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[Continued on next page]

(54) Title: FITTING A GOLF BALL USING A STRIKE CHARACTERISTICS DETECTOR

(57) Abstract: A system and method for ball fitting is disclosed. The system and method may use a swing characteristics detector. A detector may be placed between a golf club face and a golf ball. The golf club may strike the golf ball, and a mark may be made on the swing characteristic detector. The mark may be evaluated to determine at least one swing characteristic. The swing characteristic may be used to select an appropriate golf ball for a golfer.

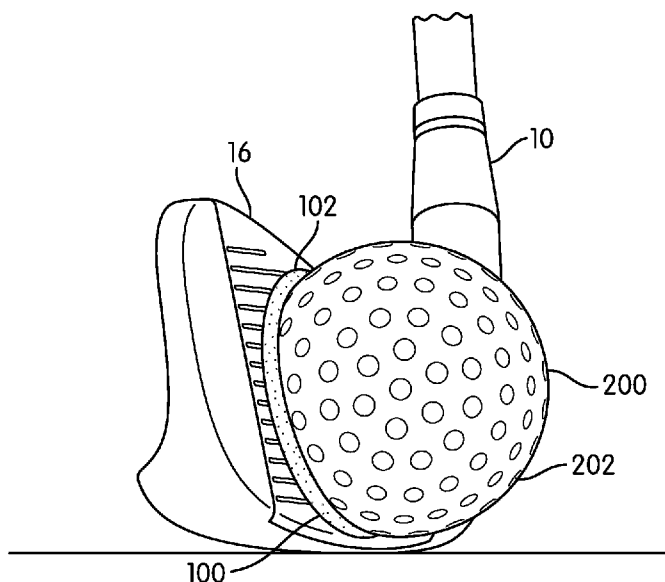


FIG. 6





TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, **Published:**
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FITTING A GOLF BALL USING A STRIKE CHARACTERISTICS DETECTOR

BACKGROUND

[0001] The present disclosure relates generally to a method and system for fitting or selecting a golf ball for a specified golfer.

[0002] The distance that a golf ball travels is dependent on the club, delivery of said club to the ball (i.e., the swing), and the ball used. Accordingly, it is desirable for a golfer to make an appropriate selection of a golf ball in order to maximize performance for a given swing. It would be advantageous to have a convenient way of obtaining swing information that can be used to select an appropriate golf ball.

SUMMARY

[0003] A system and method for fitting a golf ball is disclosed. The system and method may be used with any club to determine a golfer's swing characteristics, thereby aiding in the selection of an appropriate ball for the golfer. The system and method may include fitting a golf ball by using a swing characteristic detector that produces a mark created by the impact between a club face and a golf ball.

[0004] In one aspect, the disclosure provides a method of selecting a golf ball for a golfer that may include a plurality of steps. For example, the method may include a step of placing a first swing characteristic detector between a golf club face and a golf ball. The method may include a step of examining a first mark on the first swing characteristic detector made by the golf club face striking the golf ball to determine at least one golf swing characteristic. The method may include a step of selecting an appropriate golf ball for the golfer based on the at least one golf swing characteristic.

[0005] In some embodiments, the at least one golf swing characteristic may comprise at least one of the following: club head speed, angle of attack, dynamic loft, club path, impact location, and clubface angle.

[0006] The step of examining the first mark may include comparing the first mark on the first swing characteristic detector to a guide.

[0007] The method may include a step of placing a second swing characteristic detector between the golf club face and the golf ball. The method may include a step of examining a second mark on the second swing characteristic detector made by the golf club striking the golf ball to determine the at least one golf swing characteristic.

[0008] The step of placing a first swing characteristic detector between a golf club face and a golf ball may include applying the first swing characteristic detector to a golf club face.

[0009] The method may include photographing the first mark.

[0010] The step of examining the first mark may include folding the first swing characteristic detector along a diameter of the first mark and comparing the diameter of the first mark to a guide.

[0011] The step of examining the first mark may comprise placing the first swing characteristic detector on a scanner and activating the scanner to scan the first swing characteristic detector.

[0012] The method may include a step of activating a computer attached to the scanner. The computer may be capable of evaluating a scanned image generated by the scanning step.

[0013] In another aspect, the disclosure provides a golf ball fitting analysis system for a computer that may comprise a database of known golf ball profiles based on at least one golf swing characteristic. The system may include an input device for inputting a value for at least one golf swing characteristic. The system may further comprise stored instructions for calculating a ball fit value using the input value and the database of known profiles. The system may comprise a display for displaying at least one recommended golf ball.

[0014] In some embodiments, the input device may comprise a scanner.

[0015] The at least one golf swing characteristic may comprise a plurality of golf swing characteristics and the input device may allow inputting of values of a plurality of golf swing characteristics.

[0016] In some embodiments, the input device may comprise a screen allowing a user to select from a plurality of patterns of marks.

[0017] In some embodiments, the input device may comprise a sensor.

[0018] In some embodiments, the input device may comprise a user interface prompting a user to input data relating to a mark created by an impact between a golf ball and a golf club face.

[0019] In some embodiments, the input device may comprise an optical unit capable of receiving optical data relating to a mark created by an impact between a golf ball and a golf club face.

[0020] In some embodiments, the optical unit may be included on a handheld device.

[0021] In yet another aspect, the disclosure provides a golf ball fitting analysis kit that may include a set of golf balls. The kit may comprise a packaging configured to house the set of golf balls. The kit may comprise a set of instructions associated with the packaging. The kit may comprise at least one swing characteristic detector associated with the packaging. The kit may comprise a guide associated with the packaging. In some embodiments, the guide may be disposed on the packaging. The kit may comprise a set of swing characteristic detectors.

[0022] Other systems, methods, features and advantages of the invention will be, or will become, apparent to one of ordinary skill in the art upon examination of the following figures and detailed description. It is intended that all such additional systems, methods, features and advantages be included within this description and this summary, be within the scope of the invention, and be protected by the following claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0023] The invention can be better understood with reference to the following drawings and description. The components in the figures are not necessarily to scale, emphasis instead being placed upon illustrating the principles of the invention. Moreover, in the figures, like reference numerals designate corresponding parts throughout the different views.

[0024] FIG. 1 is a front view of a golf club;

[0025] FIG. 2 is a front view of a golf club to which an embodiment of a swing characteristic detector has been applied;

[0026] FIG. 3 is a front view of a golf club to which an embodiment of a swing characteristic detector has been applied;

[0027] FIG. 4 is a side view of a golf club and golf ball showing a zero angle of attack;

[0028] FIG. 5 is a top view of a golf club to which an embodiment of a swing characteristic detector has been applied and a golf ball showing a square hit;

[0029] FIG. 6 is a perspective view of a golf club to which an embodiment of a strike characteristics detector has been applied and a golf ball showing the two just after impact in a striking step;

[0030] FIG. 7 is a front view of the golf club of FIGS. 4-6 showing a mark resulting from of the stroke;

[0031] FIG. 8 is a side view of a golf club and golf ball showing a negative angle of attack;

[0032] FIG. 9 is a front view of the golf club of FIG. 12 showing a mark resulting of the stroke;

[0033] FIG. 10 is a top view of a golf club and golf ball showing a strike near a heel end of the club from a stroke that is slightly open with a positive angle of attached;

[0034] FIG. 11 is a front view of a golf club showing a mark resulting from a stroke that is slightly open with a positive angle of attack;

[0035] FIG. 12 is a perspective view showing a user visually inspecting a marked club;

[0036] FIG. 13 is a perspective view showing a user placing an embodiment of a swing characteristic detector on a scanner;

[0037] FIG. 14 is a schematic view showing the use of a computer in evaluating a swing and a swing characteristic detector;

[0038] FIG. 15 is a schematic view showing the steps of an embodiment of the analysis of a mark in flowchart form;

[0039] FIG. 16 is a schematic view showing the steps of an embodiment of the analysis of a mark in flowchart form;

[0040] FIG. 17 is a view of a swing characteristic detector before and after being folded along a diameter of a mark;

[0041] FIG. 18 is a view of a user comparing the folded swing characteristic detector of FIG. 17 to a chart on a sleeve; and

[0042] FIG. 19 is a view of a smartphone being used to analyze a mark left by a golf ball on a swing characteristic detector.

DETAILED DESCRIPTION

[0043] The present embodiments relate to structures and steps used to determine one or more of a golfer's swing characteristics to determine an appropriate ball for that golfer to use in play. The present embodiments involve using a swing characteristic detector configured to change properties upon impact with a ball. For example, in some embodiments, the swing characteristic detector may be a pressure-sensitive medium that develops a mark upon impact with a ball. The mark may be produced by a change in color and/or shading. For example, the mark may be a darkened area on the medium. The appearance of the swing characteristic detector after impact reveals one or more swing characteristics, which can then further be used to select an appropriate ball. The medium may be made of any material suitable for being placed between a golf club face and a golf ball during impact between the two. In some embodiments, the medium may include a sheet or card of material. For example, the medium may include a paper sheet impregnated with chemicals that responds to pressure applied to the sheet by darkening and/or changing color. In some embodiments, as discussed below, the medium may be a material sprayed on one of the golf club and golf ball.

[0044] FIG. 1 shows a golf club 10 that may be used in connection with the presently disclosed embodiments. Throughout the FIGS., an iron is shown. However, any type of club could be used in connection with the present embodiments. For example, a driver or wood could instead be used. A different iron could instead be used. To some extent, a putter could instead be used. The selection of this particular club is to show visual consistency among the FIGS., rather than to indicate a specific club that must be used in connection with the present embodiments. Any club or clubs may be used.

[0045] The club 10 includes a variety of typical parts and properties. The club 10 includes a shaft 12. The shaft may be made of any appropriate

material, such as wood, graphite, plastic, metal, or any suitable material or blend of materials. The club further includes a club head 14 that, as mentioned above, may take a variety of shapes and sizes and may be made of any suitable material or blend of materials. The club head 14 and shaft 12 may be joined in any conventional manner with conventional materials and methods. The club head includes a club face 16. The club face can include a region 20 that includes a plurality of spaced grooves 18. These features are well-known. Club 10 can use any of the conventional configurations.

[0046] In some embodiments, the detector may be placed between the golf ball and the club face without being applied to either of the golf ball or the club face. In some embodiments, the detector may be applied to the golf ball. The present embodiments as illustrated show a swing characteristic detector that may be applied to a club face. For example, in some embodiments, the detector may be removably applied to the club face with a relatively weak adhesive. The adhesive may be sufficiently strong to allow for secure attachment to the face of the club, but may also be sufficiently weak to allow for the detector's removal, as will be disclosed below. However, in other situations, it may be desirable to use a different system for creating a marking. For example, the MARKIT™ product available at market-golf.com allows a golfer to spray a golf club with the product and strike a ball, thereby creating a mark on the club where the ball has come into contact with the club. An alternative product may be a ball that includes a coating that provides a mark on a club face and/or a golf ball, or label or other surface applied to the golf ball or club face. Any of these products could be considered to be swing characteristic detectors. Certain of these possible choices would be more easily used with computer applications of the present embodiments, as will become apparent through a discussion of the remainder of the systems below, but may be used in other applications of the present embodiments.

[0047] FIG. 2 shows club 10 in use with a first swing characteristic detector 100. The first detector 100 is applied to the club face 16. The outer size and shape 102 are desirably large enough that the first swing characteristic

detector 100 can accurately detect the desired swing characteristic, as will be discussed in greater detail below. FIG. 3 shows the club 10 in use with a second or alternative swing characteristic detector 104. In this embodiment, the second swing characteristic detector 104 covers substantially the entire club face 16. If desired, the second swing characteristic detector 104 can conform to the grooves 18 on the club face 16 or any other features of the club face 16 as desired.

[0048] Both the first swing characteristic detector 100 and the second swing characteristic detector 104 are configured to discolor or become marked on impact, thereby forming a pattern when the club 10 strikes a ball 200, as is shown, for example in FIG. 4. In the context of the present embodiments, it is desirable that the ball 200 be a known golf ball, i.e. a known brand and type. It is helpful if the known ball has known characteristics, such as construction, center of gravity, compression, and the like, so that swing characteristics can be accurately determined. However, an examination of a swing characteristic detector can still produce the same general result, even with an unknown ball, as will be described below.

[0049] As seen in FIGS. 4-7, a golfer (not shown) will strike a ball 200 with a club 10. The stroke shown in FIG. 4 reveals that in this instance, the ball 200 is struck with a zero angle of attack. The stroke shown in FIG. 5 reveals that in this instance as well, the ball is hit squarely. In the embodiment shown in FIGS. 4-7, the swing characteristic detector chosen is the smaller swing characteristic detector 100. As shown most clearly in FIG. 6, when a ball 200 is struck with a club 10, the ball compresses and rebounds in a well-known manner. The peripheral edge 102 of the swing characteristic detector 100 should be sized and shaped to permit the ball 200 to compress and be smaller than the shape and size defined by the peripheral edge 102.

[0050] After the ball 200 has compressed and rebounded to leave the club face 16, it leaves a mark on the swing characteristic detector 100. As seen in FIG. 7, when the ball 200 is struck squarely or with a square or zero clubface angle and at a zero angle of attack, the mark 300 may have a substantially circular

peripheral shape 302. Although the ball 200 may compress, in many cases the dimples 202 (see FIG. 6) do not completely flatten. Accordingly, within the periphery 302 may be a plurality of dimple marks 304 that represent the areas where the dimple cavities do not contact the swing characteristic detector 100. The shape of the dimple marks 304 are substantially circular and correspond generally to the shape of the periphery 302.

[0051] The first swing characteristic detector 100 and second swing characteristic detector 104 both have various properties. For example, first detector 100 and second detector 104 may become marked or discolored when they are subjected to an impact. This property allows them to receive markings from the impact between a ball and a club face. The present embodiments may include a variety of designs. In some embodiments, the swing characteristic detector may be placed between a golf ball and a club face such that the ball and the club face both contact the detector at the same point during impact. Such a placement may cause the detector to develop a mark at the point of impact between the golf ball and the club face.

[0052] FIGS. 4-7 show the use of a smaller sized version of a swing characteristic detector 100. The remaining FIGS. show the use of a full sized version of a swing characteristic detector 104. The disclosed embodiments are used to select an appropriate ball for a golfer. A golfer who is capable of regularly hitting a golf ball in a manner that would allow the use of a small sized detector, such as the detector 100, is more likely to have a predictable golf swing, on average, than a golfer who is unaware of his or her swing patterns. Accordingly, it may be desirable to use the full sized swing characteristic detector 104 in many cases, and the FIGS. show such a use. If a swing characteristic detector smaller than the full sized detector is used, it may be desirable to estimate the surface area of the club face 16 that will be contacted by the golf ball 200 upon striking and compression. The swing characteristic detector may be sized to be at least large enough to capture a complete mark. In addition, the swing characteristic

detector may be positioned to cover the surface area of the club face 16 that will be contacted by the golf ball upon striking and compression.

[0053] When a golfer strikes a ball 200 with a club face 16 in a manner that is not fully square or that has a non-zero angle of attack, the mark or pattern left on a swing characteristic detector will be elongated. When a golfer hits a non-zero, non-square stroke, the compression of the ball by the club will be less efficient than in a square, zero angle stroke and will cause the compression marking to be elongated in a generally predictable manner. The mark on the detector can be compared to circular reference to determine how the golfer's swing or stroke differs from a square, zero angle of attack stroke. The circular reference may be considered to be aligned with the narrowest area of the mark left on the club face. When such a circular reference is so aligned, it may reveal areas where there are no markings within the circle and areas outside of the circle that are marked. The areas within the circular reference that show no markings are caused by an absence of contact between the ball and the detector. The areas outside the circle that show markings are caused by contact in that area between the ball and the detector. An examination of where those areas of absence of contact within the circle and the areas of compression outside the circle can assist in determining one or more swing characteristics. Examples of marks that may be created by different types of strokes and how those marks may be interpreted appear below, and are merely exemplary of many different types of strokes that different golfers may hit.

[0054] FIGS. 8-9 show a stroke which has a negative angle of attack and a square clubface angle. When a golfer hits a ball 200 with a negative angle of attack and a square clubface, the mark made by the ball 200 may be similar to the mark 360 shown in FIG. 9. The mark 360 differs from the mark 300 that is created with a zero angle of attack angle. A circular reference 362 appearing in dashed lines may be included on the swing characteristic detector 104. The circular reference 362 may be used for comparison with the mark 360. When a negative angle is demonstrated, the mark 360 may appear elongate slightly from

the bottom to the top, as illustrated in the diagram. The elongation and irregular compression also is shown in the areas of absence of contact between the ball and the circular reference 362, which are numbered as 364 and 366. The mark 360 shows an increase in compression in the region numbered as 368. The mark 360 may be slightly narrower on top than on bottom. Additionally, the mark 360 shows that the dimples leave dimple marks 370 that appear to be slightly smaller toward the center of the mark 360 than the top of the mark 360. This difference in size and absence of dimple marks in the center of the mark 360 may indicate that the center of the golf ball compressed as the golf ball contacted the club face.

[0055] FIGS. 10-11 show a stroke with both a non-zero angle of attack and a non-square clubface angle. As shown in FIG. 11, the mark 400 left by the golf ball is elongate slightly from the bottom heel area toward the top toe area. Such a mark would indicate that the golfer hit a stroke with a positive angle of attack and an open face. A circular reference 420 appearing in dashed line may be included on the swing characteristic detector 104. The circular reference 420 may be used for comparison with the mark left by the golf ball. The mark 400 may include dimple marks 350 that are slightly smaller toward the center of the mark 360 than the area closest to the top toe area of the club 10. This difference in size and an absence of dimple marks in the center of the mark 360 may indicate that the center of the golf ball compressed as the golf ball contacted the club face.

[0056] In addition to being able to detect the stroke characteristics, the swing characteristic detector 104 may also be designed to be able to detect where along the club face 16 the ball 200 makes contact with the club face 16. In FIG. 10, the golfer is making a stroke where the club 10 contacts the ball near the heel 401 of the club 10. As may be seen in FIG. 11, the mark 400 is positioned near the heel 401 of the club 10. It is common for the ball to be hit with an open face toward the heel 401 of the club 10.

[0057] In addition, the swing characteristic detector may be designed to provide information regarding the clubhead speed. The swing characteristic detector may do this in two ways. First, the swing characteristic detector may be

designed to change into a variety of colors upon impact. Instead of the detector providing a single discoloration color where the ball hit, the detector may be made of a material that changes into one of a variety of colors depending on the force applied. The clubhead speed may be related to the force applied to the ball, and accordingly, an examination of the detector will reveal what the clubhead speed was during the stroke. In addition, the clubhead speed will affect the degree of compression of the ball. A higher clubhead speed will produce more force and flatten the ball more substantially than a slower clubhead speed. Thus, the size of the diameter of a mark left by a ball may indicate the clubhead speed. In some embodiments, as discussed below with reference to FIGS. 17-18, the diameter of the mark may be analyzed by being compared with a guide. In some embodiments, the size of the dimple markings could be examined to determine an estimate of the clubhead speed. In some cases, such as where there is significant deformation of the ball due to a mishit condition, it may be more difficult to make such a calculation.

[0058] The swing characteristic detector may, therefore, be used to determine a variety of swing characteristics. The left-right deformation can provide information regarding the clubface angle. The degree of deformation can provide a measurement of how much the clubface angle differs from a square clubface angle, if any. The top-bottom deformation can provide information regarding the angle of attack. The degree of deformation can provide a measurement of how greatly the angle of attack differs from a zero angle of attack. The position of a mark on the detector can provide an indication of how much the position of the ball is from the center of the club on impact. The shading or color of the mark or size of the dimples can provide an indication of clubhead speed. The swing characteristic detector can provide any or all of these datapoints with a single hit.

[0059] The structure described may be used in a system for selecting a golf ball for a golfer. In one embodiment, a swing characteristic detector is applied between the golf club 10 and the golf ball 200, as was described in greater detail above. A golfer then strikes the ball 200 with the club 10, desirably striking the ball

200 with the face 16 of the golf club, thereby marking the swing character detector face 16 with a mark or pattern. The mark is then examined to determine at least one swing characteristic from among those available to be determined, as was further described above. The swing characteristic determined may be any of the following: club head speed, angle of attack, dynamic loft, club path, impact location, and clubface angle. Other data gathered such as ball flight characteristics could be used in conjunction with the impact analysis to more accurately characterize the swing analysis.

[0060] The step of examining the mark may take a variety of forms, as is shown in FIGS. 12 and 13. The step of examining the mark may involve the step of visually inspecting the mark, as shown in FIG. 12. In FIG. 12, a user 500 examines a mark 506 on a swing characteristic detector 504 applied to a club 510. The user 500 may use a variety of instruments to determine one or more of the swing characteristics. First, the user 500 may use a ruler 520 or other measuring device to determine a degree of deformation. The user 500 may alternatively use a set of calipers 530 to make a more detailed measurement. The user 500 may also use a protractor 540 or other instrument for determining the angle of the deformation. The user 500 may also use a chart or guide 550. For example, in some embodiments, as discussed with respect to FIGS. 17 and 18, a guide may be provided on the packaging in which a set of golf balls are provided to the user. The guide 550 may include various types of information. The guide 550 could simply be a guide that provides the user 500 with clubhead speeds for varying shading and/or colors of impressions. The guide 550 may also include sample marks that the user 500 can compare to the mark 506 to determine other swing characteristics from the mark 506. Other features of the mark 506 may also be measured to be used alone or in a calculation. For example, a user may wish to calculate the major and minor axes of the mark, and this result may yield additional information.

[0061] As shown in FIG. 18, in some embodiments, a guide 1002 or reference may be provided on the exterior of the packaging in which the golf balls

are sold in. For example, a guide 1002 may be provided on a sleeve 1000 and/or box in which the golf balls are sold in. In some embodiments, a set of golf balls and a set of swing characteristic detectors may be provided as a kit in the same packaging. In some embodiments, the set of swing characteristic detectors may be identical. In some embodiments, the set of swing characteristic detectors may include swing characteristic detectors of various shapes and/or sizes corresponding to various types of club faces. For example, the set of swing characteristic detectors may include a plurality of a first type of swing characteristic detectors, a plurality of a second type of swing characteristic detectors, and a plurality of a third type of swing characteristic detectors. Each of the first, second, and third types of swing characteristic detectors may correspond with various types of club faces. In such embodiments, a single kit may be used with a variety of clubs. In some embodiments, the swing characteristic detectors may be color coded and/or may include another type of indicia indicating the type of swing characteristic detector and/or distinguishing the individual swing characteristic detectors from one another. Providing the swing characteristic detectors and balls in a kit may ensure that the type of swing characteristic detector corresponds with the type of golf ball(s) used for analysis. The kit may also include instructions for using the swing characteristic detectors and guide.

[0062] The guide 1002 shown in FIG. 18 is a triangular shaped guide. Referring to FIGS. 17-18, in such an embodiment, a user 600 may remove the swing characteristic detector 602 from a golf club (not shown in this FIG.). The user 600 may fold the swing characteristic detector 602 along a diameter of the mark 604, as indicated by the two arrows to the right of the swing characteristic detector 602. As shown in FIG. 18, the user 600 may hold the folded swing characteristic detector 602 next to the guide 1002 to determine which point on the chart has a height aligning with the diameter of the mark 604. The size of the diameter of the mark 604 may correlate with club head speed. In some embodiments, the guide 1002 may have ranges of diameters denoted by color, shading, or other type of indicator. As shown in FIG. 18, the ranges may be

denoted by pattern 1004, pattern 1006, pattern 1010, pattern 1010, and pattern 1012. Each range may correspond to a club head speed and/or another swing characteristic. Thus, the user 600 may align the mark 604 with the range matching the diameter of the mark 604 to determine the club head speed and/or other swing characteristic of the swing resulting in the mark 604 on the swing characteristic detector 602. In some embodiments, instructions for using the guide 1002 and swing characteristic detector 602 may be provided on the side of the sleeve 1000 and/or on a separate piece of paper provided inside the sleeve 1000. It is understood that other types of guides may be provided on or with the exterior of the sleeve 1000 and/or box in which the golf balls are sold in. For example, either swing characteristic detector 602 or guide 1002 may be clear in areas or transparent or translucent. In such an embodiment, so that swing characteristic detector 602 and/or guide 1002 may be an overlay, where swing characteristic detector 601 and guide 1002 are stacked for comparison of the markings on each without needing to fold swing characteristic detector 601 and guide 1002.

[0063] As an alternative to a visual inspection solely by a user 500, FIG. 13 shows an automated system that may be used in connection with the present method. In FIG. 13, the user 600 may remove the swing characteristic detector 602 from the golf club (not shown in this FIG.) and may place the detector including the mark 604 into a scanner 606 in operative position. While a flatbed scanner 606 is shown, it will be apparent to one having ordinary skill in the art that any structure or method that is capable of reading optical data may be used in place of the flatbed scanner 606 shown with or without additional equipment. For example, the detector 602 could be placed into a holder and scanned using a business card scanner or other automatic feed scanner or the detector could be scanned using a handheld scanner. Alternatively, a camera may be used to capture the optical or visual data. For example, in some embodiments, as discussed with respect to FIG. 19, the camera may be provided in a smartphone. Though the term "smartphone" is used, a smartphone may be considered to be any type of handheld device capable of accepting input from a user and

calculating a response or analyzing the input, preferably with a connection to a network of some sort, including but not limited to a LAN and the Internet. The visual or optical data may be acquired by any known method in the present embodiments. Once the optical data from the scanner has been generated, the data may be sent to a computer 608. The optical data may be evaluated by software in the computer 608 to determine one or more of the swing characteristics, such as any known image analysis software or algorithms. Alternatively, the optical data may be displayed on the monitor 610 and the user may use various software or hardware measuring and evaluating tools to perform a visual inspection of the mark 604. As an example, the computer 608 may include a graphical interface or screen that includes a plurality of exemplary patterns representing marks that can be created by a golfer's stroke. A user can select the pattern closest to the mark created by a golf stroke to calculate or identify stroke characteristics.

[0064] In embodiments in which the detector is applied to a club face or golf ball, it may be desirable to use a removable swing characteristic detector if a scanner is to be used. The use of a flexible swing characteristic detector allows the detector to be easily placed in a flatbed or other standard scanner. The use of an inflexible detector, such as a mark made directly on the club, creates additional complexity in getting an accurate scan. In such a case, it may be desirable to use a handheld scanner or camera to evaluate the mark accurately.

[0065] It is also noted that the scanner described and shown is described and shown as evaluating a single mark. If desired, a more complicated optical scanning system may be used. For example, in some embodiments, a user may take multiple strokes with a single swing characteristic detector applied. A more robust optical scanning system and/or analysis software may be able to distinguish between a plurality of marks on a single detector. Such a method and scanner also comes within the scope of the present embodiments.

[0066] In still a further embodiment, it is possible that a swing characteristic detector may be embedded into a golf club and that the detector be

given the capability of sensing the compression of a golf ball against a golf club face and generating data similar to that available by using a swing characteristic detector that generates visible data. If such a sensor is used as the detector, the sensor must be able to transmit data to the computer either by a wired or wireless connection. Any conventional wired or wireless system may be used. A compatible software or hardware capable of interpreting the data from the sensor is desirably included to generate relevant data to allow the selection of a ball. Such data may simply be the generation of a visual representation of the mark that would have been created on the ball with another sort of detector.

[0067] Additional data regarding a golfer's swing may be collected. For example, data may be collected regarding more than one of the golfer's clubs. In such a case, a second swing characteristic detector can be applied between a second golf club and a golf ball. The golfer may then strike the ball with the second golf club. The second mark on the swing characteristic detector is then examined and at least one golf swing characteristic is determined. Alternatively, data may be collected regarding more than one of the golfer's strokes with the same club. In such a case, a second swing characteristic detector may be positioned between the golf club and the golf ball. The golfer may strike the ball with the golf club. The further mark on the swing characteristic detector is then examined to determine the at least one golf swing characteristic. In such instances, it may be advantageous for each of the examinations of the mark to determine the same golf swing characteristic. These values can then be averaged or otherwise input into a calculation to determine appropriate ball fit.

[0068] Once each of the examination steps has been completed, the results of the examination steps are used to select a golf ball. The golf ball can be selected based on golfer's swing characteristics. The present system can be used as a component in the system disclosed in copending and commonly owned U.S. Patent Application Publication No. 2011/0009215, entitled Method and System For Golf Ball Fitting Analysis, and published on January 13, 2011, which is incorporated herein by reference.

[0069] The step of selecting a golf ball can take a variety of forms. For example, a computer may be used to select and identify an appropriate golf ball for a golfer as will be shown below. Alternatively, a selection step may be performed without a computer. For example, a chart may be provided that shows a variety of possible marks that may be made on the club face and that identifies a corresponding ball for each possible mark. Alternatively, a chart may instruct a golfer how to evaluate the mark to determine one or more swing characteristics and then instruct the golfer how to select a ball based on the resulting information. In the context of the present embodiments, any electronic or printed system may be used to convey the appropriate information. In some embodiments, a printed system may be disposed within packaging and/or on packaging. For example, a printed system may be included on sleeve 1000 (FIG. 18). Although a chart form may be helpful, the data need not be organized in chart form. The system can include any type of information that is helpful in translating the data generated in the marking and evaluating steps into information that can be used to select an appropriate ball.

[0070] The steps in the above embodiments can be considered as a flowchart for selecting a golf ball as shown in FIG. 15. Step 800 may include placing a detector such that the detector is between a ball and a club during impact. For example, step 800 may include applying a swing characteristic detector to one of a ball and a club. In another embodiment, step 800 may include placing a swing characteristic between a ball and a club without applying the swing characteristic detector to the ball or the club.

[0071] Step 802 may include striking the ball with the club, thereby making a mark on the swing characteristic detector. For example, if the swing characteristic detector is applied to the club, striking the golf ball may cause the golf ball to make a mark on the club.

[0072] In step 804, the user may visually inspect the mark on the swing characteristic detector. For example, if the swing characteristic detector is applied to the club, step 804 may include visually inspecting the club. In some

embodiments, step 804 may include the user simply looking at the mark left on the swing characteristic detector by the club hitting the golf ball. In embodiments in which a swing characteristic detector is applied to one of the club or golf ball, step 804 may include the user removing the swing characteristic detector from a club or golf ball. In some embodiments, for example as shown in FIGS. 17 and 18, step 804 may include the user folding the swing characteristic detector 602 along a diameter of the mark 604.

[0073] Step 806 may include comparing the mark to known data to evaluate the mark and determine one or more swing characteristics. For example, in the embodiment shown in FIGS. 17-18, step 806 may include comparing the diameter of the mark 604 to the guide 1002. As discussed above, the guide 1002 may show patterns indicating ranges of club head speeds and/or other swing characteristics. The range matching the diameter of the mark indicates the club head speed and/or other characteristics of the swing resulting in the mark 604 on the swing characteristic detector 602. For example, in the embodiment shown in FIG. 18, the diameter of the mark 604 matches up with the pattern 1006. The pattern 1006 may indicate a certain swing characteristic. Step 808 may include using the swing characteristic data to select a golf ball. In some embodiments, as discussed above, instructions may be provided in a kit. These instructions may inform a user about how to use the swing characteristic detector 602 and the guide 1002 to select a golf ball.

[0074] Turning now to FIG. 14, golf ball fitting analysis system for a computer system that may be used in ball selection is shown. The computer system may include a computer 700. In some embodiments, as discussed below with respect to FIG. 19, the computer 700 may be provided in a smartphone. A database may be associated with the computer 700 such that the database may be accessed by the computer 700. The database may be associated with the computer in a number of ways. The database may be stored on a hard drive in the computer 700. It may also be stored on a CD, DVD, floppy disc, or other media that fit into a drive 712 on the computer 700. It may also be stored on a

removable media, such as a USB drive 716 that may be inserted into an available port on the computer 700. Alternatively, the database can be stored remotely on the internet 718 or another locally networked computer (not shown).

[0075] An input or receiving device is also associated with the computer 700. The input device can take one of a number of forms. In the embodiment shown in FIG. 14, the input device may include a selector 714 and a scanner 710. The selector 714 is any device capable of indicating to the computer that data is desired to be input into the computer 700. The selector 714 may be a manual dial, keyboard, mouse, tablet, voice command module, microphone or other device able to be actuated by a user. The input device may prompt a user to select a particular club being used, whether it is a first or second striking step, and any number of other relevant pieces of data. Alternatively, the input device may simply be a device that launches a user interface that instructs the user which step to perform at which time, which club to use, or the like. There are no precise requirements for the input device. The scanner 710 associated with the computer 700 may be the scanner referred to earlier in this disclosure. In any event, the input device is used to input the swing characteristics into the computer 700. As noted, the scanner 710 may be used alone to determine the swing characteristics, the user may input the swing characteristics via the selector 714, or the swing characteristics can be input via the selector 714 and the scanner 710.

[0076] In addition, a launch monitor 720 or other apparatus may also be associated with the computer 700. If, for example, the computer 700 is used to instruct a user how to perform the steps, the launch monitor 720 may be helpful in providing additional feedback to the user. The launch monitor 720 can be used to determine, for example, whether a golf ball has been hit during the process. In addition, speakers or other equipment could be used without a great deal of added complexity. In addition, as noted above, a sensor may be associated with a golf club face and a computer to transmit information from the club to the computer 700 and may form part of the input device.

[0077] Stored instructions are also associated with the computer 700 such that the stored instructions may be accessed by the computer 700. The instructions may be associated with the computer in a number of ways. The instructions may be stored on a hard drive in the computer 700. It may also be stored on a CD, DVD, floppy disc, or other media that fit into a drive 712 on the computer 700. It may also be stored on a removable media, such as a USB drive 716 that may be inserted into an available port on the computer 700. Alternatively, the stored instructions can be stored remotely on the internet 718 or another locally networked computer (not shown). The stored instructions may calculate a ball fit value using the characteristics input via the input device and the database of known profiles. The stored instructions may match these data points together and generate a recommendation of a particular ball for a user.

[0078] Once the instructions have generated a recommendation for a user, a display may display one or more recommended balls. The display may take a number of forms. The display may be a monitor associated with and attached to the computer. Alternatively, the display may be a printed paper dispensed from a printer associated with the computer. The display could also be the display of a code or color that is then further correlated with various balls in a separate step. Finally, the display could be the dispensing of a ball or sleeve of balls that is recommended. The display could also include displaying information on more than one ball recommended for a user. For example, if a golfer has some clubs where the angle of attack is significantly different from other clubs, it may be desirable for the golfer to try more than one ball to determine which ball is optimal. The display could take other forms as well, as long as the user is able to use the data to select one or more appropriate balls from the data displayed.

[0079] As mentioned above, in some embodiments, a handheld device may be used for fitting a golf ball. The handheld device may have a camera and a computer. For example, the handheld device may be a smartphone. As shown in FIG. 19, in some embodiments, the method of fitting a golf ball may include using a smartphone 1100 having a camera. For example, the smartphone 1100 may

include an iPhone, commercially available from Apple Inc. The camera on the smartphone 1100 may be used to capture optical or visual data. In some embodiments, instead of or in addition to a user 500 examining the mark 506 on the swing characteristic detector 504, as shown in FIG. 12, the smartphone 1100 may be used to analyze the mark 506 on the swing characteristic detector 504 applied to the club 510. The smartphone 1100 may include a smartphone application that is configured to analyze the mark 506 on the swing characteristic detector 504 applied to the club 510. For example, the smartphone application may be "Nike Golf 360" and such a smartphone application may be configured to analyze the mark 506 on the swing characteristic detector 504 applied to the club 510. As is well known, smartphones include computers configured to access the internet. Any of the features discussed above as being associated with computer 700 may be associated with the computer of smartphone 1100. In some embodiments, smartphone 1100 may include an input device, as discussed above with reference to FIG. 14. For example, the smartphone 1100 may include buttons, dials, selection boxes, and/or drop down menus appearing on a screen of the smartphone 1100. A user may input information identifying details useful for analysis. For example, the details may include the ball type, club type, and/or user's name into the input device. The smartphone 1100 may use these details to analyze the user's swing and to determine ball recommendations for the user.

[0080] The steps in the above embodiments can be considered as a flowchart for selecting a golf ball as shown in FIG. 16. Step 900 may include positioning a swing characteristic detector between a ball and a club. For example, in some embodiments, step 900 may include applying the swing characteristic detector to a club face. Step 902 may include striking the ball with the club, thereby making a mark on the swing characteristic detector. Step 904 may include collecting optical data regarding the mark on the detector. For example, in some embodiments, step 904 may include using the scanner 710 to collect optical data. In embodiments in which the detector 504 is applied to club 510, step 904 may include removing the swing characteristic detector 504 from the

club 510 and inserting swing characteristic detector 504 in the scanner 710. In other embodiments, step 904 may include using a camera, such as the camera of smartphone 1100 (FIG. 19), to collect optical data by photographing the mark on the club. In step 906, the optical data may be compared to a database to evaluate the mark and determine one or more swing characteristics. In some embodiments, step 906 is performed by a computer. For example, step 906 may be performed by the computer 700 or the computer in the smartphone 1100. Step 908 may include using the swing characteristic data to select a golf ball. In some embodiments, the computer 700 or the computer in the smartphone 1100 may select a golf ball based on the swing characteristic(s) determined in step 906.

[0081] While various embodiments of the invention have been described, the description is intended to be exemplary, rather than limiting and it will be apparent to those of ordinary skill in the art that many more embodiments and implementations are possible that are within the scope of the invention. Accordingly, the invention is not to be restricted except in light of the attached claims and their equivalents. Also, various modifications and changes may be made within the scope of the attached claims. Each of the disclosed embodiments may be combined with one another.

WHAT IS CLAIMED IS:

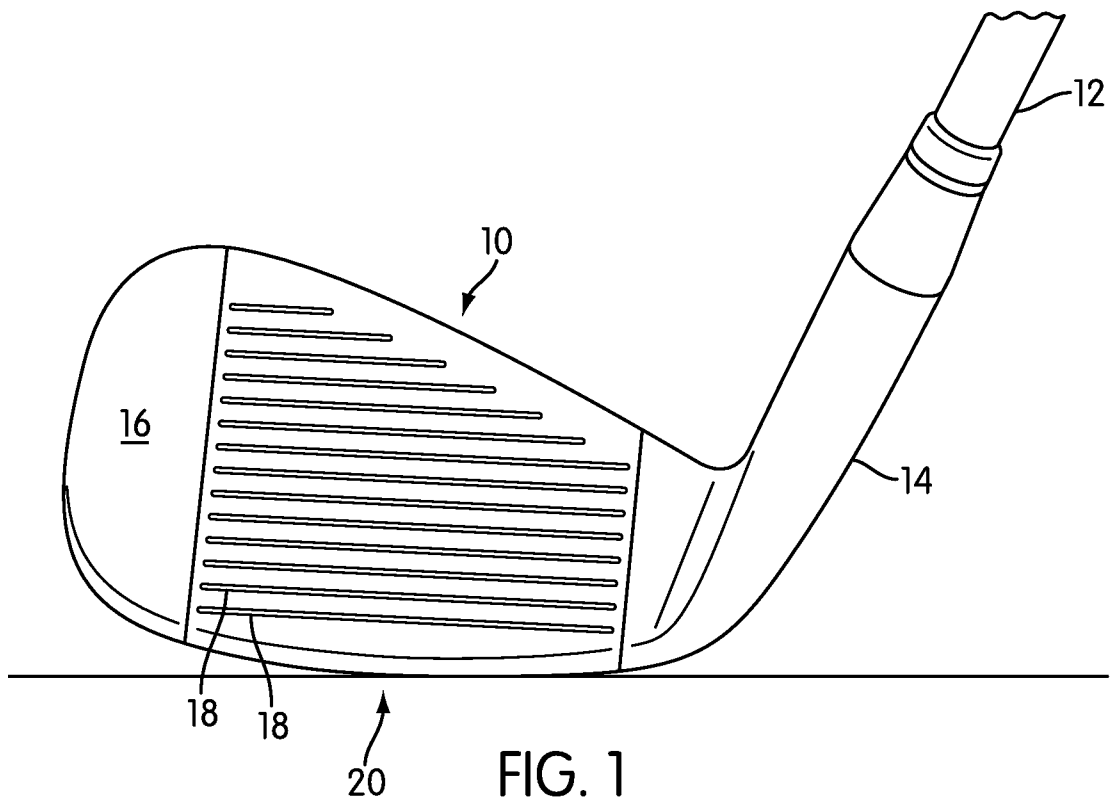
1. A method of selecting a golf ball for a golfer, comprising:
placing a first swing characteristic detector between a golf club face and a golf ball;
examining a first mark on the first swing characteristic detector made by the golf club face striking the golf ball to determine at least one golf swing characteristic; and
selecting an appropriate golf ball for the golfer based on the at least one golf swing characteristic.
2. The method of selecting a golf ball for a golfer according to claim 1, wherein the at least one golf swing characteristic comprises at least one of the following: club head speed, angle of attack, dynamic loft, club path, impact location, and clubface angle.
3. The method of selecting a golf ball for a golfer according to claim 1, wherein the step of examining the first mark includes comparing the first mark on the first swing characteristic detector to a guide.
4. The method of selecting a golf ball for a golfer according to claim 1, further comprising the steps of:
placing a second swing characteristic detector between the golf club face and the golf ball; and
examining a second mark on the second swing characteristic detector made by the golf club striking the golf ball to determine the at least one golf swing characteristic.

5. The method of selecting a golf ball for a golfer according to claim 1, wherein the step of placing a first swing characteristic detector between a golf club face and a golf ball includes applying the first swing characteristic detector to a golf club face.
6. The method of selecting a golf ball for a golfer according to claim 1, further comprising photographing the first mark.
7. The method of selecting a golf ball according to claim 1, wherein the step of examining the first mark includes folding the first swing characteristic detector along a diameter of the first mark and comparing the diameter of the first mark to a guide.
8. The method of selecting a golf ball according to claim 1, wherein the examining step comprises placing the first swing characteristic detector on a scanner and activating the scanner to scan the first swing characteristic detector.
9. The method of selecting a golf ball according to claim 8, further comprising the step of activating a computer attached to the scanner, the computer being capable of evaluating a scanned image generated by the scanning step.
10. A golf ball fitting analysis system for a computer, comprising:
 - a database of known golf ball profiles based on at least one golf swing characteristic;
 - an input device for inputting a value for at least one golf swing characteristic;
 - stored instructions for calculating a ball fit value using the input value and the database of known profiles; and
 - a display for displaying at least one recommended golf ball.

11. The golf ball fitting analysis system for a computer according to claim 10, wherein the input device comprises a scanner.
12. The golf ball fitting analysis system for a computer according to claim 10, wherein the at least one golf swing characteristic comprises a plurality of golf swing characteristics and the input device allows inputting of values of a plurality of golf swing characteristics.
13. The golf ball fitting analysis system for a computer according to claim 10, wherein the input device comprises a screen allowing a user to select from a plurality of patterns of marks.
14. The golf ball fitting analysis system for a computer according to claim 10, wherein the input device comprises a sensor.
15. The golf ball fitting analysis system according to claim 14, wherein the input device comprises a user interface prompting a user to input data relating to a mark created by an impact between a golf ball and a golf club face.
16. The golf ball fitting analysis system according to claim 14, wherein the input device comprises an optical unit capable of receiving optical data relating to a mark created by an impact between a golf ball and a golf club face.
17. The golf ball fitting analysis system according to claim 16, wherein the optical unit is included on a handheld device.

18. A golf ball fitting analysis kit, comprising:
- a set of golf balls;
 - a packaging configured to house the set of golf balls;
 - a set of instructions associated with the packaging;
 - at least one swing characteristic detector associated with the packaging;
- and
- a guide associated with the packaging.
19. The golf ball fitting analysis kit according to claim 18, wherein the guide is disposed on the packaging.
20. The golf ball fitting analysis kit according to claim 18, further comprising a set of swing characteristic detectors.

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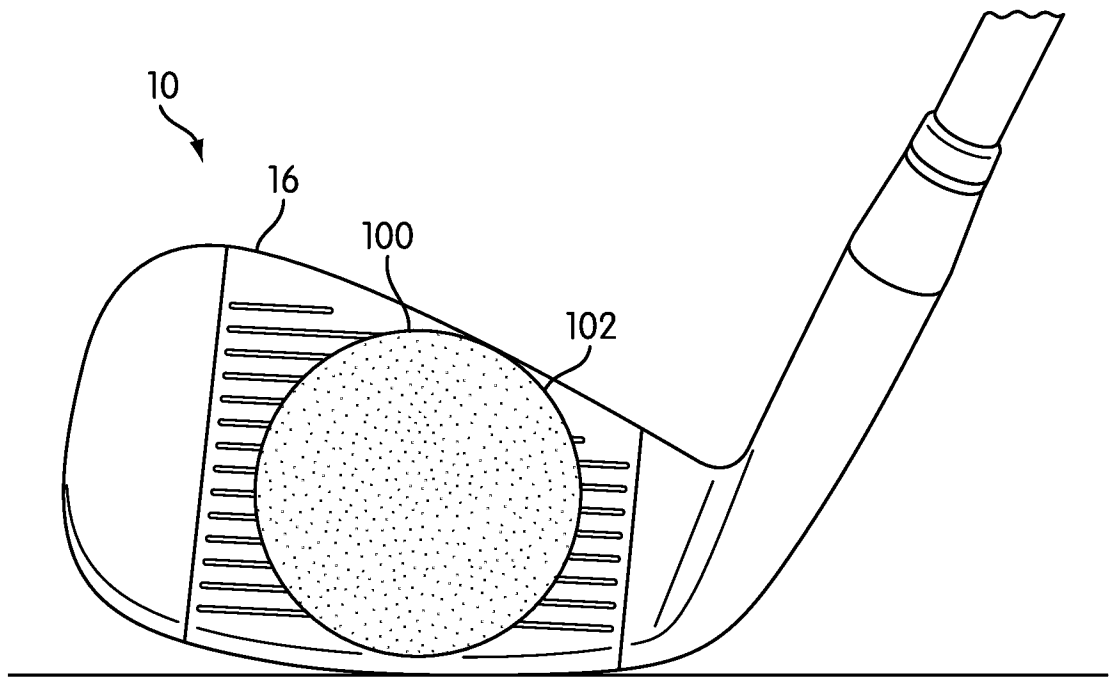


FIG. 2

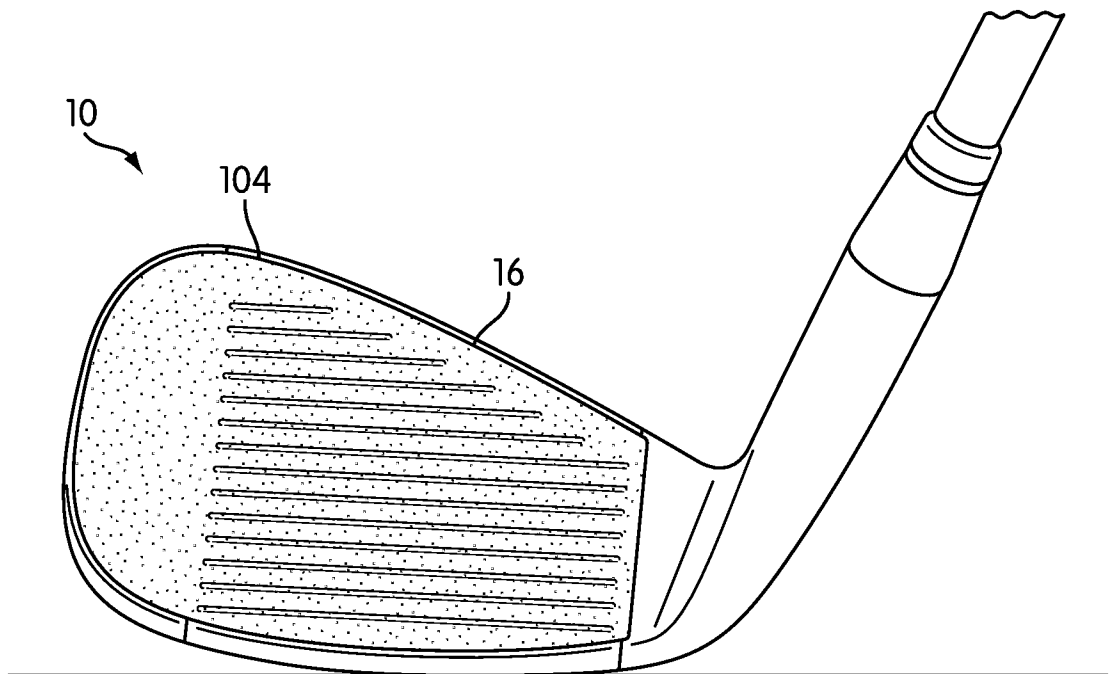


FIG. 3

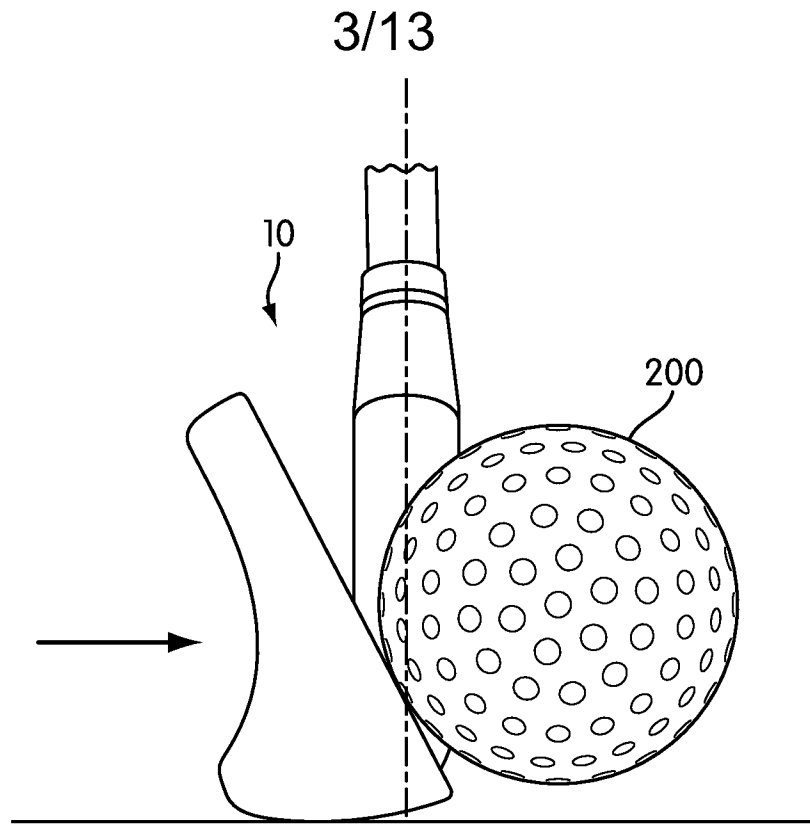


FIG. 4

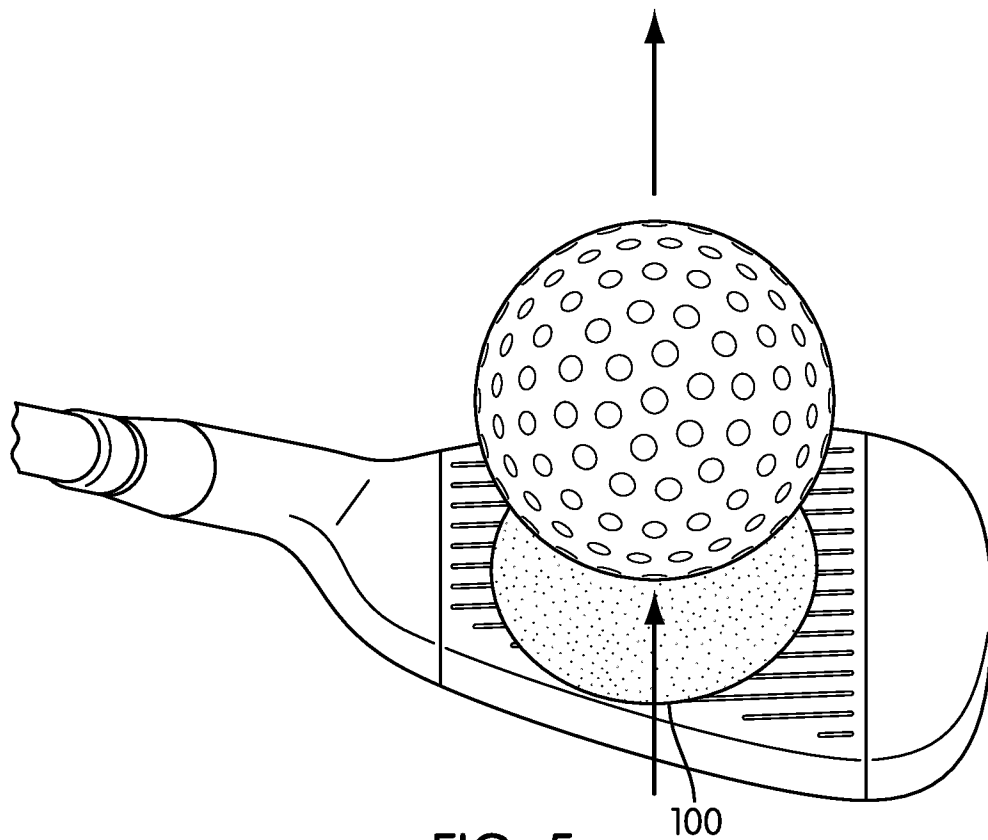


FIG. 5

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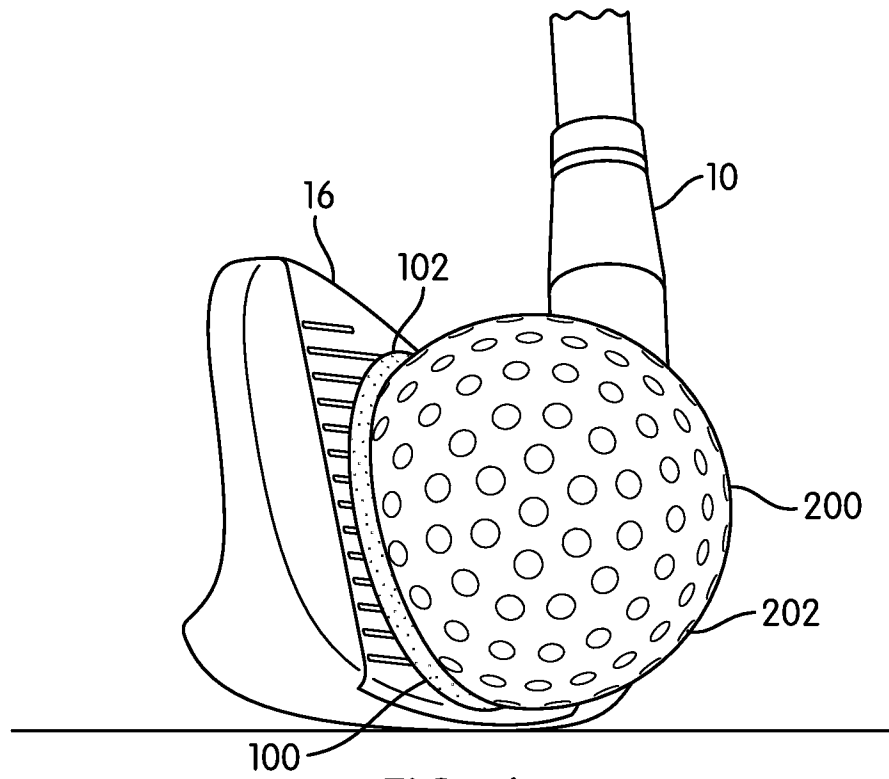


FIG. 6

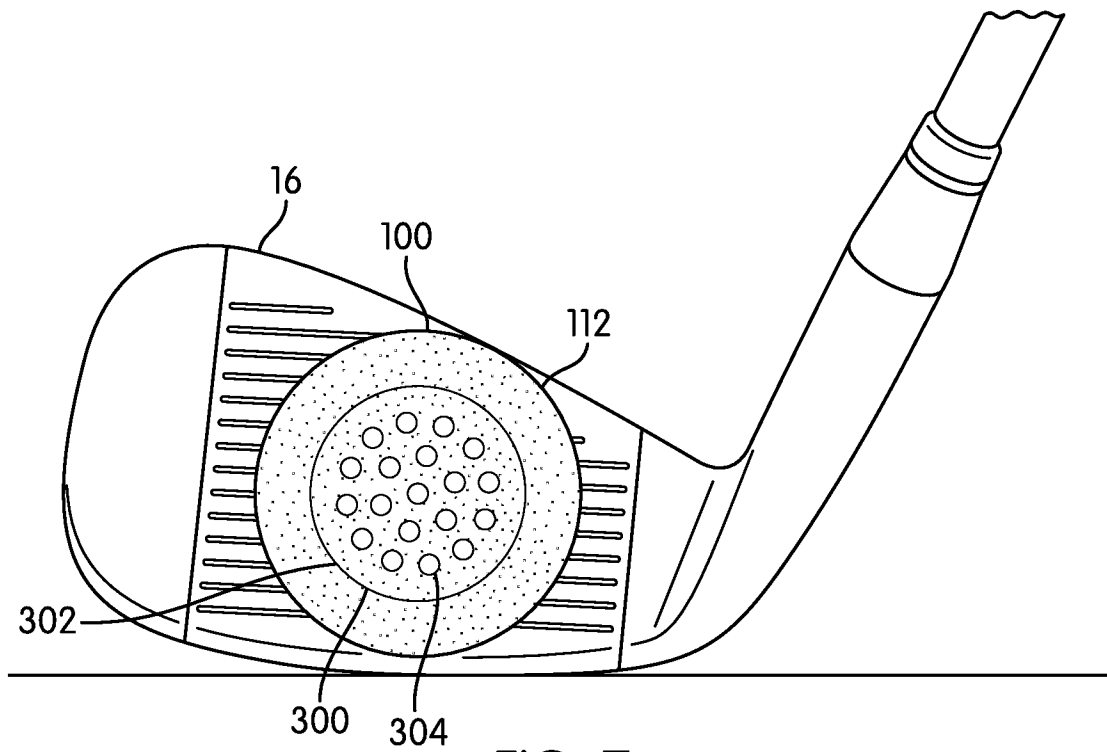


FIG. 7

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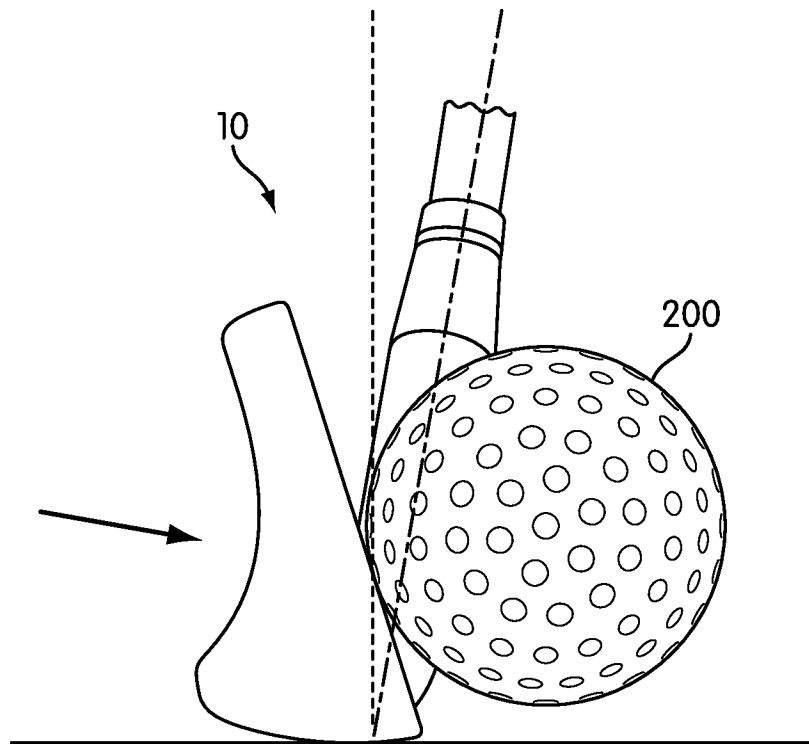


FIG. 8

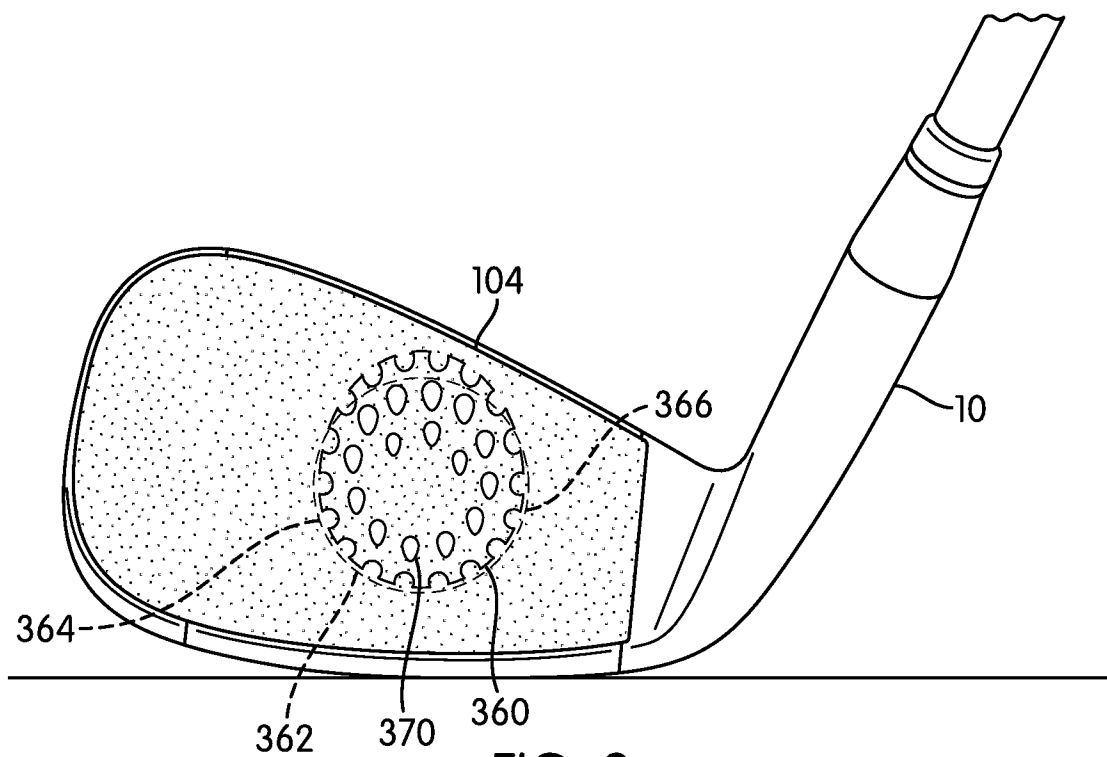


FIG. 9

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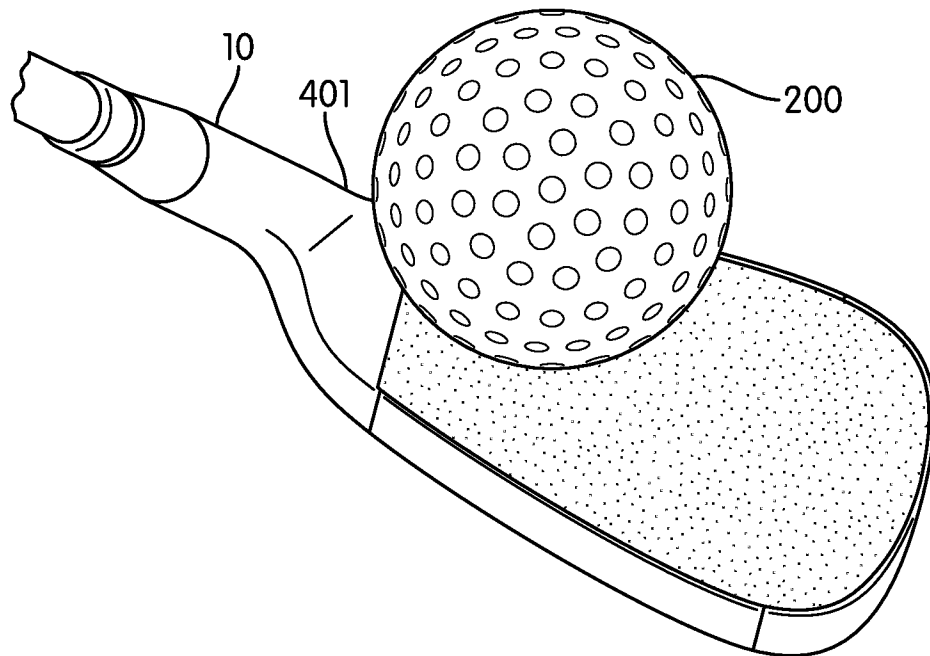


FIG. 10

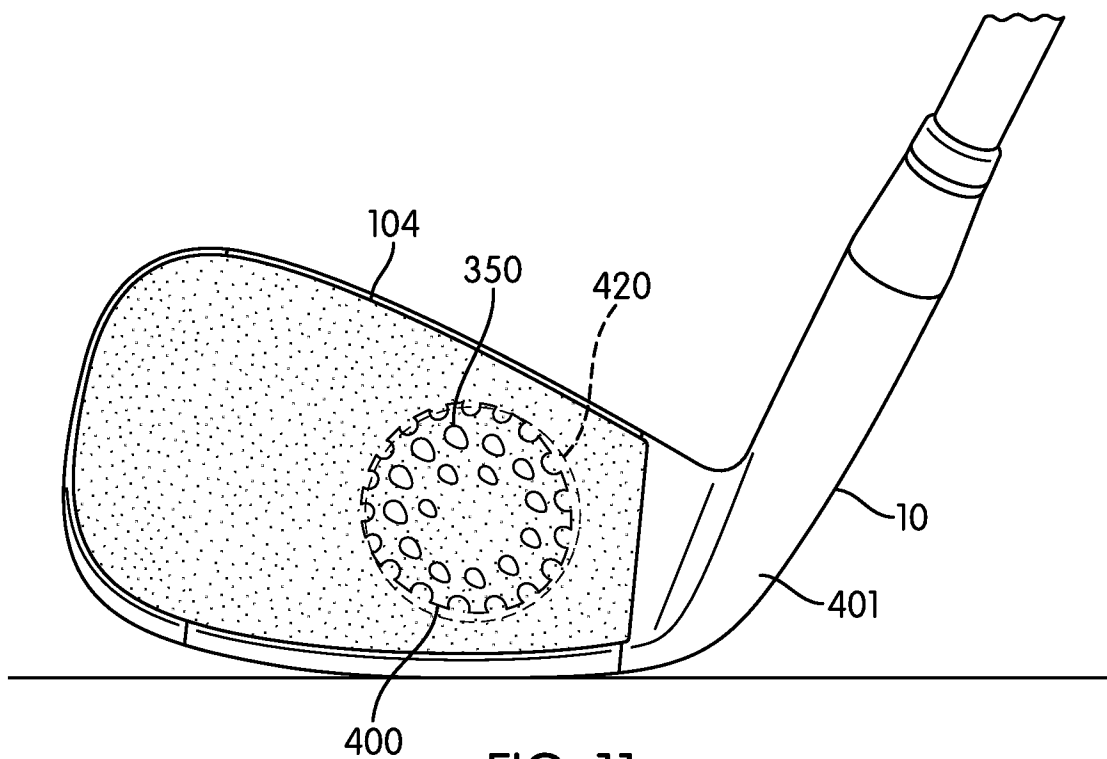


FIG. 11

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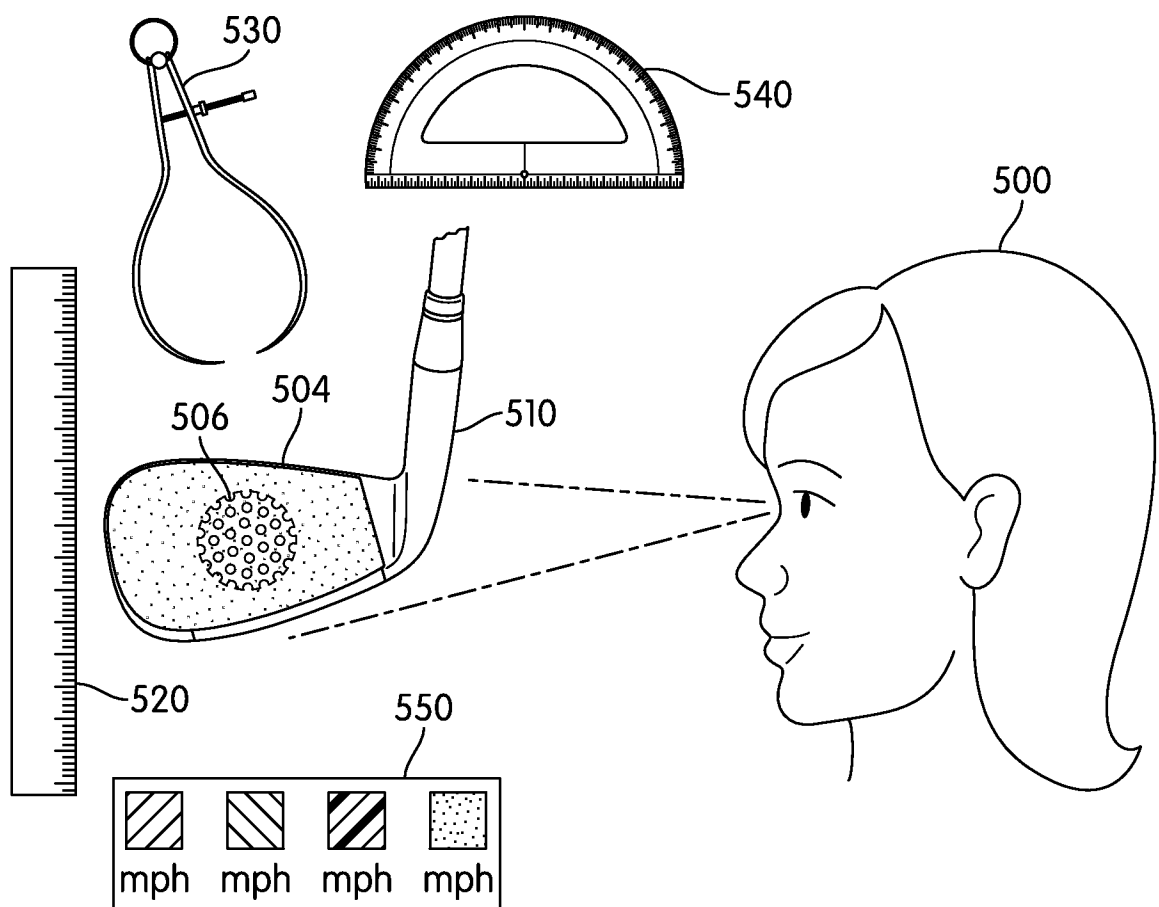


FIG. 12

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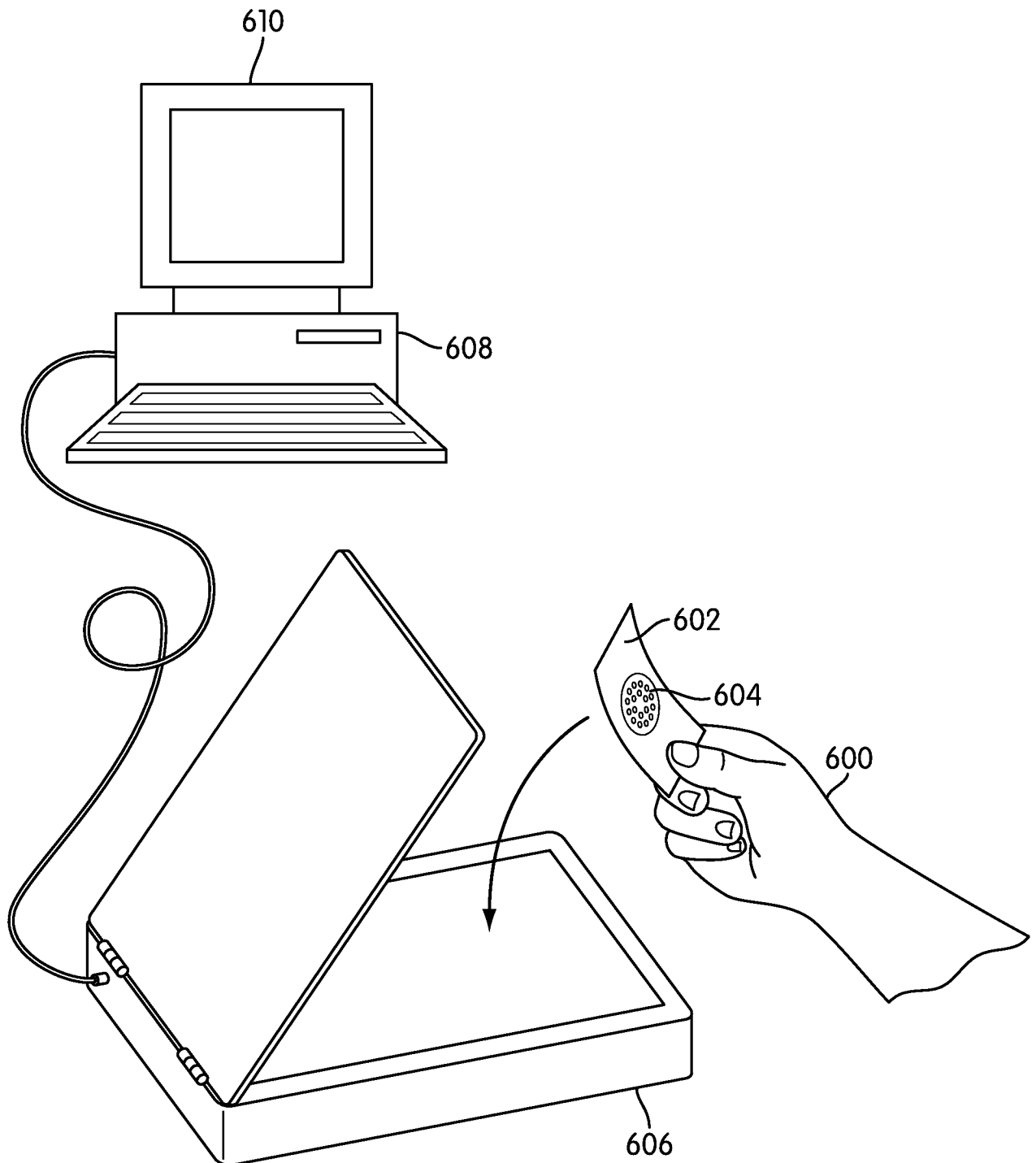


FIG. 13

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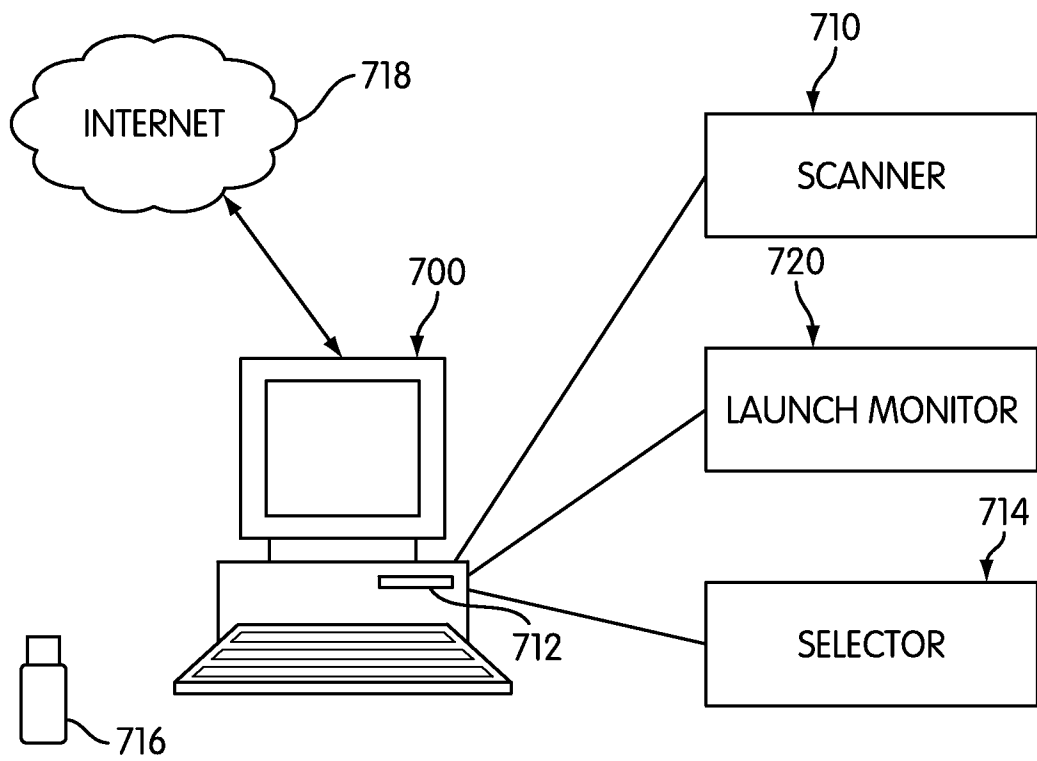


FIG. 14

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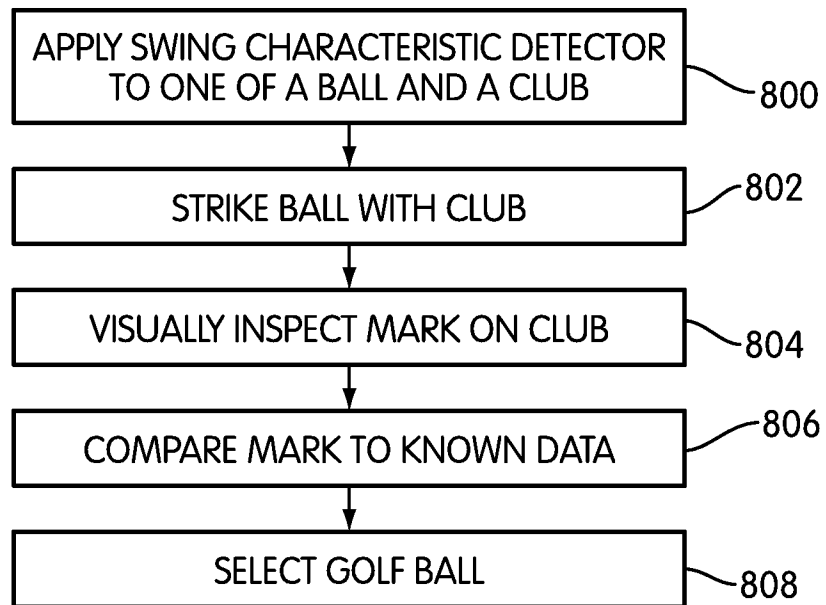


FIG. 15

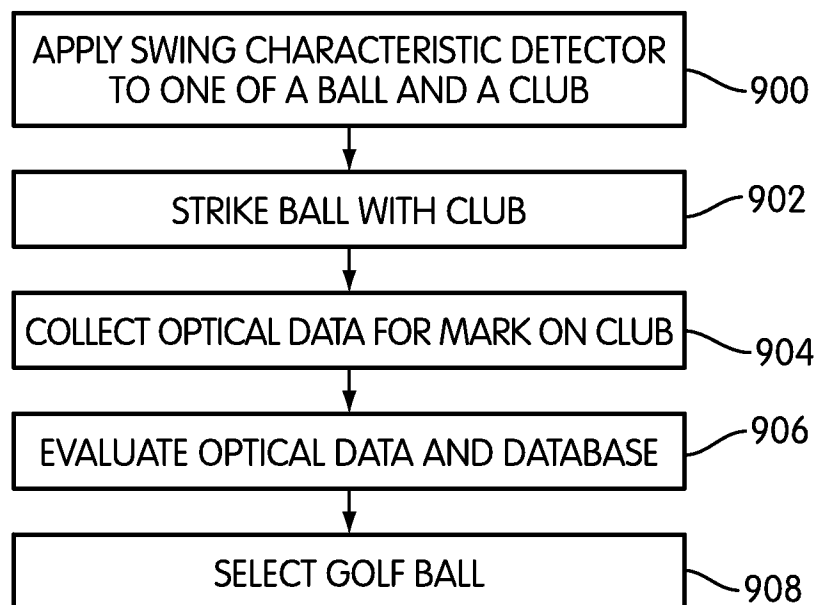


FIG. 16

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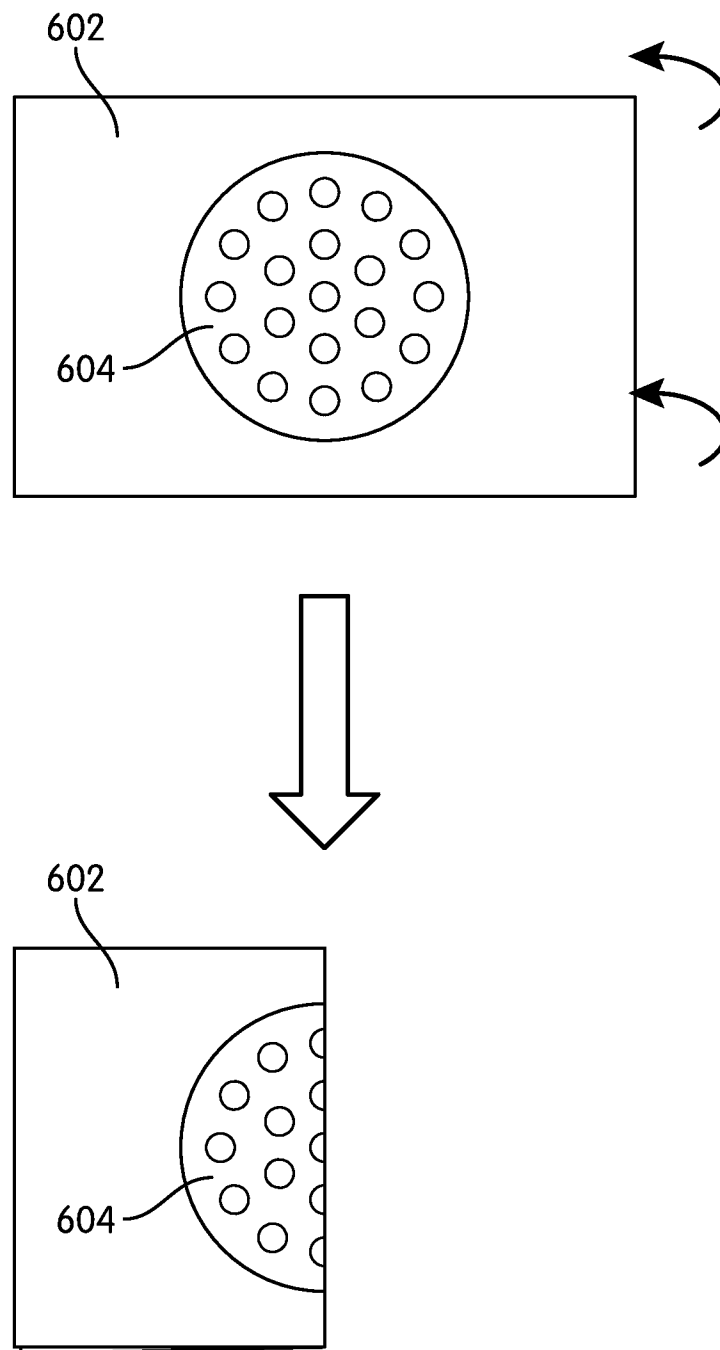


FIG. 17

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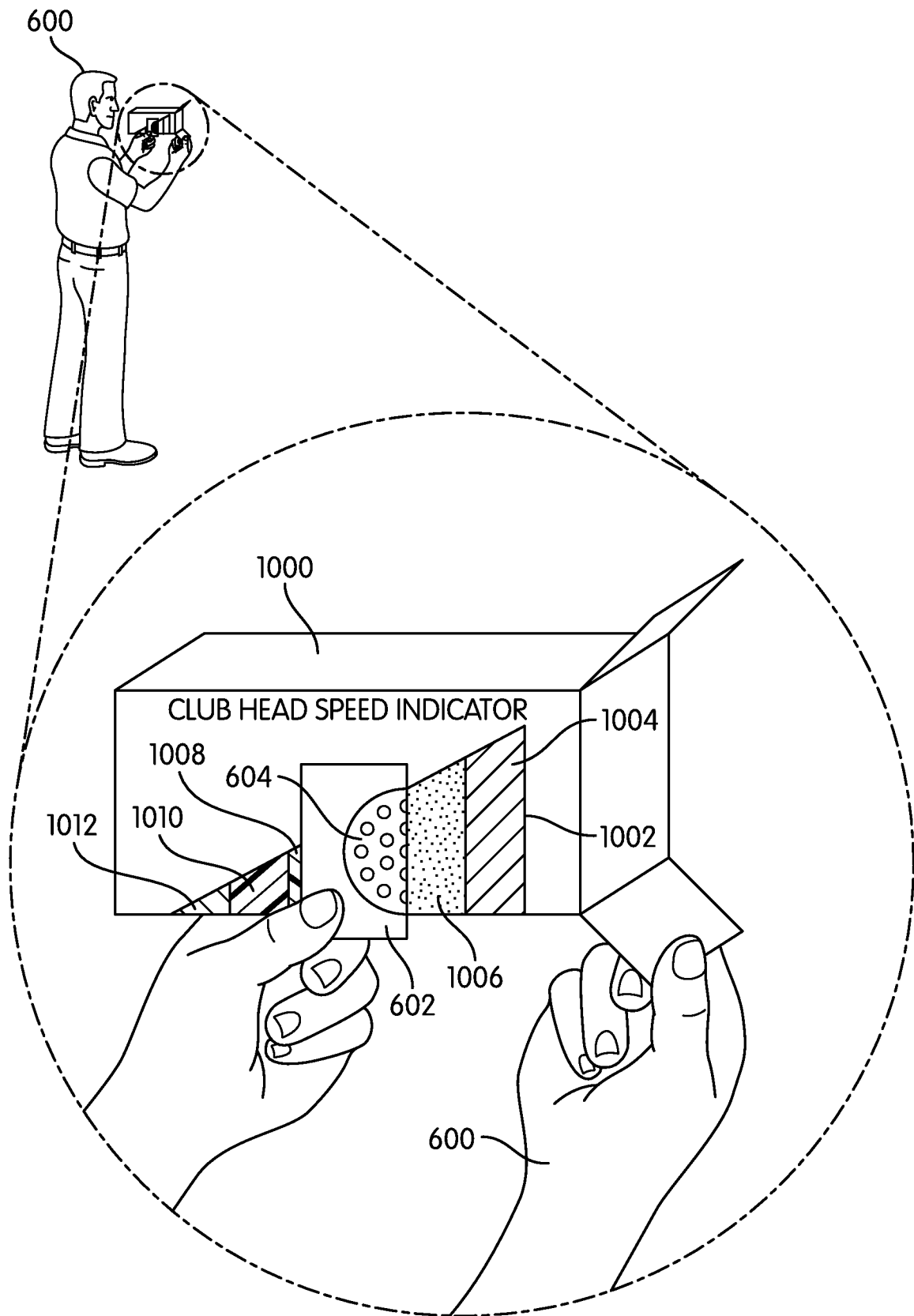


FIG. 18

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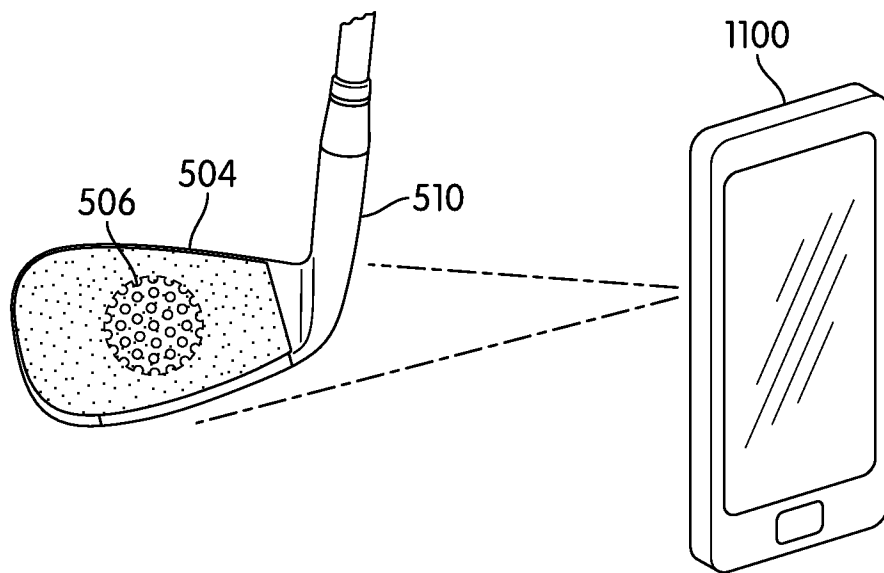


FIG. 19