July 13, 1965 F. MACKNIESH 3,194,563

MEANS FOR INDICATING THE POSITION OF A GOLF CLUB HEAD STRIKING FACE AT THE INSTANT OF BALL IMPACT

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FIG. 1

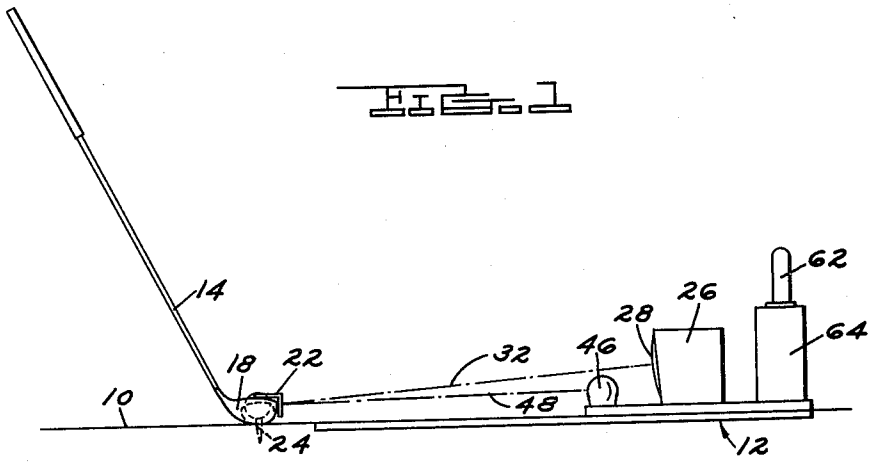



FIG. 2

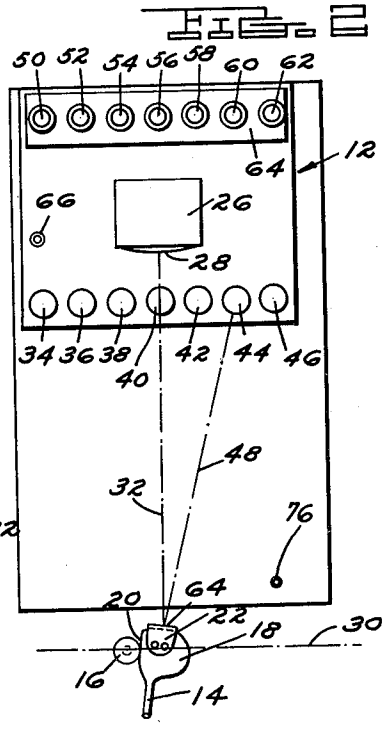
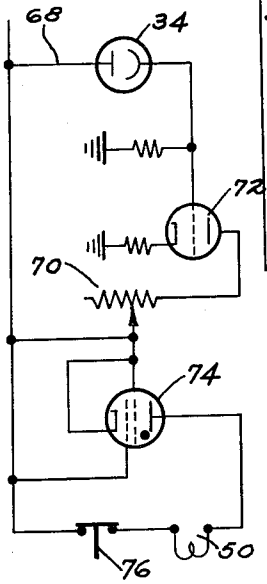



FIG. 3




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# MEANS FOR INDICATING THE POSITION OF A GOLF CLUB HEAD STRIKING FACE AT THE INSTANT OF BALL IMPACT

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This invention relates to the provision of a device for analysing a golf swing, and in particular to such a device operable to indicate the exact relation of the ball striking face of the club head to the golf ball at the moment of impact of the club with the ball.

In playing the game of golf, there are many factors that determine the flight of the golf ball when it is struck by the club. Ultimately the entire cycle of the golfer's swing, his body position in relation to the ball, the grip of his hands on the club, etc. all have an effect upon the flight of the ball. However, one of the most important factors is the relationship of the face of the club head to the ball at the moment of impact. If the club face is "square" to the ball at the instant of impact, it is probable that the ball will travel in the intended line of flight, even through other faults may be present in the swing of the club.

It is therefore the principal object of the invention to provide a golf practice device which will indicate the relationship of the club face to the golf ball being struck at the exact moment of impact between the club and the ball, which device is of an electronic nature and which is comparatively inexpensive to manufacture, simple in construction, and easy to operate.

Other objects, advantages and meritorious features will more fully appear from the following specification, claims and accompanying drawings, wherein:

FIG. 1 is an end view of a device embodying my invention showing the relationship of the various components of the device;

FIG. 2 is a plan view of the device shown in FIG. 1; and

FIG. 3 is a schematic electrical wiring diagram of the device of FIGS. 1 and 2.

Referring now to the drawings, there is shown in FIGS. 1 and 2 a device incorporating my invention, which includes a base 10, upon which is mounted a sensing and indicating system generally indicated at 12 for analysing the angle of impact between golf club 14 and golf ball 16. The golf club has a club head 18 provided with a ball striking face 20, and rigidly mounted on the head 18 is a reflecting mirror or the like 22 having its reflecting surface disposed perpendicularly to the club face 20. The ball 16 is supported on a golf tee 24 upstanding from the base 10. Although the golf club shown is a club commonly referred to as a "wood," it is obvious that an "iron" could be provided with a mirror 22 with equally satisfactory results. Mirror 22 may be mounted on the club 14 in any suitable fashion, it being only necessary to assure that it is securely mounted in a position horizontally perpendicular to the club face 20.

The sensing and indicating system comprises a source of light 26 having a lens 28 which serves to direct a concentrated beam of light. Member 26, which may be of any suitable design, is mounted so as to direct the light beam in a path adjacent the tee 24. As shown in FIG. 2, the imaginary line indicated by numeral 30 shows the intended line of flight of golf ball 16 when struck by club face 20. Means may be provided such as a large sheet of heavy canvas or the like (not shown) to intercept the ball in flight, so that the device may be used indoors or in a confined space. Of course practice golf balls such as are generally available from a number of sources may



be used when practicing indoors, obviating the necessity of the canvas backstop. The light source 26 must be positioned to direct a light beam (indicated at 32 in FIG. 2) in a direction perpendicular to the intended line of flight of ball 16, and should be also so oriented that the mirror 22 will intercept the light beam 32 at the exact instant club face 20 contacts ball 16. Suitable markings may be provided on base 10 to indicate the line of flight of the ball, or a target (not shown) may be set up at which the golfer can aim when swinging the club 14.

Spaced from tee 24 are a plurality of photoelectric tubes shown at 34, 36, 38, 40, 42, 44 and 46. These tubes are arranged in uniformly spaced-apart relation, as shown, and are adapted to be energized by a beam of reflected light, as for example as indicated at 48 in FIG. 2, which light is reflected from mirror 22 mounted on club head 18. The photo tubes are so arranged that only one of them will be actuated, depending upon the angle between mirror 22 and light beam 32 when the club head reaches the position shown in FIG. 2. This angle, of course, will be determined by the position of the club head 18 as the club face 20 strikes ball 16. If the club face is "square" with the ball, the light beam will be reflected back to tube 40.

The photo tubes are wired in an electrical circuit connected to a suitable source of electrical power which may be a battery or conventional 110 volt A.C. source. Each tube has its associated indicating member, which as shown in the drawings at 50, 52, 54, 56, 58, 60 and 62 can be a neon lamp. Preferably the indicators are supported on a base 64, within which may be housed the necessary electrical wiring, etc. for the device. Upon the reception of light at a given photo tube, the tube is actuated, passing a current to its associated indicator, which then lights up to show the golfer if he has hit the ball "squarely" or not. For example, if when the golfer swings club 14 the club head 18 is in the position shown in FIG. 2 when the ball 16 is struck, the club face 20 will not strike the ball 16 squarely (that is, perpendicular to the desired line of flight) and the plane face 64 of mirror 22 will be disposed at an angle with the intended flight line 30. The light beam 30 striking mirror face 64 will thus be reflected along path 48, which will energize photo-electric tube 44 and indicating light 60. It can be seen that the angle between the mirror face 64 and line 30 is equal to the angle between light beam 32 and the path of reflected light 48.

If at the moment of impact club face 20 is "square" with the ball 16, mirror face 64 will be parallel to line 30, and light beam 32 will be reflected back to tube 40, lighting indicator 56, which informs the golfer that the relationship of club face to ball is correct. Although various other factors influence the flight of the ball 16, the most important single determinant of whether the ball will travel in the intended direction is the relationship of club face 20 to ball 16 at the moment of impact. It is this relationship that is measured by the device embodying my invention.

Electrical power from a suitable source (not shown) may be connected through main off-on switch 66 to furnish power to the light 26 and to the electronic elements shown in FIG. 3 and hereinafter explained. Main switch 66 may be located in any desired position, and when such switch is closed, light from member 26 will be focused along a path indicated by the imaginary line 32 of FIG. 2, and the electronic circuit shown in FIG. 3 will be energized.

For convenience and simplicity of illustration, FIG. 3 shows schematically only one of the photo tubes and its associated circuit. It will be obvious, however, that each photo tube may be similarly connected in the circuit to perform the same function as is shown and described.

FIG. 3 shows the photo tube 34 connected to an electrical conductor 68 leading from a power source (not shown). Photo tube 34 is connected to the grid of an amplifier tube 72, which in turn is coupled through a resistance 70 to the grid of a thyratron tube 74. The output of the thyratron is wired to the neon light 50. A current change caused by a reflected beam of light striking the cathode of the photo tube 34 unbalances the grid of the amplifier 72, causing the amplifier tube to conduct. This causes the grid of the thyratron 74 to become more positive, which fires the thyratron, lighting the indicator 50. Once the thyratron fires, it will continue to conduct, keeping indicator 50 lit until the plate circuit of the thyratron is broken. Reset switch 76 is provided to break the circuit and re-establish initial conditions. Reset switch is a normally closed switch, and is preferably mounted on the base 10 as shown in FIG. 2, for convenient actuation by the foot of the user. Momentary depression of switch 76 is sufficient to break the circuit and reset the device for another operation.

It is to be understood that the diagram of FIG. 3 is only a schematic drawing showing the relationship of the electron tubes which may be used to provide a workable device. As will be obvious to one skilled in the art, there are other components readily commercially available which might be substituted for those shown in FIG. 3.

When it is desired to use the device embodying my invention, the mirror 22 is securely fastened to the club head 18 with the plane surface 64 of the mirror perpendicular to the face 20 of the club head. A golf ball 16 is placed upon tee 24, and start switch 66 is closed, energizing light source 26 to project a beam of light along the path shown at 32, and also energizing the circuit containing the photo tubes and neon indicators. The user then grips golf club 14 and swings the club to strike the ball 16. As the face 20 of the club strikes the ball 16, the mirror 22 will intercept the light beam, reflecting light to one of the photo tubes, which, as above described, will light the corresponding neon indicator. The indicator will stay lit until the reset switch 76 is depressed, opening the circuit. When switch 76 is released the circuit will be automatically reset for another operation. When the user finishes his swing, he observes which of the neon indicators is lit, and can make suitable adjustments if necessary.

Assume for example that the conditions at impact of club face against ball are as shown in FIG. 2. This is what is commonly known as an "open" club face, which will cause the ball 16 to travel in a path other than a true line. Light will thus be reflected from mirror surface 64 along the path 48 to photo tube 44, as shown, which will in turn light up neon indicator 60. When the user completes his swing, he observes lighted indicator 60 and he then knows that at the moment his club struck the ball 16, the club face 20 was "open." If on the other hand the club face 20 was "closed" to the same degree, photo tube 36 would receive light, and neon indicator 52 would light up. If the ball were struck exactly squarely, photo tube 40 and indicator 56 would be energized. Obviously only one reset switch 76 need be provided which may be suitably placed in the circuit to open all the thyratron plate circuits simultaneously.

What I claim is:

1. Apparatus of the character described comprising, in combination: a base; means on the base for supporting a golf ball; a source of intense light mounted on the base spaced from said ball support and positioned to direct a concentrated beam of light in a generally horizontal path



at such support; a golf club; a light reflecting member affixed to said golf club and positioned in a plane that is perpendicular to the ball striking face of the club so as to reflect light from said concentrated beam in a horizontal path; a plurality of photoelectric elements arranged in uniformly spaced relation having light sensitive elements positioned to be selectively actuated by reflected light from said member when the reflecting member intercepts the light beam; and indicating means coupled to each of said photoelectric elements and responsive to the actuation of a respective photoelectric element to indicate such actuation.

2. In apparatus for indicating the angular relationship between a golf club face and a golf ball at the instant of impact, a source of intense light; means for directing a concentrated beam of light from said source in a predetermined generally horizontal path; a light reflecting mirror adapted for securement to the head of a golf club, said mirror having a plane light reflecting surface adapted to be disposed perpendicular to the face of said club to reflect light from said concentrated beam in a horizontal path; a plurality of photoelectric elements positioned in uniformly spaced relation on opposite sides of said source of intense light and adapted to be selectively energized by light reflected thereagainst by said mirror when the mirror intercepts the beam of light from said source; an indicating lamp electrically coupled to each of said photoelectric elements, each of said lamps responsive to the energization of its associated photoelectric element to be lighted thereby; and a source of electric power coupled to said photoelectric elements and said indicating lamps.

3. Apparatus of the character described comprising in combination: a base; means on the base for supporting a golf ball; a source of intense light mounted on the base spaced from said ball supporting means; means for directing a concentrated beam of light generally horizontally from said source to a point immediately behind said ball supporting means; a member adapted to be rigidly secured to the head of a golf club having a plane light reflecting surface adapted to be positioned perpendicular to the ball striking face of said club to reflect light from said concentrated beam in a horizontal path; a plurality of photoelectric tubes arranged in uniformly spaced relation, said tubes having light sensitive elements positioned to be selectively actuated by light reflected by said light reflecting member when said club head intercepts said light beam; a source of electric power coupled to said photoelectric tubes in an electric circuit; and an indicating lamp electrically coupled to each of said photoelectric tubes in said circuit and adapted to be energized by electricity from said power source in response to the actuation of its associated photoelectric tube; and means in said circuit for retaining said indicating lamp energized until the circuit is opened.


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