United States Patent [19]

Rawson

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[45] **Jan. 29, 1974**

[54] **PUTTING STROKE ANALYSER**

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[52] **U.S. Cl.** ..... **273/183 C,** 273/199 R
[51] **Int. Cl.** **A63b 69/36**
[58] **Field of Search** ... 273/183, 184, 185, 199, 200, 273/186

[56] **References Cited**

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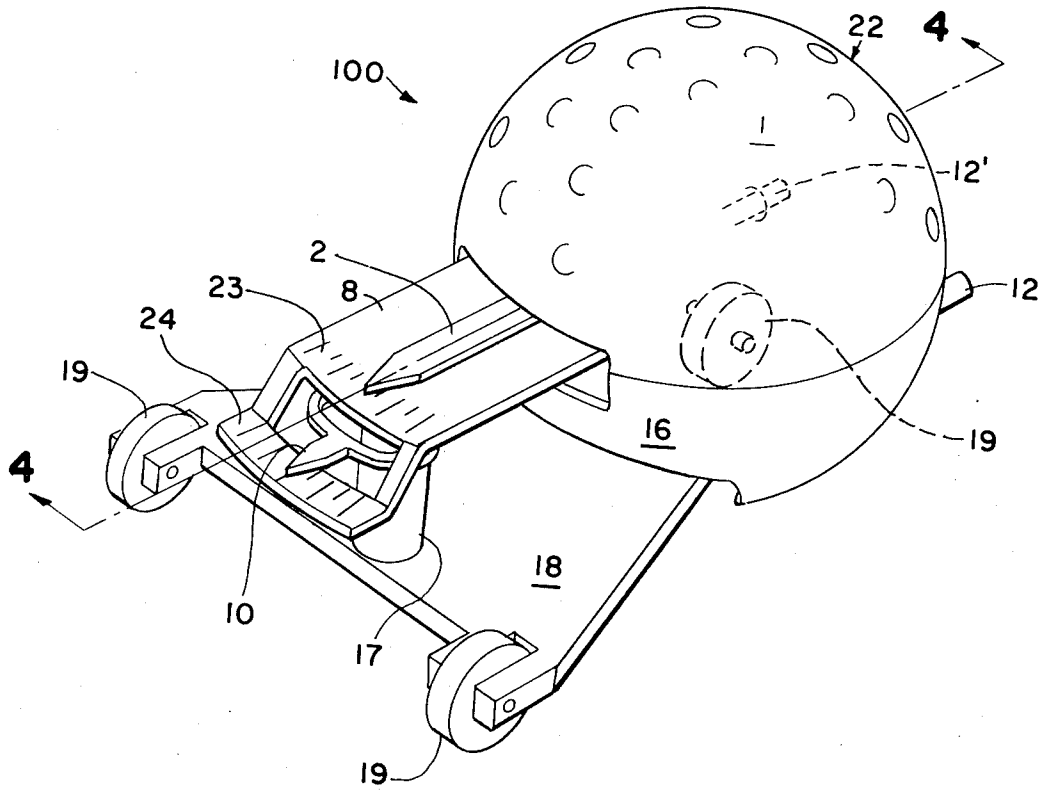
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Primary Examiner—George J. Marlo
Attorney, Agent, or Firm—John F. McClellan, Sr.

[57] **ABSTRACT**

An analytical putting improvement instrument of the struck or missile type having graphical outputs showing direction and degree of putter-face misalignment when a putter is addressed to the instrument prior to and after stroking, and showing direction and degree of putting-stroke misalignment when a putter strokes the instrument; flexible connection of sensing elements and wheeled carriage provisions prevent impact damage to the mechanism; putting stroke and putter face misalignment register until reset.

13 Claims, 4 Drawing Figures



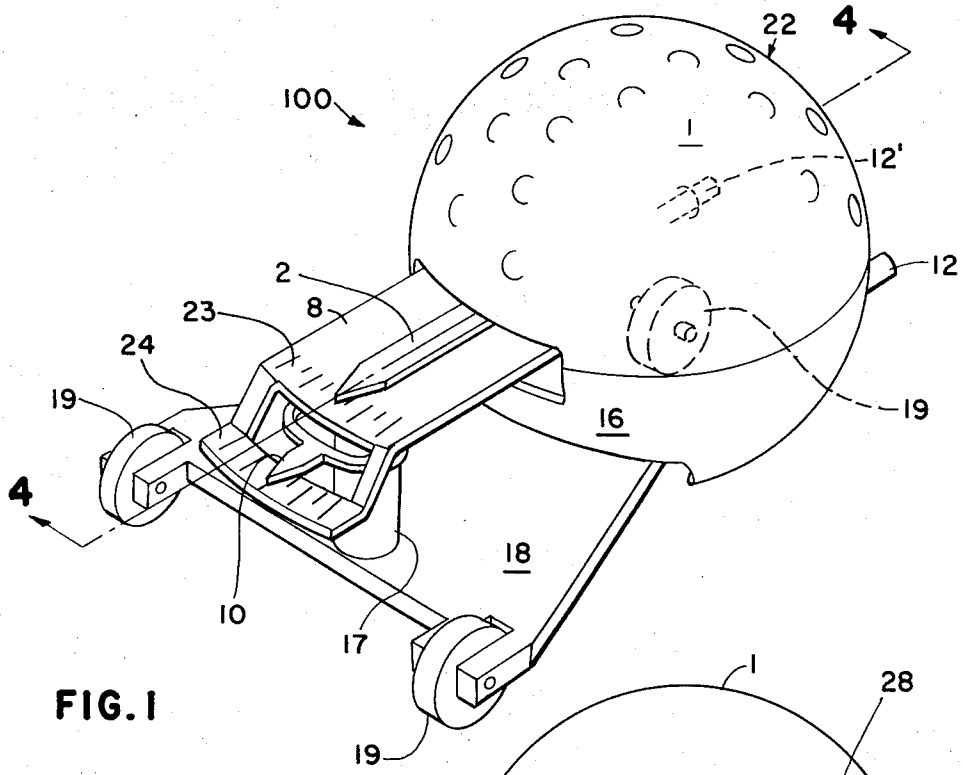

22
4
100
1
12'
12
2
8
23
24
19
16
19
4
18
10
17
19

FIG. 1

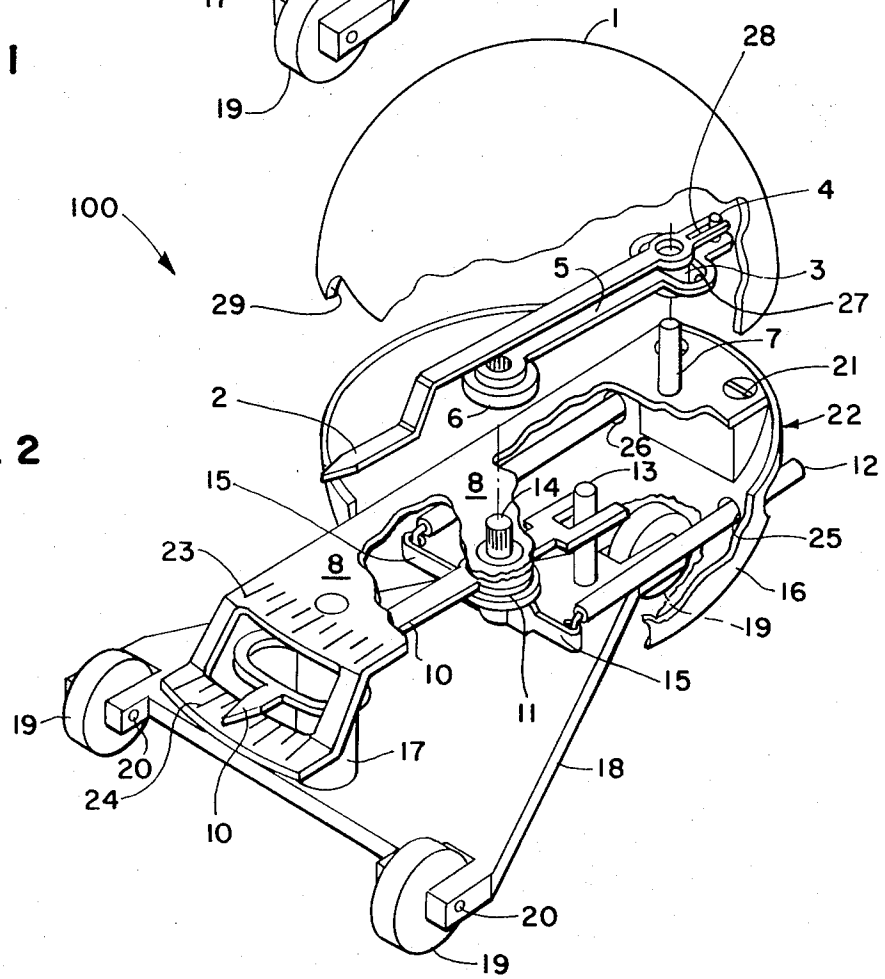

1
28
100
4
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3
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27
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21
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19

FIG. 2

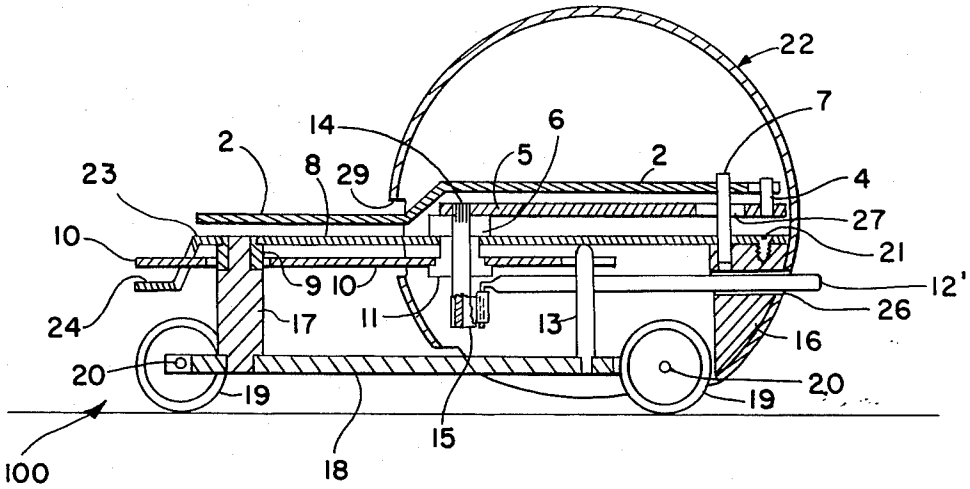

22
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12'
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19
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15
100
18

FIG. 3

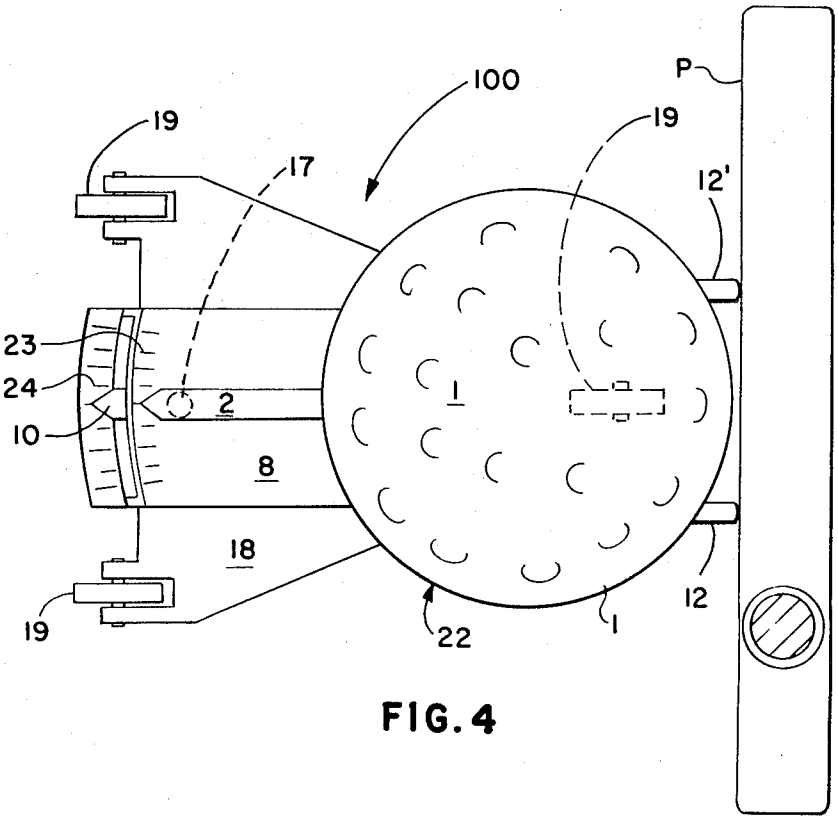

P
100
19
19
17
12'
23
24
2
1
10
8
18
12
19
22
1

FIG. 4

PUTTING STROKE ANALYSER

This invention relates generally to devices for measuring muscular effort and direction of muscular effort, and relates specifically to practice devices to be struck to increase skill in playing golf and the like.

Although this invention was made and developed to further proficiency in the game of golf, it will be understood that it is not limited to golf, and that with variations based on my disclosure, those skilled in the art will be able to adapt my invention to similar uses in which they may be interested, without requiring invention on their part.

The primary object of this invention is to provide golfers, both occasional and professional, with a tested practice device which quickly and significantly improves the putting ability of the user.

Another object of this invention is to provide a struck or missile type putting diagnostic tool adapted for use indoors or outdoors on any smooth surface.

Further objects are to provide a device as described which graphically indicates the following characteristics of the putting stroke:

a. Putter Face Position

b. Putting Stroke Direction

Still a further object is to provide numerical information assisting in selection of suitable putters and in modification of putters to suit individual requirements.

To facilitate the above objects, the invention in the preferred embodiment comprises a 2 to 3 ounce assembly including a carriage bearing a simulated golf ball to be addressed and struck with a putter, sensors responsive to the address and to the stroke which actuate corresponding indicators, which in turn magnify and display errors in the putter-face-position and in the putter-stroke-direction. The carriage is designed to move in response to the stroke when sufficient force is exerted, thus limiting excess force on the analyser and affording a follow through as in striking a ball.

The above and other objects and advantages of the invention will become more readily apparent on the examination of the following description, including the drawings in which:

FIG. 1 shows the invention in front quartering perspective, looking slightly down;

FIG. 2 shows the invention in partially exploded view, looking in the FIG. 1 direction;

FIG. 3 is a side elevation in partial section taken at 4—4, FIG. 1; and

FIG. 4 is a plan view showing a putter head addressing the invention.

Particularly referring now to FIGS. 1 and 4, the invention **100** comprises three aligned wheels **19** journalled in the corners of a triangular-shaped carriage plate **18.** The carriage plate **18** is symmetrical about the long axis of the invention, with the base of the triangular-shape at the front. A simulated golf ball **22** consisting of matching upper shell portion **1** and lower shell portion **16,** is pivotally suspended over the rear of the carriage plate **18,** and extends rearwardly behind it. The pivotal suspension of the simulated golf ball **22** is provided by upper plate **8,** to which the simulated golf ball is affixed. Plate **8** is pivotally attached by post **17** to carriage plate **18.**

Two sensor rods **12** and **12'** protrude rearwardly from the simulated golf ball **22.** The sensor rods are slidable fore-and-aft within part of the simulated golf ball and connect through an internal analytical mechanism, not shown, with forwardly protruding upper indicator **2.** The simulated golf ball connects through a similar mechanism with lower indicator **10.** The two indicators are pointed and are provided with respective scales **23, 24** on upper plate **8.**

PUTTER FACE ALIGNMENT INDICATION

The upper indicator and scale show putter face angular position.

As shown in FIG. **4,** prior to putting, the putter face P is squared with the intended line of putt as represented by the line of indicator **2** along the axis of the invention **100.** Any departure from perpendicularity of the putter face with the intended line of putt registers through sensor rods **12, 12',** and shows as a displacement of indicator **2** on upper scale **23.**

Both direction and amount of angular error are indicated. When error is indicated, after correcting his stance, his grip, or whatever combination appears to him to cause the error, the golfer again addresses the putter face to the invention. Assuming that the putter face angle error now registers at zero, as it will when the sensor rods **12, 12',** are depressed equally, the golfer now soles his club and prepares to stroke the simulated ball.

Following the stroke, the last angle of contact of the putter face with the device during the stroke will remain registered on upper scale **23.**

STROKE ALIGNMENT INDICATION

The lower indicator and scale show putting stroke angular direction with respect to the intended line of putt.

As the golfer putts, his club face first contacts and depresses the sensor rods **12, 12'** and continuing through the stroke strikes the rear of the simulated golf ball **22.** If the putting stroke deviates from the intended line of putt as represented by the line of indicator **10** along the fore-and-aft axis of the invention, the simulated golf ball swings to one side or the other.

As result of the sideways swing of the simulated golf ball under putter impact, the lower indicator, indicator **10,** deflects to one side or the other, showing direction and degree of putting stroke misalignment.

The distance the carriage advances gives a useful indication of the force of one putt relative to another.

It can be seen that the device of this invention, when suitably engaged by a putter at the trailing end, indicates on an upwardly facing portion an objective analysis and measurement of putter face angle and stroke alignment to replace the subjective impressions of the golfer or his professional.

MECHANISM FOR INDICATING PUTTER FACE ALIGNMENT

FIGS. **2** and **3** detail the mechanical linkages of the invention which connect sensor rods **12** and **12'** and simulated golf ball **22** with indicators **2** and **10** respectively to provide analysis and display of putter face angle and putter stroke angle with respect to the line of intended direction of the putt.

Operation of the mechanism is easiest to comprehend if it is noted that:

a. carriage plate **18** has only five items affixed to it: the three wheels **19** on which it rolls, and posts **17** and **13.**

b. all other parts of the mechanism are primarily carried by and swing with upper plate 8, which pivotally attaches to post 17 and which at the rear is frictionally supported on the under surface, as it swings, by the top of post 13. Plate 8 is pivotally secured to post 17 by upset or other suitable means, preferably with an anti-friction bushing 9 between. The anti-friction bushing 9 may rest on a shoulder of post 17, and the assembly may be retained together by a screw, by upsetting the post and bushing as shown, or by any other conventional means.

With this relation in mind, the remainder of the effective, reliable, and economical linkages in the interior of the invention are readily understood.

First, the linkage which actuates the top indicator 2 through the sensor rods 12, 12' to show the angle of address of the putter face operates as follows:

The sensor rods 12, 12' slide back and forth in respective parallel holes 25, 26 in the lower shell 16 (both holes are indicated in FIG. 2.) The forward ends of the sensor rods are reduced in diameter and turned downward, engaging loops in the respective ends of spring lever arm 15 which is disposed transverse to the sensor rods. The center of spring lever arm 15 is retained in the lower end of shaft 14.

When both sensor rods 12, 12' are contacted euqally during address of the putter blade, nothing happens. The invention 100 remains where it is, without forward roll, and both indicators remain on zero. This indicates that the putter face is properly perpendicular to the intended line of the stroke as represented by the line of indicator 2 along the fore-and-aft axis of the invention.

When the device is stroked squarely, a portion of the mechanism yields to allow the sensor rods 12, 12' to advance into the lower half 16 of the simulated ball 22, without disturbing the remainder of the mechanism. This yielding portion is spring lever arm 15. Depressing the sensor rods equally simply bends the two ends of the spring lever arm 15 equally without rotating shaft 14, the lower end of which shaft is split and pressed around spring lever arm 15 so that it supportively affixes the middle of the spring lever arm.

For similar reasons the simulated ball does not swing to the side when stroked squarely. First, the pressure of the putter face on sensor rods 12, 12', balances out about post 17 through alignment of plate 8 which supports the ball. Secondly, friction in the pivots and between the top of post 13 and the bottom of plate 8 is made to be greater than the torque which can be exerted by the relatively weak spring lever arm 15, even when the forces on the spring lever arm 15 are unbalanced.

When the forces on the spring lever arm 15 are unbalanced and one of the sensor rods 12, 12' is depressed more than the other by lack of squareness of the putter face prior to putting, the direction and the degree of misalignment are made to show by movement of the upper indicator 2 across scale 24 through rotation of vertically pivotal post 14 by unequal deflection of spring lever arm 15. The connective structure is as follows:

Post 14 passes upward through step bushing 11, which is retained by resting on the center of spring lever arm 15. The bushing 11 is stepped vertically so that it passes through and pivotally supports lower indicator 10 below upper plate 8, for reasons which appear later. Continuing upward, the post 14 is pivotally journalled in plate 8 by the step bushing 11. Post 14 then passes upward through anti-friction bushing 6 which rides on top of plate 8 and which in turn is borne on and held captive by lever arm 5. Lever arm 5 is force-fitted or otherwise securely affixed to the top of post 14. The bearing of lever arm 5 on bushing 6 and hence on plate 8 prevents the post 14 assembly from dropping through the hole in plate 8.

Lever arm 5, which is securely affixed to the top of post 14 by a force-fitted spline or by other suitable means, extends rearwardly and detours around pin 7 which is vertically affixed in plate 8. The detour section of lever arm 5 consists in a key-handle-expansion to either side, forming a slot 27 in lever arm 5.

At the rearmost end of lever arm 5, pin 4 is vertically affixed to it and extends upward. The upper part of pin 4 engages a longitudinal slot in the rearmost end of indicator 2.

Indicator 2 extends forward a short distance to pivotal attachment with pin 7 near the slotted end and then continues forward almost the length of the device roughly parallel with and above lever arm 5, to a pointed end at the front offsetting downward at an intermediate point to emerge from slot 29 in upper shell 1.

In operation, differential advance of one sensor rod 12, 12' rotates spring lever arm 15 and then post 14, which in turn rotates lever arm 5. Lever arm 5 through pin 4 pivots the slotted rear end of indicator 2 about post 7, causing indicative deflection of the pointed forward end of lever arm 2 over scale 23 in plate 8 immediately below the pointed end. The mechanical multiplication derived from the unequal pivot radii makes this indication extremely sensitive. When pressure is released, the indicator remains in the last position assumed.

It will be apparent that pivotal swing alone of plate 8 about post 17, as will be described below in reference to stroke alignment, in no wise changes the reading on the upper scale, because all the structure affected swings with plate 8, thus providing clear separation of the indications on the upper and lower scales. The stroking readings are generated by separate factors in the putting stroke and may register in the same or in opposite directions. Indications on the lower scale show misalignment of stroke rather than misalignment of club face prior to stroke, in putting.

MECHANISM FOR STROKE ALIGNMENT INDICATION

Operation leading to the lower or stroke alignment indication is as follows. As the putter stroke engages the device of this invention, sensor rods 12, 12' are easily depressed against the relatively low resistance of the spring lever arm and allow the putter face to strike the rear of the simulated golf ball 22.

If the putter face strikes the simulated ball squarely in alignment with the center position axis of lower indicator 10, no deflection of indicator 10 results, showing proper stroking. However any deviation to one side will cause the simulated ball to swing off-center of the fore-and-aft axis of the invention. Since the simulated ball is screwed (at 21) to upper plate 8, upper plate 8 is caused to pivot to the side about post 17.

Plate 8 carries indicator 10 journalled medianly in step bushing 11. The rearward end of indicator 10 is

forked and a short distance back of bushing **11** engages post **13** which is affixed to carriage plate **18.** When the simulated ball swings to one side, the forked end of the indicator **10** is retained by pin **13,** causing the long, forwardly extended, pointed end of indicator **10** to deflect across scale **24** on plate **8,** showing direction and degree of stroke misalignment. Again, it can be seen that the long effective lever arm driving the pointer makes the error indication very sensitive. The entire device of this invention rolls forward in proportion to the force of the stroke, giving a proportional indication and reducing shock loading on device and putter alike.

The scales in the invention are preferably graduated in units showing error per foot of ball travel.

It will be apparent that the lever arms may be changed in ratio to change error multiplication, and that the mechanism may be substituted in part or in whole by other arrangement for the same purpose by those skilled in the art without departing from the spirit of the invention.

Obviously, many modifications and variations of the present invention are possible in light of the above teachings. For example, it has been found advantageous in stabilizing the device against extreme off-line putting strokes to reverse the position of the triangular base plate, providing two wheels at the rear and one in front. It is, therefore, to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What is claimed and desired to be secured by United States Letters Patent is:

1. A putting stroke analyser, comprising:

means including first and second sensors laterally spaced in the putting stroke analyser for sensing putter face angle and for indicating, respectively, proper and actual putter face angle when the putting analyser is addressed by a putter; means for indicating, respectively, proper and actual putter stroke direction when the putting analyser is stroked by a putter; and means including a freely movable carriage mounting all parts of said putting stroke analyser for movement with the carriage for yieldingly supporting all said means for sensing and indicating putter face angle and putter stroke direction.

2. A putting stroke analyser as recited in claim **1,** wherein said putting stroke analyser includes a linkage between said laterally spaced first and second sensors, and a simulated golf ball positioned to be struck at the rear of the yielding support means.

3. A putting stroke analyser as recited in claim **2,** wherein the first and second sensors protrude in position for putter face contact at the rear of the simulated golf ball.

4. A putting stroke analyser as recited in claim **3,** wherein the means for indicating putter face angle has a display portion, wherein the means for indicating putter stroke direction has a display portion, and wherein both the first said and the second said display portions face upwardly, thereby being visible from above at all times.

5. A putting stroke analyser as recited in claim **4,** wherein each display portion includes a pointer and a scale, wherein the means for indicating proper putter face angle includes an indicated predetermined relation of the pointer and scale of the first said display portion, wherein the means for indicating proper putter stroke direction includes an indicated predetermined relation of the pointer and scale of the second said display portion, and means fixing the scale of the first said display portion in spaced relation to the scale of the second said display portion.

6. A putting stroke analyser as recited in claim **5,** wherein all said pointers and scales are displayed forward of the simulated ball and wherein the pointers point away from the simulated ball.

7. A putting stroke analyser comprising: means for sensing putter face angle and for indicating, respectively, proper and actual putter face angle when the putting analyser is addressed by a putter; means for indicating, respectively, proper and actual putter-stroke direction when the putting analyser is stroked by a putter; means for yieldingly supporting all said means for sensing and indicating putter face angle and putter stroke direction, and a simulated golf ball positioned to be struck at the rear of the yielding support means, the yielding support means including a wheeled carriage, the wheel orientation with respect to the carriage being such as to adapt the carriage for movement in the direction indicated by the means for indicating proper putter stroke direction.

8. A putting stroke analyser comprising: means for sensing putter face angle and for indicating, respectively, proper and actual putter face angle when the putting analyser is addressed by a putter; means for indicating, respectively, proper and actual putter-stroke direction when the putting analyser is stroked by a putter; means for yieldingly supporting all said means for sensing and indicating putter face angle and putter stroke direction, and a simulated golf ball positioned to be struck at the rear of the yielding support means, the means for sensing putter face angle being positioned for putter face contact at the rear of the simulated golf ball, and comprising a first sensor and a second sensor, said sensors protruding rearwardly of the simulated golf ball, and structure mounting said sensors movably in relation to the simulated golf ball, whereby on address by a putter the sensors are adapted to indicate said actual putter face angle, and whereby on stroke by a putter, the sensors are adapted to yield, allowing the simulated ball to receive direct putter contact.

9. A putting stroke analyser as recited in claim **8,** wherein the means for sensing putter stroke direction includes structure mounting the simulated golf ball movably relative the yielding support means, the direction of said relative movement between the simulated golf ball and the yielding support means being substantially transverse to the direction indicated by the means for indicating proper putter stroke direction, whereby on receiving direct putter contact in a direction misaligned with said proper direction, the simulated ball is adapted to move transversely of said proper direction in response thereto.

10. A putting stroke analyser as recited in claim **9,** wherein the direction of said relative movement between the sensors and the simulated golf ball is substantially parallel with said proper putter stroke direction, and wherein a connection is provided between the sensors and the simulated golf ball for constraining the sensors to move transversely with the simulated golf ball.

11. A putting stroke analyser as recited in claim **10,** wherein the structure mounting the simulated golf ball movably relative to the yielding support means includes

a pivot on the yielding support means and a member rigidly connecting the simulated golf ball with the pivot, wherein the sensors have extension forwardly, and wherein the structure mounting the sensors movably relative to the simulate golf ball includes a rotative shaft journalled in the member rigidly connecting the simulated golf ball with the pivot and a resilient lever arm affixed to the rotative shaft, with one end of the resilient lever arm affixed to the forward end of the first sensor and the other end of the resilient lever arm affixed to the forward end of the second sensor.

12. A putting stroke analyser as recited in claim **11**, wherein the means for indicating putter face angle includes a pointer, a scale, and a lever system affixed in rotation at one end to said rotative shaft and terminating at the other end in said pointer, the scale being integral with said member rigidly connecting the simulated golf ball with the pivot and being positioned adjacent said pointer.

13. A putting stroke analyser as recited in claim **12**, wherein the means for indicating stroke direction includes a pointer, a scale, and a lever system, the lever system having a fulcrum in said member rigidly connecting the simulated golf ball with the pivot and being positioned adjacent said pointer.

* * * * *