

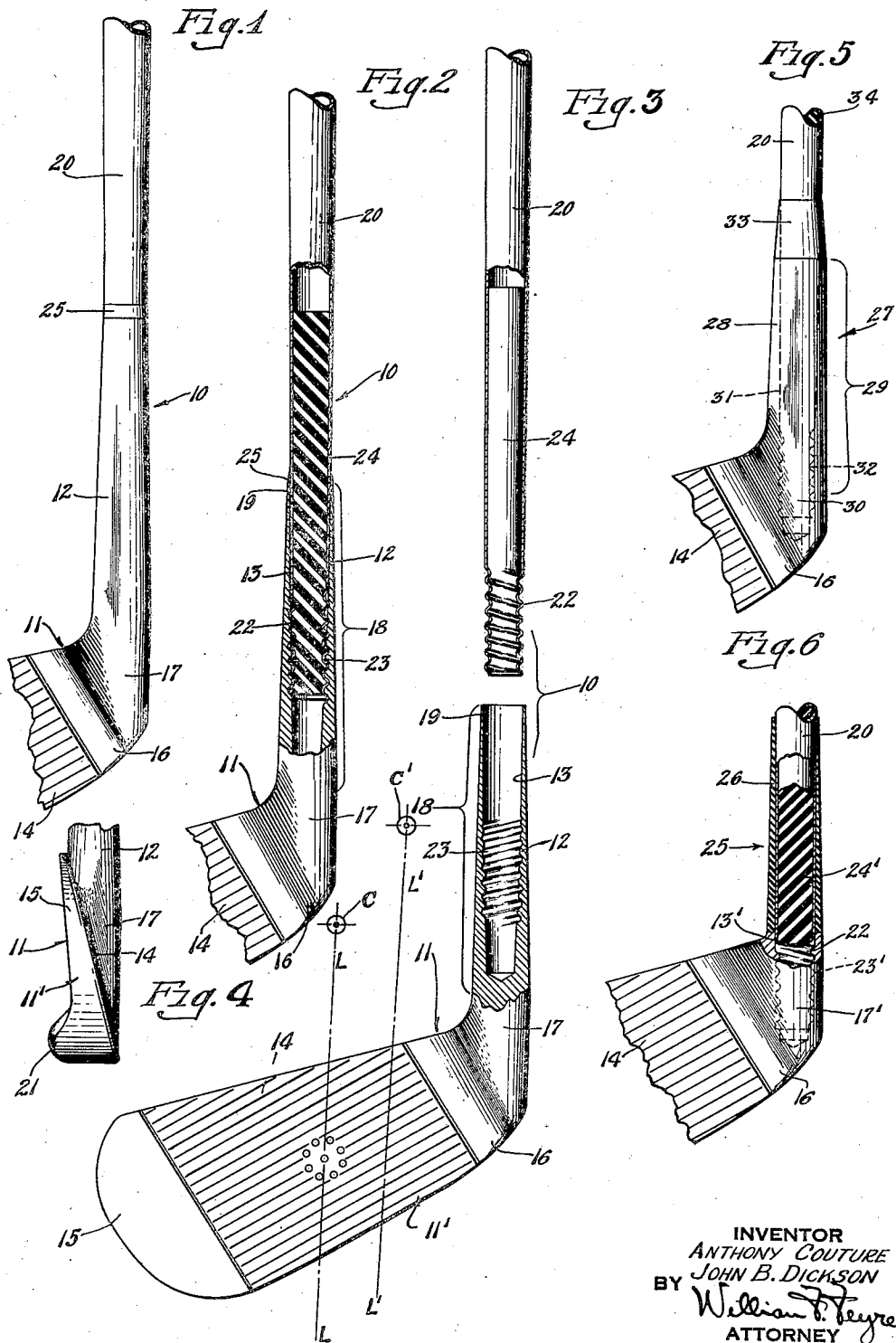
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GOLF CLUB

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GOLF CLUB

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This invention relates to golf clubs.

It is an object of the invention to provide a golf club having a metal shaft and a metal head, popularly known as an iron, which because of its novel construction is less liable to break and may be used with greater success and with less skill than the metal-shafted irons now in general use.

In many metal-shafted irons now in general use there is a large bulge at the point where the shaft enters the hosel of the club head. The large bulge renders it extremely difficult to sight down the shaft and properly line up the face of the club with the ball.

A feature of the present invention, therefore, resides in providing a golf club in which there is no bulge at the point where the shaft enters the hosel and in which there is a substantially uniform, continuous and straight-line taper of the hosel from the club head to the upper end of the hosel, whereby there is achieved an uninterrupted sighting line down the shaft to the face of the club.

Because of the large, bulging and heavy hosel on many of the irons now in general use, and the resulting concentration of weight near the heel of the club head, the sweet spot on the face of the club head, that is, the spot on the face where the ball may be hit with maximum results and with a minimum of shock to the player, is of very limited extent. Only a player of exceptional skill, therefore, is able to obtain a "good hit" with any degree of regularity.

With the present invention the hosel is either substantially reduced in size and weight or eliminated altogether, and the weight is shifted to the blade. This change in the distribution of weight constitutes an important feature of the invention in that it serves to increase the useful extent of the sweet spot and to move it away from the heel of the club, and also tends to facilitate an even, smooth swing of the club head.

Moreover, by substantially reducing or eliminating entirely the hosel the center of percussion of the club is shifted laterally away from the heel of the club head and is also shifted downwardly. This shifting of the center of percussion brings the latter closer to the geometrical center or normal impact area of the face of the club head and, therefore, is of the utmost importance.

The actual center of percussion of a golf club which is defined in Marks' Handbook as "the point at which a suspended body may be struck without causing any pressure on the axis passing through the point of suspension," is in the air above the face of the club. Hence, in actual

practice a player when grasping the grip of a club and swinging the latter about a center corresponding to the wrist or to the "waggle point," hits below the center of percussion. Because of this fact the impact force does cause pressure on the hands and wrists of the player and tends to rotate the club as a whole about a horizontal axis through the center of percussion in such a direction that the head of the club tends to move backward and the grip forward against the hands of the player. Some of the energy in the descending club, therefore, goes into rotating the club instead of propelling the ball.

Accordingly, it will be appreciated that the shorter the distance from the center of percussion to the normal impact area of the face of the club, the less the moment of impact reaction tending to rotate the club about the center of percussion, and the less the energy dissipated in overcoming the moment of impact reaction instead of driving the ball. It, therefore, follows that with the same stroke, a ball will be propelled farther with a club in which the center of percussion has been moved closer to the face of the club by substantially reducing or eliminating the hosel and by preferably placing the removed weight thereof or its equivalent in the blade.

In addition to serving as a means for minimizing the adverse tendency of the club to rotate about a horizontal axis through the center of percussion, the substantial reduction or elimination of the hosel serves as a means for minimizing the adverse tendency of the club to rotate about an approximating vertical line passing diagonally across the face of the club, which line may for convenience be called the "line of percussion."

The "line of percussion" is determined by the distribution of weight in the golf club taken as a whole with relation to the grip portion of the club. In the conventional club with a relatively large hosel the "line of percussion" lies adjacent the heel of the club face and is spaced appreciably from the geometrical center of the club face. This "line of percussion" is such that whereas any striking of the ball on either side of the line does tend to produce a rotation of the club about the line, any striking of the ball on the line does not tend to produce this adverse rotation of the club.

Because of the fact that the average player is unable to hit "toward the heel" or "toward the toe" at will, his natural tendency, in his uncertainty, and his logical course, is to aim for the geometrical center of the face of the club. Accordingly, with the conventional large hosel club

when a hit is made at the geometrical center there is a tendency for the moment of impact reaction about the "line of percussion" to rotate the club. Hence, here again, energy is lost and sweetness of feel is lessened by the grip tending to rotate in the player's hands when the hit is not on the "line of percussion."

In a club embodying the present invention of shifting the center of percussion outwardly from the heel end of the club, as by substantially reducing or eliminating the hosel, the redistribution of weight is such that the "line of percussion" is moved from the heel of the club and toward the geometrical center of the club face. Thus when a player swings a club embodying the present invention in the normal way so as to hit the ball at or closely adjacent the geometrical center of the club face, the hit will be either on the line of percussion or substantially closer to the line of percussion than would be the case if a conventional club having a relatively large hosel were being used.

Because of this shifting of the line of percussion from the heel and toward the geometrical center of the club face, therefore, the adverse tendency of the club to rotate about the "line of percussion" is minimized, the possibility of wasted energy due to the turning of the club in the player's hands minimized, "sweetness" of feel is increased, and accuracy of the drive materially aided.

It is apparent, therefore, that that feature of the invention which resides in shifting the center of percussion closer to the geometrical center of the face of the club is of the utmost importance and makes it possible for the average player and even the highly skilled player to obtain greater distance and more accuracy in his shots with less shock upon his hands.

To complement the advantageous effects produced by substantially reducing or eliminating the hosel, weight taken from the hosel, and if desired additional weight, is preferably added to the flanged sole of the club. This weight is so placed that it not only tends to facilitate an even, smooth swing but also serves to shift the center of percussion closer to the geometrical center of the face of the club.

One of the primary objections to steel-shafted golf clubs is the fact that there is a tendency for the shaft to break at or adjacent the point where it enters the hosel. This is caused by the normally abrupt change from the relatively rigid hosel to the relatively yielding and flexible metal tube that forms the club shaft. When a ball is hit, this abrupt change from the rigid hosel to the relatively yielding and flexible metal shaft results in a concentration of the shaft vibrations in a localized area in the shaft at the upper end of the hosel with an attendant breakdown of the metallic structure of the shaft at that point. This results in an eventual breaking of the shaft.

It is, therefore, an object of this invention to provide a golf club, and in particular a metal-shafted iron, in which this tendency of the metal-shafted golf clubs to break is overcome.

To overcome this tendency, there is provided as a feature of this invention a means for distributing the vibrations of the shaft over a larger area.

One of the means for thus distributing the shaft vibrations comprises the forming of the hosel in the form of a thin sleeve with a gradual taper toward its upper end so that the mass of metal in the hosel becomes progressively less as it

extends upwardly on the shaft. With such a construction, therefore, there is no sudden change from an unyielding hosel to the relatively yielding and flexible shaft and the vibrations are dispersed over a relatively large area of the shaft and of the hosel itself. Such a construction, by distributing the vibrations in the shaft and making possible an absorption of the vibrations by the hosel, not only overcomes the tendency of the shaft to break, but also by leveling off the intensity of the vibrations materially reduces the shock on the hands of the player at the moment the club hits the ball.

Another of the means for thus diminishing and distributing the shaft vibrations comprises the provision of a plug or core of distortable, resilient, shock-absorbing material, such as rubber, inserted in the tubular metal shaft and extending from within the socket or hosel on the club head to a point above the upper end of the socket or hosel. This rubber plug dampens any localized vibrations that may be set up in the shaft at the point where it enters the socket or hosel on the club head and tends to distribute these vibrations over a relatively large area. As in the case of the tapered hosel, this rubber plug by dampening and distributing the shaft vibrations overcomes the tendency of the metal shaft to break due to the concentration of vibrations in a localized area, and also reduces the resulting shock on the hands of the player at the moment the club head hits the ball.

Other objects and features will hereinafter appear.

In the drawing:

Figure 1 is a fragmentary side view of a golf club embodying the invention.

Fig. 2 is a view similar to Fig. 1 but partially in section.

Fig. 3 is an exploded view showing the shaft and the club head in aligned but disassociated relation, certain of the parts being shown in section to more clearly illustrate the invention.

Fig. 4 is an end view of the club head embodying the present invention.

Fig. 5 is a fragmentary side view showing another form of the present invention.

Fig. 6 is a fragmentary view, partially in section, showing a modified form of the present invention.

Before describing the present improvements and mode of operation thereof in detail it should be understood that the invention is not limited to the details of construction and arrangement of parts shown in the accompanying drawing, which are merely illustrative of the present preferred embodiments, since the invention is capable of other embodiments, and the phraseology employed is for the purpose of description and not of limitation.

Referring more particularly to the drawing, and first to Figs. 1 to 4, there is shown a golf club 10 having a metal head 11 from which extends upwardly an integral hosel 12 having a shaft-receiving socket 13 therein. As is conventional, the club head includes a blade 11' with a face 14, a toe 15 and a heel 16 from which extends a neck portion 17 which joins the blade of the club to the hosel.

Of particular importance, however, the hosel 12 of the club is provided with a substantially uniform, continuous and straight-line taper 18 from the neck 17 of the club to the upper end of the hosel. The hosel 13, therefore, is in the form of a thin tapering sleeve and at its upper

end the walls 19 have a thickness substantially the same as those of the tubular metal shaft 20. As seen most clearly in Figs. 2 and 3, this continuous taper reduces the weight of the hosel and causes the mass of metal in the hosel to become progressively less and less as it extends upwardly.

When the tubular metal shaft 20 is inserted in the socket 13 of the hosel 12, as shown in Figs. 1 and 2, there is no abrupt bulge at the point where the shaft enters the hosel. On the contrary, there is a very gradual uniform and straight-line taper outwardly from the upper end of the hosel to the neck of the club. Such a construction by eliminating any bulge between the upper and grip end of the shaft and the neck of the club gives a player an uninterrupted sighting line down the shaft to the face of the club and thus makes it a very simple matter to properly line up the face of the club with the ball. Failure to properly line up the face of the club with the ball not only causes the player to slice or hook the ball but also causes the player to hit the ball in a line which is angularly disposed relative to the line along which he assumes he is aiming.

Also of importance, by forming the hosel 12 in the form of a thin tapering sleeve, the hosel is rendered progressively less rigid and more yielding as it approaches its upper end. Thus, with the present invention the relatively yielding and flexible tubular metal shaft 20 is not uniformly and rigidly supported throughout the hosel and then abruptly left totally unsupported. On the contrary, by making the walls of the hosel progressively thinner the hosel itself becomes progressively less rigid and more yielding so that any shock transmitted from the head of the club is not localized at the point where the shaft enters the hosel, but is gradually distributed over a relatively large area of the shaft and also absorbed by the hosel itself.

This distribution of the shock dampens the vibrations set up in the club shaft and by preventing a localization of the vibrations prevents the breakdown of the metallic structure of the shaft which results in an eventual breaking or splitting of the shaft. Also, this dampening of the shaft vibrations tends to minimize any shock that might otherwise be transmitted to the hands of the player.

Moreover, and of particular importance, by tapering the hosel and thereby reducing the mass of metal therein the center of percussion of the golf club, which is determined by the distribution of weight relative to the grip of the club or the "waggle point," is shifted laterally relative to the heel 16 and also downwardly. This moves the center of percussion closer to the geometrical center of the club face and thus not only serves to locate the sweet spot, that is the spot on a club face where the ball may be hit with maximum results and with minimum shock to the player, in the normal hitting area at or adjacent the geometrical center of the club face, but also serves to increase the effectiveness of the club when the ball is hit on the sweet spot.

This shifting of the center of percussion is shown diagrammatically in Fig. 3. There it is seen, by way of illustration, that the center of percussion is moved from a point at C' to a point at C spaced outward and downward relative thereto. This diagram thus shows in a graphic manner how, by the present invention, the moment of impact reaction about a hori-

zontal line passing through the center of percussion is substantially reduced to thus reduce the amount of energy dissipated in overcoming this adverse moment of reaction.

Also, in Fig. 3 it is shown diagrammatically that with the conventional golf club having a relatively large hosel, the "line of percussion" is near the heel of the club, as on the line L'-L'. This condition results in the setting up of an appreciable turning moment about the line L'-L' when the ball is hit at the geometrical center of the face of the club. Energy that might otherwise be utilized in propelling the ball must be used in resisting the tendency of the club to rotate about the approximately vertical line that constitutes the "line of percussion" L'-L'.

By shifting the center of percussion laterally away from the hosel of the club the "line of percussion" is moved away from the heel and toward the geometrical center of the face of the club. In the ideal condition the "line of percussion" would pass through the geometrical center of the face of the club, as on the line L-L. Under such a condition a ball hit at the geometrical center of the club face would cause no adverse moment of reaction about the "line of percussion." Hence, any appreciable movement of the "line of percussion" away from the heel and toward the geometrical center of the club face will substantially increase the effective energy that may be used in propelling the ball.

With a club embodying the present invention, therefore, it is seen that by substantially reducing the weight of the hosel and thus shifting the center of percussion away from the hosel and downwardly toward the normal point of impact at the geometrical center of the club face, a ball, with the same stroke, may be hit a greater distance and with greater accuracy than with a conventional club having a large hosel.

To further increase the advantageous effects produced by reducing the size of the hosel, there is preferably formed an enlarged flanged sole 21 on the blade, see Fig. 4, so proportioned and located that the center of percussion is moved still closer to the geometrical center of the club face. This enlarged flanged sole may be added to the club without any substantial variation in the total weight of the club, because in effect, the weight taken from the hosel is redistributed to the blade.

In addition to serving as a means for more advantageously locating the center of percussion, the enlarged flanged sole 21 serves also to facilitate an even and smooth swing of the club.

It will be appreciated, therefore, that a club constructed in accordance with the teachings of the present invention may be used with very fair success by a player even though he may not be highly skilled. This is due in part to the fact that because of the advantageous uninterrupted sighting line down the club shaft, the player may easily and properly line up the face of the club with the ball and on the line on which the ball is to be hit, in part to the fact that the useful extent of the sweet spot is enlarged and is moved more toward the center of the face where the ball would naturally be hit, in part to the fact that by shifting the center of percussion closer to the geometrical center of the club face the energy needed to resist any adverse rotation of the club is substantially reduced, and in part to the fact that because of the increased weight at the sole of the blade there will be a tendency for

the club head to move in a uniform and aligned direction before, during and immediately after the club head hits the ball.

For achieving a simple and particularly advantageous connection between the metal shaft and hosel, helical threads 22 are preferably formed at the lower end of the shaft. Soldered and other type connections may also be used. These threads 22 engage with cooperating threads 23 formed in the hosel socket 13 and preferably terminating below the upper end of the socket and above the lower end of the socket. With this construction, when the shaft is inserted in the hosel and turned so that the threads pull the shaft progressively down into the socket the lower end of the shaft is jammed onto the lower unthreaded portion of the socket and squeezed so as to be securely held in place. If desired, the socket 13 may be formed, as shown in Fig. 5, to extend downwardly nearly to the bottom of the head. This further reduces the weight at the heel of the club and serves to aid in shifting the center of percussion and "line of percussion" toward the geometrical center of the club face.

If preferred, and as shown most clearly in Figs. 2 and 3, there may be utilized a second means for distributing the shaft vibrations in addition to the means provided by forming the hosel progressively less rigid and more yielding as it approaches its upper end. This secondary means comprises a plug or core 24 of distortable, resilient, shock-absorbing material, such as rubber, inserted in the lower portion of the tubular metal shaft and extending from within the socket 13 to a point above the upper end of the socket. This rubber plug dampens any localized vibrations that may be set up in the shaft adjacent the upper end of the hosel 12 and distributes the same over a relatively larger area of the shaft. Also, in addition to preventing the breakage of the club shaft because of a breakdown of the metallic structure due to intense localized vibrations, the rubber plug 24 serves as a cushion to prevent the transmittal of impact shock from the club head 11 to the hands of the player.

Moreover, the rubber plug 24 may further serve to yieldingly maintain the lower end of the shaft in firm threaded relation with the threads in the socket. The indentations and projections in the rubber plug accommodating the helical threads formed on the shaft, cooperate with these threads in maintaining the rubber plug in fixed position longitudinally of the shaft.

To give the club a more finished appearance a small ring 25 of "Celluloid" or other material, may be placed around the club shaft adjacent the upper end of the hosel. Also, the shaft may be left with a metallic face or covered with "Celluloid" or other materials.

In Fig. 6 a modified form of the invention is shown. As in the form first described it embodies a construction which facilitates a proper lining up of the face of the club head; which properly locates and increases the extent of the sweet spot; which shifts the center of percussion and the "line of percussion" closer to the geometrical center of the club face; which dampens and distributes the shaft vibrations; and which facilitates an aligned and uniform swing of the club head.

This modified club 25 differs from the form first described in the complete elimination of the hosel and in the formation of a shaft-receiving socket 13' in a bulge or neck 17' on the heel end of the club head. This complete elimination of the hosel, like the provision of a tapered hosel of re-

duced weight in the club shown in Figs. 1 through 4, serves to shift the center of percussion and the "line of percussion" closer to the geometrical center of the club face and to thereby increase the efficiency of the club and the useful extent of the sweet spot.

As in the case of the club 10 first described, this modified club 25 is, preferably, provided with an enlarged flanged sole on the back of the club head, proportioned and located in the same position as the enlarged flanged sole 21' shown in Fig. 4, for the purpose of further shifting the center of percussion and the "line of percussion" toward the geometrical center of the club face and for facilitating an even and smooth swing of the club head.

To securely connect the shaft with the club head there is provided in the socket 13', which extends nearly to the bottom of the club head, a threaded section 23' preferably spaced from both the top and the bottom of the socket. When the tubular metal shaft 20 is inserted in the socket the cooperating threads 22 and 23' on the shaft and in the socket draw the shaft downwardly and thus cause the shaft to jam against the unthreaded portions of the socket and thus firmly secure the shaft relative to the club head.

With the shaft thus secured in the head it is seen that there is, as in the form first described, an uninterrupted sighting line down the shaft to the face of the club. This follows because of the complete elimination of the hosel and of any bulge that might have been caused thereby.

If desired, to further improve the sighting line and to give the club a more finished appearance a tapering thimble 26 of enamel, "Celluloid" or similar lightweight material may be inserted on the shaft above the socket 13'.

To dampen any vibrations that might be set up in the shaft by the impact of the club head with the ball and to distribute this vibration over a relatively large area, a plug or core 24' of rubber or the like, may be inserted in the lower portion of the tubular shaft so as to extend from within the socket 13' and contiguous the threads 22 and 23' to a point appreciably above the upper end of the socket. As with the plug 24 described in connection with Figs. 1 through 4, the plug 24' by dampening, absorbing and distributing the shock and vibrations, prevents the building up of intense localized strains and stresses at the point where the shaft 20 enters the socket 13', and also materially reduces any shock or vibration that may reach the hands of a player.

As shown in Fig. 5 the same broad inventive concept of shifting the center of percussion and the "line of percussion" closer to the geometrical center and normal impact point of the club face as embodied in the two forms of golf club heretofore described, may be embodied in a third form of golf club 27. This result is accomplished in the modified golf club 27 as in the club 10 shown in Figs. 1, 2 and 3, by decreasing the size and weight of the hosel. However, instead of providing a hosel which may extend upwardly substantially the same extent as hosels in the usual and conventional golf clubs, this modified club 27 embodies a hosel 28 which is substantially shorter than the hosel of a conventional golf club. To further reduce its weight and to substantially eliminate any sight interfering bulge, the hosel 28 preferably, and as shown, is formed with a substantially uniform, continuous and straight line taper 29 from the neck 30 of the club to the upper end of the hosel.

An enlarged flanged sole such as shown in Fig. 4 is also preferably provided on this modified club 27 to aid in shifting the center of percussion toward the geometrical center of the club face and in increasing the smoothness and evenness of the swing.

For connecting the shaft 20 to the head of the modified club there preferably is provided in the hosel 28 a socket 31 which, like the socket 13' in the modified club 25, extends nearly to the bottom of the club head. This extension of the socket, by reducing the mass of metal at the heel end of the club, serves to further shift the center of percussion and the "line of percussion" toward the geometrical center of the club face 14

To complete the connection between the shaft 20 and the club head there is preferably formed in the socket 31 and spaced downwardly from the upper end of the hosel, a threaded section 32 which cooperates with the threads 22 on shaft 20 to hold the latter securely relative to the head.

A tapering collar or sleeve 33 of Celluloid or other lightweight material may be advantageously inserted on the shaft 20 immediately above the hosel so as to improve the sighting line down the shaft to the face 14 of the club and to provide a more finished appearance to the club.

In order to dampen any vibration that might be set up in the shaft when the ball is hit, a plug or core 34 of rubber or the like, similar to the plugs 24 and 24', may be advantageously inserted

in the lower portion of the shaft so as to extend from within the socket 31 and contiguous the threads 22 and 32 to a point appreciably above the upper end of the socket. By dampening, absorbing and distributing the shock and vibrations the plug 34 prevents the building up of intense localized strains and stresses at the point where the shaft 20 enters the hosel 28, and also serves to further reduce any shock or vibration that might otherwise reach the hands of a player.

Variations and modifications may be made within the scope of this invention and portions of the improvements may be used without others.

Having thus described the invention what is claimed as new is:

A golf club comprising a metal head having a playing face, and having a shaft-receiving socket therein at the heel end thereof, said head being formed to reduce the mass of metal adjacent said socket; helical threads formed in said socket; a tubular metal shaft extending into said socket; a rubber plug in said shaft and extending from a point adjacent the lower extremity of the shaft and within the socket to a point above said socket; and helical threads formed on the exterior and interior of the end portion of said shaft for respectively maintaining said shaft in said socket and maintaining said plug in fixed position longitudinally of said shaft.

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