Dec. 19, 1950 E. M. BRIGHT 2,534,947

GOLF CLUB HEAD

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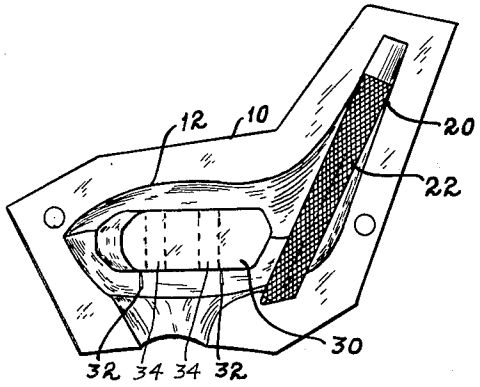


FIG. 1

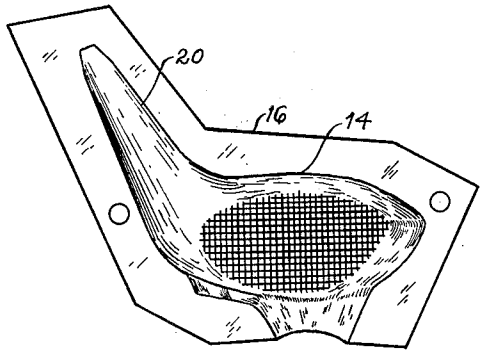


FIG. 2

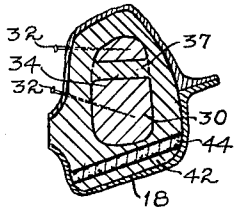


FIG. 5

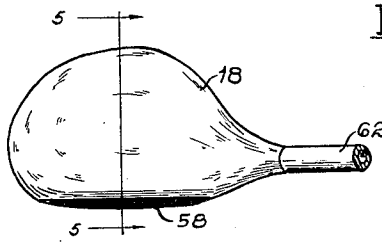


FIG. 3

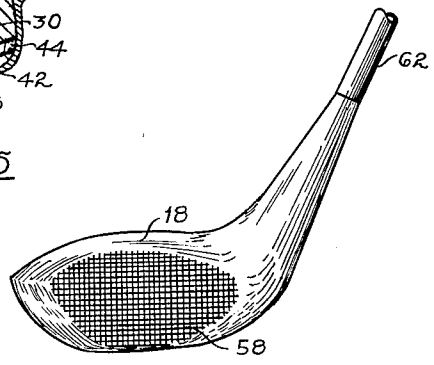


FIG. 4

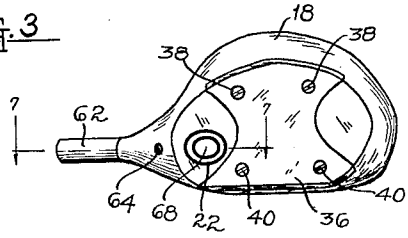


FIG. 6

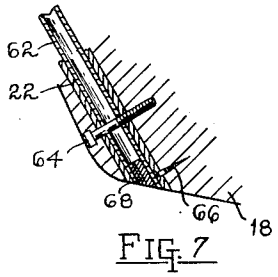


FIG. 7

INVENTOR.

BY Elvin M. Bright

Harry G. Dybvig

His attorney

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GOLF CLUB HEAD

Elvin M. Bright, Milwaukee, Wis.

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2 Claims. (Cl. 273—80)

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This invention relates to a golf club head and more particularly to a golf club head manufactured from plastic molding material.

In the past, golf club heads that have been in general use are usually made from certain types of wood, such as persimmon, or from metal.

An object of this invention is to manufacture a golf club head from plastic molding material that has been reenforced by suitable reenforcing material and the weight controlled by inserting fillers or ballasts having a specific gravity differing from the specific gravity of the plastic molding material.

Another object of this invention is to provide a plastic molding material that is reenforced by two or more types of materials, one of which tends to remain suspended throughout the entire mass and the other floating or settling into a predetermined area to reenforce portions of the golf club head that are the most vulnerable to breakage.

Another object of this invention is to provide a plastic golf club head wherein portions of the golf club head are molded from a molding material having one color and one or more other portions being molded from molding material having a different color or colors, to thereby enhance the ornamental appearance of the golf club head. For example, the face of the golf club head may be molded from white molding material adjacent a layer of red molding material, then another layer of white molding material, then the balance of the golf club head being black, blue or some other color.

Another object of this invention is to provide a ballast so positioned in the head of the golf club that the proper balance is maintained and at the same time the strength of the club is not impaired.

Another object of this invention is to provide a plastic golf club head that has the hole for receiving the golf club shaft reenforced by a tubular reenforcing member of strong material, as for example, molded fibrous material.

Other objects and advantages reside in the construction of parts, the combination thereof and the mode of operation, as will become more apparent from the following description.

In the drawings,

Figure 1 is a perspective view of one-half of the mold, showing the insert in position and the tubular member for the shaft in position.

Figure 2 discloses the other mold member.

Figure 3 is a top plan view of the golf club head with the shaft broken away.

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Figure 4 is a front elevational view of the golf club head showing a portion of the handle.

Figure 5 is a cross sectional view taken substantially on the line 5—5 of Figure 3.

Figure 6 is a bottom view of a golf club head showing the sole plate.

Figure 7 is a fragmentary cross sectional view taken substantially on the line 7—7 of Figure 6.

Referring to the drawings, the reference character 10 indicates a mold member that has a cavity 12 formed therein, which cavity 12 cooperates with a cavity 14 in mold member 16 to form a mold cavity for a golf club head 18. The mold members 10 and 16 cooperate to form a cylindrical recess 20 adapted to receive a reenforcing tubular member 22, adapted to receive the shaft, not shown, which tubular member 22 may be made from zinc chloride paper wrapped upon a mandrel. In order to cause a firm union between the molded golf club and the tubular member 22, the outer surface of the tubular member 22 is preferably roughened, notched or grooved, so that when the plastic molding material is poured into the mold, the plastic molding material firmly binds the tubular member 22 into position. The tubular member 22 has its lower end cut to the exact required angle before being located in the mold, which mold has a corresponding angular cavity for the reception of the tubular member. The upper end of the tubular member 22 is tapered before molding. This taper agrees with the taper needed for the finished club handle. The tubular member, after molding, is reamed to the exact diameter required for a proper fit with the end of the tubular metallic shaft or any other type of shaft.

In view of the fact that the use to which the golf club is to be put determines to a great degree the desired weight, and in view of the fact that golfers have been accustomed to certain sizes for certain types of golf clubs, as for example, the drivers, and in view of the fact that the plastic molding material may not have the identical specific gravity of wood, it is necessary to provide inserts of foreign matter having the desired specific gravity and/or size to displace some of the molding material, so as to obtain the proper weight.

In Figure 1 the mold 10 has mounted therein an insert 30. The material used for the insert 30 is selected to suit the particular requirements of the club. If, for example, it is found desirable to lighten the club, that is, if the specific gravity of the molding material is too great, the insert 30 may be made from a cellular synthetic rubber

coated with a film of cellulose acetate. The cellulose acetate coating is duo-functional. This coating prevents the molding material from contacting the synthetic rubber, thereby preventing undesirable chemical reactions. The coating material also seals the insert 30, to thereby trap the air in cells that have been severed during the cutting of the insert to the desired shape from the stock material. By trapping the air, it is prevented from escaping into the molding material during the curing thereof.

In other types of clubs, as for example in putters, the weight of the molding material is insufficient. In order to increase the weight, the insert may be made from lead or some other heavy material.

The insert 30 is held in position by a pair of pins 32, passing through suitable apertures in the sole of the mold 10 and projecting into the insert 30 to hold it in the proper position. The pins 32 are preferably located in the area that will be covered by the sole plate. Thus, the pin holes in the finished golf club are concealed. This insert is positioned in the mold before the plastic molding material is poured into the mold. It may be desirable to provide the insert 30 with apertures 34 extending through the body thereof, which apertures are filled with plastic molding material. The apertures 34 are so aligned with respect to the sole plate 36 that the boss or column-like portion 37 in the apertures 34 provide seats for the screws 38 or 40, as the case may be, holding the sole plate 36 in position. Furthermore, these columns reenforce the golf club head. The sole plate, of course, is mounted in position after the plastic molding material has been poured and properly cured.

The insert 30 has a contour similar to the contour of the golf club. The insert is so positioned that the proper balance is maintained. Furthermore, the insert has one face substantially parallel to the striking face of the club. There is sufficient space between the striking face of the finished golf club and the insert to provide sufficient strength to withstand the impact.

In the manufacture of golf clubs it may be found desirable to provide a golf club with ornamental areas that may consist of highly colored zones or layers. In Figure 5 the layers 42 and 44 may be made from contrasting colored plastic molding material. This effect has been brought about during the molding operation, as will appear more fully later.

A plastic molding material that may be used consists of a mixture including styrene, an unsaturated polyester, which may be represented by the following formula: $C_6H_5—CH=H_2$. Styrene has a low viscosity, a viscosity quite comparable to that of water. In order to cause this styrene, or unsaturated polyester to gel, a catalyst, consisting of $\frac{3}{10}$ of 1% of tertiary butyl hydroperoxide is used. This catalyst has a peculiar reaction, in that immediately after the addition of the catalyst the viscosity of the styrene is lowered, so as to cause the liquid to flow more freely. Furthermore, the percentage of the catalyst is not critical, in that it may vary from .05% to 1.5%. After the catalyst has been added to the liquid, a chemical reaction sets in that generates heat and causes the liquid to gel, that is, the viscosity increases. However, before the catalyst is added, 15 parts of glass fibers and 8 parts of cotton fibers are added to the liquid to function as reenforcing material. These fibers may vary in length. They may be from ⅛" to ¼", more or less. After the fibers are added, the liquid is agitated, so as to distribute the fibers uniformly throughout the liquid. Due to the fact that the specific gravity of the glass fibers is greater than the specific gravity of the liquid, there is a tendency for the glass fibers to settle or precipitate to the bottom. The cotton fibers have a tendency to remain uniformly dispersed throughout the volume of liquid and actually reduce the weight of the main body of the club.

If it is found desirable to provide layers of various colors on one side of the golf club head, this is accomplished by first pouring in plastic molding material having added thereto a suitable dye, so as to form the layer 42. This plastic molding material has had added thereto a catalyst, so that after the plastic molding material has been poured into the bottom of the mold so as to form the bottom layer 42, this layer gels, so that it will not mix with additional molding material that may be added later. After the layer 42 has gelled, another layer 44 may be placed in the bottom of the mold and this permitted to gel. One or both of these layers may be reenforced with a suitable reenforcing material mixed with the liquid molding material, so that the layers will withstand impacts.

After the layers 42 and 44 have been poured and gelled sufficiently to hold these in position, the molds may then be oriented into such a position that the opening 50 is on top of the molds 10 and 16 juxtaposed side by side.

The joining surfaces of the two mold members lie in a common plane. These joining surfaces are provided with fine parallel grooves, as for example, the grooves resulting from the use of a coarse grinder. The surfaces are coated with silicon or caribou wax or any other sealing material that seals the joint during the molding operation. The edges of the molds are preferably clamped together by suitable spring clamps.

The plastic molding material is poured through the opening 50, which molding material has added thereto the reenforcing fibers, both cotton and glass, or any other suitable fibers, and the catalyst.

Due to the glass fibers having a specific gravity greater than the molding material, the glass fibers settle to the bottom. That being the case, the sprue or opening has been arranged so that the shank is located in the bottom of the mold. By being located in this position, the glass fibers settle around the shank where the greatest strength is required, thereby causing the glass fibers to effectively reenforce the portion of the golf club head that is most vulnerable to breakage.

The cotton fibers remain dispersed uniformly throughout the mass, thereby reenforcing the golf club head sufficiently throughout the main body. If desirable, the portion 42 which may function as the face of the golf club may be reenforced with reenforcing material having the desirable characteristics of a face plate.

After the plastic molding material has been poured into the cavity or mold, so as to fill the mold cavity, the mold may be vibrated, so as to cause air bubbles to flow to the top. The mold members are vibrated at various angular positions to facilitate the escape of trapped air. Furthermore, while the molding material is going through the setting process, it may be heated to a temperature of from 70° to 130° F., preferably maintained at about 100°, for a period of from 30 to 120 minutes. This temperature should be

controlled. When the molding material is subjected to the influence of the catalyst and undergoing a chemical change, it generates heat. That being the case, the mold is preferably placed in a liquid, such as water, at 100° F. The water may be thermostatically controlled, so as to dissipate the heat generated by the plastic molding material during the gelling process. While the plastic molding material is undergoing this change, a vacuum is preferably created above the water, to further expedite the withdrawal of air. In addition thereto, the mold may be rotated, so that the air may escape more easily. Air pockets or blow holes in the finished golf club head obviously are objectionable. The air escapes through the sprue in the hole 50. The pins 32 are then removed.

After the plastic molding material has set or gelled, the mold is then removed into a curing compartment, where it is subjected to a temperature of from 200 to 250° F. During the curing process the molds are preferably submerged in heat treating oil. Thus, if the seal in the joints is broken, the heat treating oil will have no injurious effect upon the molding material, in that no chemical reaction takes place. The duration of the heat treatment depends in part upon the size of the body, a large body requiring more time. For golf club heads the time may be anywhere from 30 to 60 minutes. When the golf club head has been cured, it is ready to be removed from the mold.

After the molding operation has been completed and the golf club head removed from the molds 10 and 16, the sprue is preferably severed and polished. The hosel is severed to the proper length. It is also trimmed, so as to have the proper taper. The head is then polished. After the head has been polished, the base is routed to provide a suitable recess for the sole plate 36. Holes may then be drilled for the screws 38 and 40 and the sole plate 36 is then secured to the golf club head by the screws 38 and 40.

The golf club head is then ready for the finishing touches on the driving face. The head is placed in a fixture for accurately holding the head. The molded lines 58 in the face of the club are then cleaned and the outer surface, that is used as a driving surface, is finished, so that it will lie within a plane.

The shaft is then inserted. A hole is drilled through the heel of the club, so as to pass through the tubular member 22 and the shaft 62. An Allen head type screw 64 is threaded into the hole, so as to prevent rotation of the shaft with respect to the tubular member and the head. Furthermore, in order to prevent rotation, a small wood screw 66 is inserted through a hole in the shaft 62. After the screw 66 has been properly seated, a suitable plug 68 is used in closing the lower end of the shaft. In finishing this wood plug, it may be polished and burnished by a grinder, so as to provide a finished surface. The burnishing of the wood enhances the appearance thereof.

The molding material described herein is not limited to golf club heads in its use. It may be used for numerous other purposes, for the reason that the molding material has great strength, lends itself to variations in color, as a dye may be added, and it is easily molded, in that for many purposes no pressure is required. For some types of molding it may be necessary to apply pressure, so as to force the molding material into the mold, although pressure applied to the molding material does not enter into the curing process.

A method has been developed for attaching the sole plate to the club head without the use of screws. This has been done as follows: The golf club head is routed out to the depth and contour required to inlay the sole plate. This provides a rather rough surface in the routing area. The head is then placed in an oven at 150° F. until the head reaches that temperature. A heavy coating of a resin, similar to the resin used in casting a head, but having exceptional adhesive properties mixed with the necessary catalyst and colored to the same color as the molded head, is then applied with a brush to the routing area. The aluminum or brass sole plate, which has been knurled on the inside surfacing only, is then clamped into the routing area. The adhesive resin, having been heated to approximately 150° F., then completes its chemical reaction, forming a perfect bond between the metal sole plate and the club head. In actual tests, it is impossible to remove the sole plate without breaking the head. As soon as the sole plate has been attached and while the head, which is a good insulator, retains its heat, the shaft, which has been roughened over the area to be inserted in the hosel, is dipped into the same adhesive resin, and subsequently inserted into the hosel which completes its cure in the same manner as the sole plate. The bond here again under actual tests is far superior to mechanical methods of attaching the head to the shaft.

Furthermore, in the event the weight of the molding material is such that the resultant golf club head has the proper weight without the ballast member, the ballast member is then eliminated. Also, the ballast may be eliminated by redesigning the golf club head so as to obtain the proper weight in the club head. Furthermore, instead of using a ballast member comprising a unitary member, the specific gravity of the molding material may be reduced by adding ground cork, or any other suitable lightening agent, to the molding material, so as to obtain the proper specific gravity. If the head is too light, the weight may be increased by adding some heavier material, preferably granular, to thereby increase the specific gravity.

Although the preferred embodiment of the device has been described, it will be understood that within the purview of this invention various changes may be made in the form, details, proportion and arrangement of parts, the combination thereof and mode of operation, which generally stated consist in a device capable of carrying out the objects set forth, as disclosed and defined in the appended claims.

Having thus described my invention, I claim:

1. A molded golf club head including a tubular member of molded fibrous material having a roughened surface, a plastic molded head member having the molding material firmly embedded into the roughened surface of the tubular member, glass fibers in the plastic molded head, said glass fibers being concentrated around portions of the tubular member, and layers of ornamental design extending along one face of the golf club head, said layers being formed in situ during the molding operation.

2. A molded golf club head including a tubular member having a roughened outer surface, molding material molded around the tubular member forming the golf club head, said molding material surrounding the tubular member so as to form a shank, glass fibers concentrated in the shank portion for reenforcing the molding mate-

rial to give the shank sufficient strength, and a shaft fixedly attached to the tubular member.

ELVIN M. BRIGHT.

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