

[54] **METHOD OF MAKING A GOLF CLUB  
WHEREIN RATIO OF GROSS WEIGHT TO  
SWING WEIGHT IS LESS THAN 0.62**

[76] Inventor: **Benjamin L. Averbach**, 45 Orchard  
St., Belmont, Mass. 02178

[22] Filed: **Dec. 24, 1968**

[21] Appl. No.: **786,627**

[52] **U.S. Cl.** ..... 273/77 R, 273/167 F, 273/173

[51] **Int. Cl.** ..... **A63b 53/00**

[58] **Field of Search** ..... 273/77, 80, 79, 173, 174,  
273/167, 193, 194, 169-172

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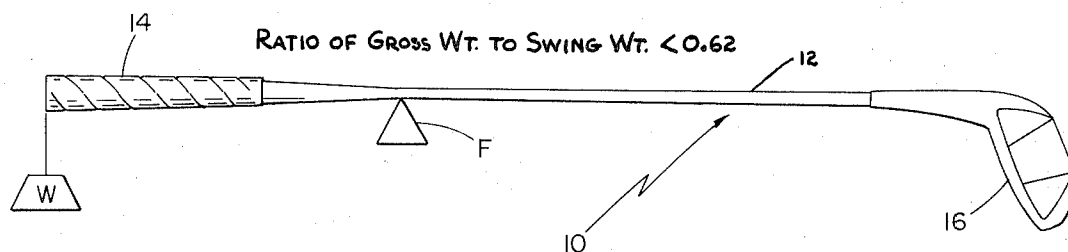
*Primary Examiner*—Richard C. Pinkham

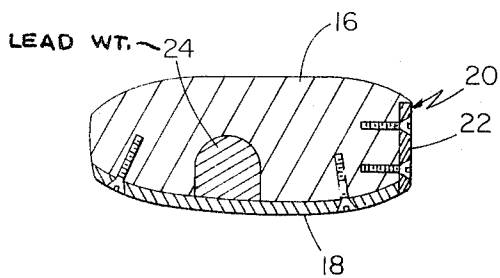
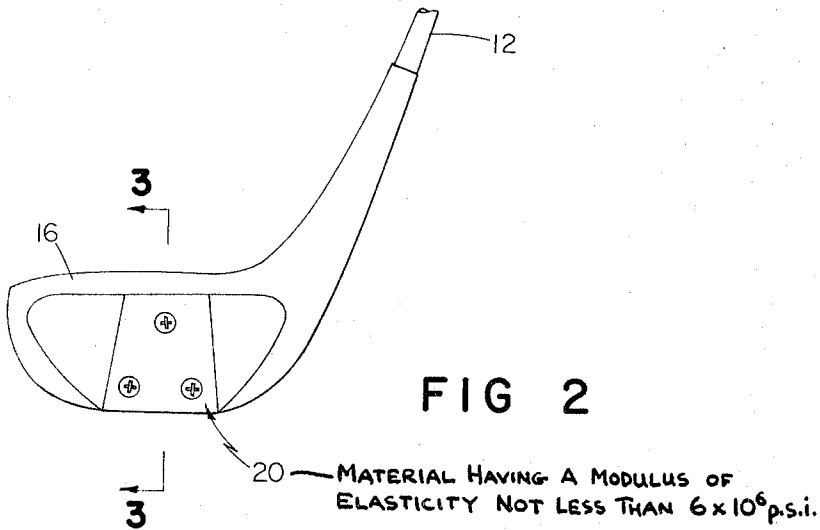
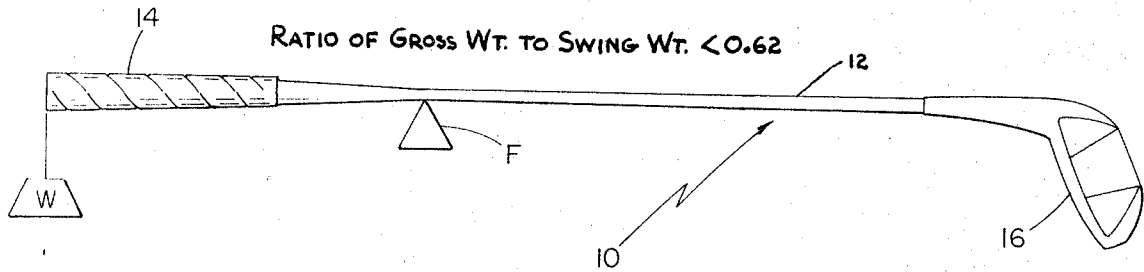
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## [57] ABSTRACT

The golf club having a ratio of gross weight to swing weight that is less than 0.62 and a head including an insert having a modulus of elasticity greater than six thousand p.s.i. defining the club's striking surface.

**1 Claim, 3 Drawing Figures**





# METHOD OF MAKING A GOLF CLUB WHEREIN RATIO OF GROSS WEIGHT TO SWING WEIGHT IS LESS THAN 0.62

This invention relates to golf clubs.

The distance traveled by a golf ball hit from a tee depends mainly on the initial velocity of the ball just as it leaves the clubhead, together with such other variables as the spin, wind, angle between the ball path and ground, and the general terrain. The latter variables are primarily a function of the character of the swing and the playing conditions. The initial velocity depends on the speed with which the golfer is able to bring the clubhead through the ball and the interaction between the clubhead and ball.

It is a primary object of the present invention to provide a golf club which significantly increases the initial velocity a golfer is able to impart to the ball and which thereby increases the average length of the golfer's drives.

The invention features a golf club having a ratio of gross weight to swing weight that is less than 0.62 and a head including an insert of modulus of elasticity greater than 6,000,000 defining the club's striking surface. In preferred embodiments in which the club is of the driver type, the shaft is a lightweight material such as aluminum, the head is wood, and the insert is a high carbon or tungsten steel alloy having a modulus of elasticity greater than 20,000,000 and has a weight of slightly less than 0.75 oz.

Other objects, features and advantages will become apparent from the following detailed description of a preferred embodiment of the invention, taken together with the attached drawings wherein:

FIG. 1 and 2 are plan views of a golf club of the present invention; and,

FIG. 3 is a sectional view, the section taken along the line 3—3 in FIG. 2.

Referring more particularly to the drawings, there is shown a golf club, generally designated 10, comprising an aluminum shaft 12, a handle 14 at one end of shaft 12, and an head 16 at the other end of shaft 12. Head 16 is principally of wood but includes a steel sole plate 18, a steel insert 20 defining the clubs striking face 22, and a lead weight 24 in the heel of the head. Insert 20 is generally trapezoidal, having an upper width of 1.0 inch, a lower width of 1.6 inch, a height of 1.5 inch and a thickness of 0.050 inch and has a weight of slightly less than three-fourth ounce.

With reference to FIG. 1 and through this specification and appended claims, the "swing weight" of a golf club, such as club 10, is defined as the weight W required to balance the club on a fulcrum F placed 12 inches from the end of handle 14. The swing weight is thus independent of the total weight. Heretofore, the handle, shaft and head of a club have been assembled to produce a given weight and then a sufficient amount of lead is added to the head (as lead weight 24) to produce a desired swing weight, thus adding to the total weight, and without regard to any specific relation between the gross weight and the swing weight, with the result that, so far as I know, the ratio of the gross weight

to the swing weight has invariably exceeded what I have discovered to be a significant value when the insert has a high modulus of elasticity.

In accordance with this invention, the initial velocity imparted to a ball is materially increased by using a club striking surface defined by a material having a modulus of elasticity in excess of 6,000,000, preferably over 20,000,000 p.s.i., and distributing the weight of and in the club components, i.e., the shaft, head, insert, and grip, to hold the gross weight of the club below a maximum value with respect to the swing weight. As shown by the following table, clubs in which the insert was constructed of steel having such a high modulus and having a weight distribution such as to provide a gross weight to swing weight ratio of less than 0.62 imparted significantly greater initial velocity to a struck ball than did conventional clubs having either a higher ratio or a lower modulus of elasticity striking face or both. In the table, the series A clubs, swung by an amateur, had a slightly less swing weight than did the series B clubs, which were swung by a professional.

Table

| Club No. | Striking Face Material | Gross Weight | Ratio of Gross Weight to Swing Weight | Initial Ball Velocity Ft./sec |
|----------|------------------------|--------------|---------------------------------------|-------------------------------|
| 1A       | Plastic                | 13.02        | 0.645                                 | 172                           |
| 2A       | Plastic                | 12.64        | 0.626                                 | 178                           |
| 3A       | Steel                  | 12.95        | 0.641                                 | 178                           |
| 4A       | Steel                  | 12.49        | 0.619                                 | 183                           |
| 1B       | Plastic                | 13.13        | 0.641                                 | 210                           |
| 2B       | Plastic                | 12.77        | 0.623                                 | 210                           |
| 3B       | Steel                  | 13.02        | 0.635                                 | 210                           |
| 4B       | Steel                  | 12.57        | 0.619                                 | 213                           |

Although in the preferred embodiment, shaft 12 is of aluminum, other material having a high stiffness to weight ratio such as magnesium, titanium and high strength steels may be used. Similarly magnesium, titanium and carbides of titanium, tungsten and chromium are useful as striking face defining inserts.

Other embodiments within the scope of the following claims will occur to those skilled in the art.

What is claimed is:

1. The method of manufacturing a golf club comprising the steps of:

- providing a shaft, a grip, and a club head;
- providing a striking face insert from a material having a modulus of elasticity not less than 6,000,000 p.s.i.;
- assembling said shaft, said grip, said club head, and said striking face insert into a golf club having a gross weight;
- maintaining said gross weight of the assembled club with respect to the ensuing swing weight thereof be adjusting the weight distribution within said shaft, said grip, said head, and said insert in such a manner as to provide said assembled golf club with a ratio of said gross weight to said swing weight that is less than 0.62.

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UNITED STATES PATENT OFFICE  
CERTIFICATE OF CORRECTION

Patent No. 3,834,700 Dated September 10, 1974

Inventor(s) Benjamin L. Averbach

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In the Abstract: line 4, change "thousand" to --million;

Column 2, line 37, change "material" to ~~..materials~~ --,  
line 56, change "be" to --by--.

Signed and sealed this 17th day of December 1974.

(SEAL)

Attest:

McCOY M. GIBSON JR.  
Attesting Officer

C. MARSHALL DANN  
Commissioner of Patents