

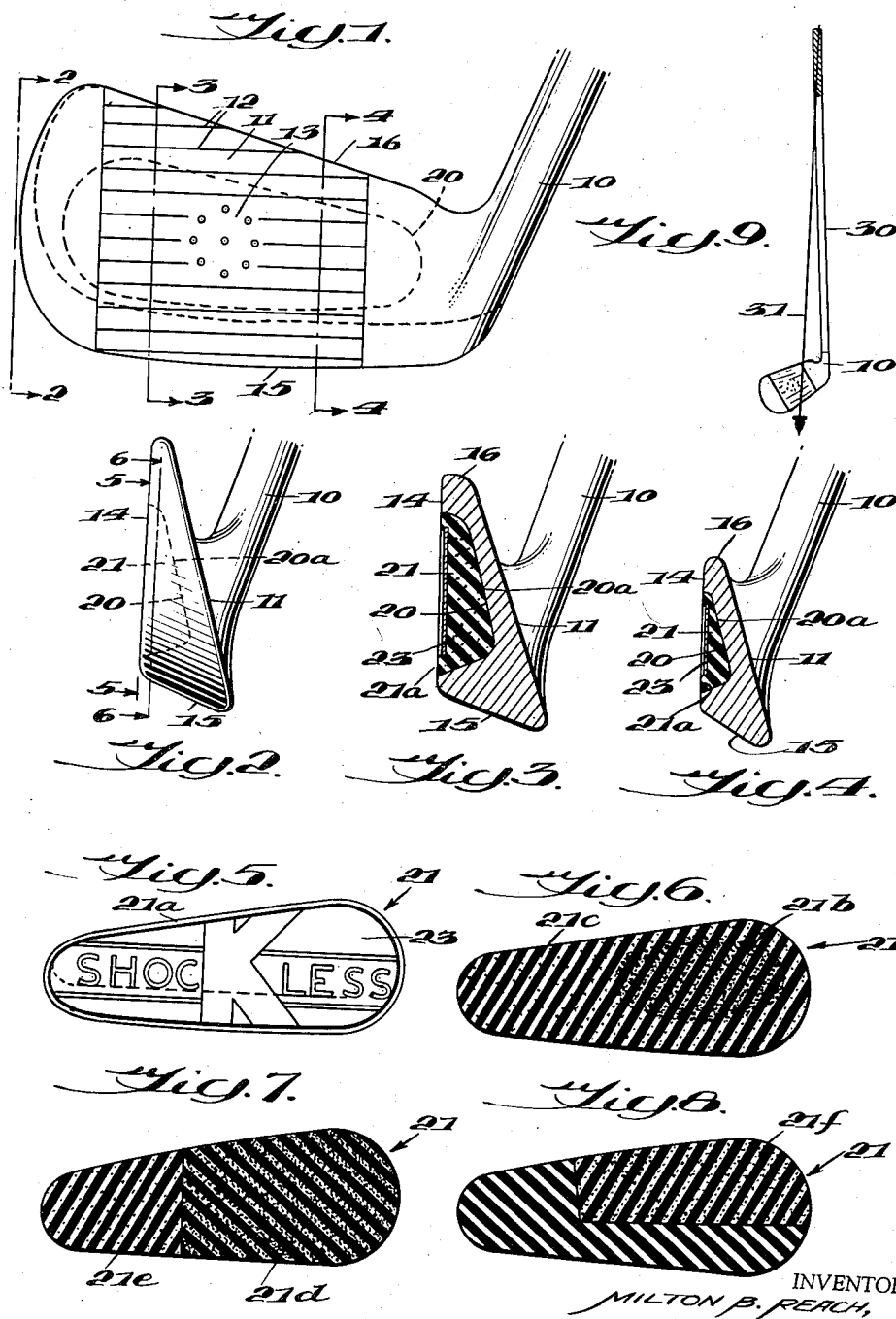
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GOLF CLUB OF THE "IRON" TYPE

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GOLF CLUB OF THE "IRON" TYPE

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This invention relates to golf clubs of the "iron" type and to the manufacture thereof, and aims generally to improve the same.

Several problems, heretofore unsolved, are presented in the manufacture of golf irons. Among these, the following are especially noteworthy:

(a) Iron clubs as used in the game of golf are definitely restricted in shape and style. Custom and demand have imposed limitations in shape to such point that the front elevational shapes of the blades have become largely standardized with the height of the blade progressively increasing from the heel toward the toe of the blade, with the toe generally rounded rather sharply where it meets the upper edge of the blade and more gently where it merges with the sole of the blade, and with a hitting surface virtually standardized as regards face marking and loft. In an effort to effect desired weight distributions and to create appealing style differences to individualize the numerous products of different manufacturers, club designers have therefore resorted to varying the contours and shapes of the back surfaces of the blades. In many instances these variations have been arbitrary, and have merely concentrated weight at an undesirable location.

(b) Furthermore, custom and demand have established that the fore and aft cross section of the blade must be rather wedge shaped so that the sole portion is relatively thick while the upper edge of the blade is relatively thin. As a result, in most such irons, much of the mass of the blade is positioned near the sole of the blade, instead of near the sweet spot that lies approximately at the center of the length and height of the blade, and that is usually marked on the blade face in some fashion, and it will be recognized that many of the modifications of back-face design that have been proposed tend even further to concentrate the weight of the head near the sole thereof. Now to obtain a satisfying "feel," transferring minimum impact shock to the hands of the player, the center of percussion of the head portion of the club, swinging about the center of flexure and torque of the shaft, should coincide as nearly as possible with the sweet spot, and to this end it is desirable that more of the weight of the head be located close to the level of the sweet spot. Yet the shape limitations imposed by custom and demand places a substantial obstacle in the way of attaining this desideratum by alteration of back-face contours.

(c) Also custom and demand has largely standardized the face angle or loft of the irons, which are designated as "Number 1," "No. 2," etc. irons, as the face angle or loft is increased, and the accepted standardization has more or less prescribed the size as well as the shape and loft of each "number," and has prescribed a range of weights for each number iron, that embraces as much as a three-fourths ounce difference between a "light" and "heavy" iron of a particular number, with one or more medium, or medium-light, or medium-heavy weights therebetween. Thus the normal variants in iron golf heads, from light to heavy, have a range of about $\frac{3}{4}$ of an ounce in each of the iron sequences—No. 2 starting at a lighter

base than No. 3; and the higher numbers—having shorter shafts, more pitch, and wider focus—starting at increasingly heavier bases. For these reasons, manufacturers have been faced with the necessity of producing several weight variants in each size or number of golf irons, and since the cost of forging dies is high, the conventional practice is to rough forge the head for a given number iron somewhat oversize as compared to the finished weight of a "heavy" iron of such number, and to then grind and polish each head to a predetermined light, heavy or intermediate weight, which practice involves considerable skill to maintain the prescribed curvatures and ridges and adds greatly to the cost of the club.

According to the present invention, these problems are met by providing a club-head that may be forged with all dies set to produce the lightest base weight, in a simple forging, and in which the intermediate and heavy weights of the club are obtained in a simple and efficient manner in the assembly, or as a custom feature.

(d) A great number of golf irons currently are made of stainless steel. This is a hard, tough metal, costly in dies and costly in labor operations. Sharp ridges and angles, which characterize many of today's designs, quickly wear the forging dies and complicate the polishing and stamping labor of the finishing operation.

One of the aims of the present invention is to enable said stainless steel club-heads to be produced by a simple forging, without such sharp ridges and angles, with consequent saving of wear on the forging dies, and to enable such clubs to be finished to weight and stamped or marked in a simple and inexpensive manner. While these provisions are of particular value in connection with stainless steel club heads, they also contribute to economy, to a somewhat lesser, but percentage-wise equally important extent, in the manufacture of cheaper clubs of softer, lower specific gravity steel, that are finished by chrome plating; and in the latter connection the invention facilitates the attaining of proper club weight without undue bulk and without the inclusion of external reentrant angles difficult to plate efficiently.

Furthermore, when heads of metal of still less specific gravity become available, say of titanium, the heads may be die cast for economy, and by employing the features of the present invention, may be adjusted to proper weight and feel without excessive departure from orthodox shape and bulk.

(e) As above noted, the "sweetness" of the stroke depends to a considerable extent on having the center of weight so located relative to the point of impact with the ball, that little tendency toward sudden clockwise or counterclockwise torquing of the shaft, and little tendency toward sudden longitudinal wave motion or vibration of the shaft is produced by the impact. If the center of weight is too far toe-ward at impact the club torques counterclockwise, and as the flattened ball leaves the club face, tends to give it a "hook" producing spin; if it is too far heelward, a reverse torquing occurs, tending to give the ball a "slice" producing spin; if the weight is too low, a torque is produced about the longitudinal axis of the club head, that creates a vibrational wave motion traveling up the shaft; finally, since the head is off-center with respect to the shaft, the mass of the head, during the swing, tends to force the shaft to bend inwardly toward the feet of the player, and thus to establish a contact point forward of the centrifugal orbit of the club. In conventional clubs, the line of gravity, determined by a plumb line dropped from the grip center across the club face, crosses such face inward toward the heel of the club. However, the nature of the shafting, whether it is steel, fibre glass, or flexible, stiff, or of special design, effects the centrifugally-produced bend of the club shaft, and hence the location of the contact point relative to the gravity orbit of the

club in play. The present invention in a simple manner enables the line of gravity of the club to be so related to the nature of the shafting as to bring the contact point more nearly on the sweet-spot and on the gravity orbit of the club in play, as will hereinafter appear.

(f) Again, as ball manufacturers continue to become more precise and the technique of rubber thread winding improves and produces harder, more controllable balls, there is more impact shock to the club and any off-center of the club weight relative to the point of impact produces greater torsional and vibratory shock to the hands and fingers of the user. Yet the club, to conform to custom and usage and to obtain proper distance must have a rigid striking face, and cannot be too resiliently attached to the shaft, as the delicate sense of "feel" and "control" is lost. Another advantage of the present invention in its preferred form resides in establishing the desired weight distribution and maintaining the rigidity of the striking face and the sense of "feel" and control, while arranging for vibration damping action of a part of the weight of the head, with consequent reduction in the shock transmitted to the shaft. Especially near the end of a long session of, say 72 holes of play, the cumulative effect of shocks transmitted through the shaft, commences to increase the subconscious tension of the player, and to interfere markedly with the sense of ease, looseness, and feel that determines accuracy and quality of play in the "short game" around the putting green. Hence even a percentagewise reduction of such shocks may make a great difference in the player's ability near the end of a long session of play.

(g) Finally, the maintenance of a complete stock of light, medium, and heavy clubs in the entire number sequence requires a considerable investment. By the present invention clubs may be stocked in what might be termed skeleton form and may be made to order on the spot, reducing inventory and shipping costs, in addition to the savings in the cost of manufacture above mentioned.

These and other advantages and objects of the present invention are attained by the improvements hereinafter set forth. The invention resides in the novel features and combinations exemplified or described in connection with the illustrative embodiment shown in the accompanying drawings and is defined in the appended claims.

In the drawings of the illustrative embodiment:

Fig. 1 is a front elevation of a club head embodying the invention, taken normal to the back face of the club.

Figs. 2, 3 and 4 are respectively end elevation and sectional views at the lines 2—2, 3—3 and 4—4 of Fig. 1 in the direction of the arrows.

Figs. 5 and 6 are fragmentary rear elevation and sectional views at the lines 5—5 and 6—6 of Fig. 2, in the direction of the arrows.

Figs. 7 and 8 are sectional views similar to Fig. 6 of modified construction.

Fig. 9 is a gravity line diagram.

The several objects and advantages of the invention, in the illustrative embodiment shown, are attained by forming the head for a given iron number, with a metal skeleton of generally conventional shape, but with a considerable area of its back face reentrantly deeply recessed, and somewhat lighter than the lightest "weight" head for said club member. The recess is preferably of generally ovate shape and generally concentric with the shape of the back face of the club head. Secured in the ovate recess is a polyfunctional ovate filler member, that in the form shown carries stamping or marking on its outer face, the weight and weight distribution of which combines with the single head skeleton to produce a light, heavy or intermediate weight iron of given gravity orbit, and the resiliency of which, in the preferred embodiment, accomplishes a measure of shock absorption, particularly when the wall between the recess and the

front face of the club is made relatively thin as compared to the area of the recess. When the filler is formed of weighted natural or synthetic rubber, as is preferred, it is preferably vulcanized to the walls of the recess, and preferably has the club markings or trade mark, or both, lithographed or formed in intaglio or relief, on or in a metal or plastic plate that is secured by adhesive, vulcanization or other suitable means to the insert, which preferably has a beaded edge that embraces the plate and isolates it from contact with the metal of the head skeleton.

In the form shown in Figs. 1—4, the club head of the "iron" type, when completed, has the normal, accepted "wedge" shape with no excrescences or protuberances therefrom. It comprises a metal body including a conventional hosel 10 and a metal blade having the usual inclined front face 11, preferably having thereon suitable scoring 12, and a suitable target 13 marking the "sweet spot" or bent striking area of the blade face; the usual back face 14 of lesser inclination; the usual relatively wide sole area 15; and the usual narrower upper edge 16.

The metal club head body, however, is peculiar in that it has in its back face 14 a recess 20 of substantial area in which is secured a weighting means 21, that preferably fills the recess substantially flush with the back face 14 of the club, defined by the marginal or framing portions of the metal body.

The recess 20, as best indicated in dotted lines in Figs. 1 and 2, has at the rear face 14 a generally ovate shape (see Figs. 5—8) that extends throughout a major part of the height of the back face and a major part of the length thereof, is generally concentric with the perimeter of the back face 14, and is framed by the marginal metal areas 14. As shown in Figs. 2, 3 and 4, the recess preferably flares outwardly toward the back face 14, which reduces the wear on dies, and has an inner wall 20a that generally parallels the front face 11 of the metal body, defining therewith an area that is relatively thin compared with its height and width. Such area, for example, may be approximately $\frac{1}{8}$ inch thick, and have a height averaging about $\frac{3}{4}$ of an inch, and a length of say, two to three inches.

The weighting means 21, as shown, is secured in the recess 20. In its preferred form the weighting means 21 is composed of a natural or synthetic rubber matrix (specific gravity about 1.00) heavily loaded either throughout its body, or in predetermined parts thereof, with a heavy filler or particulate material, for example, litharge (yellow lead oxide, PbO , specific gravity about 9.37). With, say, a 70% loading of the litharge a composition is obtained having a specific gravity of about 9.1, which is considerably heavier than iron or steel (s. g. about 7.7) and even more weighty as compared to light metals such as "titanium" (s. g. 4.9). While other materials may be employed in the broader aspects of the invention, a resilient weighting means, and more especially a weighted rubber composition, is especially advantageous, as it may be bonded to the metal body by vulcanization or the like, and has the capability of absorbing impact shock transmitted to it by the relatively thin area defined by the front face 11 and inner wall 20a, thereby measurably reducing the shock transmitted directly through the hosel 10 and shaft 30 (Fig. 9) to the hands and fingers of the player.

The weighting means 21, especially when formed of rubber composition, may be prefabricated in either vulcanizable or vulcanized condition, in weights that vary as much as $\frac{3}{4}$ of an ounce between them, and may be assembled with the metal body and be secured therein by cementing or vulcanization to custom-fit a single, standard, metal body to the demand of the particular player for a light, intermediate, or heavy club of a particular number, or the vulcanizable composition may be supplied in pasty form and be filled into the cavity 20 with a

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spatula or by extrusion. In either case, when the weighting means 21 is being vulcanized in place, it may be placed under heat and pressure by plunger means fitting the open mouth of the cavity, the cavity walls serving to complete the mold, and the plunger may mold the club markings, including a trademark, directly into the face of the weight, or may carry a plate including such indicia, that exhibits the indicia in a manner that is not damaged by vulcanization temperature, and that vulcanizes to the weight element.

As above noted, the weighting element 21 is preferably provided with a marginal bead 21a (Figs. 3-5) and is recessed slightly within said bead, and when a separate metal name plate 23 is employed and suitably secured in the recess, the bead prevents contact between the metal plate and the marginal metal portions of the back surface 14. When the weighted element 21 is of uniform composition, and of the shape shown in Figs. 1-5, a larger proportion of its weight is positioned toward of the sweet spot, and only a minor proportion heelward thereof. This weight distribution tends to move the gravity line of the club (indicated by the plumb line 31, Fig. 9, more toward the toe of the club, and also tends to shift the sweet spot slightly in a toward direction, and is particularly desirable to offset a tendency to produce a hook by hitting the ball toward of the sweet spot.

When special weight distributions are desired, the composition of the weighted element 21 may be varied accordingly. This fact is illustrated in Figs. 6-8. In Fig. 6, for example, the portion 21b of the weighted element 21 is more heavily loaded with litharge or like heavy filler than the portion 21c, concentrating more of the weight toward of the club head. In Fig. 7, a similar result is achieved by employing two sections of different composition, the section 21d being more heavily loaded than section 21e. In Fig. 8 the more heavily loaded section 21f is placed high in the element 21 to raise the center of weight of the club head into nearer proximity to the sweet spot, thus to reduce vibration of the shaft in the fingers. From these illustrative examples, it will be apparent that the weight and weight distribution can be shifted as desired by appropriate selection of the resilient weighting material.

While there have been described herein what are at present considered preferred embodiments of the invention, it will be obvious to those skilled in the art that many modifications and changes may be made therein without departing from the essence of the invention. It is therefore to be understood that the exemplary embodiments are illustrative and not restrictive of the invention, the scope of which is defined in the appended claims, and that all modifications that come within the meaning and range of equivalency of the claims are intended to be included therein.

I claim:

1. A golf club head comprising a metal blade having an inclined front face, a less inclined back face, a relatively wide sole area and a relatively narrow upper edge, said blade having a recess extending throughout a major part of the central area of its back face, said recess hav-

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ing an inner wall spaced from the front face of the club head, said inner wall and front face defining an area of metal relatively thin compared to its extent and embracing the normal striking area of said front face, whereby striking impact may in part be transmitted through said relatively thin area, and resilient weight means in said recess and bonded to said inner wall and capable of at least partially absorbing impact forces transmitted therethrough, said weight means comprising a shock absorbing matrix having a particulate weighting material of different specific gravity distributed therein.

2. A golf club head according to claim 1, said recess being ovate at the back face of the club and extending throughout a major portion of the height and width of said back face and generally concentric with the perimeter of said back face, and being framed by the marginal portion of said back face, and said weight means being heavier toward the toe end of said blade.

3. A golf club head according to claim 2, said resilient weight filling said recess to a point substantially flush with said back face.

4. A golf club head according to claim 1, said resilient weight consisting of rubber loaded with filler material.

5. A golf club head according to claim 4, said resilient weight having at least in part a specific gravity differing from that of said metal blade and effecting the weight distribution of the club head.

6. A golf club head according to claim 5, said resilient weight having one area thereof of a specific gravity greater than that of said metal blade and another area thereof of less specific gravity than that of said metal blade.

7. A method of manufacturing golf clubs of a given "number" but with differing weights, comprising forming identical golf club heads each having a recess in its back face and each weighing less than the weight of the lightest desired club head of that "number," preparing weighting compositions having different specific gravities by distributing particulate material in matrices, and thereafter filling the recesses of said club heads substantially flush with the back faces thereof with said weighting compositions, and bonding the compositions in said recesses.

8. A method according to claim 7, further comprising the step of prefabricating said weighting compositions to fit said recesses prior to the filling of said recesses.

9. A method according to claim 7, in which said weighting compositions comprise moldable compositions and are molded into said recesses, the recesses serving as part of the molds.

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