July 22, 1941. N. P. VICKERY 2,250,441

GOLF CLUB

Original Filed Oct. 17, 1933 2 Sheets-Sheet 1

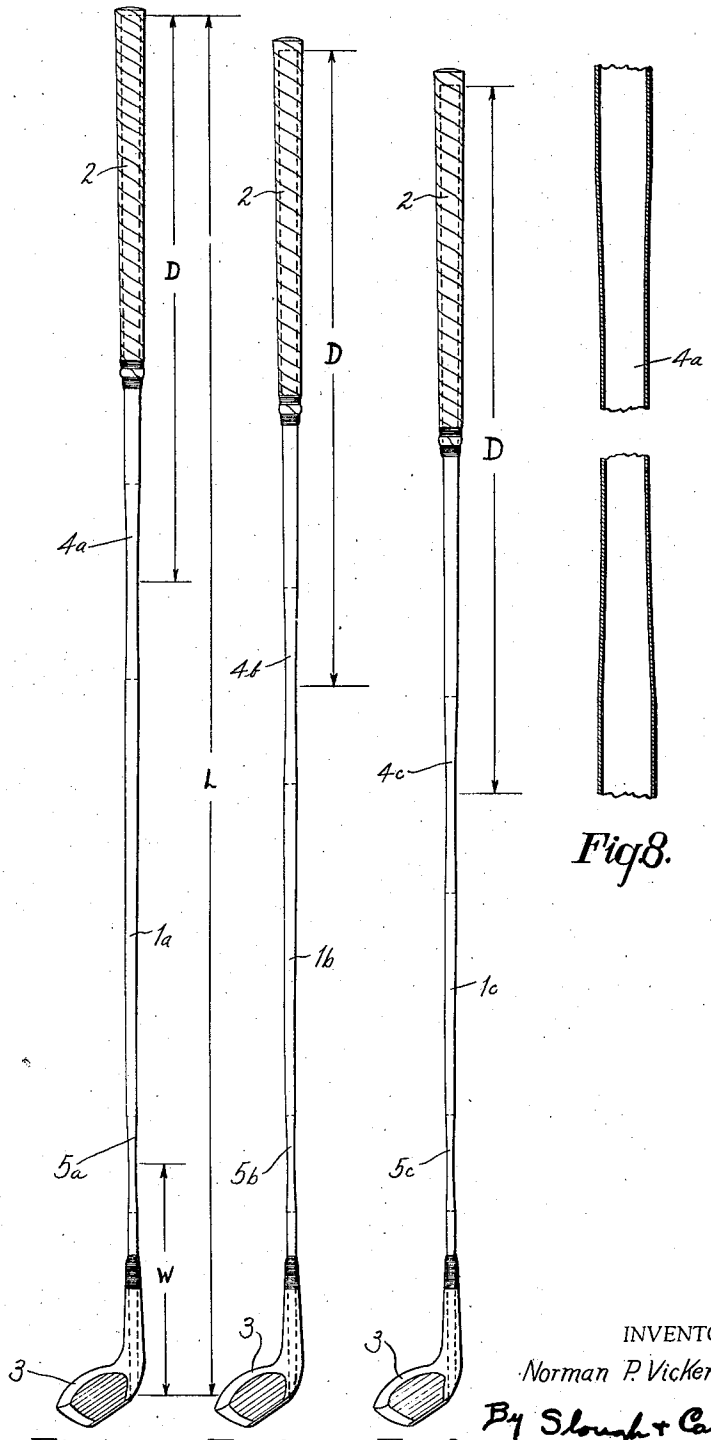

Fig. 1. Fig. 2. Fig. 3.

Fig. 8.

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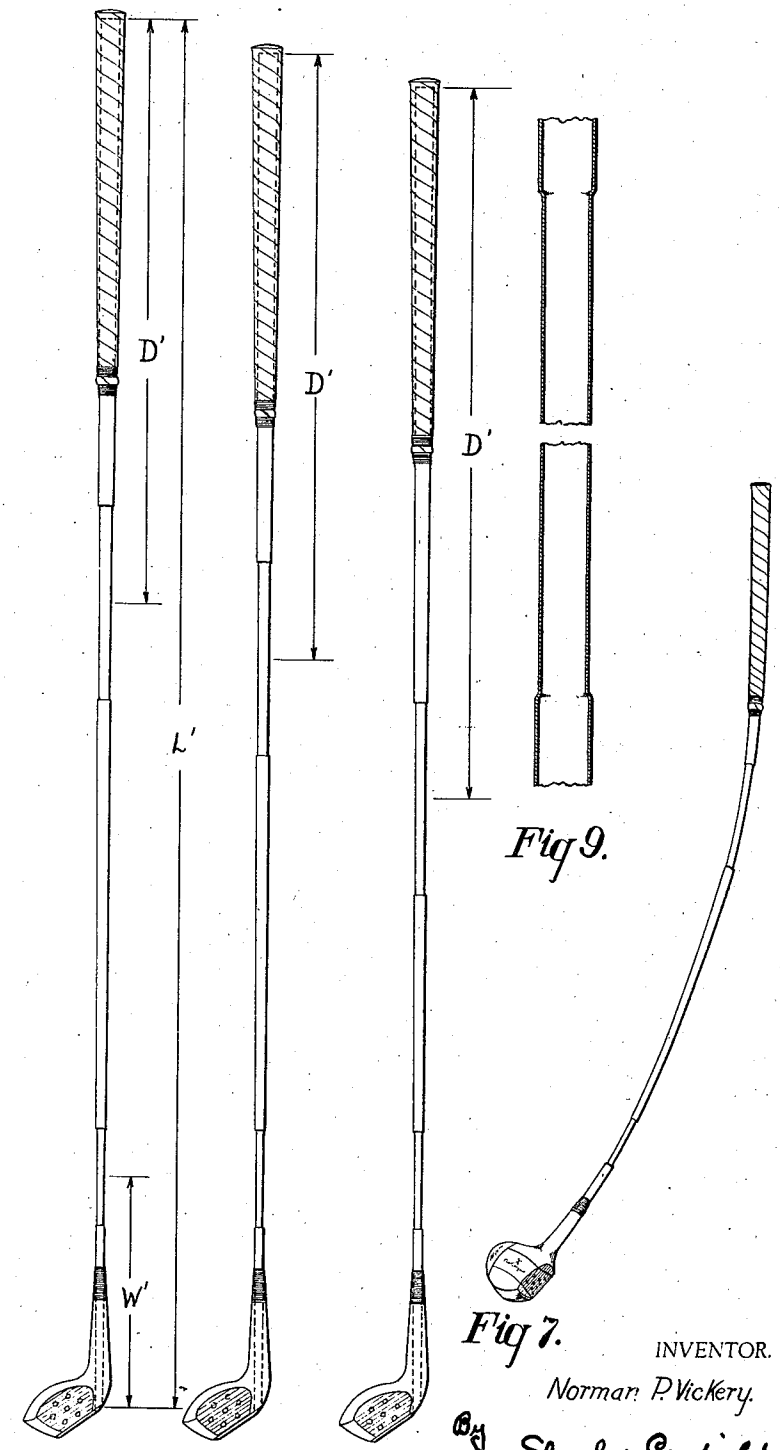

Fig 4.

Fig 5.

Fig 6.

Fig 9.

Fig 7.

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UNITED STATES PATENT OFFICE

2,250,441

GOLF CLUB

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Original application October 17, 1933, Serial No. 693,935. Divided and this application August 23, 1934, Serial No. 741,116

21 Claims. (Cl. 273—80)

My invention relates to golf clubs and relates particularly to improved shafts for golf clubs wherein a plurality, preferably two in number, of localized flexing points are so disposed with reference to the club head as to achieve a more effective striking action on a golf ball when the club is in use.

Golf club shafts as now commonly used, whether of solid wood or tubular steel construction, are sometimes of uniform diameter throughout the length of their working portions intermediate the hand grip and the golf club head supporting ends, or more commonly are gradually tapered proceeding from the hand grip supporting end toward the club head supporting end.

I have found that particularly for clubs of the longer lengths, a more effective stroking action may be accomplished by providing two preferably short operative substantially localized relatively spaced flexing portions so disposed in the length of the shaft that the first is positioned generally in the longitudinal middle portion of the shaft and the second being positioned relatively close to but substantially spaced from the tip end thereof. The resulting action is quite analogous to that secured by the throwing arm of a baseball player when pitching a baseball, the first localized flexing portion serving as a medial resilient hinge corresponding to the elbow of the arm of such player and the second acting as a resilient hinge corresponding to the wrist of said player's arm; inasmuch as the club head is employed to strike a ball, perhaps a closer analogy is in this respect the punting of a football by the leg of a football player, the knee of the leg corresponding to the medial resilient hinge in the golf club shaft and the ankle corresponding to the lower resilient hinge of said shaft.

In other words, I achieve in the stroking with a club provided with such a shaft, a more or less of a final snap action upon the club head, whose motion at the moment of impact with the ball is thus accelerated and due to the resilient nature of the hinges the head maintains contact with the ball for a longer period than where shafts of the ordinary character are employed to effect striking of the ball at a corresponding velocity.

The invention of my present application relates to subject matter disclosed in certain embodiments thereof, in my previously filed applications, Serial No. 693,935, filed October 17, 1933, and Serial No. 674,530, filed June 6, 1933. The present application is divisional of, and a continuation in part of, my aforesaid previously filed applications, with respect to such subject matter.

Although my invention has a more advantageous application to shafts for golf clubs which are of tubular steel construction, wherein the walls are of circular cross section throughout, my invention is not limited thereto in its broader aspects. Generally described, my improved shaft in one preferred embodiment is one wherein the shaft is so formed as to cause it to have two portions in its length adapted to resiliently yield during the making of a golf stroke, so as to achieve a flexible hinge action at such points, one of said points being relatively near the portion of the shaft gripped by the player during play, i. e., being relatively high and relatively near the handle portion, whereas the other flexible hinge portion is disposed relatively near the end of the shaft to which the head is adapted to be affixed, but preferably spaced therefrom a substantial distance and preferably made be positioned about six and one-half inches from the head end of the shaft.

An object of my invention is to provide an improved tubular shaft for golf clubs, wherein preferably provision of a generally medially disposed reduction in diameter, relative to the larger diameter of a substantial portion of the length of the shaft causes the shaft to be relatively more resiliently responsive to bending stresses in said medial region than in the next succeeding lower region of the shaft length.

An object therefore of my invention is to provide an improved shaft for golf clubs having preferably two resilient hinge portions so disposed in the length of the shaft as to be analogous to the elbow and wrist of the arm of a baseball pitcher, or the knee and ankle of the leg of a football punter.

Another object of my invention is to provide additional improvements relating to an improved shaft for golf clubs which is so constructed as to obtain a greater resilient bending effect during the making of a driving stroke at or adjacent that point in the length of the shaft which is roughly indicated by the formula $D=104-2L$, where D is the distance in inches from the extreme handle end of the shaft and L is the overall length in inches of the shaft.

As a matter of further improvement another object of my invention is to incorporate in the shaft of the previously recited objects, and the succeeding object of my invention an additional localized resiliently bending point so disposed

longitudinally of the shaft that it will permit a certain amount of independent movement of the lower end of the shaft carrying the club head, the center of such localized portion being preferably from three to six inches above the lower shaft portion which extends within the hosel of and carries the hosel of the club head.

The above formula very closely positions the resilient flexing point which I prefer for my shafts to secure, which I believe to be the most advantageous effect, particularly for the longer shafts such as are used for "woods" which commonly employ shafts of the longer lengths, to suit the manner of stroking of a large class of golf players who are unable to achieve the manner of stroking commonly employed by golf professionals and the best amateur players who have devoted much of their lives to the perfection of their stroking.

Another object of my invention is to provide an improved shaft for golf clubs effective when in use to maintain the head of the club traveling at high velocity and longer in contact with the ball than with shafts heretofore commonly in use.

Another object of my invention is to provide a highly improved construction of golf club shafts.

Another object of my invention is to provide an improved construction for each of a set of golf clubs, which commonly progressively vary in length.

My invention and the invention itself will be better understood by reference to the drawings illustrating certain embodiments of my invention.

In the drawings:

Figs. 1, 2 and 3 illustrate in side elevation a set of three golf clubs commonly known as "woods" comprising golf club shafts which are embodiments of my invention;

Figs. 4, 5 and 6 are similar views of clubs comprising shafts which are another embodiment of my invention;

Fig. 7 is an exaggerated view of a club having a shaft which is an embodiment of my invention with the shaft flexed in the manner exaggerated, but such shaft may be flexed shortly after the beginning of the downward stroke of the club with the head approaching the position whereat the ball is to be struck;

Fig. 8 is a longitudinal medial sectional view of a fragment of one of the shafts of Figs. 1 to 3 inclusive;

Fig. 9 is a similar view of a fragment of shaft illustrated in Figs. 4 to 6 inclusive.

Referring now to the drawings, referring first to the embodiment of my invention illustrated in Figs. 1 to 3, and 9, I have shown in Figs. 1 to 3, inclusive, a series of three golf clubs commonly known as "woods" characterized by the provision of long shafts in the shaft of the previously recited objects, and the succeeding object of my invention, having the usual hand grip wrappings 2 at their upper ends and each having a relatively heavy head 3 affixed to the lower end of the shafts in any suitable manner, the heads for the three shafts taken in order being respectively more and more inclined to the ground plane so as to give the proper "loft" for a driver, Fig. 1, a brassie, Fig. 2, and a spoon, Fig. 3, respectively. While the lengths of such shafts commonly vary, usually with the height of the player, yet the shafts for woods are commonly substantially longer than the shaft for "irons" shafts for "woods" being commonly 40 inches or more in length, whereas shafts for "irons" are more commonly less than 40 inches in length. It will be understood that, in addition to shafts for woods my invention may be beneficially practiced also in connection with irons.

In the shafts of Figs. 1 to 3 inclusive, I show at 4*a*, 4*b* and 4*c*, a short section of the length of each of the shaft each herein arbitrarily assumed to be six inches in length, the walls of the shaft tapering from both ends of said restricted portion to the middle thereof and merging smoothly with the more diametrically enlarged portions at either end of the said restricted portion, said restricted portions being positioned relative to the extreme hand-grip end of the shaft at varying distances depending upon the over all length of the shafts employed in the particular club.

Preferably the points of maximum diametrical restriction are spaced from the extreme hand grip end of the shaft a distance D, which is obtained from the formula D equals 104 plus or minus 4 minus two L, where L equals the over all length of the club; in this formula the portion plus or minus 4 is to provide a range of permissible operation in the positioning of the particular restricted portion relative to the extreme hand grip end of the shaft i. e. the range of permissible variation of the distance D.

The restricted portions 4*a*, 4*b* and 4*c* for each of the shafts shown are provided for the purpose of increasing the resilient yield of the shaft at such localized portions, so that the shaft may bend to a greater extent during the making of a stroke, particularly during the downward and striking portion of the stroke than at other portions of the shaft adjacent to such portion.

I find also that particularly for the longer shafts similar but preferably shorter diametrical restrictions 5*a*, 5*b*, and 5*c*, respectively, for the three shafts illustrated, should be practiced over a localized length of the shaft substantially spaced from the upper end of the hosel of the club head, such restrictions being tapered from their ends toward their middles, and in the embodiment illustrated are preferably each 3 inches long, and each of the restrictions are preferably spaced about 3 inches from the upper end of the club head hosel, although this distance may be susceptible to considerable variation.

In all cases, however, the lower restriction is preferably placed nearer the club head than to the upper restrictions of the series 4*a*, 4*b* and 4*c*, and also preferably the upper series of restrictions are placed on one side of the longitudinal middle portion of the shaft and the lower restrictions are placed on the lower side of the shaft middle.

The shafts illustrated in the drawings are each preferably of steel tubular construction, although my invention is not limited to shafts of this kind, but find their greatest use in connection with such shafts. The restrictions may be rolled or otherwise formed and the particular method of providing such restrictions is left to the well known skill of the worker in the tube working arts. Preferably also the lowermost restrictions are positioned each at the same distance from the lower end of the shaft, although this is also susceptible of considerable variation.

I am aware that other embodiments of my invention may be made other than by providing diametrical restrictions such as for instance slotting the walls of the tubular shaft in the portions of greater flexibility so as to increase the resilient

yield to bending stresses communicated to such portions. In all cases, however, I consider it important for best results to position the more flexible portions as above described and which position for the upper of said portions being determined by the length of the shaft according to the empirical formula above disclosed.

The action of golf clubs having the above improvements is as I have before stated to be compared with the kicking leg of a football punter whose knee on the back stroke and the first part of the striking stroke is in the nature of a flexible hinge, and then at the moment of punting the ball the ankle hinge comes into play, or by another analogy is analogous to the throwing arm of a baseball pitcher, whose elbow and wrist flexible hinges come successively into play. The lower hinge portions are very effective in absorbing much of the reaction between the ball and club head when the ball is struck and both of the flexible hinge portions cooperate to maintain contact over a desired longer period during the striking and subsequent directive propelling contact between the ball and club head.

Figs. 4 to 6 inclusive illustrate the same constructural principles in another embodiment of my invention applied to clubs having shafts of differing lengths but wherein the diametrical restricted or resilient hinge portions are not tapered from either end toward the middle but are substantially cylindrical throughout nearly all of their lengths, there being a rounded shoulder junction between such restricted portions and the diametrical increased portions of the shaft adjacent to the hinge portions.

Fig. 8 is a longitudinal medial sectional view of a hinge and adjacent portions of any of the shafts of Figs. 1 to 3 inclusive, and Fig. 9 is a similar view of a similar fragment of shaft of the embodiment of Figs. 4 to 6 inclusive.

In Figs. 1 to 3 inclusive, and also Figs. 4 to 6, inclusive, I have indicated the dimensions D and L for Figs. 1 to 3, inclusive, and D' and L' for Figs. 4 to 6, inclusive, for driver, brassie and spoon shafts embodying my invention, wherein these three shafts have for instance dimensional characteristics as follows: D equals 18, 20 and 22 inches, respectively, where L equals 43, 42 and 41 inches, respectively. Also in these shafts the distance between the flexing centers of the lower hinge portions and the lower ends of the shaft is indicated as W for Figs. 1 to 3, inclusive, and W' for Figs. 4 to 6, inclusive, and in each case these are for instance 6½ inches.

It will be understood that the distances W may be varied somewhat and such variation involving variations in the effect imparted upon the driven golf ball including the spinning and length of period of contact between club head and ball. For my own style of stroking, the dimensions above given have been found by me to be most advantageous.

The golf club shafts illustrated in the accompanying drawings are progressively decreased in diameter proceeding from the upper terminus of the shaft upper portion which is indicated by "D" in the drawings, and the lower portion of the shafts indicated by reference characters, 1*a*, 1*b*, and 1*c*, in Figs. 1–3, inclusive, and the corresponding portions of the shafts of Figs. 4, 5, 6 and 7, are progressively decreased in diameter starting at the junction between the sections 1*a*, 1*b* and 1*c*, with the shorter flexing portions 4*a*, 4*b* and 4*c*, also progressively decrease in diameter to the middle of the lowermost flexing sections 5*a*, 5*b* and 5*c*.

The embodiments of Figs. 1, 2 and 3 and of 4, 5, 6 and 7, are similar in the above respect, except from the qualification which arises by reason of short flexing sections of Figs. 4–7, inclusive, being shown as cylindrical in the illustrated embodiment, but it will be understood that my invention also contemplates making these shorter flexing sections tapered, as set forth in my co-pending previously filed application, Serial No. 674,530, filed June 6, 1933.

References also hereby made to my previously filed co-pending aplication, Serial No. 693,935, filed October 17, 1933, and my present application derives its subject-matter from both of my above identified applications, as originally filed.

Having thus described my invention in different embodiments and indicating the scope of my invention by the above description thereof, I am aware that numerous and extensive departures may be made from my invention as illustrated herein, but without departing from the spirit thereof.

I claim:

1. A golf club shaft of reduced cross sectional area in two short relatively spaced portions of the club length intermediate its ends, the upper portion being spaced in inches from the hand grip end of the shaft, 104 inches, plus or minus 4 minus, twice the overall length of the shaft, the over all length of said shaft being at least 40 inches.

2. A gold club shaft of reduced diameter in two short relatively spaced portions of the club length intermediate its ends, the upper portion being spaced in inches from the hand grip end of the shaft, 104 inches, plus or minus 4, minus twice the over all length of the shaft, the over all length of said shaft being at least 40 inches.

3. A shaft for golf clubs comprising a distinct resilient elbow hinge portion of increased flexing characteristics relative to adjacent portions of the shaft, spaced in inches from the extreme hand grip supporting end of the shaft approximately 104 inches, minus twice the over all length of the shaft, the over all length of said shaft being at least 40 inches.

4. A tubular tapered golf club shaft wherein one localized short resilient universal hinge portion of increased flexing characteristics is formed therein and positioned longitudinally of the shaft relative to its two ends in the generally upper portion thereof but below the grip supporting portion, said shaft formed to have a second localized resilient short portion of increased flexing characteristics disposed substantially near to but spaced from the club head end portion of the shaft, the shaft being intermediately substantially free of such localized portions of increased flexing characteristics.

5. A shaft for golf clubs comprising distinct "elbow and wrist" resilient hinge portions positioned generally respectively in the middle longitudinal portion of the length of the club and adjacent the club head suporting end thereof, and being elsewhere substantially free of resilient hinge portions, the said elbow hinge portion being spaced in inches from the extreme hand grip supporting end of the shaft being approximately 104 inches, minus twice the over all length of the shaft, the over all length of said shaft being at least 40 inches.

6. A shaft for golf clubs of tubular resilient steel or like metallic construction comprising two

distinct respectively "elbow and wrist" resilient hinge portions positioned generally respectively in the middle longitudinal portion of the length of the club and adjacent to but spaced from the club head supporting end portion thereof, and being elsewhere substantially free of localized resilient hinge portions.

7. A golf club shaft of tubular resilient steel or like metallic construction having its wall in different portions of its length differently formed so as to provide a substantially localized portion of increased resiliency forming a substantially universal relatively resilient hinge portion, said portion spaced in inches from the extreme hand grip supporting end of the shaft being approximately 104 inches minus twice the over all length of the shaft, and being free of other localized flexing portions intermediate said portions and the extreme handle end of the shaft, the over all length of said shaft being at least 40 inches.

8. A shaft for golf clubs comprising a distinct resilient elbow hinge portion of increased flexing characteristics in all radial directions relative to adjacent portions of the shaft, spaced in inches from the extreme hand grip supporting end of the shaft 104 inches, minus at least twice the over-all length of the shaft, the over all length of said shaft being at least 40 inches.

9. A golf club shaft of metallic tubular construction of reduced circumferential dimensions in two short relatively spaced portions of the club length intermediate its ends, the upper portion being spaced in inches from the hand grip end of the shaft, 104 inches, plus or minus 4, minus twice the overall length of the shaft, the over all length of said shaft being at least 40 inches.

10. A golf club shaft of metallic tubular construction of reduced circumferential dimensions in two short relatively spaced portions of the club length intermediate its ends, the upper portion being spaced in inches from the hand grip end of the shaft, 104 inches, plus or minus 4, minus twice the over-all length of the shaft, the said other circumferentially reduced portion being positioned considerably closer to but substantially spaced from the head supporting end of said shaft, the over all length of said shaft being at least 40 inches.

11. A golf club of metallic tubular construction of reduced circumferential dimensions in two short relatively spaced portions of the club length intermediate its ends, the upper portion being spaced in inches from the hand grip end of the shaft, 104 inches, plus or minus 4, minus twice the over-all length of the shaft, the over all length of said shaft being at least 40 inches.

12. A tubular shaft for golf clubs adapted for the placement of a hand grip and a club head respectively on its two end portions, having a distinct resilient hinge portion of relatively short length provided by weakening the walls of the shaft to laterally directed bending stresses exerted upon said portion relative to longitudinally disposed adjacent portions, said hinge portion being disposed substantially nearest said hand grip supporting portion, said shaft being formed to be substantially less responsive to bending stresses in the other portions of its length intermediate said hand grip supporting portion and that portion of its length disposed mid-way of said supporting portions, said shaft comprising a portion extending from said hinge portion in the direction of the club head of substantially greater length and extending substantially beyond said mid-way portion, said shaft being additionally weakened to laterally flexing stresses in that portion of its length disposed closely adjacent its club head supporting end.

13. A golf club shaft of resilient material having a short portion of its length weakened to increase its response to bending flexure at such portion, said portion being spaced from the handle end of the shaft approximately 104 inches minus twice the overall length of the shaft, plus or minus four inches, said shaft being additionally substantially similarly weakened in only one additional portion disposed near that end thereof adapted to support a golf club head, and spaced therefrom, and said shaft being at least 40 inches in overall length.

14. A tubular shaft for golf clubs adapted for the placement of a head and a hand grip on its two opposite ends, said shaft having an intermediately disposed relatively short portion of its length so formed as to provide a substantially resiliently bendable hinge, the distance of such hinge portion from the hand grip end of said shaft being approximately 104 inches plus or minus 4 inches, minus twice the overall length of the shaft in inches; and said shaft having a circumferentially constricted neck portion between said hinge portion and the club head disposed relatively near to but being substantially spaced from the juncture of said shaft with said club head, and being substantially widely spaced from said hinge portion, and said shaft being at least 40 inches in overall length.

15. A tubular shaft for golf clubs adapted for the placement of a head and a hand grip on its two opposite ends, said shaft being generally tapered from its hand grip supporting end to its head supporting end and having a short intermediate portion circumferentially constricted to provide a substantially resilient flexible hinge, the distance of such hinge relative to the hand grip end of said shaft being approximately 104 inches minus twice the total length of the shaft in inches; said constricted portion being intermediately of least diameter and progressively of greater diameter until its junction with the other portions of the shaft, and said shaft having a circumferentially constricted neck portion between said first constricted portion and the club head being substantially spaced from the juncture of said shaft with said club head, and from said first constricted portion, and said shaft being at least 40 inches in total length.

16. A golf club shaft of reduced cross-sectional area in two short relatively spaced portions of the club length intermediate its ends, the upper portion being spaced in inches from the hand grip end of the shaft 104 plus or minus 4 minus twice the overall length of the shaft, the other cross-sectionally reduced portion being positioned considerably closer to but substantially spaced from the head supporting end of said shaft, the overall length of the shaft being, at least, 40 inches.

17. A golf club shaft of reduced cross-sectional area in two short relatively spaced portions of the club length intermediate its ends, the upper portion being spaced in inches from the hand grip end of the shaft 104 plus or minus 4, minus twice the length of the shaft, the other cross-sectionally reduced portion being positioned considerably closer to but substantially spaced from the head supporting end of said shaft, the overall length of said shaft being, at least, 40 inches.

18. A tubular shaft for golf clubs adapted for

placement of a hand grip and head on its two opposite end portions, said shaft being generally tapered proceeding toward its head supporting end portion, and having a portion of substantially relatively abruptly constricted circumference to provide a substantially resilient hinge portion, said hinge portion having substantially less resistance to lateral bending than the adjacent shaft portion of greater circumference adjacent thereto, said adjacent portion relatively disposed toward the hand grip portion, and the distance of such hinge portion relative to the hand grip end of the shaft being 104 inches minus twice the length of the shaft in inches, within a range of further permissible variation of plus or minus 4 inches, the shaft being at least 40 inches in overall length.

19. A tubular metallic golf club shaft having a grip portion at its upper end and a tip at its lower end, said shaft having contiguous upper and lower portions of circular cross section throughout, and said upper and lower portions being connected by a portion outwardly protruding from the upper portion and providing the upper terminus of the lower portion, said lower portion tapering to a minimum diameter in the tip region.

20. A tubular metallic golf club shaft having a grip portion at its upper end and a tip at its lower end, said shaft having contiguous upper and lower portions of circular cross section throughout, and said upper and lower portions being tapered in the same general direction and connected by a portion outwardly protruding from the upper portion and providing the upper terminus of the lower portion.

21. A tubular metallic golf club shaft having a grip portion at its upper end and a tip at its lower end, said shaft being of circular cross section throughout and consisting of an upper portion and a lower portion, said upper and lower portions being interconnected by a shoulder outwardly protruding from the upper portion and affording the upper terminus for the lower portion, and the lower portion immediately below the shoulder tapering therefrom to a minimum diameter at the tip.

NORMAN P. VICKERY.