April 11, 1939. G. E. BARNHART 2,153,880

GOLF CLUB

Filed Dec. 28, 1935 2 Sheets-Sheet 1

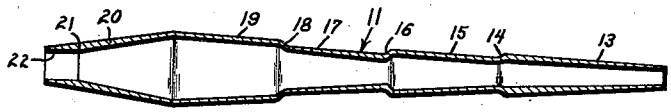

Fig. 1

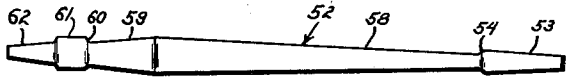

Fig. 2

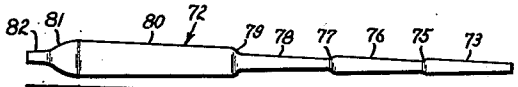

Fig. 3

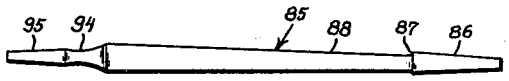

Fig. 4

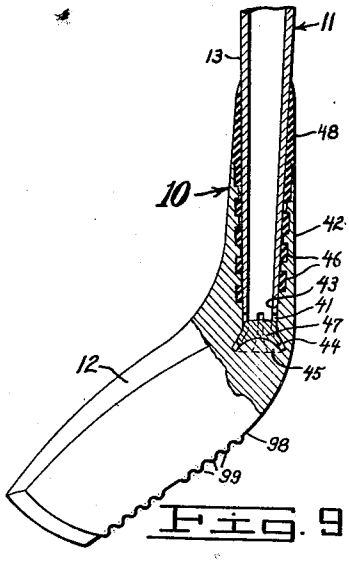

Fig. 9

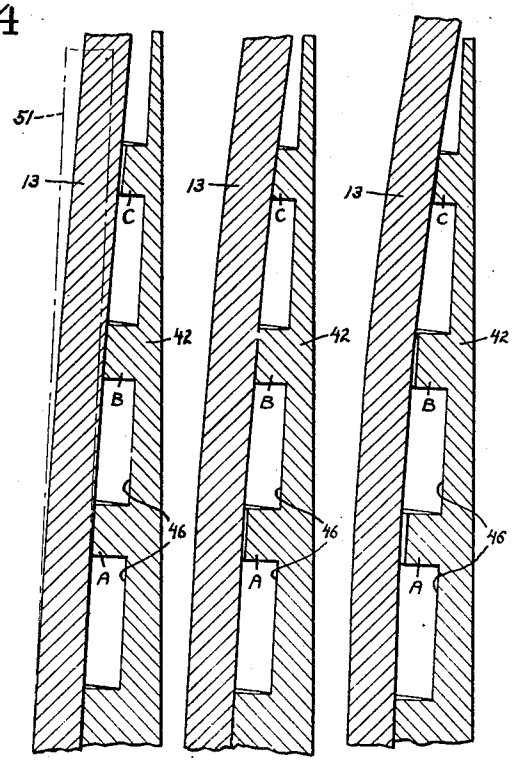

Fig. 10 Fig. 11 Fig. 12

INVENTOR.
GEORGE E. BARNHART

BY

ATTORNEY.

April 11, 1939. G. E. BARNHART 2,153,880

GOLF CLUB

Filed Dec. 28, 1935 2 Sheets-Sheet 2

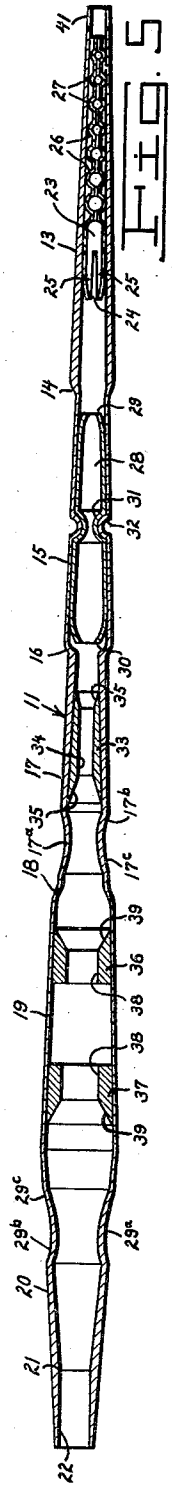

Fig. 5

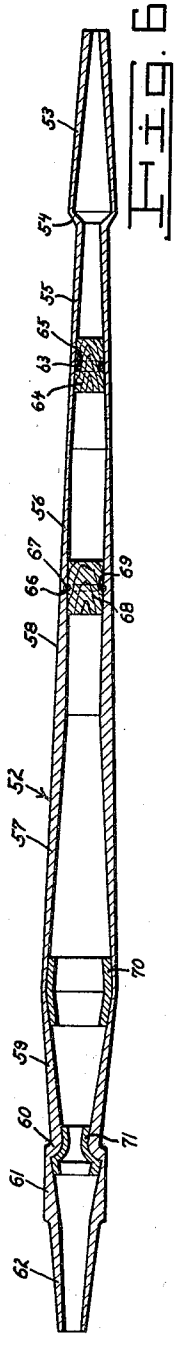

Fig. 6

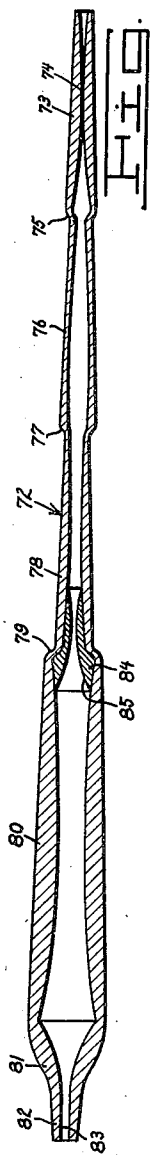

Fig. 7

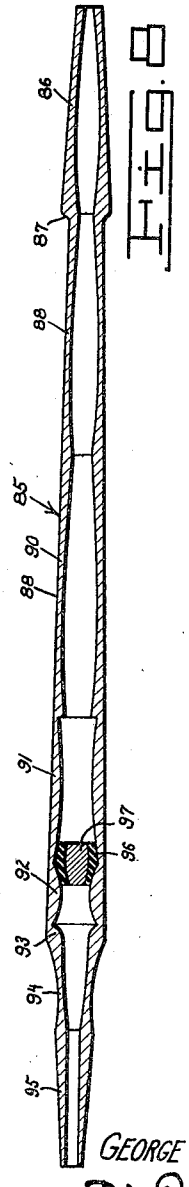

Fig. 8

INVENTOR.
GEORGE E. BARNHART

BY

ATTORNEY.

Patented Apr. 11, 1939 2,153,880

UNITED STATES PATENT OFFICE

2,153,880

GOLF CLUB

George E. Barnhart, Pasadena, Calif.

Application December 28, 1935, Serial No. 56,500

7 Claims. (Cl. 273—80)

This invention relates to structural elements particularly such as are adapted to be used as golf club shafts, fishing rods, telephone poles, etc.

The general object of the invention is to provide an improved structural element such as a golf club shaft.

A more specific object of the invention is to provide a golf club which includes a novel shaft, together with novel means for mounting the shaft in the club head.

An additional object of the invention is to provide a golf club shaft which is made of metal or other suitable material and which is hollow and wherein the wall of the club is of varying cross-section so that vibration in the shaft is reduced to a minimum.

A more specific object of the invention is to provide a golf club shaft having reverse tapered portions and having varying wall thickness with the walls of different thicknesses distributed in a novel manner so that vibration is controlled and the shock to the player is reduced.

Another object of the invention is to provide a golf club shaft which is hollow and made of metal and which has novel inserts therein which reduce vibration and shock to the player's hand.

Another object of the invention is to provide a novel golf club shaft including step portions of varying wall thickness wherein inserts are provided at the juncture of the step portions and elsewhere.

Another object of the invention is to provide novel means for anchoring a shaft in the head of the club.

Another object of the invention is to provide novel means for flexibly supporting a club shaft in the hosel of a club head.

A further object of the invention is to provide a multiple tapering golf shaft.

An additional object of the invention is to provide a novel golf club head.

Other objects and advantages of the invention will be apparent from the following description taken in connection with the accompanying drawings, wherein:

Fig. 1 is a central sectional view through a golf club shaft embodying the features of my invention;

Fig. 2 is a side elevation of the modified form of shaft;

Figs. 3 and 4 are views similar to Fig. 2 and showing further modifications;

Figs. 5, 6, 7 and 8 are central sectional views through golf club shafts which are similar to those shown in Figs. 1, 2, 3, and 4, respectively, and showing the varying wall thickness, the tapering, and the use of inserts in the shaft to reduce vibration;

Fig. 9 is a fragmentary view partly in section showing a golf club head and illustrating my novel means for supporting and securing a shaft in the head;

Figs. 10, 11, and 12 are enlarged, sectional, details with the rubber cushion removed showing the relative position of the hosel and shaft when the latter is flexed.

This invention is a continuation-in-part of my co-pending application, Serial Number 693,-112, filed October 11, 1933.

Referring to the drawings by reference characters I have shown my invention as embodied in a golf club which is indicated generally at 10. As shown the golf club includes a shaft 11, having a head 12 secured thereto.

The shaft as shown in Fig. 1 comprises a hollow, metallic tube which includes a plurality of portions of different configuration. These portions will be described progressively from right to left as shown in Fig. 1.

As shown the shaft includes a portion 13 the wall of which increases in thickness towards the upper end while the outer circumference of the shaft also increases in the same direction. The portion 13 is connected by a short inwardly tapered section 14 to a second portion 15 which has a uniform wall thickness and tapers in the same direction as the portion 13.

The portion 15 is connected by a short inwardly tapered section 16 to a third tapered portion 17 which is of decreasing wall thickness as the diameter increases. The portion 17 has a bead 17^a therein which includes an abrupt step 17^b and a less abrupt step 17^c.

A short outwardly tapering section 18 joins the portion 17 to a fourth tapering portion 19 which is of uniform wall thickness and is directly connected to a portion 20 which tapers in a direction reverse to that of the other portions. The wall of the portion 20 increases in thickness to an intermediate location 21 beyond which it decreases in thickness terminating in a cylindrical inner surface 22.

These portions of gradual and abrupt change of wall thickness and taper combine to form a shaft possessing desirable qualities wherein the varying tapers and wall thicknesses serve to control vibrations and to provide a good whip and weight distribution in the shaft and to reduce the shock to the player.

The playing qualities of the shaft 11 are fur-

ther improved by the use of inserts as shown in Fig. 5. In the section 13 I provide a tapered tubular metallic insert 23 which adjacent one end is slotted as at 24 to provide a plurality of tongues 25 the ends of which are bent inwardly away from the shaft wall. The insert 23 further includes a plurality of grooves which form circumferential corrugations 26 which engage the portion 13 as shown at 27.

Within the portion 15 I show a tapered, tubular, metallic insert 28 having inwardly curved ends 29 and 30 between which the insert 28 includes a small circumferentially inwardly directed bead 31. The metal of the portion 15 of the shaft 11 adjacent this bead 31 is also formed into a small bead 32 which engages the bead 31 and locks the insert 28 in place.

In the portion 17 I provide a tapered, metallic insert 33 which has a cylindrical inner bore 34 to provide a wall thickness increasing in a direction opposite to that of the wall thickness of the portion 17 in which it is positioned. The ends of the insert 33 are bevelled at 35 and form a thin edge where they meet the inside of the section 17.

A pair of tapered, metallic inserts 36 and 37 are provided within the section 19. These inserts each include a cylindrical inner surface 38 which terminates at one end in a bevelled portion 39 and at the other end terminates in a plane end 40. The bevelled portions 39 meet their associated shaft portions in a thin edge.

The portion 20 is shown as provided with a bead 39^a which includes a more abrupt step 39^b and a less abrupt step 39^c.

In order to secure the shaft 11 in the head 12 the end of the portion 13 is slotted as at 41. (See Figs. 5 and 9.) The head 12 includes a hosel 42 which has a bore 43 which is tapered to conform to the taper of the portion 13. At the lower end of this bore I provide an outwardly flared bore 44 at the bottom of which I arrange a rounded protuberance 45. The upper portion of the bore 43 is provided with a square tapered thread shown at 46. The root of this thread 46 is tapered to conform with the taper of the aperture 43 and the top of the thread 46 is relieved in a curve as shown in Figs. 10, 11, and 12.

In assembling the shaft 11 and the head 12 the portion 13 is forced into the aperture 43 until the end engages the protuberance 45 and is expanded thereover into the bore 44 thus securing the shaft in place. A plug 47 made of lead or other suitable material positioned in the end of the shaft engages in the slots 41 and the bore 44 holding the shaft in place. This plug 47 may be introduced into position in a molten condition through the shaft 11 or it may be driven into position.

To resiliently support the shaft 11 in the hosel 42 I provide a supporting member 48 made of rubber or other suitable material. As shown the member 48 includes a cylindrical portion 49 and a helical portion 50 which is positioned in the thread 46. This member 48 is moulded separately and placed in the hosel 42 before the shaft is fixed in place.

Due to the fact that the top of the thread 46 is cut away in a curve the shaft portion 13 as it is flexed engages the thread 46 at changing locations as shown in Figs. 10, 11, and 12. In Fig. 10 I show at 51 a broken line indicating the normal position of the portion 13 with respect to the hosel 42. I further show the portion 13 in a partially flexed condition engaging the first thread A and the second thread B but not touching the third thread C.

In Fig. 11 the portion 13 is shown as flexed still further. It now engages threads B and C and has raised from thread A.

In Fig. 12 the portion 13 is shown as further flexed. In this condition its point of contact has shifted to C and the portion 13 has raised from both thread A and B.

As the shaft returns to its initial position the reverse actions occur.

In Figs. 2 and 6 a modified shaft is indicated generally at 52. The configuration of the shaft 52 will be described progressively from right to left as shown in Figs. 2 and 6.

As shown the lower end of the shaft consists of a portion 53 the wall of which decreases in thickness towards the upper end of the shaft while the outer circumference of the portion 53 increases toward the upper end of the shaft. The portion 53 is connected by a short, inwardly tapered section 54 to a second portion 55. The section 54 has straight sides and meet the portions 53 and 55 in abrupt angles.

The portion 55 decreases in wall thickness and tapers in the same direction as the portion 53. The portion 55 is directly connected to a third portion 56 which in turn is directly connected to a fourth portion 57. The outer surfaces of the portions 55, 56, and 57 combine to form a continuous surface 58 which has a uniform taper. The interior of the portion 56 is cylindrical and the wall of the portion increases in thickness in a direction opposite to that of portions 53 and 55. The wall of the sections 57 decreases in thickness in the same direction as that of portions 53 and 55.

A fifth portion 59 is secured directly to the portion 57. This portion 59 tapers in a direction opposite to the portion 57 and increases in wall thickness in a direction opposite to that of the portion 57.

A short outwardly curved section 60 joins the portion 59 to a portion 61 which has a cylindrical outer surface while the inside is tapered in the same direction as the portion 59. The shaft 53 terminates in a portion 62 secured directly to the portion 61. This portion 62 is tapered and decreases in wall thickness toward the free end thereof.

For reenforcement and to improve the playing qualities of the shaft 52 I provide a plurality of inserts as shown in Fig. 6. Within the portion 55 I solder or otherwise secure a ring 63 of semi-circular cross-section. A balsa wood or other insert 64 is also positioned in the portion 55 and includes a circumferential groove 65 adapted to be engaged by the ring 63 to hold the insert 64 in place.

In the inner wall of the portion 56 I cut a circular groove 66 in which is placed a split ring 67. A balsa wood or other insert 68 is positioned in the portion 56 and includes a circular groove 68 which engages the ring 67 to secure the insert 68 in place.

Adjacent the juncture of the portions 57 and 59 I provide a tubular metallic insert 70 which is tapered toward both ends to engage the insides of the portions 57 and 59.

Inside of the section 60 and adjacent the ends of the portions 59 and 61 I provide a metallic insert 71. The insert 71 is shaped to conform to the curvature of the portion 61 and the adjacent ends of the portions 59 and 61.

A modified form of my invention is shown in

a shaft 72 in Figs. 3 and 7. The shaft 72 includes adjacent its smaller end a portion 73 which increases in outer diameter in a direction away from the small end. The inner surface of the walls of this portion is longitudinally curved inwardly so that the opposite walls meet at a point 74 intermediate the ends thereof.

A short inwardly tapered section 75 joins the portion 73 to a second portion 76 which is tapered in the same direction as the portion 73 but which has the inner surface of the wall thereof curved longitudinally outwardly.

A second short inwardly tapered section 77 connects the portion 76 to a third portion 78 which is tapered in the same direction as the positions 73 and 76 and which includes walls having their inner surface longitudinally curved inwardly.

A short outwardly tapered section 79 connects the portion 78 to a fourth portion 80 which is tapered outwardly as are the other portions 78, 76, and 73. The portion 80 includes walls which have the inner surface thereof longitudinally curved inwardly.

This portion 80 is connected to a portion 81 which tapers abruptly in a direction opposite to the direction of taper of the previously mentioned sections. The wall of this section 81 has its outer surface longitudinally curved outwardly and its inner surface longitudinally curved inwardly.

The portion 81 merges into a section 82, the outer surface of which is tapered in the same direction as the section 81 and which includes a cylindrical bore 82 extending therethrough.

To assist in absorbing vibration and to strengthen the shaft I provide an insert 84 within the section 79 and extending in both directions into the adjacent portions 78 and 80. The insert 84 is in tight engagement with the walls of the shaft and includes an arcuate inner wall 85.

In Figs. 4 and 8 I show a modification in which the vibration damping and weight distribution means is confined largely to the inside of a shaft 85 permitting the appearance of the shaft to remain like that of a plain shaft. The shaft 85 includes a portion 86 adjacent one end thereof the outer surface of which tapers outwardly in a direction away from the end. The interior surface of the wall of this portion 86 is longitudinally outwardly curved.

A short inwardly tapering section 87 connects the portion 86 to an elongated portion 88 which tapers in the same direction as the portion 86. The interior of the portion 88 is formed into two outwardly curved surfaces 89 and 90 and into two inwardly curved surfaces 91 and 92.

A section 93 having an arcuate inner surface connects the portion 88 to a portion 94 which has an inwardly curved outer surface and an outwardly curved inner surface. This portion 94 is connected to a portion 95 which tapers in a direction opposite to the direction of taper of the portions 86 and 88. The interior surface of the portion 95 is cylindrical in shape.

To absorb any vibrations which may have reached a location adjacent the surface 92 I provide a rubber ring 96 which is positioned between the surface 91 and 92. A metal plug 97 is positioned in the ring 96. The plug 97 is preferably made of lead although material such as aluminum may be used.

The various insert members mentioned above may be positioned in the tube prior to the drawing thereof and may have the tube drawn about them.

The tapered inserts 23, 33, 36, and 37 may be loosely secured in the tube during the drawing action and may subsequently be wedged in place. If desired the tube may be heated and shrunk on these inserts. The inserts 64 and 68 are forced into their proper positions.

The head 12 as shown in Fig. 9 includes a sole portion 98 which is formed into a plurality of ribs 99 which extend at right angles to the playing face of the club and assist in keeping the movement of the club head in the proper direction.

Having thus described my invention I claim:

1. In a tubular golf shaft, a hollow body having an insert therein, a plurality of spaced heads and tongues on said insert and arranged within said shaft said tongues extending parallel to the shaft and spaced from the walls of said shaft so that they are free to vibrate.

2. A golf club shaft comprising a tubular, metallic member including a portion tapering in internal diameter and a metallic insert in said portion, said metallic insert comprising a member having spaced outwardly directed portions in continuous circumferential engagement with the interior of said tapering portion.

3. A golf club shaft comprising a tubular, metallic member including a tapering portion, a hollow sleeve in said tapering portion, said sleeve and said tapering portion each having a continuous circumferential bead thereon whereby said portions are united.

4. A golf club shaft comprising a hollow, one piece tubular, metallic member including a plurality of portions connected together, the outer surface of each of said portions being tapered in the same direction, and another portion secured to one of said portions, said other portion having its outer surface tapered in a reverse direction to that of the plurality of portions.

5. In a golf club shaft including a portion of increasing wall thickness in one direction; a tubular vibration absorbing insert of increasing wall thickness in said portion, the increase of said insert wall thickness being in a direction opposite to the direction of wall thickness increase in said portion of said shaft.

6. A golf club shaft comprising a tubular, metallic member including a portion having a tapering wall thickness, an insert in said portion, said insert having bevelled ends and being tapered in wall thickness in a direction reverse to that of said portion.

7. A golf club shaft comprising a tubular, metallic member including a tapered portion, a pair of inserts in said tapered portion, said inserts being hollow and spaced apart and each having at their opposite ends a bevelled portion defining edges engaging said portion.

GEORGE E. BARNHART.