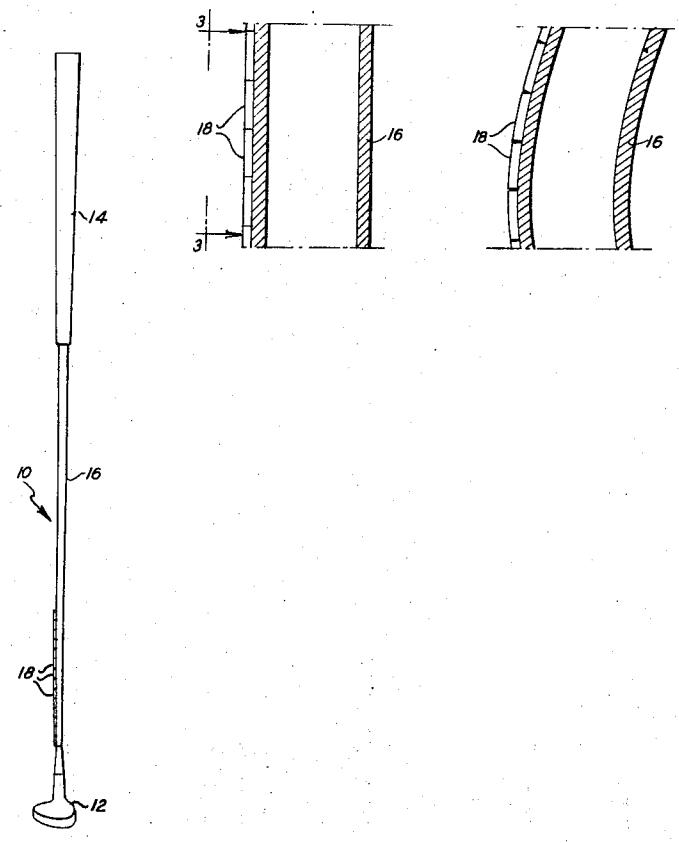
9,625	4/1914	Great Britain	273/80 B

Primary Examiner—Richard C. Pinkham
Assistant Examiner—Richard J. Apley
Attorney—D. Paul Weaver et al.

[57] **ABSTRACT**

A golf club haVing a shaft construction that inhibits rearward flexing of the shaft at the top of the back swing and initial part of the down swing while permitting forward flexing through the ball on the down swing. A rearwardly facing side of a wall of the shaft is formed of a plurality of sections that extend longitudinally along the shaft and that have proximately located facing ends.

11 Claims, 10 Drawing Figures



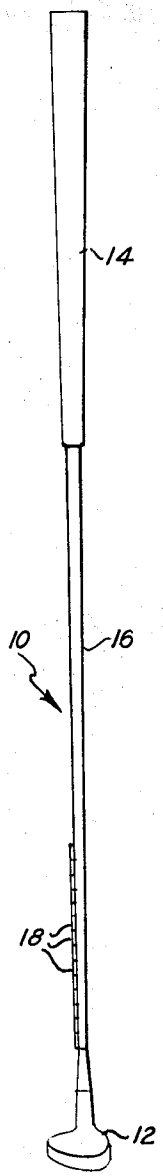


FIG. 1

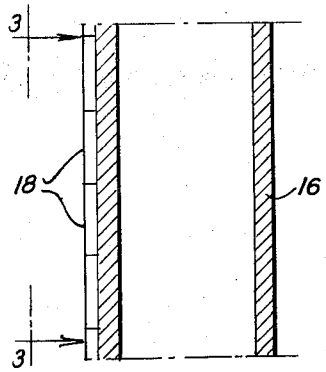


FIG. 2

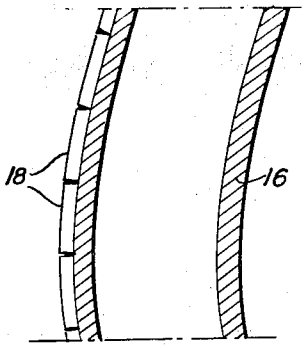


FIG. 5

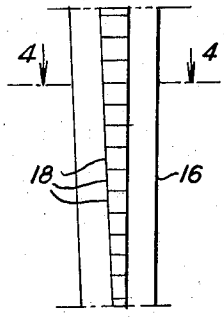


FIG. 3

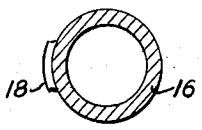


FIG. 4

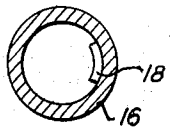


FIG. 6

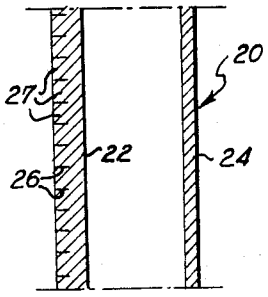


FIG. 7

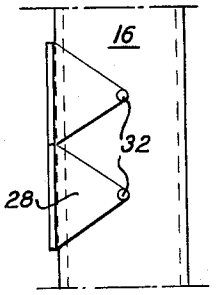


FIG. 8

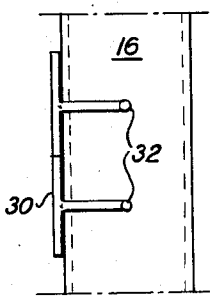


FIG. 9

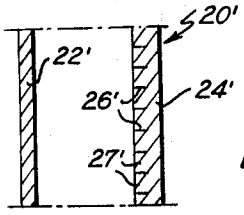


FIG. 7A

COMBINATION STIFF AND FLEXIBLE GOLF CLUB SHAFT

BACKGROUND OF THE INVENTION

When a golfer makes his back swing he produces potential energy. During the down swing this energy becomes kinetic-moving energy-- which is imparted to the ball. The more kinetic energy a golfer can impart to the ball, the farther it will go. The kinetic energy is equal to one-half of mass times velocity squared. In using a golf club to drive a golf ball it is therefore desired to impart as much velocity as is feasible to the club head.

Presently, golf club shafts are designed in different thicknesses to thus vary the shaft stiffness. Golfers select shaft stiffness depending on their strength or ability to swing the club head forwardly against the ball against the resistance presented by the shaft rigidity.

A relatively strong golfer will select a relatively stiff shaft due to his having the strength in his hands to overcome the resistance of the shaft to forward flexing as the club head engages the ball.

A relatively weak golfer must necessarily use a more flexible shaft so that the shaft will flex forwardly during the down swing to increase the head velocity at the moment of impact of the head with the ball. However, with a flexible shaft, there is also a rearward flexing of the shaft at the end of the back swing and at the beginning of the down swing. If a golfer swings too fast with a flexible shaft, there is a large rearward head displacement at the end of the back swing and at the beginning of the down swing so that the club head will be rearwardly displaced by the bending of the shaft during the initial part of the down swing if the speed of the down swing is too great. Therefore, with a flexible shaft, a golfer must swing slower than he is able to in order to minimize rearward head displacement and allow the head to square itself on impact with the ball. As a result, although it is easier to swing a flexible shaft from a strength standpoint, the necessity of a slower swing reduces the velocity of the club head at the moment of impact of the head with the ball to thus reduce the distance the hit ball will travel.

SUMMARY OF THE INVENTION

The object of this invention is to provide a golf club shaft construction which will inhibit rearward displacement of the golf club head by minimizing rearward shaft flexing and will, nevertheless, permit easier forward head movement through the impact zone to provide for the increased velocity of the head at the moment of its impact with the ball. This object is accomplished by providing a plurality of longitudinally aligned sections on a rearwardly facing side of the shaft, the sections having adjoining ends that are proximate to each other. The abutment of the sections at the top of the back swing and initial part of the down swing minimizes shaft flexing rearwardly. Through the impact zone, the proximate section ends move away from each other to permit the shaft to flex forwardly.

While the prior art, as illustrated by U.S. Pat. Nos. 2,078,728 and 2,220,852 show golf club shafts having sections with facing ends extending longitudinally of the shaft, these sections are not so located as to solely face rearwardly of the shaft for the purpose of this invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an elevation of the golf club;

FIG. 2 is a section of a part of the golf club shaft;

FIG. 3 is a view taken on the line 3—3 of FIG. 2;

FIG. 4 is a section taken on the line 4—4 of FIG. 3;

FIG. 5 is a section similar to FIG. 2, but showing the shaft while it is flexing forwardly;

FIG. 6 is a section similar to FIG. 4, but showing the sections as being mounted on the rearwardly facing side of the front portion of a tubular shaft; and

FIGS. 7 through 9 are views of different species of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 1 shows a golf club 10 having a head 12 and a grip 14 that are separated by a resilient shaft 16. The shaft 16, as is conventional, is formed of a hollow tubular member. The front of the shaft is considered to be that side of the shaft that faces toward the golf ball when the golf club is suwng towards the ball and the back of the shaft is considered to be that side of the shaft that faces away from the golf ball when the golf club is swung towards the golf ball.

Referring to FIGS. 2–4, the shaft 16 has a substantially uniform wall thickness. A plurality of metal sections 18 extend longitudinally along the shaft 16 on the rearwardly facing side of the back portion of the shaft 16 and are secured thereto as, for example, by being bonded thereto. In the unflexed condition of the shaft 16, the facing ends of the sections 18 are parallel to each other and are proximately located by either being spaced very close to each other or by abutting each other.

When the shaft tends to bend backwards at the top of the back swing and initial part of the down swing, the rearwardly facing or back side of the shaft exterior periphery is under compression and the adjoining edges of the sections 18 are forced against each other to thus minimize rearward flexing of the shaft 16. However, when the club head is entering the impact zone on the down swing, the rearwardly facing or back side of the shaft goes into tension and the shaft may flex more easily forward, as indicated in FIG. 5, with the adjoining ends of the sections 18 separating from each other.

Since the lower part of the shaft 16 has the maximum flexing during the down swing, and since in certain circumstances, it would be desirable not to add an undue amount of weight to the shaft, the metal sections 18 preferably extend along the lower one-half to one-third of the shaft as indicated in FIG. 1. For the same reason, the sections 18 are preferably made smaller as they extend downwardly of the shaft 16, as shown in FIG. 3.

In view of the foregoing, it can be seen that the shaft 16 with attached sections 18 is rigid or stiff against rearward flexing so that the head 12 will only deflect minimally rearwardly with respect to a plane lengthwise through the grip 14 of the club at the end of the back swing and the beginning of the down swing. However, through the impact zone on the down swing, the head 12 will swing more readily forwardly relative to the plane through the grip 14 to thus increase the velocity of the head at the moment of impact with the ball and thereby impart increased energy to the ball to thus increase the travel distance of the hit ball. Since the head deflects less with respect to the plane through the

grip on rearward shaft flexing, the golfer will not have to deliberately swing slower during the down swing to wait for the head to move from its rearwardly deflected position relative to the grip of the club.

Instead of mounting the sections **18** to the rearwardly facing exterior of the back portion of the shaft **16**, the same effect may be accomplished as shown in FIG. **6** by mounting the sections **18** to the rearwardly facing side of the front portion of the tubular shaft **16** on the inner periphery of the shaft.

FIG. **7** shows a tubular golf club shaft **20** wherein the back shaft portion **22** (the portion facing away from the golf ball during the down swing) is made thicker than the front shaft portion **24**. A series of thin slits **26** are formed in the rearwardly facing side of the back portion **22** that are spaced lengthwise of the shaft and lie in planes that are at right angles to the shaft axis. The slits **26** separate the rearwardly facing side of the shaft back portion into sections **27** that function similarly to the sections **18** in rendering the shaft rigid or stiff during rearward flexing and in rendering the shaft flexible during forward flexing.

As shown in FIG. **7A**, this same concept is attainable wherein the front shaft portion **24'** (the portion facing toward the golf ball during the down swing) of a tubular golf club shaft **20'** is made thicker than the back shaft portion **22'**. A series of thin slits **26'** are formed in the rearwardly facing side of the front portion **24'** that are spaced lengthwise of the shaft and lie in planes that are at right angles to the shaft axis. The slits **26'** separate the rearwardly facing side of the shaft front portion into sections **27'** that function similarly to sections **18** in rendering the shaft rigid or stiff during rearward flexing and in rendering the shaft flexible during forward flexing.

In arrangements discussed above, the shaft is rendered rigid against rearward flexing due to an increase in the compressive strength of a rearwardly facing side of the shaft. While these arrangements may also slightly increase the tensile strength of said shaft side, they do not do so to such an extent as to materially inhibit the flexibility of the shaft through the impact zone. In order to increase the compressive strength of a rearwardly facing side of the shaft without increasing its tensile strength, the arrangements of FIGS. **8** and **9** may be provided. In these Figures, metal sections **28** (FIG. **8**) or **30** (FIG. **9**) extend at least 180° about the periphery of the shaft **16** and are fastened along the axial centerline of the shaft to the shaft periphery by fasteners **32**. As in the arrangement of FIG. **2**, the facing edges of the sections **28** and **30** are either close to eace other or abut each other in the unflexed condition of the shaft **16**.

I claim:

1. In a golf club having a shaft extending between a head and a grip, the head being adapted to hit a golf ball while moving forwardly during a down swing that is imparted to the club while it is being held by the grip after the club has been moved through a back swing; said shaft comprising: a plurality of adjacent sections located exclusively on a rearwardly facing side of said shaft and extending longitudinally of said shaft, an end of each of said sections facing an end of an adjoining section, said plurality of sections constituting means on said shaft whereby said ends are proximate to each other in an unflexed condition of said shaft, forced against each other during a back swing and the initial part of the down swing thereby inhibiting rearward flexing of said shaft, and spaced apart from each other during the latter part of the down swing thereby allowing forward flexing of said shaft

2. The golf ball club of claim **1** wherein the shaft is tubular and wherein the sections are on the rearwardly facing side of the back portion of the shaft.

3. The golf club of claim **1** wherein the shaft is tubular and wherein the sections are on the rewarwardly facing side of the front portion of the shaft.

4. The golf club of caim **1** wherein a plurality of rearwardly facing slits intersecting the shaft periphery are formed in the rearwardly facing side of the shaft to thus form said sections.

5. The golf club of claim **4** wherein the shaft is tubular and wherein the back portion of the shaft, containing the slits, is thicker than the front portion of the shaft.

6. The golf club of claim **4** wherein the shaft is tubular and wherein the front portion of the shaft, containing the slits, is thicker than the back portion of the shaft.

7. The golf club of claim **1** wherein said sections extend at least 180° about the periphery of the shaft and are fastened to the shaft periphery along the longitudinal centerline of the shaft.

8. The golf club of claim **1** wherein said sections extend along the lower part of the shaft.

9. The golf club of claim **1** wherein said sections are made of metal and are bonded on said shaft.

10. The golf club of claim **1** wherein said sections are progressively smaller as they extend downwardly of said shaft.

11. The golf club of claim **10** wherein said sections extend along the lower part of the shaft.

* * * * *