UNITED STATES PATENT OFFICE

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SHAFT FOR GOLF CLUBS

Application filed November 30, 1925, Serial No. 322,846, and in Great Britain October 23, 1925.

This invention relates to shafts for golf clubs.

In connection with golf clubs it is desirable that the shaft be so made that it can be readily attached to and detached from the head in order that various sizes and weights of shaft can be made, and a shaft of a suitable size and weight can be selected and secured to a selected head, and the club tried by the user, and if found unsuitable can be readily removed and replaced by another shaft, and so on, until a suitable shaft is selected.

The primary object of this invention is to provide a shaft for the purpose specified above, and which will be simple and cheap to produce.

A further object is to produce a shaft of which the number of parts are reduced to an absolute minimum and thereby the cost of production is minimized and the strength and accuracy of the club increased.

In the drawings:

Fig. 1 illustrates a tubular metallic shaft as applied to a golf club head, the head being shown partly in section and being partly broken away, while the middle of the shaft is also broken away.

Fig. 2 illustrates a modification of Fig. 1.

Fig. 3 illustrates a wooden shaft applied to a golf club head, the head being partly in section to show the shaft clearly, and the head and the shaft partly broken away.

Fig. 4 illustrates a modification of Fig. 3.

Figs. 5, 6, 7 and 8 illustrate the different stages in one method of manufacturing the shaft, Fig. 5 illustrating part of the tapered tube from which the shaft is formed, Fig. 6 illustrating the tap and part of the shaft, Fig. 7 illustrating the bending operation and Fig. 8 showing a part of the finished shaft.

In Fig. 1 of the drawings, the numeral 1 denotes a tubular metallic shaft preferably of relatively thin highly tempered steel, tapered gradually from one end 2, at which the grip (not shown) is fixed, to its other, and smaller, end the taper being slight for example, about .007. This smaller end has a tapered part 3 and a screw threaded part 4. The head 5 is provided with a socket portion 6 which is internally tapered at 7 to correspond with the tapered part 3 on the shaft and is provided with a screw threaded part 8. The screw threaded parts serve to draw the tapered parts 3 and 7 together to give a frictional, or wedging, inter-engagement which serves to hold the parts together. The screw threaded part may be made in the manner to be hereinafter described.

The screw threaded parts are preferably left handed for a right hand club and right handed for a left hand club so that the act of hitting the ball tends to tighten the head on the shaft.

In the modification shown in Fig. 2, the shaft is the same as that in Fig. 1 except that the part 3 of the shaft is only tapered to the dotted line marked 1—1 and, below this, is a cylindrical, or parallel sided, part 12. A screw threaded part 4 is provided at the end of the shaft as before. By providing this cylindrical part the shaft will have a travel substantially equal to the length of the cylindrical part to compensate for any inequalities introduced during manufacture and will thus ensure proper frictional, or wedging, inter-engagement of the tapered parts.

In Fig. 3 the tapered wooden shaft 15 is provided with a tapered metallic part 16 constituting a shoe and this shoe has, at its smaller end, a screw threaded part 17 which may be made by bending the metal in a manner to be hereinafter described. This shoe is fixed to the shaft by a cross pin 18 or by an adhesive or by other means, and by expanding the wood into the convolution of the screw threaded part by means of a tapered screw 19.

Fig. 4 illustrates a modification of the wooden shaft construction of Fig. 3 in which all the parts are the same as those in Fig. 3 and are designated by the same reference...
numerals, except for the fact that the shoe and the shaft are tapered up to the dotted line marked II—II and the part between this line and the screwed part is made cylindrical. This cylindrical part is marked 20 and is provided for the same purpose as the cylindrical part 12 in Fig. 2. As hereinbefore stated, the screw threaded part on the shaft is made by a bending action. This is necessary because the metal must be thin for lightness and yet stiff for screwing securely into the head and also for giving the necessary rigidity in the use of the club. In addition, on a wooden shaft, the metal part must be thin in order that the size of the shaft may be sufficient to give the necessary strength and the socket part of the head made as small as possible to keep down its weight. With thin metal cutting or reducing thereof weakens the same and therefore this must be avoided and in order to do so the screw is made by bending the metal into convolutions without cutting or otherwise reducing its thickness. This may be attained by a method, the stages whereof are illustrated in Figs. 5 to 8 of the accompanying drawings which latter illustrate, by way of example, the method when applied to tubular metal shafts. Under this method the tapered tubular metallic shaft 26 as partly shown in Fig. 5 is taken into the small end 26 of this shaft is introduced, as indicated in Fig. 6, a tap in the form of a spigot 26' having a rounded helical groove 27 on its periphery and having a stock 28 at one end. The stock 28 projects from one end and can be mounted in a lathe 31 or other machine for rotating the tap and shaft, and, while rotating, the metal is acted on, as shown in Fig. 7, by a tool 29 having a round nose 30. This tool acts to force the metal by a bending action into the rounded helical groove of the tap so that it conforms thereto. When the tap and shaft are mounted in a lathe, the tool can be carried by the lathe slide rest. After the screw has been formed, the tap and shaft are removed from the lathe or other machine and then the tap is removed from the shaft by turning it relatively to the shaft. The product obtained is a shaft with a screwed end part, as shown in Fig. 8, in which the screw is formed merely by bending the metal without reducing its thickness by cutting action or by otherwise weakening it. The socket 6 of the head is screw cut, in known manner, to conform to the thread on the shaft.

I claim:

1. A tapering shaft of relatively thin high-ly tempered steel, for golf clubs, said shaft having a slight taper towards its lower end and a portion of the metal thereof at its lower end being itself bent into helical screw formation of uniform diameter substantially the same as the smallest diameter of the tapering part of the shaft, a plain cylindrical clearance portion on the shaft separating the screw threaded and tapering parts and of diameter not greater than the smallest diameter of the tapering part, the metal of the shaft being of uniform thickness throughout the length of the tapering, screw threaded and cylindrical clearance parts.

2. A wood shaft for golf clubs having a tapering metallic shoe at the lower end there-of, said shoe having a slight taper towards its lower end, and a portion of the metal thereof at its lower end being itself bent into helical screw formation without thickening reinforcing or cutting the metal or reducing its thickness, the diameter of said screw threaded part being uniform throughout its length and substantially the same as the smallest diameter of the tapering part of the shoe, the shoe being formed completely in one integral piece being hollow throughout its length, and the metal thereof being of uniform thickness throughout the length of the tapering and screw threaded parts, the wood shaft fitting snugly in the shoe for the full depth thereof, with portions extending into and filling the threads.

3. A wood shaft for golf clubs having a tapering metallic shoe at the lower end there-of, said shoe having a slight taper towards its lower end, and a portion of the metal thereof at its lower end being itself bent into helical screw formation without thickening reinforcing or cutting the metal or reducing its thickness, the diameter of said screw threaded part being uniform throughout its length and substantially the same as the smallest diameter of the tapering part of the shoe, the shoe being formed completely in one integral piece being hollow throughout its length, and the metal thereof being of uniform thickness throughout the length of the tapering and screw threaded parts, and means for expanding the wood of the shaft into the convolutions of the screwed part of the shoe.

4. In a golf club, a head having a socket formed by a tapered portion and an internally threaded portion, a shaft tapered towards its lower end and terminating in a cylindrical shank extending from the lower end of its tapered portion and formed with threads leading from its lower end and terminating in spaced relation to the upper end of the shank, the threads on said shank engaging the threads in said socket, the threaded portion of the shank being of greater diameter than the unthreaded upper portion thereof, and the threads in said socket terminating at the lower end of the tapered portion of said socket and having a diameter at least as great as the diameter of the lower end of the tapered portion of said socket.

5. In a golf club, a head having a tapered socket, a shaft for the golf club, the lower end of which comprises a tapered tubular
metallic shell said shell having a cylindrical portion and a portion at its lower end bent upon itself into helical screw formation, the diameter of the said helical screw portion being uniform throughout its length and of larger diameter than the diameter of said cylindrical portion and of substantially the same diameter as the smallest diameter of the tapered socket in said head, said tapered metallic shell forming an intimate connection with the said tapered socket when said metallic shell is screwed into said socket.

In testimony whereof I affix my signature.

WILLIAM JAMES HADDEN.