

[54] **GRAPHITE SHAFT CONNECTION TO GOLF CLUB HOSEL**

[76] Inventor: **Stanley C. Thompson**, 7851 Talbert St., Apt. 1, Playa Del Rey, Calif. 90271

[22] Filed: **Dec. 17, 1973**

[21] Appl. No.: **425,335**

[52] U.S. Cl. **273/80.8, 273/80.3, 273/80.4, 273/80.5**

[51] Int. Cl. **A63b 53/02**

[58] Field of Search **273/77 R, 80 R, 80 C, 273/80.2-80.8, 167-175, 80.1, 81.2, 273/67 R, 73 R, 73 J**

[56] **References Cited**

UNITED STATES PATENTS

264,243	9/1882	Chubb.....	273/80 R UX
1,582,836	4/1926	Link.....	273/167 H
1,652,594	12/1927	Walker	273/80.3
1,946,007	2/1934	Watson	273/80.8 X
2,463,053	3/1949	Pritchard	273/80.3 X
2,478,554	8/1949	Yearley.....	273/80.2
2,699,182	1/1955	Baldrige	273/81.2 UX
3,170,691	2/1955	Pritchard	273/80.8 X

3,176,987	4/1965	Johnston.....	273/80.5 X
3,389,046	6/1968	Burress	273/80.8 X
3,516,697	6/1970	Hahn.....	273/80 R X
3,529,826	9/1970	Hulyk	273/80.2 X
3,661,388	5/1972	Leslie.....	273/80.2

FOREIGN PATENTS OR APPLICATIONS

4,326	2/1911	United Kingdom	273/80.8
287,303	3/1928	United Kingdom	273/80.5

OTHER PUBLICATIONS

"Golf World"; Feb. 16, 1973; page 27.

Primary Examiner — Richard J. Apley

Attorney, Agent, or Firm — William W. Haeffliger

[57] ABSTRACT

A tubular graphite containing shaft is connected to a metallic hosel, or the like. The hosel contains a bore, a pin is received in the hosel and shaft bores, and a sleeve fits over the hosel and shaft to bridge the ends thereof and to extend beyond the end of the pin in the graphite shaft bore typically, the pin and sleeve are bond connected to the hosel and shaft, as via a cured, flexible, bonding agent.

6 Claims, 2 Drawing Figures

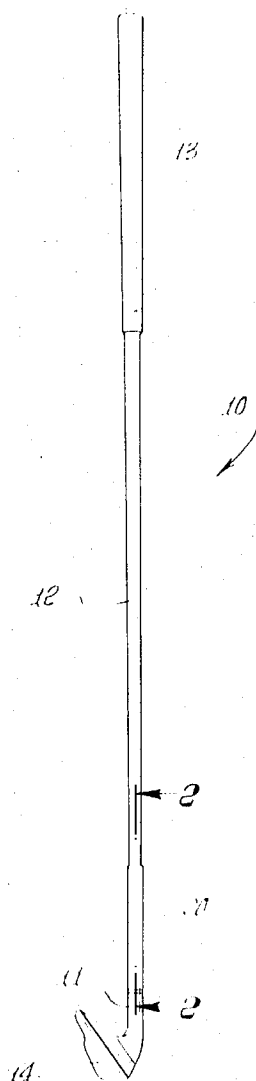


FIG. 1.

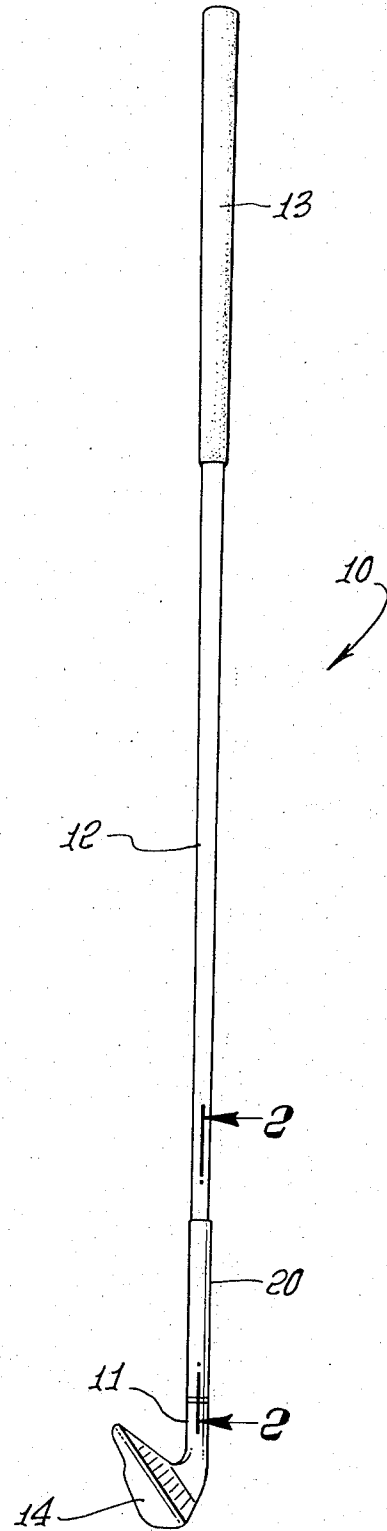
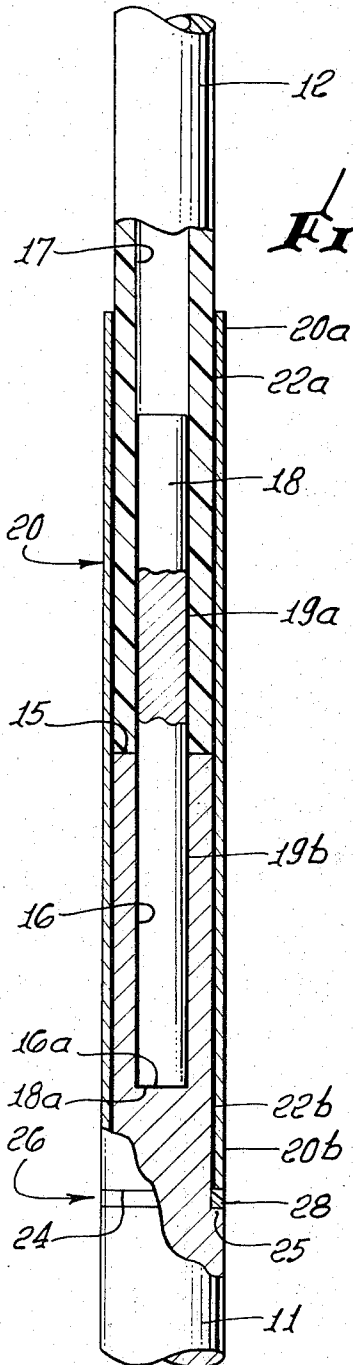


FIG. 2.



GRAPHITE SHAFT CONNECTION TO GOLF CLUB HOSEL

BACKGROUND OF THE INVENTION

This invention relates generally to the connection of implement shafts and heads, where the shafts contain substantial amounts of graphite; more particularly, it concerns the connection of graphite golf club shafts to hosels.

Graphite filament golf club shafts have recently become favored by golfers due to their extremely light weight characteristics; however, the connection of such shafts to hosels presents the problem of avoiding fracture of the shaft during use of the club. In this regard, the radial compressive strength of a tubular graphite shaft is unsatisfactorily low, while bending strength is high. Also, the connection should be such as to present a smooth transition between the hosel and shaft. While attempts have been made to overcome these and other problems, none of which I am aware have incorporated the unusual advantages in structure, mode of operation and results as now afforded by the present invention.

SUMMARY OF THE INVENTION

It is a major object of the invention to provide solutions to the above problems, as well as to provide a connection between an implement head and shaft, as described, and incorporating the unusual advantages as will appear. Basically, and in accordance with the invention, the hosel and light weight, graphite containing shaft are formed to extend in end-to-end relation, with a pin received in aligned bores in these elements and connected to the latter; and a sleeve is fitted over the hosel and shaft in bridging relation to the ends thereof, the sleeve connected with these elements and extending endwise beyond the end of the pin received in the shaft bore. As a result, the shaft is strengthened at its locus of connection to the hosel, and in such manner that despite its relatively low radial compressive strength the shaft will not fracture at such locus during usage. Also, the sleeve and hosel extents adjacent the sleeve end provide an exteriorly smooth transition proximate their juncture, as will appear.

Additional objects include the bonding of the pin to the shaft and hosel bores, and preferably employing a flexible bonding agent; and the bonding of the sleeve to the shaft and hosel employing a flexible bonding agent.

These and other objects and advantages of the invention, as well as the details of an illustrative embodiment, will be more fully understood from the following description and drawings, in which:

DRAWING DESCRIPTION

FIG. 1 is an elevation showing a golf club incorporating the invention;

FIG. 2 is a section on lines 2—2 of FIG. 1.

DETAILED DESCRIPTION

An implement, as for example a golf club, incorporating the invention includes a hosel or the like and a tubular shaft to be connected with the hosel, the shaft containing graphite fibers and resin. Other representative implements include tennis rackets, badminton rackets, etc. The representative golf club 10 shown in the drawings includes a steel hosel 11 and a graphite filament shaft 12, which is normally tubular. Merely as

illustrative, the club also includes a handle 13 and a club head 14.

Extending the description to FIG. 2, the hosel and shaft extend in end-to-end relation at interface 15, the hosel having an end bore 16 in alignment with shaft bore 17. The diameters of both bores are preferably equal.

An elongated pin 18 is received in the two bores, the pin preferably consisting of a lightweight metal (of specific gravity less than steel), as for example high tensile strength aluminum or aluminum alloy. Note that about one-half the pin length extends in bore 16 and about one-half the pin length extends in bore 17, for best results; further, the pin end 18a engages the inner end wall 16a of bore 16. Note that the pin is connected with the hosel and shaft, and preferably a bonding agent indicated at 19a and 19b accomplishes such connection along the pin length. More specifically, the bonding agent substantially fills the slight annular or near annular clearances between the pin and the walls of bore 16 and 17, the agent preferably consisting of a flexible epoxide cured in situ. One such epoxide is known in the trade as high strength, flexible 3M structural adhesive mix: three parts No. 2216A mixed with two parts No. 2216B, products of the 3M Company.

As a result, the bonding agent will flex with the shaft and hosel during use of the club, without deterioration, and cushions the force transmission between the hosel and shaft.

Finally, a relatively thin-walled metal sleeve 20 is fitted over the hosel and shaft in bridging relation with the ends thereof at interface 15, the sleeve extending endwise beyond opposite ends of the pin as indicated by sleeve end extents 20a and 20b. The latter may each be about ½ inch long, for best results. As a result, bending stress concentrations during use of the club are minimized, and radial deflections of the graphite shaft, particularly proximate the end of the pin and the end of the shaft, are contained by the sleeve. A flexible bonding agent 22a and 22b, cured in situ in the clearance between the pin and the shaft and hosel peripheries, serves to interconnect these elements, and to accommodate their flexing without deterioration of the bond. Also, the sleeve end 24 terminates proximate hosel step shoulder 25, and the sleeve and hosel provide an exteriorly smooth transition at 26; for example these elements may have the same external diameter. Sleeve 20 may consist of high carbon chrome plated steel.

If desired, an identifying plastic (or other material) ring 28 may be inserted between sleeve end 24 and hosel step shoulder 25, as shown.

I claim:

1. In a sports implement having a shaft, hosel, and means connecting said shaft to said hosel, comprising: said shaft being tubular and made from graphite fibers and resin, said hosel extending from the head of the sports implement for a predetermined first distance and a predetermined first outer diameter, a hosel step shoulder formed at the end of said predetermined first distance, said hosel extending from said shoulder a second predetermined distance and a second predetermined outer diameter less than said first outer diameter and terminating in an end surface, a bore formed in said second predetermined distance hosel portion and extending from said end surface inwardly thereinto to a predetermined distance less than said second prede-

3

4

terminated distance, said connecting means including a uniform diameter solid pin closely received in and adhesively bonded to the hosel bore wall, said pin occupying substantially the entire length of said bore and extending outwardly beyond said end surface a distance approximately equal to said predetermined distance, said shaft being positioned over and adhesively bonded to substantially the entire exposed pin portion and in end-to-end relation to said hosel at said end surface, the outer surface of said shaft being aligned with said second predetermined outer diameter hosel portion, said connecting means further including a sleeve telescopically received over and adhesively bonded to the shaft and second predetermined distance hosel portion, said sleeve extending endwise beyond both ends of said pin, the hosel end of said sleeve terminating adjacent said hosel step shoulder, the outer surface of said sleeve being aligned with said first predetermined outer diam-

eter hosel portion.

2. The combination of claim 1 wherein the adhesive bond material consists of a cured, flexible epoxide.

3. The combination of claim 1 wherein said pin consists of a metal having a specific gravity substantially less than that of steel.

4. The combination of claim 3 wherein said pin metal consists of aluminum.

5. The combination of claim 1 wherein the sports implement comprises a golf club.

6. The combination of claim 1 including an identifying ring inserted between the hosel end of said sleeve and said hosel step shoulder, the outer surface of said ring being aligned with said outer surface of said sleeve and said first predetermined outer diameter hosel portion.

* * * * *

20

25

30

35

40

45

50

55

60

65