United States Patent

[11] 3,597,831

[72] Inventor **David Morton Caplan**
Los Angeles, Calif.

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Division of Ser. No. 602,691, Dec. 19, 1966, abandoned.
[45] Patented **Aug. 10, 1971**
[73] Assignee **AMF Incorporated**

[54] METHOD OF MANUFACTURING A GOLF CLUB

5 Claims, 16 Drawing Figs.

[52] **U.S. Cl.** **29/460,** 264/171
[51] **Int. Cl.** **B23p 3/00,** B23p 19/04
[50] **Field of Search** ..... 29/460; 273/171, 172, 173; 264/271 X, 275

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Primary Examiner—Charlie T. Moon
Attorneys—Richard A. Joel and George W. Price

ABSTRACT: A golf club comprising a core having a soleplate register hole formed on the bottom portion thereof, a hosel hole formed on a side portion thereof and a cutaway section on the face portion thereof forming a rear face, a rear faceplate mounted within the cutaway portion, said rear faceplate including a base portion and a projecting portion consisting of two sidewalls and an apertured center portion extending outwardly from the base portion, a weight mounted within the soleplate register hole, a soleplate mounted to the bottom portion of the core, said soleplate having an apertured projecting portion extending outwardly therefrom to engage the soleplate register hole, a predetermined swing weight mounted within the apertured portion of the soleplate, and a shaft having one end portion mounted within the hosel hole of the core.

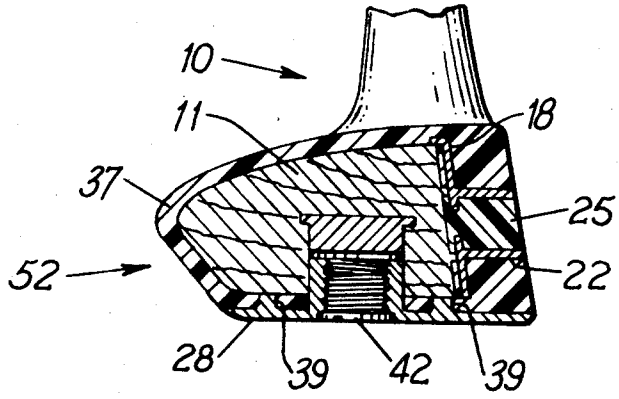

FIG. 1

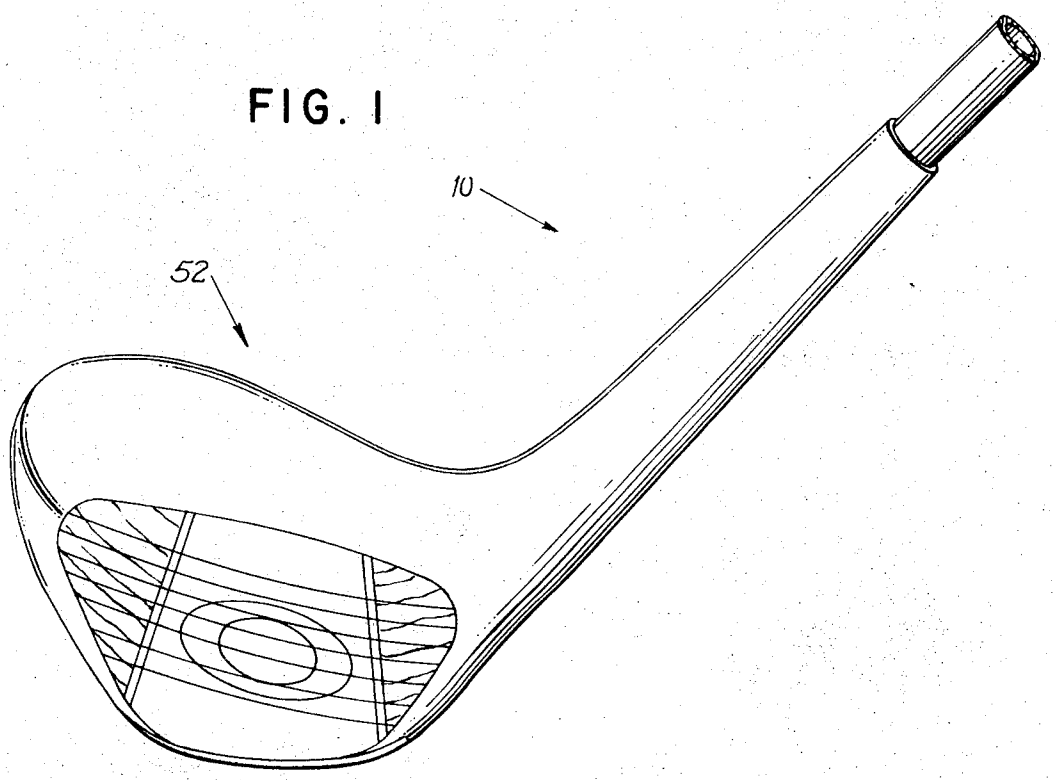

FIG. 2

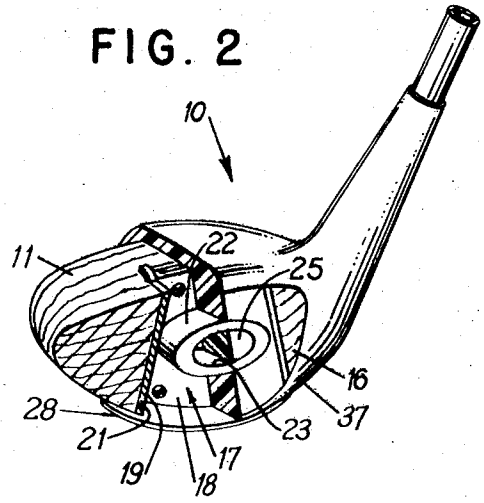

FIG. 3

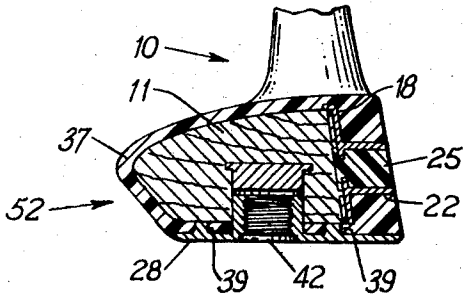

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FIG. 4

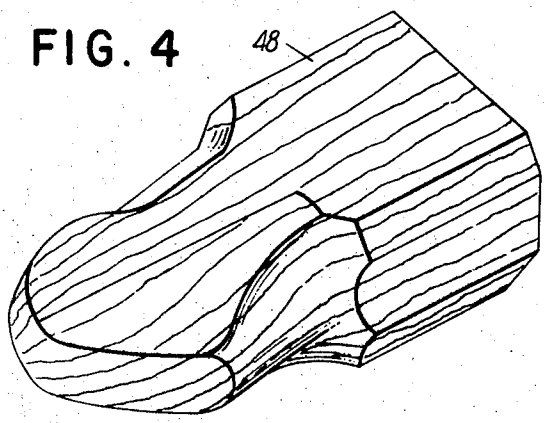


FIG. 5

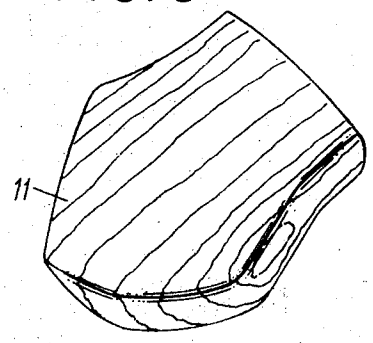


FIG. 6

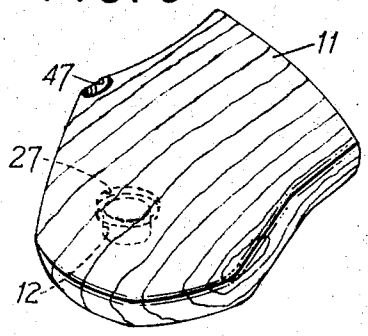


FIG. 7

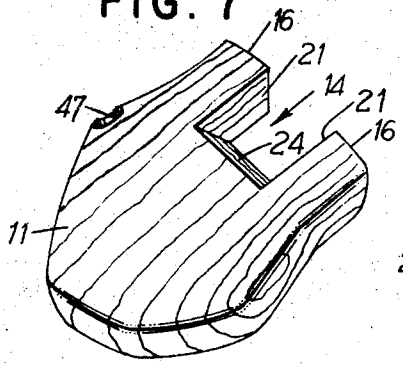


FIG. 8

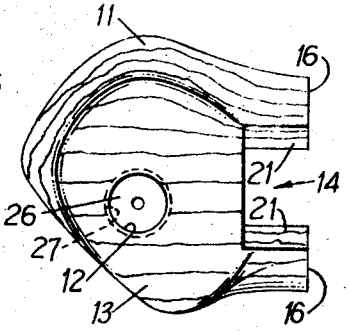


FIG. 9

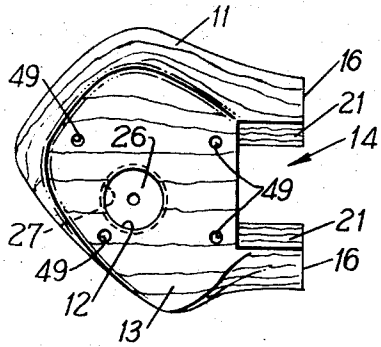


FIG. 10

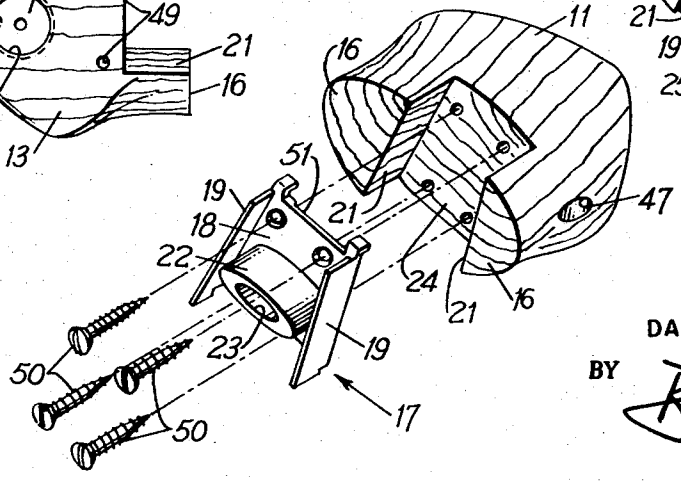
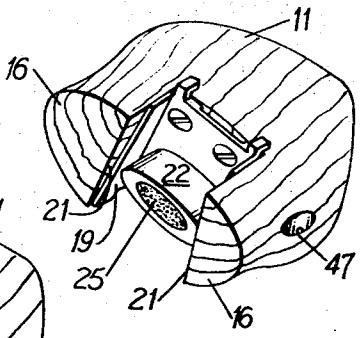


FIG. 11



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DAVID M. CAPLAN
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FIG. 12

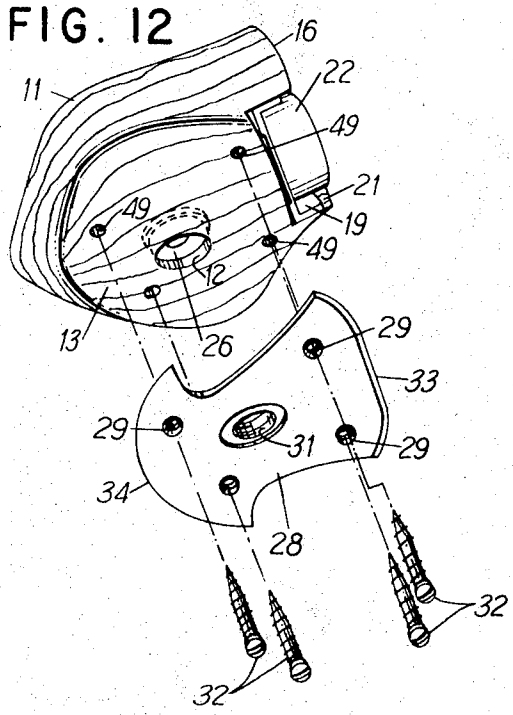


FIG. 13

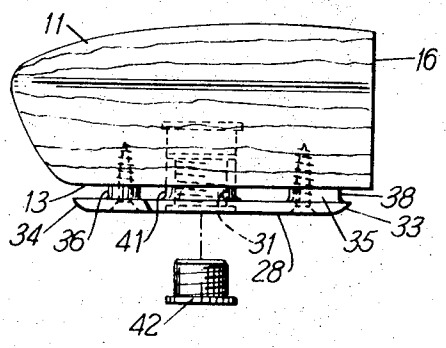


FIG. 14

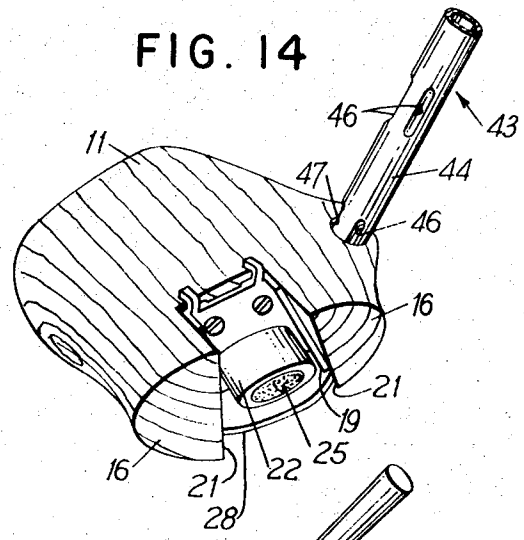


FIG. 15

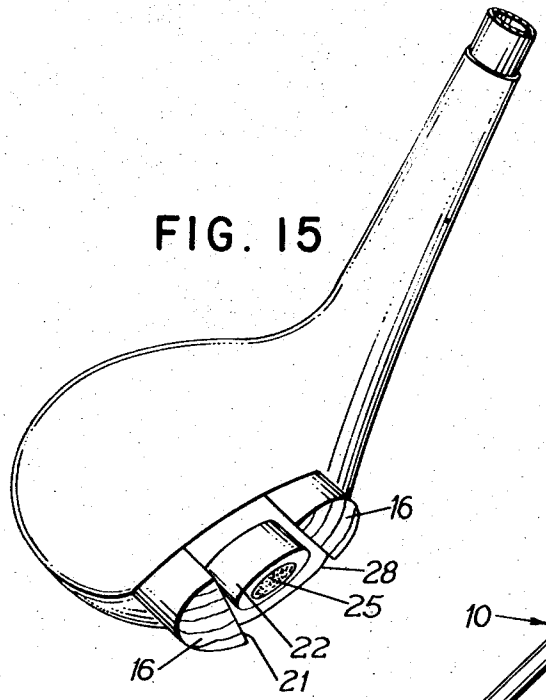
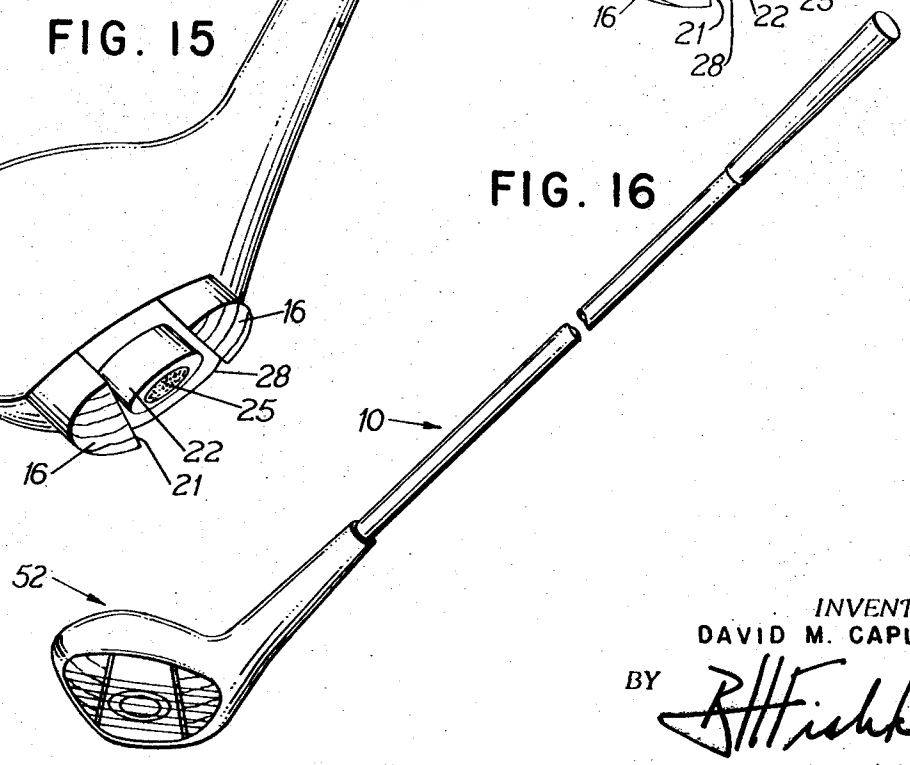


FIG. 16



INVENTOR.
DAVID M. CAPLAN
BY
ATTORNEY

METHOD OF MANUFACTURING A GOLF CLUB

This is a divisional application of Ser. No. 602,691 filed Dec. 19, 1966, now abandoned.

This invention relates to golf equipment and particularly to a new and improved golf club and the method of making said club.

The club head of a conventional "wood" or "driver" comprises a suitably shaped laminated or solid wood block having a face insert mounted thereto and a soleplate mounted on the bottom portion thereof. A metal shaft is then secured within a reamed hole in the hosel portion of the head and pinned through the head. The golf club head is then finished in a number of separate steps by the application of a variety of sealing agents, paints, lacquers, and waxes. Further assembly steps include the addition of the swing weight, the application of a wound thread or one-piece ferrule at the neck of the head and the provision of a suitable grip on the upper end of the shaft.

The foregoing conventional club requires considerable handwork to exacting dimensional requirements. Furthermore, the manufacture of the club necessitates a great number of separate operations with a corresponding increase in labor costs. The typical club is, in essence, a handcrafted product with the quality variances and high unit costs attendant upon such products. It is also extremely difficult because of the multiplicity of hand sanding and finishing operations to duplicate performance characteristics in the finished golf clubs.

Solid clubs molded from synthetic resins have been produced commercially, but by preferred standards of golf club performance they have not been satisfactory. Major disadvantages of this construction are that they do not produce the desired sound on impact, and its dynamic characteristics particularly in terms of driving distance, are not as good as those of a conventional wood club.

In the prior art, and particularly in U.S. Pat. application Ser. No. 441,519 filed Mar. 22, 1965, now U.S. Pat. Ser. No. 3,390,881, and assigned to applicant's assignee, it has been proposed to manufacture a gold club having a wood core and a plastic shell mounted thereabout. The present invention, however, while having a plastic encased wood core, represents a distinct improvement over the prior art both in structure and method of manufacture. The unique golf club of the present invention is highly resistant to moisture, maintains a predetermined swing weight and will neither swell nor change its shape over a period of time. Also, the new club uses the full end grain of the wood as the driving surface of the club, thereby enabling better transmission of the swing energy into impact against the ball.

Accordingly, it is an object of this invention to provide a new and improved golf club and a method of making said club.

Another object of this invention is to provide a superior golf club at a lower cost.

Another object of this invention is to produce a new and unique golf club by a method which eliminates many of the prior art operations with an attendant savings in unit cost.

A further object of this invention is to provide a golf club having superior characteristics and appearance and in particular having an outer surface which is resistant to wear.

A still further object of this invention is to provide a new type golf club having a wood core enclosed within a plastic shell, said club also including a face insert and soleplate assembled thereto to produce a novel golf club construction.

A more specific object of this invention is to provide a new type of golf club in which all vital components—core, shaft, soleplate, striking face, and weight are completely assembled in correct relationship to each other before being enclosed in a plastic shell.

With the above and other objects and advantages in view, the present invention relates to a new and improved golf club which includes a suitably shaped wood core having a soleplate register hole and a hosel hole formed therein, and a cutaway

section or notch on the face portion thereof. A rear faceplate having a projecting portion including an aperture extending therethrough is mounted within the face notch and bonded to the wood core by an epoxy compound. The epoxy can also be used to fill the aperture and flowing therethrough bond to the core face. A predetermined amount of lead is positioned within the soleplate hole and the soleplate is mounted to the bottom of the core. A shaft which may have a dimpled end portion is bonded within the hosel hole. The assembly is surrounded by a plastic shell and then subjected to a plurality of finishing operations.

The method of manufacturing the above golf club comprises basically the steps of forming a wood core on an automatic core lathe and then drilling the soleplate register hole and the shaft hole. A face notch is then cut in the face portion of the core. A predetermined amount of lead is added to the insert and pounded therein. After the soleplate holes have been drilled, the rear faceplate is mounted within the notch. The aperture or "eye" of the projecting faceplate portion is filled with epoxy in order to bond the plate to the core face, or the "eye" can be filled with plastic simultaneous with the encasing of the core assembly with an auxiliary gate and runner so provided and adjusted that the plastic completes the filling of the "eye" just as the exterior of the "eye" is encased in plastic. By this method the interior pressure matches the exterior pressure and the "eye" shape is not distorted. The soleplate and associated plug are then mounted to the bottom of the core. The shaft is sandblasted and then inserted and bonded within the hosel hole. The club assembly is then positioned within a mold and surrounded with an injection molded coating of plastic. After molding, the head is cut and scored with a predetermined spherical radius. The club is then finished by a procedure which includes removing mold marks, labeling, stamping the serial number on the hosel and coating with a tough durable coating of polyurethane.

Other objects and advantages of the invention will become more apparent from the following detailed description when read in conjunction with the accompanying drawings wherein:

FIG. 1 illustrates the new improved golf club produced by the method of the present invention;

FIG. 2 illustrates the subject golf club with portions removed to illustrate the construction thereof;

FIG. 3 is a sectional view taken along the line 3–3 of FIG. 1.

FIGS. 4—16 illustrate in sequence the method of manufacturing the subject golf club wherein:

FIG. 4 illustrates the wood core which is formed by an automatic lathe turning apparatus;

FIG. 5 shows the completed wood core;

FIG. 6 shows the wood core with the soleplate hole and shaft hole drilled therein;

FIG. 7 illustrates the wood core after the face notch has been formed therein;

FIG. 8 shows the wood core with a lead weight inserted in the soleplate register hole;

FIG. 9 shows the wood core with the mounting holes for the soleplate drilled therein;

FIG. 10 is an exploded view showing the mounting of the rear striking face to the wood core;

FIG. 11 shows the striking face mounted to the core and an epoxy compound filling the eye of the striking face;

FIG. 12 is an exploded view showing the mounting of the soleplate to the bottom portion of the wood core;

FIG. 13 is a side view showing the soleplate assembled to the wood core and a swing weight in threaded engagement with the aperture in the soleplate;

FIG. 14 shows the shaft being mounted to the wood core;

FIG. 15 shows the subject golf club after molding; and

FIG. 16 shows the finished golf club.

Referring now to the drawings, the invention comprises a new and unique golf club 10 which includes a wood core 11 such as a hard eastern maple. The core 11 is machined to include a soleplate register hole 12 on the bottom portion 13 thereof and a cutaway portion or notch 14 on the face portion

16 thereof. A rear faceplate 17 having a base portion 18, a pair of sidewalls 19 which engage the walls 21 of the notch 14 and a projecting portion 22 including an aperture 23 extending therethrough is mounted within the face notch 14. The aperture 23 in the projecting portion or "eye" 22 is filled with epoxy which bonds to the rear face 24 of the notch 14.

The club 10 also includes a lead weight 26 which is inserted or poured into the hole 12 and forced into the undercut portion 27. A soleplate 28 having a plurality of mounting apertures 29 and a threaded hole 31 is mounted by means of screws 32 to the core 11. The soleplate outer edges 33 and 34 are shaped to the contour of the respective front and rear edges of the bottom portion of the club 10 while the projecting portions 35 and 36 surrounding the corresponding apertures 29 are designed to provide a support for the mounting elements or screws 32 and to aid in anchoring the soleplate 28 within the plastic envelope 37. The front projecting portions 35 include enlarged flat forward faces 38 to resist the club impact and to increase the surface area in contact with the core 11 to facilitate the molding operation. Additional members 39 project at predetermined intervals from the soleplate 28 to aid in achieving a permanent bond with the outer plastic surface 37 and to prevent the molding pressure from forcing the spacer collars into the core 11. The threaded aperture 31 includes a cylindrical wall 41 which engages the soleplate register hole 12 and is designed to receive a predetermined adjustable swing weight plug 42. The plug 42 may be selected to provide the desired swing weight in combination with weight 26 without removing the soleplate as required in conventional woods.

A shaft 43 having an end portion 44 with a plurality of depressions or dimples 46 is bonded within the shaft hole 47. The club head is encased within an injection-molded envelope 37 of a plastic or thermoplastic resin material such as the acrylonitrile-butadiene-styrene polymers. The resultant club 10 is highly resistant to moisture and hence will neither swell nor change its weight. As further advantages, the hosels will not crack as in clubs of the prior art and soleplate slippage is eliminated. Thus, the present invention involves a new and improved golf club 10 which retains its solid, lively performance under the toughest playing conditions.

The subject golf club 10 is produced by a unique process which results in a virtually moistureproof and totally balanced club. The construction process guarantees uniformity of size, shape and weight in order to provide the balance and feel for consistent accuracy and power.

The method of manufacturing the golf club 10 is illustrated sequentially in FIGS. 4—16. FIG. 4 depicts the start of manufacturing process wherein a wood core 11 (FIG. 5) is formed from 6- to 14-foot sections 48 of approximately two-by-four on an automatic wood lathe. The cutting tool follows a template as it shapes the wood section 48 and then cuts the finished turned core 11. The lathe (not shown) then automatically indexes and feeds the wood section 48 forward for another forming operation. Since there is no hosel in the present design, it is possible to use a better wood such as kiln dry hard maple and to employ a direct end grain for the percussion face 16. The end grain provides superior striking power and better sealing through the head as the plastic envelope 37 is applied thereover.

The wood core 11 is fed to a drilling apparatus where the hosel or shaft hole 47 and the soleplate register and lead receiver hole 12 is also undercut for better lead hold. The face notch 14 is then milled in the core face 16 in a conventional manner. As shown in FIG. 8, a predetermined amount of lead 26 is inserted or cast into the hole 12 and "pounded" to fill the hole well and expand the lead 26 into the undercut 27. Next, the soleplate holes 49 are drilled using a drill jig.

The rear faceplate 17 is mounted within the notch 14 by means of screws 50 while a matching color epoxy is used to bond the sidewalls 19 to the respective walls 21 of the notch 14. The rear faceplate 17 may be composed of either metal or an acrylonitrile butadiene-styrene-polycarbonate blend which provides a high impact and tensile strength, and readily bonds to the plastic envelope 37. The plate 17 also includes a pair of channels 51 which fill with plastic during the injection molding operation to provide a locking arrangement.

The aperture 23 within the "eye" 22 is filed with epoxy 25 which bonds to the wood core 11 through the rear portion of the aperture 23. The insert 17 is then shaped to the exterior wood profile where necessary in order to produce the assembly depicted in FIG. 11. In another embodiment the aperture 23 is filled with plastic during the molding operation and a separate step is thereby eliminated.

As illustrated in FIG. 12, a die-cast soleplate 28 is mounted to the bottom portion 13 of the core 11 by means of screws 32. The soleplate 28 conforms to the finished contour of the club bottom and is spaced a predetermined distance from the core surface by the bosses 35, 36 and 39. This provides a locking space for the plastic during the molding operation and prevents sole plate slippage in the finished club 10.

A shaft 43 having a sandblasted end portion 44 for better adhesion is inserted in the hole 47 and bonded to the core 11 by means of an epoxy binder. The detents 46 aid in anchoring the shaft 43 within the hole 47 and within the plastic envelope 37 thereby eliminating the need for a conventional pin arrangement. Furthermore, the present shaft design prevents the hosel breakage which formerly occurred.

FIG. 13 shows the sole plate 28 assembled to the core 11 and the soleplate plug 42 which is mounted in threaded engagement within the aperture 31. The soleplate plug 31 is removable to permit swing weight changes, by adding to or removing lead in combination with weight 26. Thus, it is possible to custom-fit the club characteristics to a particular individual.

FIG. 14 illustrates the club 10 after it has been removed from the mold after an injection molding operation; the club 10 is surrounded with a tough durable layer of material such as that sold under the trademark "Cycolac" by The Marbon Chemical Division of The Borg-Warner Company. The club head 52 and shaft 43 are located precisely within the mold to obtain the desired configuration and then the club illustrated in Flg. 15 is cut and scored to provide the finished contour. The striking faces 16 and the "eye" 22 are cut along a predetermined face angle while the plastic and wood surface is rounded with a spherical radius of approximately 9½ inches.

The club 10 is then rough sanded on a belt and finished in a number of separate operations which include fine-sanding the head, filling the scoring, labeling, hosel stamping and spraying. The finished head 52 is sprayed with several coats of a material such as polyurethane and buffed to provide an attractive appearance. A wood sealant may be applied to the wood faces 16 prior to spraying.

The new and improved club 10 thus produces is totally balanced and completely uniform in size, shape and weight. The club 10 is superior in performance and endurance and is more reasonable to product due to the elimination of a plurality of separate hand operations.

It is to be understood that the above-described arrangements are simply illustrative examples of the application of the principles of the invention. Numerous other arrangements may be readily devised by those skilled in the art which will embody the principles of the invention and fall within the spirit and scope thereof.

What I claim is:

1. The method of making a golf club which comprises the steps of:

providing a core of a predetermined shaped configuration,

forming a plurality of holes therein,

forming a face notch in the face portion of the core,

inserting a weight into one of the holes in the core,

mounting a rear faceplate having a projecting portion with an aperture extending therethrough within the face notch in the core,

mounting the soleplate to the bottom of the core,

mounting one end of a shaft to the core, and

surrounding the core and the portion of said projecting portion of said rear face plate within said face notch with a layer of plastic material.

2. The method of making a golf club in accordance with claim 2 further including the step of:

mounting a predetermined removable swing weight within mating holes in the soleplate and juxtaposed core portion.

3. The method of making a golf club in accordance with claim 1 wherein:

the weight comprising a metal material is cast into one of the holes in the core and forced to assume the configuration of the hole.

4. The method of making a golf club in accordance with claim 1 further including the step of:

filling the aperture in the projecting portion of the face plate with epoxy.

5. The method of making a golf club in accordance with claim 1 further including the step of:

cutting the face portion of the plastic encased club to provide a predetermined striking face for the club.