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Cochran et al.

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[54] **CORRELATED SET OF CLUBS WITH INDICATOR LINE**

[75] Inventors: **Alastair J. Cochran**, Sutton, Coldfield, England; **John W. Jepson**, Marion, Mass.; **Edward R. Woolley**, Rancho Santa Fe, Calif.; **Francis deS. Lynch**, Mattapoisett, Mass.

[73] Assignee: **Acushnet Company**

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Related U.S. Application Data

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[52] **U.S. Cl.** .....**273/77 A**, 273/164

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

[58] **Field of Search** ....273/77 A, 163 R, 163 A, 164, 273/167 R, 167 J, 183 D

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Primary Examiner—Richard C. Pinkham
Assistant Examiner—Richard J. Apley
Attorney—Eyre, Mann & Lucas

[57] **ABSTRACT**

In a correlated set of golf clubs at least one visible indicator line on the striking face of each club head is provided. This indicator line lies in the loft plane of the club head and is in a predetermined angular relationship with a second line, real or imaginary, and being perpendicular to a third line, real or imaginary, formed by the intersection of the loft plane and the plane on which the club is placed in its normal position for striking a golf ball. The angular relationship is a certain degree for each successive club in the set.

5 Claims, 6 Drawing Figures

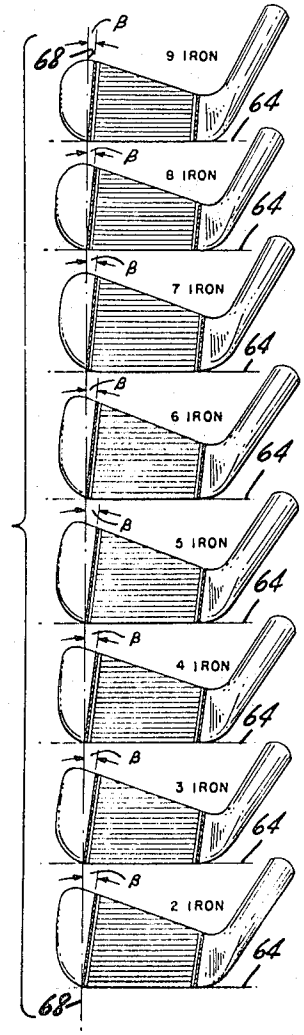
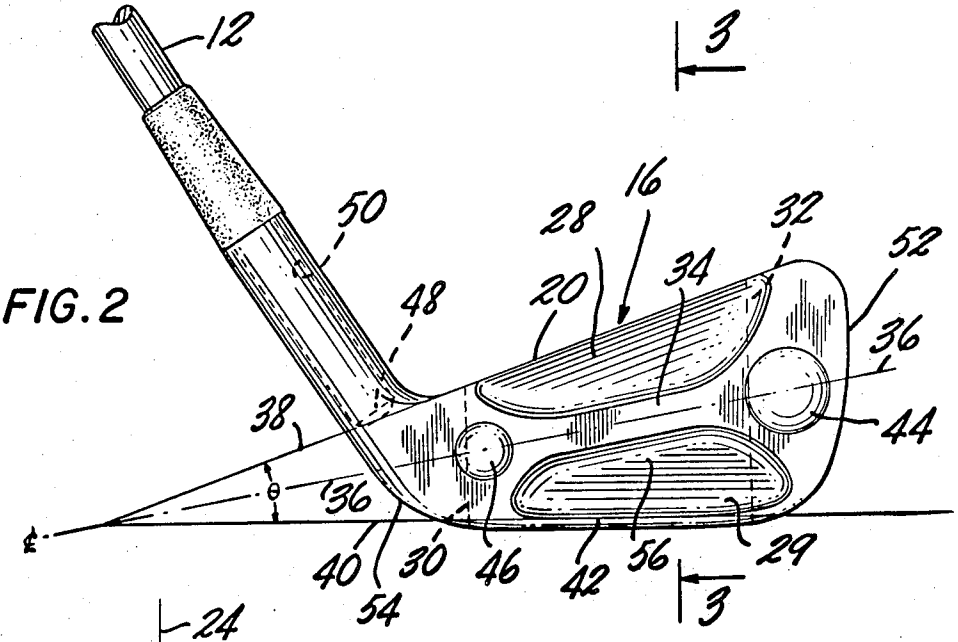


FIG. 2



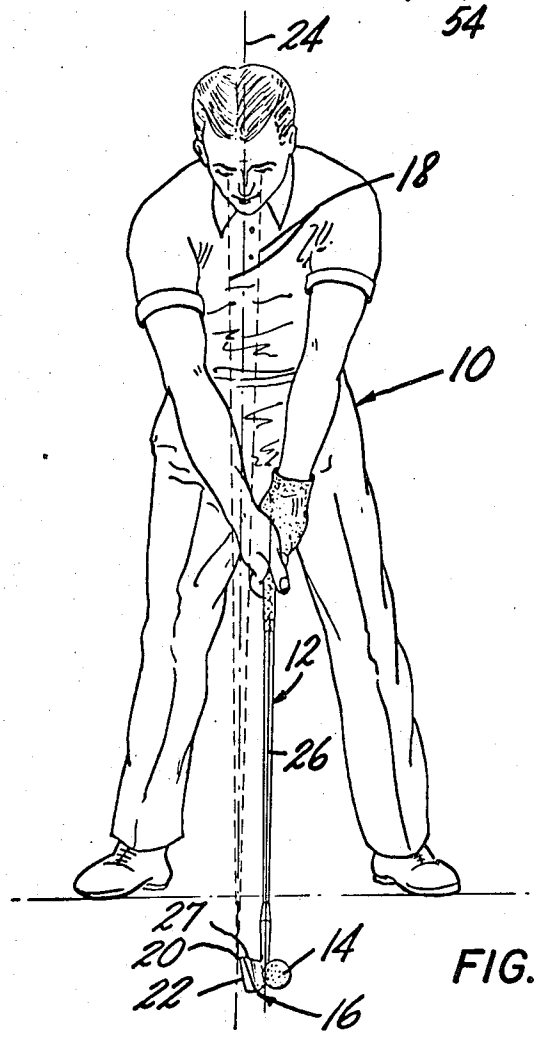


FIG. 1

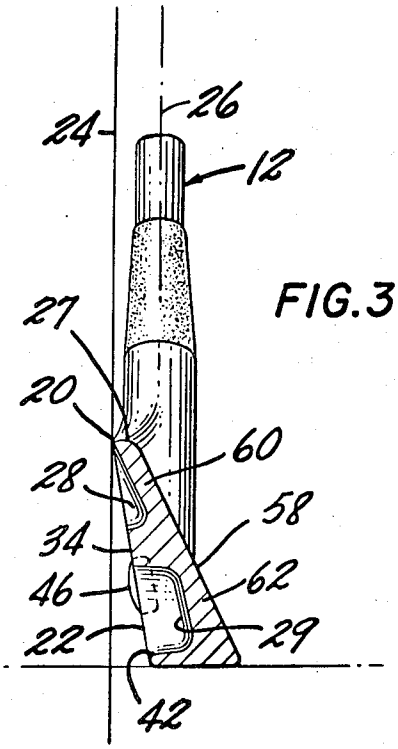
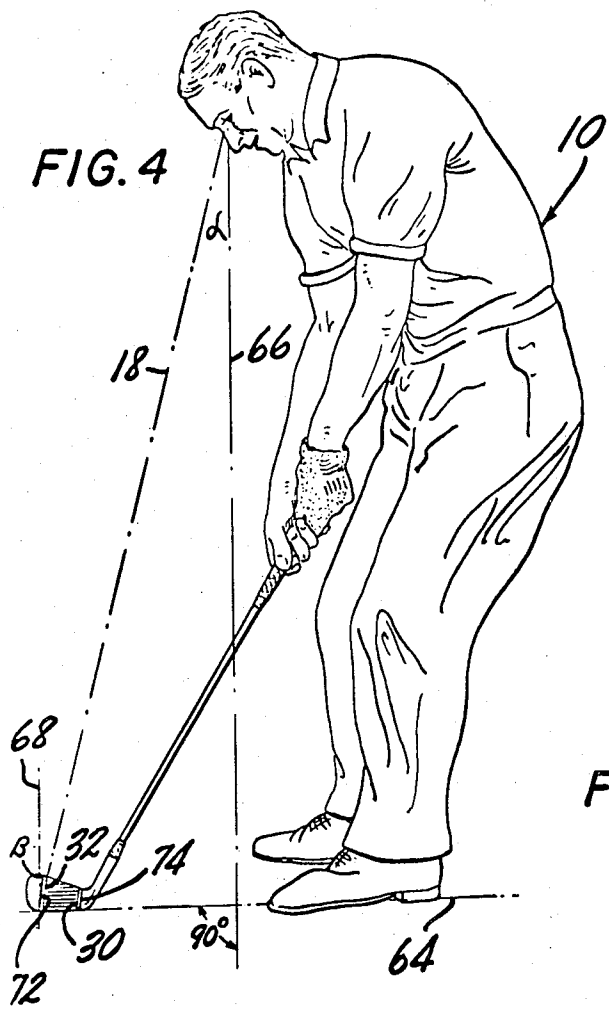


FIG. 3

FIG. 4



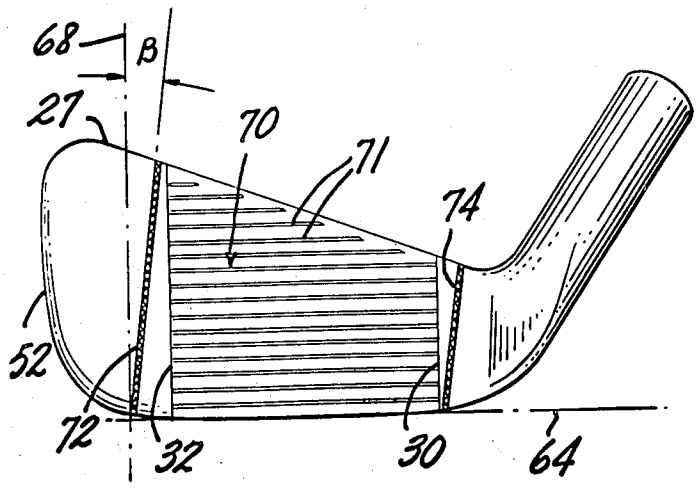
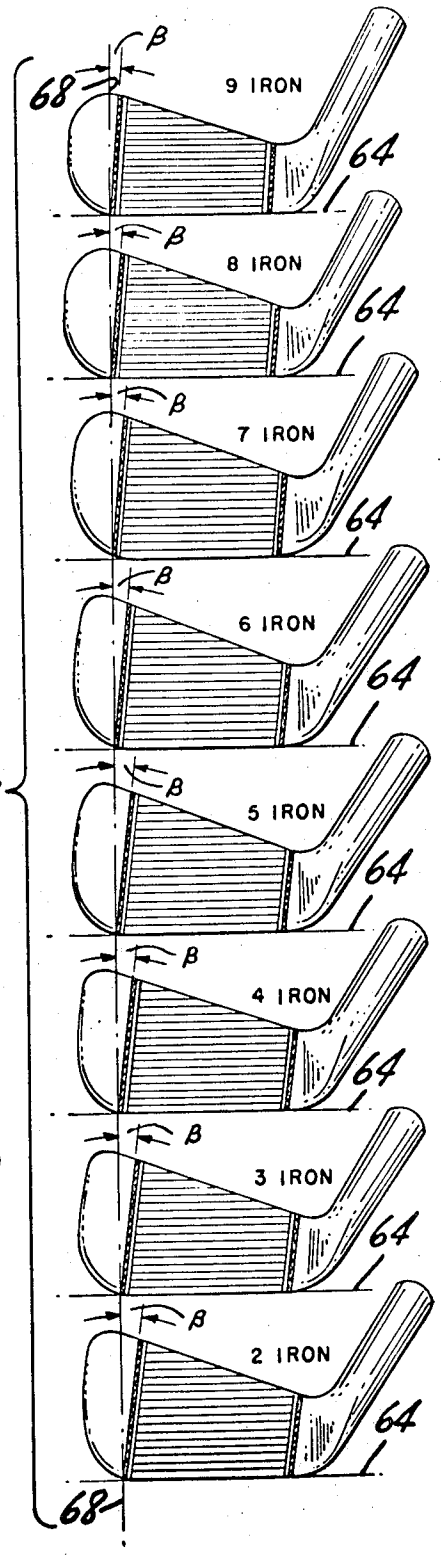


FIG. 5

FIG. 6



CORRELATED SET OF CLUBS WITH INDICATOR LINE

The present invention is a division of our co-pending application Ser. No. 146,255 filed May 24, 1971 and is an improvement on our co-pending application Ser. No. 106,690 filed Jan. 15, 1971.

In our latter co-pending application we broadly disclose the manner in which the sweet spot of a golf club head can be enlarged by moving the weight of the club head towards the heel and the toe.

It has been found that protrusions on the back of the club head which are visible to the golfer tend to distract the golfer and divert his attention so that he does not concentrate completely on the shot to be made. We have now discovered that an improved golf club can be made incorporating the advantages of our prior invention and having a further advantage of not having the back of the club head visible to the golfer so that it is not distracting to the golfer. The means for accomplishing this is by hollowing out a substantial portion of the back of the club head directly behind the scored part of the face and adding weights in the area of the heel and the toe, as close to the heel and the toe as possible. One or more reinforcing members are preferably located across the hollowed out back of the club head.

We have also discovered that there is advantage in having indicator lines on the face of the clubs at an increasing angle for each successive club in relation to a line lying in the loft plane of the club head and being perpendicular to the line formed by the intersection of the loft plane and the plane on which the club is placed in its normal position for striking a golf ball. The loft plane is defined as the plane which is tangential to the surface of the scored area of the club head face. The plane on which the club head is placed in its normal position for striking a golf ball may be further defined as tangential to the sole of the club head and it is almost always parallel to the grooves of the scored area of the club head face. Standard golf clubs have indicator lines near the edges of the scored area essentially along this line for each club. We have discovered that if the indicator lines (or other linear markings) are at an angle with relation to this line and with the angle increasing by approximately ½° for each club from the 9 iron to the 2 iron, then it is easier to line up the club head with the ball for the proper shot.

These and other advantages of the present invention may be more fully understood with reference to the accompanying drawings in which like numbers are used for like parts and wherein:

FIG. 1 shows a golf club made in accordance with the present invention in use by a golfer;

FIG. 2 shows the back of the club head made in accordance with the present invention;

FIG. 3 shows a sectional view of FIG. 2 taken through line 2—2;

FIG. 4 shows a golfer in standard position for addressing a golf ball using a golf club with the unique indicator lines of the present invention;

FIG. 5 shows the face on a golf club with the indicator lines of the present invention; and

FIG. 6 shows a series of golf clubs with the indicator lines increasing in angle according to the present invention.

In FIG. 1 there is shown a golfer **10** holding a golf club **12** in standard position for striking a golf ball **14**.

The golf club **12** has a club head **16** made in accordance with the present invention. The line of sight **18** of the golfer **10** sees the back of the top of the club head **20** but does not see any portion of the back of the club head **22**. The reason for this is that the entire back **22** of the club head **16** is on one side of a plane **24** which is parallel to the axis of the club shaft **26** and is tangential to the top of the club head **20**. Since there are no protrusions on the back of the club head, the golfer's eye is not distracted when addressing the ball in standard position. For purposes of the present invention, the back of the club head is defined as that part of the back of the club head which is below the top **27** of the club head.

FIG. 2 shows the back of the golf club head of FIG. 1. There is provided an upper hollowed out area **28** and a lower hollowed out area **29** which comprise a substantial portion of the back of the club head defined by an area corresponding to the edges of the scored area **30** and **32**. The top of the club head **20** to which plane **24** of FIG. 1 is tangential may be defined by the line along the top of the club head extending from line **30** to line **32**. One or more reinforcing ribs **34** are preferably located in the hollowed out areas **28** and **29** in order to reinforce the club head. In a preferred embodiment of the invention, and as shown, the center line **36** of the rib **34** essentially bisects the angle θ made by a line **38** passing through the back of the top of the club **20** and a line **40** passing through the back of the bottom of the lower hollowed out area **29**. When the center of the rib is located along this line, it is highly advantageous since this is the area in which most golf balls are struck and thus the reinforcing rib reinforces the golf club head at the place where greatest stress is put upon it. While this is the preferred location for the reinforcing rib, it is to be understood that the reinforcing rib could be in an X shape in which case there could be four hollowed out areas or in any other desired shape or there could be no rib at all. The only requirement is that the club head be strong enough to preserve its structural integrity under normal playing conditions.

Weights **44** and **46** are shown located in the heel and the toe of the club head respectively. These weights are made of a material which is more dense than the material of which the club head **16** is made. It has been found that for best results there should be a weight in the toe in order to make a golf club wherein all of the club head is confined within the area defined by a plane which is parallel to the axis of the shaft **26** and tangential to the back of the top of the club **20** and it is preferable that a heel weight **46** be provided. While the heel weight is shown on the back of the club head, it is to be understood that this heel weight can be located in the bottom **48** of the hosel shaft receiving hole **50**. For maximum benefit the weights **44** and **46** should be located as close as practical to the toe **52** and heel **54**. The center of mass of the club head is preferably located at a point **56** which is equidistant between lines **30** and **32**. In order to locate the center of mass at this point, and still maintain the other desirable features of the present invention, the mass of the weight **44** located in the toe area should be at least three times as great as the mass of the weight **46** added in the heel area. The weights **44** and **46** are preferably made of tungsten alloys and for best results the tungsten alloyed weights

should contain between about 85 and 95 percent tungsten. If the percentage of tungsten is greater than about 95 percent the weights become brittle and are not easily fabricated. On the other hand, if the percentage of tungsten is less than about 85 percent, then there is little advantage since the mass of the tungsten alloy will not be sufficiently greater than the mass of the club head material, which is usually iron or stainless steel.

In all cases, club heads according to the present invention have a radius of gyration above about 1.05 inches about an axis which is parallel to the shaft and which passes through the centroid (center of mass) of the club head. A suitable method for measuring this radius of gyration is set forth in our prior co-pending application referred to hereinabove. The radius of gyration can be defined by the following formula:

$$K = \sqrt{I/M}$$

wherein K is the radius of gyration about a specific axis, I is the moment of inertia of the club head about the same axis and M is the mass of the club head. The club head is defined as the weight of a golf club below a point located about 5 inches up the golf club shaft from the heel. In determining the moment of inertia of the club head, the centroid (center of mass) of the club head is first located in known manner. A point is then selected along an axis which passes through the centroid of the club head and is parallel to the axis of the gold club shaft. The club head is suspended from this point by one or more wires or other suitable means which maintain the club head parallel to the axis of the shaft. The moment of inertia of the club head is then determined in known manner with respect to the axis which passes through the centroid. When the moment of inertia is thus determined and the mass of the club head is determined, the radius of gyration can be computed according to the formula given hereinabove.

It has now been found that best results are achieved when the radius of gyration of the club head for each of the 2 through 9 irons is within the ranges as set out in the Table below.

TABLE

IRON	Minimum Radius of Gyration (inches)	Maximum Radius of Gyration (inches)
2	1.06	1.17
3	1.07	1.18
4	1.08	1.19
5	1.09	1.20
6	1.10	1.21
7	1.11	1.22
8	1.12	1.23
9	1.13	1.24

If a wedge is to be included in the set, it will preferably have a radius of gyration from about 1.14 to about 1.25 inches. The weight of the club head will generally be the same as conventional club heads. This will generally be from about 4 to about 12 ounces for the 2 iron and from about 6 to about 16 ounces for the 9 iron and best results are obtained with a club head weight of from about 8 to about 9 ounces for a 2 iron and from about 10 to about 11 ounces for the 9 iron with the rest of the clubs having a weight therebetween, the weight of each successive club increasing from the 2 iron to the 9 iron.

In FIG. 3 is shown a sectional view of FIG. 2 taken through line 3—3. As there shown, rib **34** extends through hollowed out areas **28** and **29** essentially in the middle of the club head face **58**. Plane **24** is shown tangential to the top of the back of the club head **20** and parallel to the shaft **26**. The thickness of the club head face at points **60** and **62** is preferably at least about 0.15 inches since otherwise there may be an undesirable "pinging" sound when the club makes contact with the ball.

In FIG. 4 there is shown a side view of a golfer addressing a golf ball with a golf club having a club head face made in accordance with the present invention. As there shown, the indicator lines **72,74** are parallel to the edges **30** and **32** of the scored area of the club head and are on an angle so that they appear approximately straight with the line of sight **18** of the golfer **10**. In present day clubs, the indicator lines **72** and **74** are substantially perpendicular to the line **64** formed by the intersection of the loft plane and the plane on which the club head is placed in its normal position for striking a golf ball. The golfer, however, looks down at the club at an angle α from the perpendicular **66**. Because of this, the indicator lines **72** and **74** appear to be "falling away" from the golfer and this makes it somewhat difficult to line up a shot. It has been found that if these lines **72** and **74** are set at an angle β which appears to the golfer to correspond approximately to his line of sight **18**, then the lines **72** and **74** will appear to be parallel to the line of flight along which it is intended to hit the golf ball. Because of variations in length of shaft and in the angle of loft of club head faces, this angle will not be the same for every club from the 2 through the 9. In addition, lines **72** and **74** may not appear to correspond exactly to the line of sight **18** of the golfer **10** because of varying heights and stances of golf players. However, even though the indicator lines do not appear to correspond exactly with the line of sight of the golfer, it has been found that when they are made in accordance with the present invention it is considerably easier for the golfer to line up his shot. The greatest change in angle β is required for the 2 iron and the least change in angle is required for the 9 iron. It has been found that the difference in angles from the 9 to the 8, from the 8 to the 7 and so on through the **2** should be from about ¼° to about ¾° for each successive club and preferably the increase in angle should be about ½°. For example, in accordance with the preferred angle, if the 9 iron has an angle β of 0°, then the 8 iron will have an angle of ½°, the 7 iron will have an angle of 1°, the 6 iron will have an angle of 1½°, the 5 iron will have an angle of 2 degrees, the 4 iron will have an angle of 2½°, the 3 iron will have an angle of 3° and the 2 iron will have an angle of 3½°. It is preferred that the 9 iron have an angle of about 3° and that the angle of the indicator lines of the rest of the clubs increase to an angle of about 6½° for the 2 iron. While the description of the indicator lines has been given with respect to a complete set of 2 through 9 irons, it will be understood that it has equal applicability to so-called "beginner sets" which usually comprise the 3, 5, 7 and 9 irons. In such a set the increase angle would be doubled i.e., it would be ½° to 1½° greater for each club than the immediately preceding club and the angle is preferably 1° greater. Thus, if the 9 iron has an angle

of 0°, the 7 iron will have an angle of 1°, the 5 iron an angle of 2° and the 3 iron an angle of 3°. It will be understood that when the term "angle" is used, it is intended to mean the angle formed by an indicator line **72, 74** and a line **68** lying in the loft plane of the club head and being perpendicular to the line **64** formed by the intersection of the loft plane and the plane on which the club is placed in its normal position for striking a golf ball.

In FIG. **5** there is shown a face of a golf club comprising a scored area **70** with grooves **71**, edges of the scored area **30** and **32** and indicator lines **72** and **74**. The indicator lines **72** and **74** are at an angle β with respect to line **68**. The edges **30** and **32** of the scored area **70** may be at the same angle as lines **72** and **74** or they may be parallel to line **68** as shown. In the preferred embodiment of the present invention, lines **72** and **74** are coincident with lines **30** and **32** and are at an angle with respect to line **68** as previously discussed. It will be understood that when the term "line" is used with reference to lines **30, 32, 72** and **74**, it is intended to include a single unbroken line as well as a series of dots, diamonds, maltese crosses or other configurations which are in a line.

In FIG. **6** is shown a correlated set of clubs having the indicator lines **72** and **74** of the present invention. The **9** iron is shown at the top of FIG. **6** and the 2 iron is at the bottom. Each successive club has an increase in the angle β from ¼° to ¾° over the next preceding club and the angle β of the 9 iron is anywhere from 0°–6°, depending upon the length of the shaft of the club, the loft of the club and the height of the golfer for which the club is intended.

It will be understood that the claims are intended to cover all changes and modifications of the preferred embodiments of the invention, herein chosen for the purpose of illustration, which do not constitute departures from the spirit and scope of the invention.

What is claimed is:

1. In a correlated set of golf clubs comprising the 2, 3, 4, 5, 6, 7, 8 and 9 irons, the improvement which comprises at least one visible indicator line on the striking face of each club head, said indicator line lying in the loft plane of the club head and in a predetermined angular relationship with a second line, real or imaginary, lying in the loft plane of the club head and being perpendicular to a third line, real or imaginary, formed by the intersection of the loft plane and the plane on which the club is placed in its normal position for striking a golf ball, said angular relationship being from about 0° to about 6° for a 9 iron and from about ¼° to about ¾° greater for each successive club in the set.

2. The set of clubs of claim **1** wherein the said angular relationship of the indicator line in each successive club is about ½° greater than each preceding club.

3. The set of clubs of claim **1** in which the said angular relationship of the indicator line of the 9 iron is about 0°, the said angular relationship of the indicator line of the **8** iron is about ½°, the said angular relationship of the indicator line of the 7 iron is about 1°, the said angular relationship of the indicator line of the 6 iron is about 1½°, the said angular relationship of the indicator line of the 5 iron is about 2°, the said angular relationship of the indicator line of the 4 iron is about 2½°, the said angular relationship of the indicator line of the 3 iron is about 3° and the said angular relationship of the indicator line of the 2 iron is about 3½°.

4. In a correlated set of golf clubs comprising the 3, 5, 7 and 9 irons, the improvement which comprises at least one visible indicator line on the striking face of each club head, said indicator line lying in the loft plane of the club head and in a predetermined angular relationship with a second line, real or imaginary, lying in the loft plane of the club head and being perpendicular to a third line real or imaginary formed by the intersection of the loft plane and the plane on which the club is placed in its normal position for striking a golf ball, said angular relationship being from about ½° to about 1½° greater for each successive club in the set.

5. The set of clubs of claim **4** wherein the said angular relationship of the indicator line in each successive club is about 1° greater than each preceding club.

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