

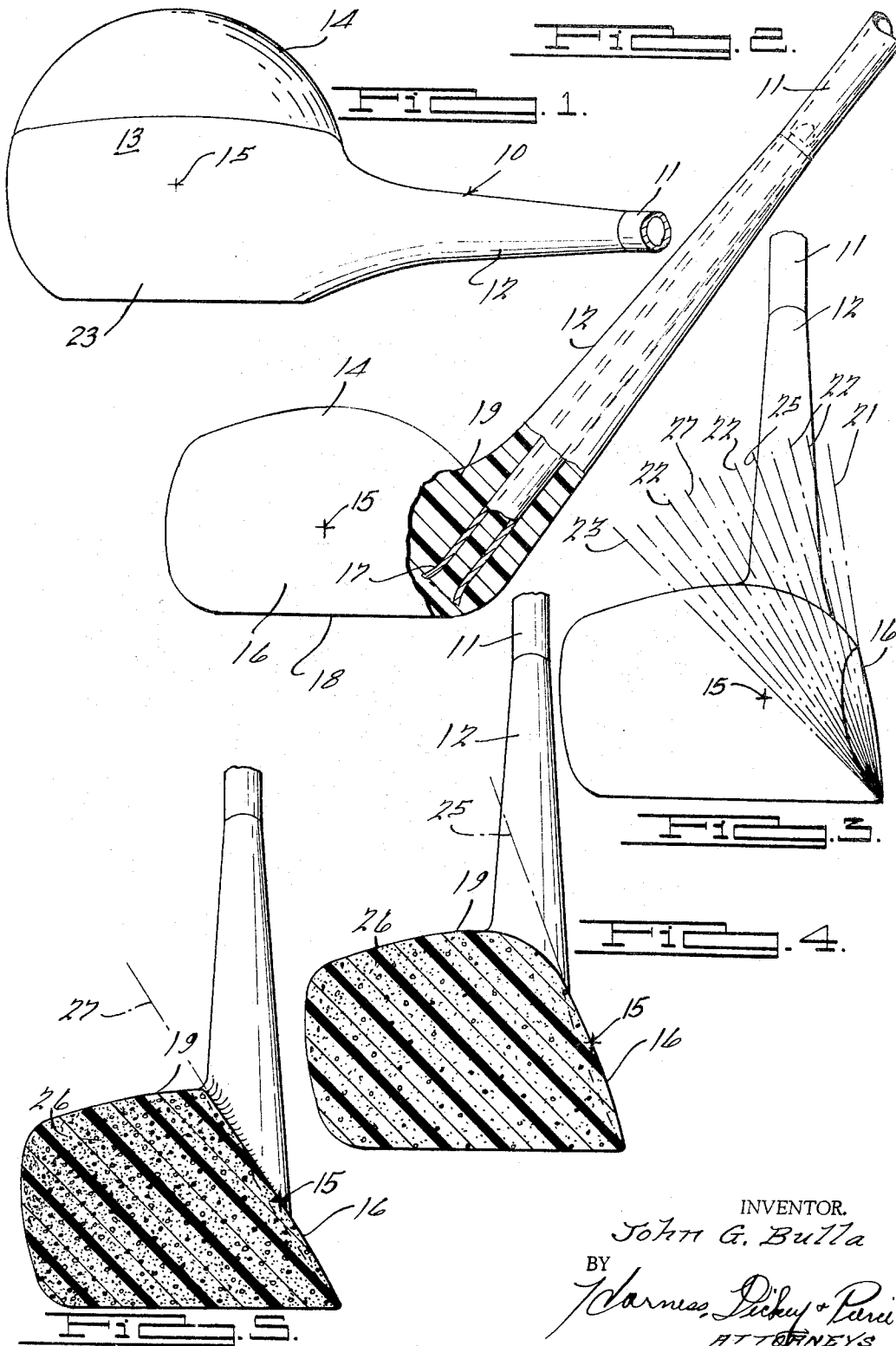
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GOLF CLUB HEAD

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GOLF CLUB HEAD

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1 Claim. (Cl. 273-78)

The principal object of the invention is to provide a golf club head made from a moldable plastic material, the shape of the head and the density of the material being such that the shock wave produced when striking a ball returns to the striking face at the time the ball begins to decompress and leave the face, the rate of recovery of the striking face matching that of the ball.

Other objects and features of novelty of the invention will be specifically pointed out or will become apparent when referring, for a better understanding of the invention, to the following description taken in conjunction with the accompanying drawing, wherein:

FIGURE 1 is a plan view of a golf club head embodying features of the present invention;

FIG. 2 is a view in side elevation of the golf club head illustrated in FIG. 1;

FIG. 3 is a front view of the structure illustrated in FIG. 2 showing the face angles of a series of golf club heads;

FIG. 4 is a sectional view of structure similar to that illustrated in FIG. 3, showing a golf club head with a metal filler in the material thereof, and

FIG. 5 is a view of structure similar to that illustrated in FIG. 4, showing a golf club head having a face of greater slope and with a greater amount of a metal filler added to the material thereof.

Referring to FIGS. 1-3, a golf club 10 is illustrated as having a shaft 11 to which a shank 12 of a head 13 is molded. The head has a body portion 14 of spherical section struck from a center 15 disposed on striking face 23 which slopes at an angle of approximately 45° from the vertical. The center of curvature 15 of the body portion is located substantially at the center of the face 23 and this causes the shock wave, occurring when the ball is struck by the head approximately at the center to move to the spherical surface of the body and back to the point of impact. The density of material employed in the head is such that the recovery rate substantially equals that of the golf ball which is propelled from the face of the club by the force of recovery of the material of the striking head. This force will be effective at the face of the club just prior to or at the time of separation of the ball from the face. Shaping the club head as a section of a sphere, the center thereof lying substantially at the center of the face, will cause the shock wave to radiate through the material to the spherical surface and return to the point of impact and thereby provide a maximum striking force to the ball at the time it separates from the club face.

The material employed in the set of club heads is not critical as it is a balance of a moldable plastic and metal filler materials chosen to vary the weight of the series of heads and provide a high impact and tensile strength thereto. Any well-known plastic material may be employed either alone or in combination with other plastic materials to which a metal filler is added which may be filaments, fillings or of powder form. The metal may be iron, copper, brass, aluminum, silver or any suitable type which is wetted by the plastic material and which adds desirable weight and striking characteristics to the heads. Such a plastic material or a compound thereof has a certain amount of elasticity and is one which is durable and not too brittle, one which provides the proper impact

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strength when employed with the filler material, one which will vary in weight conforming to the slope of the faces of the heads and particularly one of such density as to have a desired recovery property.

The shaft 11, as illustrated in FIG. 2, has a bell shaped end 17 which is disposed adjacent to the bottom 18 of the head in position to receive the plastic material 19 when forced in the mold to fill the shaft to a point adjacent to or slightly above the shank 12 of the head. To make certain that the material will flow properly within the shaft, the shaft may be heated at the time it is inserted within the mold so as not to chill the plastic material, which readily flows therein as the hollow shaft functions as a vent for the cavity. By having the end of the shaft bell shaped, it is more securely maintained within the head without any tendency to shift longitudinally or rotate within the shank 12 thereof.

In FIG. 3, the face 16 of the driver is illustrated as being disposed on a slope of 9° to the vertical indicated by the broken line 21. The twelve additional sloping faces are indicated by the broken lines 22, 23, 25, 27 which are disposed at an angle of 3° to the adjacent lines. With this arrangement, the last head of the series of thirteen club heads will have a face disposed at an angle of 45°.

As the slope of the heads increases, the volume of the plastic material 19 decreases and the lengths of the shafts decrease. The heads must be increased in weight so as to have all of the clubs of the set provide a like weight of swing to each of the clubs. In FIG. 4, a head is illustrated having a slope 25 which conforms substantially to that of a #2 iron. The plastic material 19 employed in the head has an increased amount of metal filler 26 therein to increase the weight of the head. The plastic material may be altered for each head to have the recovery rate thereof conform to the rate of recovery of the ball, the amount of deflection of which decreases as the slope of the face of the club increases.

In FIG. 5, a head is illustrated having a slope 27 which substantially conforms to that of a #6 iron, which is approximately 30°. The resin material 19 has a greater amount of the metal filler material 26 therein to produce a greater weight to the head having the slope 27 than that of the head having the slope 25 and the other heads having less slope to the faces. By increasing the amount of metal filler within the material of a head which has decreased mass and a face of greater slope in the series, the heads become increasingly heavy, and as the shafts decrease in length, the weight of swing of the clubs will be uniform throughout the set.

A suitable plastic composition for the heads would comprise a mass of unwoven continuous metal filaments such as steel wool, copper wool, silver wool or copper or silver-coated steel wools, or the like, coated with a polymerizable or a thermosetting epoxy resin or polymerizable polyester. Such materials may be molded to form club heads having exceptional strength, thermal conductivity, impact resistance and extremely good surface finish. By the term "unwoven continuous metallic filaments" is meant a filler material comprising spun, extruded or cut metal filaments having a continuous length appreciably greater than that present in a finely chopped filamentary mass, or metal granules, or a metal powder. The preferred filler is the familiar metal or steel wool which is composed of a mass of unwoven more or less continuous metal filaments of steel, copper, aluminum, silver or the like. The filaments present in the unwoven wool type metals may satisfactorily have a diameter of between about 0.0005 inch and about 0.025 inch. While the filaments may be of any metal it is preferred that they be of steel, iron, copper, aluminum and their alloys.

The only known restrictions on the metal forming the filaments is that it should be a good thermal conductor and have relatively high tensile and compressive strength.

The proportion of the metal filaments in the composition will vary widely as less and less material is employed in the club head since the club head of less volume must weigh more than the club heads having a greater volume. In other words, as the slope of the face of the club becomes greater, less material is employed in the head and such heads being on shafts of decreasing lengths, must weigh more to maintain the same weight of swing to all of the clubs of the series. In general, it has been found that at least 25% by weight of the total weight of plastic composition should comprise metal filaments in order to appreciably improve the thermal conductivity, strength, impact resistance and other desired properties. Except in special circumstances it has been found that the range of the metal filler in the binder may vary throughout the series of clubs from 25% to as much as 75%.

In many instances, it is desirable to incorporate other fillers of both filamentary and finely-divided form, in order to further modify the molding properties, flow properties (in the mold), and other physical properties of the plastic composition. For this purpose, up to two-thirds of the total filler content may comprise other added filler materials. Other substances may be incorporated in the composition such as natural and synthetic resins and polymers, stabilizers, mold release agents or lubricants, plasticizers, dyes, colored pigments and the like. The plastic materials may be polyesters and alkyd molding materials with a filler, silicon molding compounds with a filler, epoxy molding compounds, and with certain other materials, phenolformaldehyde and phenolfurfuryl molding compounds and filler materials. Any of these materials or these materials compounded with others and with fillers known in the art to be suitable can be employed for the molding of the heads.

Color materials may be added to the material of the heads of the series of clubs so that they will be readily recognizable. For example, the seven colors, red, orange, yellow, green, blue, indigo and violet, may be employed along with a shade of color between adjacent colors so as to provide thirteen colors for a set of thirteen clubs. It is also within the purview of the invention to form a putter out of the same plastic material with a face which slopes at an angle of substantially 5° to provide a "feel" to the putter that will correspond to that of the other clubs of the set.

The faces of the club heads are curved in both a vertical and horizontal direction so as to produce a point contact with the ball at the time of engagement therewith. This is desirable to have the impact at the face emanate at a point to which the shock wave will return so as to have the recovery at the face impinge on the ball at the time of separation of the ball therefrom. By molding each head of the set in the same series of molds and by employing the same compounded material or a modification thereof for each of the molds of the set, truly matched sets are obtained from the series of heads produced from the molds. This is a new concept in the provision of a set of golf clubs never heretofore obtained when the wood clubs were made from different blocks of

wood and the series of heads were made from an alloy steel. There was no assurance that any of the clubs would match either those in the wood series or those of the iron series or those of one series with those of the other. By constructing the set of clubs in the manner as herein illustrated and described, assurance is had that a matched set of clubs is obtained when the heads thereof are increased in weight as the shafts thereof shorten and the faces increase in slope. This provides the same weight swing to each club of the set when employed for striking the ball. The golf ball is fully compressed on the face of the club in condition to decompress at the time it separates therefrom and the recovery of the material is such that the rebound force will reach the face of the club at the time the ball separates therefrom. As pointed out above, known plastics alone or in combination will produce such a recovery when tempered with the metal filler in wool, filings or powder form in a quantity to have the recovery occur at the time of separation of the ball from the club face. This provides a force in addition to that of the recovery of the ball to increase the flight of the ball. By increasing the amount of metal filler in the material as the angle of slope of the faces increases, the weight of the club heads increases even though a lesser amount of the material is employed therein. The recovery at each club face conforms to the force applied to the ball and matches the compression thereof at the face at the time the ball is separating therefrom. The increase in weight of the heads as the shafts shorten to produce the same weight of swing to all of the heads permits anyone using the clubs to employ the same stance and swing for all of the clubs of the series.

What is claimed is:

In a golf club head having a striking face, said head being made from a plastic material and formed into the shape of a section of a sphere the center of curvature of which lies substantially in the club face, the plastic material being of such density as to cause the shock wave produced when striking a ball near the said center to move to the spherical surface and return to the ball prior to the separation of the ball from the head.

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